COMPETITIVE ASSESSMENT OF THE U.S. FOUNDRY INDUSTRY

Report to the President on
Investigation No. 332-176
Under Section 332 of the
Tariff Act of 1930

USITC PUBLICATION 1582

SEPTEMBER 1984

United States International Trade Commission / Washington, D.C. 20436

UNITED STATES INTERNATIONAL TRADE COMMISSION

COMMISSIONERS

Paula Stern, Chairwoman

Susan W. Liebeler, Vice Chairman

Alfred E. Eckes

Seeley G. Lodwick

David B. Rohr

Kenneth R. Mason, Secretary to the Commission

This report was prepared under the direction of
Larry L. Brookhart, Chief
Minerals and Metals Division

Minerals and Metals Division------Patrick Magrath, Project Leader
Therese Palmer
Pamela Woods
Laszlo Boszormenyi

Machinery and Equipment Division--Deborah Ladomirak
John Tsapogas
Chuck West
William Green

Office of Industries
Norris A. Lynch, Director

Address all communications to
Office of the Secretary
United States International Trade Commission
Washington, D.C. 20436

PREFACE

On January 19, 1984, the United States International Trade Commission instituted investigation No. 332-176, Competitive Assessment of the U.S. Foundry Industry. The investigation, conducted under section 332(g) of the Tariff Act of 1930, is in response to a request from the United States Trade Representative, at the direction of the President (app. A). This study examines the competitive position of the U.S. foundry industry in domestic and world markets and includes an overview of the U.S. foundry industry, together with a detailed analysis of selected key products 1/ that are representative of major segments of the industry in terms of manufacturing process, shipments, import competition, marketing, and financial condition.

Notice of this investigation was given by posting copies of the notice of investigation at the Office of the Secretary, U.S. International Trade Commission, Washington, D.C., and by publication of the notice in the Federal Register (49 F.R. 4049) (app. B). A public hearing in connection with this investigation was held in the Commission's hearing room on July 18, 1984, and testimony was received from U.S. producers, foreign producers, and importers of foundry products (app. C).

In the course of this investigation, the Commission collected data and information from questionnaires sent to producers, importers, and purchasers of foundry products. In addition, information was gathered from various public and private sources, from questionnaire responses prepared by overseas posts of the U.S. Department of State, and from interviews with industry members representing producers, importers, and purchasers of foundry products, as well as from public data gathered in other Commission studies.

The report is presented in two parts. The first, an overview of the entire foundry industry, includes a profile of the U.S. industry and major foreign industries, data on the U.S. market for all foundry products, and a summary competitive assessment of structural and product-related factors affecting the U.S. industry and its major foreign competitors. Data used in the U.S. industry profile and U.S. market sections are based on projections of data received from a 10 percent random sample of the entire U.S. foundry industry. The second part of the study contains detailed case studies of representative foundry industry products; data presented are primarily from responses to questionnaires from U.S. producers, importers, and purchasers of these foundry products.

1/ The products covered include cast iron engine blocks, cast iron compressor housings, iron construction castings, cast iron pipes and tubes, cast iron pipe and tube fittings, certain cast steel valves, certain cast iron construction machinery components, certain cast steel rail truck components, cast copper valves, and cast aluminum transmission cases.

CONTENTS

Page

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

EXECUTIVE SUMMARY

The U.S. foundry industry encompasses some 3,400 foundries, which manufacture a wide variety of products composed of iron, steel, and many nonferrous metals. These foundries produce products called castings, which are used in 90 percent of all manufactured goods and in all capital goods machinery used in manufacturing. Products range in size from several hundred tons to less than an ounce.

Because of the pervasive use of its products, especially as components and as finished durable goods, the health of the industry is closely aligned with the general state of the economy. Recent performance, however, has not been up to historic levels, and the industry is concerned that its competitive position in domestic and foreign markets is eroding. Given the size and heterogeneity of the industry, and the fact that many castings are not traded or consumed as such but as components of machines and other assemblies, it is difficult for the industry to pinpoint the causes of recent declines. The industry experienced a rather significant downturn in shipments (down 38 percent), sales (down 21 percent), and employment (down 40 percent) during 1979-83. Net operating profit for the industry fell from $1.6 billion in 1979 to an operating loss of $527 million in 1983.

On the basis of analysis of individual product chapters, data and information received at the Commission's hearing, and information received from overseas posts and secondary sources, major findings of this study are summarized below:

1. CURRENT PROFILE OF THE U.S. AND FOREIGN FOUNDRY INDUSTRIES

- o The United States is the world leader in the production of ferrous and nonferrous castings.

World production of ferrous and nonferrous castings exceeded 51 million short tons in 1982. The United States is the world's largest producer (excluding the U.S.S.R.), manufacturing 10.5 million short tons of castings or 20 percent of world production in 1982, but the U.S. share declined from its 27-percent share of world production in 1979. In contrast, Japan increased its share of world production from 11 percent to 14 percent during 1979-82 and West Germany and Italy each increased their share of world production by one percent during the period, to 8.4 percent and 4.5 percent respectively. Japan is the second largest producer of castings, with 7.2 million short tons produced in 1982. Other major world producers of foundry products include China, West Germany, Italy, and the United Kingdom. More than 91 percent of world production was ferrous (iron and steel castings) with the remainder nonferrous metals such as aluminum and copper.

- o World production and U.S. production of castings declined from 1979 to 1982, and preliminary data indicate small gains in casting production in 1983.

World production of ferrous and nonferrous castings fell from 69.8 million short tons in 1979 to 51.6 million short tons in 1982, or by 26 percent. The declines were most evident in the United States (down 44 percent), China (down 41 percent), and the United Kingdom (down 40 percent). The production of ferrous castings experienced a 27-percent decline from 64.6 million short tons in 1979 to 47.3 million short tons in 1982, and nonferrous castings showed an 18-percent drop from 5.2 million to 4.3 million short tons during the same period. The trend in U.S. production of castings from 1979 to 1982 compares unfavorably with that of world production since the worldwide economic downturn more severely affected the United States in that period. U.S. production of ferrous castings declined by 45 percent (from 17.3 million to 9.5 million short tons), and nonferrous castings declined by 36 percent (from 1.6 million to 1.1 million short tons) over the 4-year period. Partial production data for 1983 indicate that both U.S. and world production rose modestly from the low levels reported in 1982.

o <u>Employment trends for U.S. producers of iron, steel, and nonferrous castings indicate declines in numbers of persons employed, numbers of production and related workers, numbers of hours worked, and amounts of wages paid</u>.

The U.S. foundry industry experienced steady declines in employment and wages from 1979 to 1983. The number of persons employed in the U.S. foundry industry dropped by 40 percent from 740,358 in 1979 to 444,827 in 1983, while the number of production and related workers declined 42 percent from 418,998 to 245,226. A recent reversal of this trend is reflected in the number of production and related workers employed in foundries producing engine blocks and aluminum transmission cases, which rose from 27,960 in 1982 to 40,195 in 1983 because of increased automotive production. The number of hours worked by production and related workers fell by 44 percent in the period (from 833 million in 1979 to 469 million man-hours in 1983), mainly because of general economic conditions, but also because of closures in the labor-intensive jobber foundry sector of the industry and productivity advancement in the areas of cast-iron construction castings, pipes and tubes, and tube fittings. Wages declined in the 5-year period by 29 percent from $6.6 billion to $4.7 billion. The fact that wages declined less than hours worked indicates a net increase in the hourly wage paid to foundry workers of 26.7 percent from 1979 to 1983, or 5.3 percent per annum. This compares with an average increase of 9.4 percent per annum in hourly wages for workers in all manufacturing.

o <u>U.S. producers' domestic shipments experienced substantial declines from 1979 to 1983. Exports of U.S. foundry products rose during 1979-81 but declined in both 1982 and 1983</u>.

The quantity of U.S. producers' domestic shipments declined by 38 percent from 17.3 million tons in 1979 to 10.8 million tons in 1983. The value of U.S. producers' shipments declined 26 percent from $21.6 billion to $15.9 billion during 1979-83. Both ferrous and nonferrous foundries reported decreases in shipments, with steel foundries showing the steepest declines. Only foundries producing castings directly tied to consumer products, such as aluminum transmission cases and cast-iron engine blocks, showed noticeable increases in shipments in 1983. Most foundries were negatively affected by curtailed industrial demand during the economic downturn and slow recovery in the 5-year period, whereas producers of construction machinery components were also adversely affected by strikes at a major consumer's plants in 1982-83. Exports of U.S. foundry products were small relative to total shipments, accounting for less than 4 percent. They generally followed the exchange-rate fluctuations of the U.S. dollar as well as world economic conditions, rising substantially with a relatively weak dollar from 1979 into 1981, but declining as the dollar appreciated in both 1982 and 1983.

- The financial experience of U.S. foundry producers indicates declines in net sales and in profitability during 1979-82 and only slight improvement in 1983. Sales and profitability of nonferrous castings producers fared better than ferrous castings producers.

Total net sales of U.S. producers fell by 21 percent, from $28.2 billion in 1979 to $22.4 billion in 1983. Net operating profit also dropped, from $1.6 billion in 1979 to a $784 million loss in 1982 and a $527 million loss in 1983. In 1982, iron foundries experienced a 8.1 percent loss, while steel foundries registered a 5.5 percent net operating loss on sales. Iron foundries improved marginally in 1983, but still experienced a 3.3 percent loss on sales, while steel foundries' losses increased. The nonferrous segment of the foundry industry has fared better, with increasing profitability from 1979 to 1981 (peaking at $571 million in 1980), before declining in 1982 and 1983 (to $93 million). Nonferrous net operating profit was 1.2 percent of sales in 1983, a drop of 83 percent from the 7.0 percent of sales registered in 1981. It is believed that a significant portion of the nonferrous industry is characterized by high volume, production-type foundries manufacturing aluminum, magnesium, and other special metal castings, which are less price sensitive and more profitable than most ferrous castings.

2. CONDITIONS OF COMPETITION BETWEEN U.S. AND FOREIGN FOUNDRY PRODUCERS

- In most product lines surveyed, foreign industries have a competitive edge over the U.S. foundry industry in most structural factors of competition.

Although U.S. producers are judged to have an advantage in marketing structure, such as distribution channels and market response to orders and service needs, producers and importers of products from West Germany, Canada, and Italy appear to be developing capabilities to challenge the U.S. industry. Availability and cost of fuel and raw materials is generally rated as even, except that the U.S. industry is generally judged to be at a cost disadvantage when compared to most competitors in developing countries. Domestic producers of iron construction castings and pipe and tube fittings are designated as having a competitive advantage in production technology whereas the overall technological position of the United States is rated comparable to major foreign competitors. Domestic producers are almost uniformly at a disadvantage, even to most developed country competitors, in the cost of labor and capital. Foreign foundry competitors also have clear advantages in research and development assistance, tariff and nontariff barriers to imports, and U.S. Government regulations that increase U.S. foundry industry product costs. Foreign government regulations, especially domestic content requirements, adversely affected U.S. exports of products such as engine blocks.

- o U.S. producers and importers agree that five foreign competitors possess an overall advantage in the U.S. market in product-related factors of competition, but importers view the competitive situation as essentially equal with other foreign suppliers to the United States.

The overall competitive advantage of foreign foundry products in the U.S. market sourced from India, Italy, Taiwan, the United Kingdom, and West Germany is due principally to lower delivered prices and lower cost of tooling and patterns. U.S. producers and importers also agree that foreign producers of cast iron pipe and tube fittings, cast steel construction machinery components, and certain copper valves have an overall competitive advantage in the U.S. market. In service-related factors, such as product availability and delivery time, U.S. producers were uniformly acknowledged as having an edge; however, these advantages are not seen by the industry and importers as being sufficient to outweigh the basic price advantage of most castings from foreign sources, which ranged from 15 to 28 percent lower for the representative products on which price data were collected. Importers indicate that the foreign producers in almost all product categories are equal to U.S. producers in product performance attributes such as quality, superior design, and durability.

- o U.S. purchasers of ferrous and nonferrous foundry products supported producer and importer assessments that lower purchase price of foreign foundry products and the market response of U.S. producers are the principal factors in their purchasing decisions.

U.S. purchasers overwhelmingly cited lower purchase price and also ranked foreign product quality as important in their reasons for foreign purchases. The principal reasons for domestic purchases were the greater availability of products to meet their market needs, historical supplier relationship, and the reliability of their domestic suppliers in providing shorter delivery time.

- o U.S. producers rank foreign competitors as having an overall competitive advantage in foreign markets.

Foreign producers in overseas markets have the greatest competitive advantage in lower delivered prices because of favorable exchange rates (which raise the cost of U.S. exports in foreign markets) and lower costs of tooling and patterns. As a result, foreign producers are ranked as having the overall competitive advantage in foreign markets in all products covered in the study, despite U.S. producer advantages in competition with developing countries in product performance features, such as quality and superior design.

3. FACTORS AFFECTING THE FUTURE COMPETITIVE POSTURE OF DOMESTIC AND FOREIGN FOUNDRY OPERATIONS

o Capital expenditures of U.S. producers decreased irregularly from 1979 to 1983. Research and development expenditures of U.S. producers declined from 1979 to 1983.

Capital expenditures in both the iron and steel foundry segments fell from 1979 to 1983, with the iron segment showing the greatest decline, from $1.7 billion in 1979 to $457 million in 1983. Data indicate that U.S. foundries are focusing their expenditures on new machinery and equipment purchases, especially in the nonferrous segment of the industry. Research and development expenditures in the ferrous segment of the industry declined from $393 million in 1979 to $339 million in 1983. Nonferrous foundries' research and development expenditures peaked at $154 million in 1982, and over the period increased from $76 million in 1979 to $88 million in 1983, or by 16 percent. One-third of U.S. producer respondents to the Commission questionnaire and domestic industry witnesses at the Commission's hearing cited Federal and state government costs associated with the environment, health and safety, and other social factors as limiting the availability of capital needed for investment purposes.

o U.S. producers of foundry products allege that numerous foreign government regulations place them at a disadvantage in international trade. Most major trading partners of the United States were cited.

U.S. producers of foundry products identified high foreign tariffs and 30 separate quantitative restrictions, nontariff charges, and government regulations and standards that they feel hinder the international trade of foundry products and prevent the U.S. industry from successfully serving export markets. Respondents most frequently mentioned (a) exchange and other monetary controls, (b) local content requirements (the requirement that a certain proportion of a machine or assembly be manufactured domestically). (c) Government subsidies and other state aids to industry as the chief barriers to trade. Many respondents alleged that foreign government subsidies place U.S. foundry products at a disadvantage in the U.S. market. The most frequently mentioned countries alleged to be involved in such restrictive practices are Canada, Mexico, the United Kingdom, West Germany, Brazil, and India.

o Traditionally, the largest end market served by ferrous and nonferrous castings is the automotive market, but this market is becoming relatively less important.

U.S. foundries produce a wide variety of products that are used as such or as components in almost every industrial or consumer end market. In terms of tonnage, the automotive market has been the single greatest market for castings, accounting for 44 percent of iron casting shipments and 57 percent of nonferrous casting shipments during 1981-83. This market is eroding, however, especially for ferrous castings, because of the trend to lighter automobiles, more international sourcing of components by the auto industry, and the displacement of U.S.-made castings by the downstream importation of automobiles.

- The estimated value of U.S. consumption of all castings remained stable from 1979 to 1981, but declined in 1982 and 1983. Imports' share of consumption rose throughout the period.

The estimated value of U.S. consumption increased slightly from 1979 to 1981 but decreased by 26 percent in 1982 to $16.7 billion and remained at about that level in 1983. The estimated value of imports has remained under 5 percent of U.S. consumption but increased steadily from 1979 to 1983. However, certain foundry products have experienced much higher levels of import penetration, ranging from 10 percent to 37 percent during 1979-83, including iron construction castings, malleable pipe and tube fittings, and cast-steel and copper valves.

4. IMPLICATIONS OF THE U.S. COMPETITIVE POSITION ON THE FOUNDRY INDUSTRY ITSELF, RELATED INDUSTRIES, AND THE U.S. ECONOMY AS A WHOLE

- The disadvantage of the U.S. foundry industry in the area of price-related competitive factors is forcing changes in the competitive strategy of U.S. producers.

U.S. producers of foundry products are responding to their pricing disadvantage principally by lowering prices or suppressing price increases on their products and by implementing cost reduction programs in an effort to become more price competitive. In export markets, U.S. producers' primary response to foreign competition has also been to cut prices and implement cost-reduction programs. But other producers report that they are cutting back production or dropping plans to increase capacity or that they lack the capital necessary to counter foreign competition in U.S. and foreign markets. These cost-reduction and capacity and production cut-backs, tend to suggest the eventual development of a smaller but more competitive U.S. foundry industry. If these new competitive strategies are unsuccessful, the industry could be hampered in its ability to fund investment and the research and development needed to maintain the quality and technology levels required to maintain a strong U.S. competitive position. In addition, should the value of the U.S. dollar fall relative to major trading partner currencies, the prices of foreign foundry products in the U.S. market should rise and could enable U.S. producers to become more price competitive.

- The competitive disadvantage of the U.S. foundry industry in the area of price and related factors has caused major consuming industries to shift sourcing patterns.

Imported castings are only one facet of the import situation facing the U.S. foundry industry. Related industries that rely on castings as components in their production of manufactured goods are also facing competition from imports and are trying to cut costs. Especially in the automotive and construction machinery industries, firms have begun to source casting components on an international basis in order to more effectively compete on a price basis with imports of finished assemblies. In addition, if the initial signs of a trend toward displacement of U.S.-made castings by "downstream" imports should become more widespread, it could have a negative effect on production-type foundries, many of which are captive or dependent on a limited number of customers for the majority of their sales.

- Casting as a metal-forming process will remain attractive, and demand in the U.S. market for castings will continue to grow. Whether U.S.-made or foreign-made castings supply this market will depend on the U.S. foundry industry's efforts to close the gap between U.S. and foreign prices.

Casting as a manufacturing process has many advantages over other types of metal processing, such as the ability to manufacture a great variety and intricacy of shapes and close dimensional tolerances. Such advantages lend themselves to the increased quality and performance requirements of the U.S. economy. To maintain its position in domestic and foreign markets, the U.S. foundry industry must retain its traditional advantages in servicing and other marketing advantages against indications of foreign producer or importer gains in this area and solve its dilemma in competitive pricing.

OVERVIEW OF THE U.S. FOUNDRY INDUSTRY

Description and Uses

Casting is a manufacturing process by which liquid metal is poured or injected into a mold cavity, allowed to cool and solidify, and then released from the mold for finishing and use. It is a widely used method of manufacturing metal products because it affords the producer significantly larger options in terms of product size, constituent materials, surface texture, complexity of design, and near-net shape than other metal-forming methods. Although modern casting methods are becoming increasingly complex, they can be segmented into the following seven basic categories.

Sand casting

Sand casting is the simplest and most widely used casting process, accounting for more than 90 percent of all metal poured. It consists of forming a cavity in sand with a pattern, filling the cavity with metal, allowing it to cool and solidify, and then releasing the casting by breaking away ("shaking-out") the sand. The resultant casting may then be cleaned and machined to eliminate overpourings.

Patterns are placed in metal tubs called flasks, then imprinted in sand in longitudinal halves, with the top (cope) screwed or latched on top of the bottom (drag). After the imprint is formed and the pattern removed, the molten metal is poured into a hole in the cope (sprue) and is conducted to the mold cavity through runners. Sand castings may be either "green sand," the sand being moistened with a water-base binder, or "dry sand" in which the sand is treated with an organic binder and then baked hard to remove all moisture.

The sand-casting method can be employed in producing all types of ferrous and nonferrous castings and is the least expensive method of producing foundry products. This method also affords a great variety in size and complexity of castings poured. This process, however, is dimensionally less accurate and slower than other casting methods and the resultant castings usually require some machining. Typical products made by the sand-casting method include large, heavy castings such as iron construction castings, tank and military vehicle components, and rail truck components.

Shell-mold castings

Shell-mold casting is a variation of sand-mold casting in which the metal is poured into a metal flask in which an oven-baked shell of sand and resin has been placed to form a mold cavity. As in the sand-casting process, the rigid sand shell is broken away to release the casting. Shell-mold castings can produce castings of any constituent metal, except some steels, and the process produces castings of generally greater dimensional accuracy at a higher rate of production than sand casting. The complexity of patterns as well as size is limited, however; the shell-mold casting process is best suited to castings of less than 30 pounds. Typical end-products include value and meter boxes, small fittings and propellers, and gas burners for home stoves.

Plaster-mold casting

In plaster mold casting, a compound of plaster slurry mix is poured over a brass, wood, or other permanent pattern in a cope and drag flask. After the plaster has set, the pattern is removed, the resultant mold is baked, and the metal is poured. After solidification, the completed casting is released by breaking the mold. Although this process can result in castings of very good surface qualities, dimensional accuracy, and complex configurations, only nonferrous metals can be cast and mold-making time is longer than in other methods. Typical products are limited to smaller castings (up to 15 lbs.) with irregularly shaped exterior surfaces such as toys, plumbing parts, cores, and coreboxes.

Investment castings

Investment castings, also known as precision or "lost-wax process" castings, involve the use of wax or plastic injected into a metal die to form a pattern. A number of these patterns are surrounded by refractory material, then connected to a sprue to form a tree. When the molten metal is poured into them, the wax is melted (lost) and the metal fills the remaining cavity. After solidification, the refractory mold is broken away, and the casting is released.

Castings produced by the investment method can result in products of great complexity, detail, and surface finish, and almost any metal can be cast. This process also yields castings of greater accuracy than any other process. There are size and weight (under 10 lbs.) limitations, however, and initial die-making and other labor costs are higher than other methods. Typical products made by the investment process include costume jewelry, computer parts, scientific instruments, dentures, and orthopedic implants.

Permanent-mold castings

As the name indicates, the permanent mold process involves the pouring of metal into permanent, metal molds of a higher melting point than the metal cast. The process is used for nonferrous and some iron castings. Care must be taken to regulate the flow of hot metal, and some shapes are not possible because of the difficulty in removing the casting from the mold.

The advantage of permanent-mold casting is that the mold, instead of being expended, can be used for several thousand pours. Shapes and sizes are limited in this method, however, and initial tooling costs are high. The process is therefore economical only for high-volume, standardized production. Typical products of this process are household appliances, hardware, and machine tools.

Centrifugal casting

Centrifugal casting involves the pouring of molten metal into a rotating, cylindrical mold. Centrifugal force causes the metal to be thrown against the outer wall of the mold, where it is held until it solidifies. Most ferrous and nonferrous metals may be cast in this manner.

The chief advantage of centrifugal casting is that it is the best method of producing large, cylindrical parts. The products possess high strength, good mechanical properties and can be produced at comparatively high rates. The variety of shapes that can be produced by this process, however, are limited to symmetrical, circular-shaped products. There are also limitations on the type of metal cast, as the centrifugal process can cause separation of alloys. Typical products manufactured by this process include cast-iron pipes and tubes, propeller shafts, and mill rolls.

Die casting

Die casting as a process is widely described in technical publications as the shortest distance between the raw material and the finished part because the process is fast and results in a casting of near net shape. In this process, molten metal is forced into cavities in metal dies under high pressure. The metal is held under pressure until it solidifies, then the die is opened and the casting is ejected by means of an ejector pin.

Die castings can be produced in complex shapes with great dimensional accuracy, and at a rapid production rate. However, the constituent materials used are limited to nonferrous metals, the size limit of such castings is generally under 10 pounds, and die costs are high. Typical die-cast products include aluminum transmission cases and other automobile castings, aircraft parts, and household appliances.

Although foundry technology has advanced to the stage of developing the above-mentioned processes, most casting techniques still produce metal products at a slower rate than rolling, stamping, and other metal-working production processes. The slower rate of production, together with the relatively high labor costs associated with die, pattern, and mold-making, and the energy costs associated with melting metal contrast the casting process unfavorably with other means of forming metal products from a cost standpoint. But no other process allows greater variety of shapes, intricacy of design, or closer dimensional tolerance. Casting as a production process will probably increase in importance as industrial and consumer products increase in the complexity of shape, constituent materials, and function.

The World Market

The world demand for foundry products is largely dependent on the level of construction and industrial activity. The economic uncertainty that was prevalent in most countries during 1979-83 reduced industrial output and building activity, which had an adverse effect on world production of foundry products. World production of ferrous and nonferrous castings exceeded 51 million short tons in 1982. The United States is the world's largest producer (excluding the U.S.S.R.), manufacturing 10.5 million short tons of castings or 20 percent of world production in 1982, but the U.S. share declined from its 27-percent share of world production in 1979. In contrast, Japan increased its share of world production from 11 percent to 14 percent during 1979-82 and West Germany and Italy each increased their share of world production by one percent during the period, to 8.4 percent and 4.5 percent respectively.

It is estimated that world production of iron and steel foundries amounted to 47.3 million short tons in 1982, down from 64.6 million short tons produced in 1979, a decline of 27 percent (table 1). 1/ Preliminary data indicate that world production of ferrous castings rose only modestly in 1983 from these low levels. The United States is the world's largest producer of castings, accounting for an average 25 percent share of world production during 1979 to 1982; however, the U.S. share declined from 27 percent of world production in 1979 (17.3 million short tons) to 20 percent (9.5 million short tons) in 1982 as the worldwide economic downturn more severely affected the United States in that period. Other major ferrous foundry producers include Japan, People's Republic of China (China), West Germany, Italy, and the United Kingdom. All major producers experienced a general decline in their ferrous foundry production from 1979 to 1982, with the exception of Mexico and Australia, whose production rose moderately over the period.

Although no comprehensive data are available, it is believed that aluminum castings represent the largest category of nonferrous foundry production, with copper, magnesium, lead, and zinc being the other major metals cast. Estimates of world nonferrous production indicate that such production amounted to 4.3 million short tons in 1982, an 18 percent decline from 1979 (table 2). Preliminary data indicate that world production of these castings will also rise modestly in 1983. The United States is the largest producer of nonferrous castings, accounting for 26 percent of world production from 1979 to 1982, but, as in ferrous castings, the U.S. share has declined from 31 percent (nearly 1.6 million short tons) in 1979 to 23 percent (1.1 million short tons) in 1982. Other major nonferrous foundry producers include Japan, West Germany, Italy, China, and the United Kingdom. In contrast to the ferrous-casting experience, many world producers of nonferrous castings increased production from 1979 to 1982, including Japan, the United Kingdom, Mexico, and Australia. Production declines from 1979 to 1982 were most evident in the United States (down by 36 percent), China (down by 29 percent) and West Germany (down by 11 percent).

1/ "Census of World Casting Production," Modern Castings, December 1983.

Table 1.--Iron and steel foundries: World production, by specified countries, 1979-83

(In thousands of short tons)

Country	1979	1980	1981	1982	1983
United States	17,337.6	13,909.1	14,103.4	9,503.5	10,000.0
Japan	6,900.0	7,217.0	6,641.0	6,306.0	6,079.0
China	9,788.5	9,748.8	5,686.8	5,686.8	1/
West Germany	4,591.5	4,317.1	4,060.4	3,859.5	3,650.9
Italy	1,996.7	1,996.7	1,926.4	1,926.4	1/
United Kingdom	3,162.3	2,197.5	1,977.4	1,787.6	1/
Brazil	1,677.7	1,846.3	1,439.1	1,266.6	1,076.8
Mexico	836.2	958.2	958.2	958.2	1/
India	1/	1/	1/	948.1	1/
Canada	1,380.4	1,045.0	990.3	740.7	904.0
Korea	788.9	778.7	706.3	731.6	757.9
Australia	576.5	571.0	571.1	623.9	1/
Taiwan	552.0	519.8	490.9	438.9	542.5
All other	14,988.0	14,536.6	13,084.1	2/ 12,557.6	1/
Total 3/	64,576.3	59,641.8	52,635.4	47,335.4	1/

1/ Not available.

2/ Figure does not include Argentina, New Zealand, Luxembourg, Singapore, Spain, and Yugoslavia, which were reported in previous years.

3/ Figure excludes production in the U.S.S.R.

Source: Data compiled from U.S. Department of Commerce, U.S. Department of State telegrams, German Industrial Statistics, and the Modern Castings' "Census of World Casting Production."

Table 2.--Nonferrous foundries: Production, by specified countries, 1979-83

(In thousands of short tons)

Country	1979	1980	1981	1982	1983
United States	1,575.6	1,199.2	1,219.5	1,007.5	1,100.0
Japan	778.0	881.0	907.0	865.0	882.0
West Germany	528.8	525.2	497.0	473.2	1/
Italy	456.4	475.3	416.3	416.3	1/
China	330.7	330.7	233.7	233.7	1/
United Kingdom	127.6	158.2	98.9	180.9	1/
Brazil	130.7	136.0	108.6	110.1	107.4
Mexico	66.0	77.4	95.5	92.1	1/
Australia	40.8	41.9	41.9	49.6	1/
India	1/	1/	1/	48.5	1/
Canada	27.6	14.5	41.4	29.9	1/
Taiwan	32.2	33.6	28.8	24.8	35.0
Korea	1/	1/	1/	6.7	1/
All other	1,140.8	1,016.5	927.2	2/ 734.1	1/
Total 3/	5,235.2	4,889.5	4,615.8	4,272.4	1/

1/ Not available.
2/ Figure does not include Argentina, Luxembourg, New Zealand, Singapore, Spain, and Yugoslavia, which were reported in previous years.
3/ Figure excludes production in the U.S.S.R.

Source: Data compiled from U.S. Department of Commerce, U.S. Department of State telegrams, German Industrial Statistics, Modern Castings' "Census of World Casting Production."

The U.S. Industry and Major Foreign Competitors

United States

The U.S. foundry industry is composed of those firms that manufacture metal products by means of the casting process. It is estimated that there are some 3,400 foundries in the United States, which produce a large and diverse array of products (estimates range from 50,000 to 100,000 distinct end products), ranging in sizes from artificial heart valves to presses and mill frames weighing more than 200 tons. These products are sometimes consumed as such, but more often are manufactured to be components of assembled products. Castings are used in 90 percent of all manufactured goods and in all machinery used in manufacturing. 1/

There are two basic types of foundries: production foundries, which concentrate production within a limited product and size range and manufacture castings at relatively high volumes, and contract or jobbing foundries, which produce small numbers of a large variety of castings. Jobbing foundries are

1/ Cast Metals Federation, Foundry Industry Legislative Position Paper, 1984, p. 1.

predominate in terms of numbers, as 80 percent of U.S. foundries employ less than 100 workers. Both types of foundries are scattered throughout the United States, with a concentration of facilities in the Great Lakes area. Major producing states for ferrous foundry products are Michigan, Ohio, and Pennsylvania, which accounted for 38 percent of ferrous castings shipments in 1983. Major producing states for nonferrous castings were Ohio, California, and Illinois, which accounted for 34 percent of nonferrous shipments. 1/

In recent years the foundry industry has undergone unprecedented contraction, with some 520 foundries closing since 1980. Most of the foundry closings were in the jobbing segment of the industry; some 268 of the total closings, or 52 percent, manufactured ferrous castings. 2/ The foundry industry has also experienced a number of mergers in recent years. Completed acquisitions increased from 6 in 1981 to 10 in 1982, then dropped to 7 in 1983. 3/ Several more acquisitions were in the negotiation stage, according to 1983 data. The majority of these acquistions were in the nonferrous segment of the industry, and purchasers were mostly other foundries or metal-working firms.

U.S. employment, hours worked, and wages.--Employment of persons in the U.S. foundry industry declined steadily, dropping from 740,358 persons in 1979 to 444,827 in 1983, or 40 percent. The decline in the number of production and related workers was greater, from 418,998 workers in 1979 to 245,226 workers in 1983, a 42 percent decrease. Man-hours worked and wages paid in the foundry industry also generally declined throughout the 5-year period, as shown in table 3.

A comparison of wages paid to production workers in all foundries and wages paid in all operating U.S. manufacturing establishments indicates that production workers in the foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour). However, foundry workers' hourly wages have increased 27 percent over the 5-year period, while all workers wages rose by 47 percent over the same period.

	U.S. foundry workers 1/	Workers in all operating manufacturing establishments 2/
1979--------	$7.91	$6.00
1980--------	8.66	7.27
1981--------	9.21	7.99
1982--------	9.51	8.49
1983--------	10.02	8.83

1/ Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

1/ U.S. Department of Commerce, U.S. Industrial Outlook, 1984, pp. 18-7, 19-17.
2/ U.S. Department of Commerce unpublished data.
3/ Federal Trade Commission, Yearbook on Corporate Mergers, Joint Ventures, and Corporate Policy, 1982, 1983, 1984.

Table 3.--U.S. foundry industry: Number of employees and production and related workers in the foundry industry, by type of foundry, 1979-83

Item	1979	1980	1981	1982	1983
Iron:					
Number of employees and wages:					
All persons	408,929	345,854	338,586	264,018	244,028
Production and related workers	184,896	157,107	155,839	123,567	109,956
Man-hours worked 1,000 hours	376,942	316,857	322,119	241,466	216,260
Wages paid 1,000 dollars	3,077,353	2,753,198	3,027,811	2,238,873	2,225,874
Steel:					
Number of employees and wages:					
All persons	172,520	156,053	143,862	102,853	76,871
Production and related workers	134,647	119,225	109,535	76,839	56,889
Man-hours worked 1,000 hours	268,568	216,044	207,872	136,459	106,355
Wages paid 1,000 dollars	2,228,605	2,009,614	2,060,677	1,416,387	1,132,416
Nonferrous:					
Number of employees and wages:					
All persons	158,909	141,194	146,024	120,112	123,928
Production and related workers	99,455	87,414	91,770	73,606	78,381
Man-hours worked 1,000 hours	187,522	162,405	175,490	133,478	146,693
Wages paid 1,000 dollars	1,288,178	1,258,109	1,410,169	1,209,830	1,345,369
Total:					
Number of employees and wages:					
All persons	740,358	643,101	628,472	486,983	444,827
Production and related workers	418,998	363,746	357,144	274,012	245,226
Man-hours worked 1,000 hours	833,032	695,306	705,481	511,403	469,308
Wages paid 1,000 dollars	6,594,136	6,020,921	6,498,657	4,865,090	4,703,659

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' shipments and exports.--The quantity of U.S. producers' shipments of all foundry products fell substantially from 17.3 million tons in 1979 to 10.8 million tons in 1983, or by 38 percent. The value of U.S. producers' shipments of foundry products also generally declined over the period, from $21.6 billion in 1979 to $15.9 billion in 1983, or by 26 percent, as shown in table 4.

Table 4.--U.S. foundry industry: U.S. producers' domestic shipments, by type of foundry, 1979-83

Product type	1979	1980	1981	1982	1983
	Quantity (short tons)				
Iron foundry products	10,725,766	9,067,464	9,200,287	6,379,544	6,607,903
Steel foundry products	5,214,867	4,227,453	4,863,050	3,393,733	2,819,521
Nonferrous foundry products	1,401,754	1,464,321	1,504,095	1,146,255	1,399,702
Total	17,342,387	14,759,238	15,567,432	10,919,532	10,827,126
	Value (1,000 dollars)				
Iron foundry ducts	10,391,736	9,580,570	10,321,699	7,397,966	7,044,908
Steel foundry ducts	5,686,225	5,212,539	5,699,414	3,999,801	3,248,319
Nonferrous foundry products	5,472,901	5,766,942	6,175,802	4,951,174	5,580,211
Total	21,550,862	20,560,051	22,196,915	16,348,941	15,873,438

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

Exports of U.S. foundry products have traditionally been small relative to domestic shipments. Exports followed the general trend of exchange rate fluctuations, in which the U.S. dollar generally was weaker relative to most other currencies from 1979 to 1981 (which lowered the cost of U.S. exports in foreign markets), and appreciated relative to foreign currencies in 1982 and 1983 (table 5). The value of U.S. exports of these products increased from $508 million in 1979 to $805 million in 1981, or by 59 percent, but then fell 24 percent to $614 million in 1983. The worldwide economic downturn experienced in 1982 and 1983 also contributed to the drop in U.S. exports.

Table 5.--U.S. foundry industry: U.S. producers' export shipments, by type of foundry, 1979-83

(In thousands of dollars)

Product type	1979	1980	1981	1982	1983
Iron foundry products-----	156,561	201,979	179,886	174,555	170,680
Steel foundry products-----	214,320	418,122	466,002	356,303	247,334
Nonferrous foundry products-----	136,710	128,681	159,253	152,817	195,991
Total------	507,591	748,782	805,141	683,675	614,005

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

Financial experience of U.S. producers.--Total net sales of U.S. producers of foundry products increased by 2 percent from $28.2 billion in 1979 to $28.7 billion in 1981, before declining in 1983 by 22 percent (to $22.4 billion) from 1981 (table 6). Although net sales fluctuated within a comparatively narrow range from 1979-1981, net operating profit of U.S. foundries declined from $1.6 billion in 1979 to $1.3 million in 1981, or by 18 percent, and then to a $784 million operating loss in 1982. In 1982, iron foundries showed a net operating loss equalling 8 percent of net sales, while steel foundries reported a net operating loss of 6 percent of net sales. The operating loss for the foundry industry continued in 1983, improving only marginally, with iron foundries reporting a net loss of 3 percent of sales and steel foundries still reporting an operating loss of 6 percent of sales. Nonferrous foundries fared somewhat better than ferrous foundries, reporting increasing profits during 1979-81 (reaching $563 million in 1981) before declining in 1982 and 1983 (to $93 million). It is believed that a significant portion of the nonferrous industry is characterized by high-volume, production-type foundries manufacturing aluminum, magnesium, and other special metal castings, which are less price sensitive and more profitable than most iron and steel castings. 1/

1/ Few representatives of nonferrous foundries were present at the hearing held in connection with this investigation. One representative who did attend asserted that her nonferrous foundry, which she indicated was a jobber foundry, was increasingly unprofitable because of import competition. Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 155, 162.

Table 6.--U.S. foundry industry: U.S. producers' net sales and net operating profit (loss) on their operations in producing foundry products, by type of foundry, 1979-83

Item	1979	1980	1981	1982	1983
Iron foundries:					
Net sales 1,000 dollars--	11,717,468	10,023,881	11,747,797	9,077,640	9,496,610
Net profit or (loss) 1,000 dollars--	642,482	(133,000)	441,580	(731,995)	(313,912)
Ratio of net profit or (loss) to net sales percent--	5.5	(1.3)	3.8	(8.1)	(3.3)
Steel foundries:					
Net sales 1,000 dollars--	8,683,106	7,916,097	8,661,614	5,748,577	4,875,041
Net profit or (loss) 1,000 dollars--	560,943	94,958	339,044	(316,033)	(305,816)
Ratio of net profit or (loss) to net sales percent--	6.5	1.2	3.9	(5.5)	(6.3)
Nonferrous foundries:					
Net sales 1,000 dollars--	7,809,216	7,860,733	8,281,712	7,223,790	8,003,016
Net profit or (loss) 1,000 dollars--	426,913	571,806	562,776	264,344	92,942
Ratio of net profit or (loss) to net sales percent--	5.5	7.3	6.8	3.7	1.2
Total:					
Net sales 1,000 dollars--	28,209,790	25,800,711	28,691,123	22,050,007	22,374,667
Net profit or (loss) 1,000 dollars--	1,630,338	533,764	1,343,400	(783,684)	(526,786)
Ratio of net profit or (loss) to net sales percent--	5.8	2.1	4.7	(3.6)	(2.4)

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--Capital expenditures in the U.S. foundry industry declined irregularly from 1979 to 1983. In the iron castings segment of the industry, projections indicate that iron foundry investment of $1.7 billion in 1979 declined sharply by 1981, increased somewhat in 1982, but fell again in 1983 to $457 million, its lowest level in the 5-year period (table 7). The increase in expenditures in 1982 was led by new equipment purchases, which increased 50 percent from those in 1981. In the steel foundry segment of the industry, capital expenditures experienced a steady decline from 1979 to 1983, led by significant declines in expenditures for new machinery and equipment. In contrast to the ferrous segment of the industry, the nonferrous foundries increased capital expenditures in 1983, led by increases in land and land improvements.

Table 7.--U.S. foundry industry: U.S. producers' capital expenditures on domestic facilities, by type of foundry, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Iron foundries:					
Facilities in the United States:					
Land, land improvements	107,749	39,898	51,760	41,706	27,960
Buildings, leasehold improvements	49,251	100,156	56,866	44,568	44,036
Machinery, equipment, and fixtures:					
New	1,476,402	1,640,629	646,557	968,232	341,994
Used	50,762	221,519	46,512	47,489	43,501
Total	1,684,164	2,001,842	801,695	1,101,995	457,491
Steel foundries:					
Facilities in the United States:					
Land, land improvements	796	1,285	1,976	615	893
Buildings, leasehold improvements	39,647	23,234	18,069	27,577	18,848
Machinery, equipment, and fixtures:					
New	410,870	237,066	202,863	116,660	111,036
Used	13,210	11,852	14,269	16,611	17,803
Total	464,523	273,437	237,177	161,963	148,580
Nonferrous foundries:					
Facilities in the United States:					
Land, land improvements	1,400	2,583	2,441	976	23,948
Buildings, leasehold improvements	53,187	128,206	68,147	87,634	89,414
Machinery, equipment, and fixtures:					
New	294,744	255,083	239,684	241,264	226,602
Old	16,164	25,507	38,770	18,119	22,217
Total	365,495	411,379	349,042	347,993	362,181
Total:					
Facilities in the United States	2,514,182	2,686,658	1,387,914	1,611,451	968,252

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures.--Research and development (R&D) expenditures of U.S. foundry producers increased from $468 million in 1979 to $529 million in 1980, or by 13 percent, before falling substantially in 1981 to $419 million (table 8). Expenditures in 1983 were at $427 million, or 9 percent less than 1979.

Table 8.--U.S. foundry industry: U.S. producers' research and development expenses, in thousands of dollars, by type of foundry, 1979-83

Type of foundry	1979	1980	1981	1982	1983
Iron	325,457	334,087	277,897	267,057	293,947
Steel	67,403	73,289	58,283	47,191	45,068
Nonferrous	75,509	121,486	82,721	154,228	88,393
Total	468,369	528,862	418,901	468,476	427,408

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The U.S. foundry industry, with the wide variety of castings it produces, ranges from product lines, where technology is stable and production is labor intensive, to those product lines requiring costly and constant R&D expenditures. Research and development expenditures in this industry are concentrated in the development of new alloys, especially in the nonferrous and high-alloy-steel areas, which can be made amenable to the casting process, and in high-volume casting techniques, such as vacuum mold-making and metal-injection casting processes.

Major foreign competitors

The foundry industries in developed countries that were industrialized early are encountering two factors that affect their markets. First, their domestic markets are changing as a result of technology; for example, new generations of machines containing microelectronics do not use as many castings or the same tonnage of castings as those based on mechanical processes. Second, competition is growing more intense from developing countries attempting to industrialize. Those developing countries are building modern casting plants operated by low-cost labor and are exporting at least part of their production to obtain hard currency to promote further industrialization. 1/ The development of large capacity in some of the newly industrialized countries may cause radical changes in the global production of foundry products. 2/

Major foreign competitors of the U.S. foundry industry are Japan, Republic of Korea (Korea), India, Taiwan, and Mexico. 3/ Estimates on the number of foundries, employment, production and capacity utilization of major foreign competitors in the iron, steel, and nonferrous foundry industries are given in tables 9 and 10.

1/ Foundry Management and Technology, March 1984, p. 35.
2/ Ibid., p. 68.
3/ Foundry Management and Technology, April 1983, p. 32.

Table 9.--Iron and steel foundries: Employment, production/shipments, capacity utilization and number of foundries of major foreign competitors of the U.S. foundry industry, 1982

Country	Employment	Production/ shipments	Capacity utilization	Number of foundries
	Number	1,000 short tons	Percent	
Japan	1/ 78,060	6,306.6	2/	1/ 2,825
China	2/	5,686.8	2/	2/
West Germany	3/ 4/ 77,000	3,859.5	2/	3/ 4/ 500
Italy	2/	1,926.4	2/	2/
United Kingdom	3/ 71,000	1,787.6	2/	520
Brazil	3/ 63,318	1,266.6	46	3/ 925
Mexico	2/	958.2	2/	2/
India	3/ 200,000	948.1	53	3/ 3,000
Canada	10,325	740.7	42	149
Korea	26,547	731.6	61	3/ 520
Australia	3/ 5,286	623.9	3/ 56	196
Taiwan	29,048	438.9	50-60	5,044

1/ 1981 data.
2/ Not available.
3/ Includes nonferrous foundries.
4/ 1983 data.

Source: Data compiled from U.S. Department of Commerce, U.S. Department of State telegrams, German Industrial Statistics, Modern Castings', "Census of World Casting Production."

Table 10.--Nonferrous foundries: Employment, production/shipments, capacity utilization, and number of foundries of major foreign competitors of the U.S. foundry industry, 1982

Country	Employment	Production/ shipments	Capacity utilization	Number of foundries
	Number	1,000 short tons	Percent	
Japan	1/ 45,740	865.0	2/	1/ 3,303
West Germany	3/ 4/ 77,000	473.2	2/	3/ 4/ 500
Italy	2/	416.3	2/	2/
China	2/	233.7	2/	2/
United Kingdom	3/ 71,000	180.9	2/	100
Brazil	3/ 63,318	110.1	55	3/ 925
Mexico	2/	92.1	2/	2/
Australia	3/ 5,286	49.6	3/ 56	3/ 196
India	3/ 200,000	48.5	59	3/ 3,000
Canada	2/	29.9	2/	2/
Taiwan	14,140	24.8	50-60	956
Korea	1,890	6.7	48	3/ 520

1/ 1981 data.
2/ Not available.
3/ Includes iron and steel foundries.
4/ 1983 data.

Source: Data compiled from U.S. Department of Commerce, U.S. Department of State telegrams, German Industrial Statistics, Modern Castings', "Census of World Casting Production."

Brazil.--There are 925 ferrous and nonferrous foundries in Brazil, 40 percent of which are captive foundries. The 10 largest producers of iron castings account for 45 percent of production; the 10 largest steel foundries, 70 percent; and the 10 largest nonferrous foundries, 47 percent. About 60 percent of the Brazilian foundry industry is located in the south-central state of Sao Paulo; 13 percent in central Brazil--the states of Minas Gerais and Espirito Santo; 13 percent in the state of Rio de Janeiro; 13 percent in the South; and 1 percent in the underdeveloped north-northeast.

The foundry industry in Brazil is well developed. Plant sizes range from very small companies casting a limited range of products, to the more sophisticated operations like Fundicao Tupy, which is the largest independent foundry in Latin America, and Villares Industrias De Base S/A (VIBASA), which is one of the most modern foundries in the world. However, because of the Brazilian recession, VIBASA has closed down its steel foundry and several small foundries have gone bankrupt. 1/

Brazilian foundries employed more than 59,000 persons in 1983, 31 percent fewer than 85,300 persons in 1979. While no data has been provided on wages

1/ U.S. Department of State telegram, U.S. Consul Rio de Janeiro, June 1984.

earned by employees, it is known that in addition to the employee's salary, the company pays indirect labor costs equal to about 92 percent of the salary. These indirect costs include: National Social Security Institute, Fund for Guarantee of Time of Service, Program of Social Integration, Thirteenth Month Salary, Compulsory Work Accident Insurance, weekly rest days, vaccinations, and holidays. In addition to these foregoing benefits which are made available to virtually all employees, the foundry industry pays an additional benefit called the Insalubrity Benefit, which is payment for working in unhealthy conditions. 1/ Certain Brazilian firms place an emphasis on employee relations in an effort to increase quality, productivity, dedication, and motivation. In the larger companies such as Fundicao Tupy, employees participate with management in "quality circles." Management feels that the low levels of labor turnover and absenteeism are a direct result of these efforts. 2/

Brazilian foundry production decreased 40 percent in 1983 to 1.2 million short tons, from 2.0 million short tons in 1980 (table 11). During 1983, the industry operated at about 46 percent of capacity. Production during the first four months of 1984 amounted to 422 thousand short tons, an increase of 17.3 percent compared to the same period in 1983 and the first such increase since 1980. The increase in production is mainly the result of increased exports to the automobile industry, which consumes 36 percent of foundry output. 3/

Table 11.--Brazilian foundries: Production, by type of foundry, 1979-83

(In thousands of short tons)

Type of foundry	1979	1980	1981	1982	1983
Iron	1,514.1	1,666.1	1,282.9	1,137.4	975.8
Steel	163.6	180.2	156.2	129.2	101.0
Nonferrous	130.7	136.0	108.6	110.1	107.4
Total	1,808.4	1,982.3	1,547.7	1,376.7	1,184.2

Source: Compiled from data received from U.S. Department of State telegram, U.S. Consul Rio de Janeiro, June 1984.

Market sectors for Brazilian foundry production include transportation and tractors (35 percent), iron and steel (14 percent), machinery (10 percent), mining and cement (7 percent), sanitation and electricity (7 percent), agricultural machinery (3 percent), and domestic utilities (3 percent). The foundries in Brazil are feeling the full impact of the

1/ Ibid.

2/ "Brazilian Foundries: An Overview - Part I," Foundry Management and Technology, October 1983, pp. 24-28.

3/ U.S. Department of State telegram, U.S. Consul Rio de Janeiro, June 1984.

Brazilian economic recession as domestic demand is down in most sectors served by the industry, with the exception of the automobile industry. 1/

The foundry industry has not been historically an export-oriented industry, but Brazilian producers view the export market as offering the best chance for survival. 2/ Exports of Brazilian castings amounted to 69,831 short tons ($63.3 million) in 1982 compared to 60,021 short tons ($54.7 million) in 1979 (table 12). Exports during the first four months of 1984 reached $22.4 million, 35 percent greater than exports during the same period of 1983, which amounted to $16.6 million.

Table 12.--Castings: Brazilian exports, 1979-82

Year	Short tons	Value in U.S. dollars	Share of total production
		Million	Percent
1979	60,021	54.7	3.3
1980	83,610	75.1	4.2
1981	60,903	60.2	3.9
1982	1/ 69,831	63.3	4.8

1/ Preliminary.

Source: "Brazilian Foundries: An Overview - Part I," Foundry Management and Technology, October 1983.

Korea.--There are approximately 520 establishments that produce foundry products in Korea. The 15 largest foundries account for more than 60 percent of production capacity. Foundry sizes range from 5-man shops to operations that employ 800 persons. The Korean iron and steel foundry industry employed 26,650 production workers in 1983, a 6-percent decrease from 28,415 persons employed during 1979. Nonferrous foundries employed 1,890 production workers in 1982. In 1983, the monthly average wage per production worker, including fringe benefits, was 438 dollars.

Korean producers' average capital investment, by type of foundry, are estimated in the following tabulation:

Type of foundry	Millions of U.S. dollars
Grey cast iron	4.2
Malleable cast iron	12.3
Ductile cast iron	1.5
Cast iron pipes	13.9
Precision castings	7.5
Steel castings	4.2
Nonferrous castings	7
Other	8

1/ Ibid.
2/ Ibid.

Korean foundry industry expenditures for research and development amounted to .05 percent of each year's total sales during 1979 through 1983, considerably less than an average of 1.2 percent invested by U.S. foundries. 1/

Korean production of iron and steel foundries decreased 10 percent, from 788,851 short tons in 1979 to 706,289 short tons in 1981, before increasing to 757,917 short tons in 1983, as shown in the following tabulation:

Item	1979	1980	1981	1982	1983
Production 1,000 short tons	788.9	778.7	706.3	731.6	757.9
Capacity---do	1,199.2	1,199.2	1,199.2	1,199.2	1,199.2
Capacity utilization percent	65.8	64.9	58.9	61.0	63.2

Korean production of nonferrous foundries amounted to 6,672 short tons in 1982 or about 48 percent of nonferrous capacity. Nonferrous foundry products are primarily aluminum and zinc.

There are no data available on imports and exports of Korean foundry products. In November 1983, the Korea Trade Center, a non-profit government agency for trade promotion, opened the Korea Foundry Exhibition Center in Cobb County, GA. It is the first permanent foundry and iron castings products exhibition center in the United States. 2/

Taiwan.--The number of iron and steel foundries operating in Taiwan increased 13 percent, from 4,471 foundries operating in 1979 to 5,044 foundries operating in 1982. It is estimated that 100 new foundries entered the industry during 1983, while several firms left the business. 3/ In 1982, there were 956 nonferrous foundries operating, down from 958 in 1979. The Taiwanese iron and steel foundries employed 29,048 persons, including 23,717 production workers in 1982, while nonferrous foundries employed 14,140 persons (12,031 production workers) in 1982 (table 13). While Taiwanese labor costs are still relatively low by European and U.S. standards mainly because of the low-skilled, labor-intensive nature of many casting processes used and the current prohibition under Taiwan's law to organize independent unions), wages are rising. 4/

1/ U.S. Department of State telegram, U.S. Embassy Seoul, June 1984.
2/ "Last Word" Foundry Management and Technology, January 1984, p. 80.
3/ U.S. Department of State telegram, U.S. Embassy Taipei, June 1984.
4/ Ibid.

Table 13.--Taiwan foundry industry: Number of employees and production workers and wages, by type of foundry, 1979-82

Item	1979	1980	1981	1982
Iron and steel foundries:				
Number of employees	19,800	23,848	29,769	29,048
Number of production workers	15,470	18,779	24,260	23,717
Average wages of all employees 1/ per month	$319	$359	$374	$376
Average wages of production workers 1/ per month	$292	$333	$348	$359
Nonferrous foundries:				
Number of employees	2/	9,231	11,659	14,140
Number of production workers	2/	7,757	9,880	12,031
Average wages of all employees 1/ per month	$280	$328	$373	$337
Average wages of production workers 1/ per month	$241	$312	$343	$318

1/ Wages are based on figures of the iron and steel basic metal industry and the nonferrous basic metal industry.
2/ Not available.

Source: U.S. Department of State telegram, U.S. Embassy Taipei, June 1984.

Capital expenditures for the iron and steel foundry industry are not available separately but are included in the figures for the iron and steel basic industries, as follows:

Year	U.S. dollars
1979	2,111,612
1980	2,816,682
1981	30,614,190
1982	31,095,134

The large increases in 1981 and 1982 are the result of investments by China Steel for the company's second-phase expansion. 1/ Capital expenditures for the nonferrous foundry industry increased five fold to $120,000 in 1981, then decreased to $117,000 in 1982, as shown in the following tabulation:

Year	U.S. dollars
1979	20,136
1980	77,854
1981	120,228
1982	117,841

1/ Ibid.

Taiwan's foundry production decreased 16 percent, from 553,313 short tons in 1980 to 463,608 short tons in 1982, before increasing 25 percent to 577,487 short tons in 1983. Steel foundry production decreased to 27,150 short tons in 1983, from 40,124 short tons in 1980. Production in all three sectors increased in 1983, compared to 1982, as capacity utilization increased (table 14). Estimated capacity utilization for Taiwan's ferrous and nonferrous casting industry was 50 to 60 percent during 1980 through 1982 and rose to 60 to 65 percent in 1983. 1/

Table 14.--Taiwan foundry industry: Production, by type of foundry, 1980-83

(In short tons)

Item	1980	1981	1982	1983
Iron foundry:				
Grey iron	396,609	390,767	364,786	450,732
Ductile iron	37,390	30,093	23,292	27,580
Malleable iron	45,635	36,508	25,386	37,037
Steel foundry	40,124	33,510	25,386	27,150
Nonferrous foundry	33,554	28,770	24,758	34,987
Total	553,313	519,648	463,608	577,487

Source: Machinery Manufacturers Association of Taiwan.

India.--There are approximately 5,000 foundries operating in India, according to the Indian Foundry Association. More than 75 percent of the total installed capacity is accounted for by 300 foundries in the organized sector. Only about 100 foundries are considered large-scale, while 90 percent of the foundries in India are in the unorganized small-scale sector. 2/

Several hundred small foundries have ceased production during the past 5 years because of shortages of raw materials, electrical power, and capital and because of increased domestic and international competition. Only a few new modern foundries have begun production since 1979. More than 50 percent of the total production capacity is located in the Howrah-Calcutta Industrial Complex in West Bengal. According to the Association of Indian Engineering Industry (AIEI), the foundry industry in India employs more than 200,000 persons. The average annual wage rate per worker is more than 600 dollars.

While research and development expenditures by Indian foundries have been negligible, some of the export-oriented foundries have begun to develop R&D facilities and added capital expenditures for modernization of production facilities to meet specific requirements. 3/

1/ Estimated by Mr. Su Tsun Tien, authority on the casting industry in Taiwan, U.S. Department of State telegram, U.S. Embassy Taipei, June 1984.

2/ U.S. Department of State telegram, U.S. Embassy Calcutta, June 1984.

3/ Ibid.

Production of 350 foundries in the organized sector, by type of product, was as follows: 1/

Product	1982 production (1,000 short tons)	Installed capacity (1,000 short tons)
Cast iron-----------------------	363.8	567.7
Malleable iron------------------	33.1	46.3
Spherodal graphite iron----------	11.0	15.4
Spun pipes----------------------	220.5	661.4
Steel castings------------------	319.7	496.0
Nonferrous castings-------------	48.5	81.6

According to the U.S. Embassy in Calcutta, a mixed outlook for the Indian foundry industry is expected in the near future. The abundance of skilled labor at low wage rates will continue to help Indian foundries increase their exports, but export gains will be restricted to large- and medium-sized foundries that are expected to make additional investments in research and development and modernization of production facilities. In contrast, a large majority of the more than 2,000 small foundries in the unorganized sector are likely to face increasing hardships since they are unable to make similar investments. It is likely that half of these foundries will eventually cease production. On the whole, the aggregate gains of the large, modern foundries are expected to be more than the aggregate losses of the numerous old, uneconomic foundries. A moderate growth for the Indian foundry industry is anticipated for the 1980's, although the Indian foundry industry is unlikely to be as competitive as the newer, more modern foundries in Taiwan and Korea.

Japan.--There were 2,825 iron and steel foundries operating in Japan in 1981 compared to 2,845 in 1979. Nonferrous foundries totaled 3,303 in 1981, down from 3,401 in operation in 1979. 2/ The Japanese foundry industry consists of a large number of companies engaged in the production of small volumes of iron and/or nonferrous castings, and about 100 steel foundries. Some large manufacturers of industrial machinery or equipment and most automobile manufacturers also have captive foundries, which are comparatively larger in capacity than the noncaptive foundries. According to Japan's Ministry of Trade and Industry (MITI), manufacturers of castings frequently change lines of production to meet demand.

Japanese iron and steel foundries employed 78,060 persons in 1981 compared to 80,459 in 1979, while nonferrous foundries employed 45,740 persons in 1981, up from 45,268 persons in 1979. Total cash earnings (includes wages, bonuses, allowances, severance pay, and other paid in cash) for iron and steel foundry workers amounted to $1.2 billion in 1981, up from $1.0 billion in 1979. Nonferrous foundry workers received $549 million in 1981, up from $498 million in 1979.

Japanese iron foundry production decreased 10 percent, to 5.5 million short tons in 1983 from 6.1 million short tons in 1979 (table 15). The

1/ Ibid.
2/ U.S. Department of State, U.S. Embassy Tokyo, June 1984.

decline in demand was attributed to inactivity in the construction industry and the lower demand for iron castings in automobiles. Production of steel foundry products decreased 29 percent, to 572,000 short tons in 1983 from 808,000 short tons in 1980. The decline was attributed to low demand for civil engineering construction and mining and transportation machinery. Nonferrous foundry production increased to 907,000 short tons in 1981 from 778,000 short tons in 1979 before decreasing to 882,000 short tons in 1983.

According to annual reviews of the foundry industry by the Japan General Foundry Center (an industrial association comprising 280 companies engaged in the production of foundry products), there have been many developments and improvements to production technologies in the Japanese foundry industry. Major subjects of the developments and improvements that might affect competitiveness include: (1) a metal casting process for mass production of accurate dimension iron castings; (2) "computer-aided programming" for process control for steel castings; (3) "low-pressure casting process" for mass production of aluminum alloy cylinder heads and wheels for automobile use; (4) "gas die-casting process" and "noncavity die-casting process" for production of castings, (5) "computer controlled injection machines" for investment casting; (6) "robotic operation" for coating in the lost-wax process; and (7) "argon oxygen decarburization treatment" for quality improvements to investment castings.

Table 15.--Japanese foundry industry: Production, by type of foundry, 1979-83

Type of foundry	1979	1980	1981	1982	1983
	Quantity (1,000 short tons)				
Iron	6,148	6,409	5,889	5,630	5,507
Steel	752	808	752	676	572
Nonferrous	778	881	907	865	882
	Value (millions of dollars)				
Iron	3,299	3,652	3,646	3,039	3,103
Steel	1/	1/	1/	1/	1/
Nonferrous	2,397	2,900	3,029	2,493	2,622

1/ Not available.

Source: U.S. Embassy Tokyo.

West Germany.--There were about 500 foundries employing 77,000 persons in 1983, 1/ compared to 600 foundries in operation in 1979. 2/ Of the 500 foundries in operation in 1983, 45 percent employed fewer than 49 persons; 35

1/ U.S. Department of State, U.S. Embassy Bonn, July 1984.
2/ Foundry Management and Technology, April 1982.

percent employed between 59 and 199 persons; 14 percent employed between 200 and 499 persons; and 6 percent employed more than 500 persons.

West Germany ranks fourth in world (excluding the U.S.S.R.) iron and steel production and third in world nonferrous production. Foundry production decreased 15 percent, from 5.1 million short tons in 1979 to 4.3 million short tons in 1982, as construction and industrial activity declined. 1/ Iron foundry production fell an additional 4 percent, to 3.4 million short tons in 1983 from 3.6 million short tons in 1982, while steel foundry production decreased 18 percent, to 228,200 short tons in 1983 from 277,600 short tons produced in 1982 (table 16).

Table 16.--West German foundry industry: Production, by type of foundry, 1979-82

(In thousands of short tons)

Item	1979	1980	1981	1982	1983
Iron	4,259.8	3,993.3	3,751.0	3,581.9	3,422.7
Steel	331.7	323.8	309.4	277.6	228.2
Nonferrous	528.8	525.2	497.0	473.2	1/
Total	5,120.3	4,842.3	4,557.4	4,332.7	1/

1/ Not available.

Source: Data compiled from the "Census of World Casting Production," published in Modern Castings.

The foundry industry in West Germany is facing similar problems as those encountered in the U.S. industry. Those factors include: increasing labor, energy, and environmental compliance costs and increasing demand for high quality products, product substitution, and declining markets. 2/

Canada.--There are approximately 120 iron and 29 steel foundries in Canada. 3/ Data on the Canadian nonferrous foundry industry are not available. At least 36 ferrous foundries discontinued operations during 1979-83, of which 4 were new entrants in the market. According to the Canadian Foundry Association (CFA), some of the reasons given for discontinuing operations were failure to update facilities and technology, failure to adapt to the competitive environment, declines in markets and market share, lack of capital, excessive losses resulting in bankruptcy, and poor management decisions.

Employment in Canadian ferrous foundries decreased steadily to 9,892 persons in 1983 from 17,295 persons in 1979 (table 17). Average hourly wages

1/ Agence Economique et Financiere, March 16, 1983, p. 6.
2/ Foundry Management and Technology, April 1982.
3/ Prehearing submission of the Canadian Foundry Association, July 1984.

for Canadian iron foundry workers increased 38 percent, to $9.53 in 1983 from $6.92 in 1979.

Table 17.--Canadian foundry industry: Number of employees and average hourly wages, by type of foundry, 1979-83 1/

Item	1979	1980	1981	1982	1983
Iron foundries:					
Number of employees	11,742	8,756	7,703	6,753	6,981
Average hourly wage rate 2/ dollars	6.92	7.27	7.98	8.98	9.53
Steel foundries:					
Number of employees	5,553	5,705	4,828	3,572	2,911
Average hourly wage rate dollars	3/	3/	3/	3/	8.75

1/ CFA estimates account for about 75 percent of total employment of production employees, including staff.
2/ Rates include earnings, i.e. overtime, incentives, and bonuses.
3/ Not available.

Source: Canadian Foundry Association, Statistics Canada.

While reliable data on total foundry expenditures are not available, six foundries that export significant percentages of their product to the United States spent about $32 million during 1979-83 on capital investment and research and development. The expenditures on capital investments were primarily to improve output, quality, and productivity and to comply with environmental and occupational health and safety regulations. The Canadian foundry industry is continuing to improve productivity by modernizing plants and equipment, using modern programmable controllers to handle processes, adapting the techniques of statistical process control to maintain high quality, and using employee involvement, such as quality circles, to eliminate friction between labor and management.

Total annual production capacity is estimated to be 1.5 million short tons for iron foundries and 250,000 short tons for steel foundries. Canadian foundry shipments decreased 45 percent, from 1.4 million short tons in 1979 to 771,000 short tons in 1982 (table 18). Shipments to the automotive industry accounted for 41 percent; the railway industry, 12 percent; and municipalities, 11 percent.

Table 18.--Canadian foundry industry: Shipments, by type of foundry, 1979-83

(In thousands of short tons)

Item	1979	1980	1981	1982	1983
Iron	1,160	829	821	612	791
Steel	221	216	169	129	113
Nonferrous	28	15	41	30	1/
Total	1,409	1,060	1,031	771	1/

1/ Not available.

Source: Canadian Foundry Association and Modern Castings' "Census of World Production."

The Canadian foundry industry has been faced with the same problems the United States foundry industry has experienced including the rising costs of energy, labor, and environmental and health compliance regulations 1/ and declining markets. The Canadian foundry industry and the U.S. foundry industry benefit from the auto trade pact that gives both countries the opportunity to participate in the total North American markets. 2/

The Canadian industry enjoys some advantages over U.S. counterparts. Canadian labor costs, which represent 35 percent of production costs, are 5 to 6 percent cheaper in Ontario and Quebec than comparative competitive producers along the border. Energy costs, which represent 5 to 15 percent of production costs, are 25 to 50 percent cheaper in Canada. In general, Canada has higher tariffs on foundry products than the United States. The major advantage that the Canadian foundry industry enjoys is the value of their currency relative to the high value of the U.S. dollar. 3/

United Kingdom.--There are approximately 450 iron, 70 steel, and 100 nonferrous foundries in the United Kingdom. 4/ Since 1975, the number of operating iron foundries decreased 40 percent. 5/ Industry sources indicate that about 50 firms per year are leaving the foundry industry, which is in the midst of restructuring. As a result of the substantial number of closings in the industry, employment decreased 36 percent, to 71,000 persons in 1982 from 111,300 in 1979.

The foundry industry in the United Kingdom basically serves the domestic market. It is highly diverse, with a substantial number of small firms as well as foundry operations within larger metal-working establishments. A significant part of the industry is part of an integrated firm. 6/

1/ Hearing held before the U.S. International Trade Commission, July 18, 1984.
2/ Ibid.
3/ Ibid.
4/ U.S. Department of State telegram, U.S. Embassy London, July 1984.
5/ Foundry Management and Technology, May 1984, p. 39.
6/ U.S. Embassy London.

The United Kingdom's foundry production decreased 40 percent, from 3.3 million short tons in 1979 to 2.0 million short tons in 1982 (table 19). Production declined steadily during the period in the iron and steel sectors while the nonferrous sector encountered increases in 1980 and 1982. However, preliminary data indicate that production by the nonferrous foundries decreased in 1983.

Table 19.--United Kingdom foundry industry: Production, by type of foundry, 1979-82

(In thousands of short tons)

Item	1979	1980	1981	1982
Iron	2,951.0	2,005.6	1,812.1	1,624.7
Steel	211.3	191.9	165.3	162.9
Nonferrous	127.6	158.2	98.9	180.9
Total	3,289.9	2,355.7	2,076.3	1,968.5

Source: U.S. Department of State, U.S. Embassy London, July 1984.

Confronted with a substantial decline in demand for iron castings, United Kingdom iron founders are working to achieve and maintain high levels of productivity. To that end, they have introduced appropriate modern technology to ensure their survival. 1/ However, expenditures for plants and equipment amounted to $71.2 million in 1982, a 62 percent decrease from the amount spent in 1979.

The steel casting industry has agreed to a voluntary rationalization program, which will cut capacity by 25 percent. The scheme was suggested by the Steel Castings Research and Trade Association (Scrata), as the industry was faced with severe overcapacity, cut-throat pricing, and inadequate return. 2/ Twelve companies participating in the 10-year program will close 10 of their 22 foundries. Operators of the remaining 12 foundries and the government will compensate those that close. 3/

1/ "United Kingdom Iron Foundries Emphasize Technology," Foundry Management and Technology, April 1982.
2/ Financial Times (London Edition), Jan. 24, 1983, p. 4.
3/ Financial Times (London Edition) February 12, 1982, p. 28.

Structural Factors of Competition Between U.S. and Foreign Industries

On the basis of the individual product analyses contained in this report, the United States enjoys a competitive advantage with its major foreign competitors 1/ in most facets of marketing in the majority of foundry product categories covered in the study (table 20). The advantage of foreign producers in almost all foundry products is attributed to lower costs for capital and labor, 2/ the areas of government involvement related to foreign subsidies and tariff levels, and U.S. regulations that increase costs. Generally, the United States and foreign producers maintain similar strengths in production technology although domestic industries in iron construction castings and pipe and tube fittings are rated as having a technological advantage.

A comparison of these structural factors for all individual product categories on a bilateral basis with major competitors of the United States shows that West Germany, Canada, and Italy appear to be developing capabilities to challenge the strong competitive position of the U.S. industry in marketing techniques (table 21). In addition to the relatively consistent strengths of offshore suppliers in the cost of capital and labor, almost all foreign competitors are shown to have a strong competitive advantage in research and development assistance and in nontariff barriers to imports, and most competing countries are rated as having a better competitive position because of U.S. Government regulations that increase costs.

Although exceptions in these structural factor assessments may be cited by U.S. producers for individual product areas or foreign competitors, these conclusions are based on the aggregate responses to the Commission's questionnaire. Specific information as to individual producer competitive positions are discussed in each of the product sections in the report.

Structural factors concerning U.S. and foreign government involvement, however, uniformly affect the competitive situation of U.S. and foreign foundry products in the U.S. market and are discussed here.

U.S. Government regulations that increase costs

Because of the nature of the casting process, the U.S. foundry industry is subject to every major environmental and workplace safety regulatory law. The primary Federal agency responsible for environmental regulations and enforcement is the Environmental Protection Agency (EPA), which monitors the foundry industry in air and water pollution control, and hazardous substance and solid waste disposal requirements. The U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) promulgates regulations that affect foundries in the areas of worker safety and health, noise, silicia

---

1/ These countries include Japan, Korea, Brazil, India, West Germany, Canada, Mexico, China, Taiwan, Italy, and Spain.

2/ A comparison of U.S. and foreign component cost data indicates that U.S. labor costs may represent as much as four times the share in total cost than do such costs for developing country products, which tends to confirm questionnaire responses indicating a foreign advantage in this area. The labor cost advantage is mitigated, however, by higher U.S. productivity. See the hearing before the U.S. International Trade Commission, July 18, 1984, p. 118.

Table 20.—U.S. foundry industry: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and foreign industries by product categories, 1981-84

Item	Competitive advantage 1/									
	Cast-iron engine blocks	Cast-iron compressor housings	Iron-construction castings	Cast-iron pipes and tubes	Cast-iron pipe and tube fittings	Certain cast-steel valves	Certain cast-steel construction machinery components	Certain cast-steel rail truck components	Cast-copper valves	Cast-aluminum transmission cases
Fuel:										
Availability	D	D	S	D	S	D	S	S	S	S
Cost	S	D	F	D	S	S	S	D	F	D
Raw materials:										
Availability	S	S	S	D	S	S	S	S	F	S
Cost	S	S	F	D	S	S	S	S	F	D
Capital:										
Availability	S	F	F	S	F	F	F	F	F	S
Cost	S	F	F	F	F	F	F	F	F	F
Ability of industry profits to attract funds	S	S	F	S	S	D	F	F	F	F
Labor:										
Availability	S	F	F	S	F	F	F	F	F	F
Cost	F	F	F	F	F	F	F	F	F	F
Production technology	S	S	D	S	D	S	S	S	S	S
Marketing:										
Channels of distribution	S	D	D	S	D	D	S	D	D	D
Responsiveness to orders	S	D	D	S	D	D	S	D	D	S
After-sale service capabilities	S	D	D	S	D	D	D	D	D	S
Government involvement:										
Subsidies	F	F	F	F	F	F	F	F	F	F
Research and development assistance	F	F	F	S	S	F	F	F	S	F
Tariff levels on imports	F	F	F	S	F	F	F	F	F	S
Nontariff barriers to imports	F	F	F	S	F	F	S	F	F	F
U.S. Government regulations that increase costs	S	F	F	S	F	F	F	F	F	S
Foreign government regulations that increase costs	S	2/	F	S	S	S	S	S	F	S

1/ D = Domestic advantage; F = Foreign advantage; and S = Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 21.—U.S. foundry industry: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, 1981-84

Item	Competitive advantage 1/										
	Japan	Korea	Brazil	India	West Germany	Canada	Mexico	China	Taiwan	Italy	Spain
Fuel:											
Availability	D	S	S	S	D	S	F	S	S	S	D
Cost	D	F	S	F	D	S	F	S	F	S	D
Raw materials:											
Availability	D	S	S	S	S	S	S	S	S	S	D
Cost	D	S	S	F	D	S	F	F	F	S	D
Capital:											
Availability	F	F	F	F	S	F	F	F	F	F	S
Cost	F	F	F	F	S	F	F	F	F	F	S
Ability of industry profits to attract funds	F	F	F	F	S	S	F	F	F	S	S
Labor:											
Availability	F	F	F	F	S	S	F	F	F	S	F
Cost	F	F	F	F	F	F	F	F	F	F	F
Production technology	S	S	D	D	S	S	D	D	D	S	S
Marketing:											
Channels of distribution	D	D	D	D	D	S	D	D	D	S	S
Responsiveness to orders	D	D	D	D	S	S	D	D	D	S	D
After-sale service capabilities	D	D	D	D	S	S	D	D	D	D	D
Government involvement:											
Subsidies	F	F	F	F	F	F	F	F	F	F	F
Research and development assistance	F	F	F	F	F	S	F	F	F	S	F
Tariff levels on imports	F	F	F	F	F	S	F	F	F	F	F
Nontariff barriers to imports	F	F	F	F	S	F	F	F	F	F	S
U.S. Government regulations that increase costs	F	F	F	F	S	F	F	F	F	S	S
Foreign government regulations that increase costs	S	S	F	F	S	S	F	F	F	S	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

dust, metal fumes and dust, and carbon monoxide and other emissions. In addition to Federal environmental and safety regulations, foundries are subject to State regulations, which, according to industry officials, may conflict with or exceed Federal standards. 1/

Thirty-three percent of the U.S. producers who responded to Commission questionnaires cited government environmental and safety regulations as adversely affecting the competitive position of the U.S. foundry industry. 2/ Only a few respondents complain of the necessity of such regulations or their enforcement; rather, producers see such regulations as adversely affecting the U.S. foundry industry's competitive position because foreign competitors, especially in developing countries, do not have to bear such costs. Hence such costs are not reflected in import prices, and the monies spent on compliance by the U.S. foundry industry represent capital that could otherwise be used for investment in facilities and equipment to improve competitive position. 3/

Questionnaire respondents and witnesses at the hearing also cited other social costs, some of which are mandated by Federal or State governments, which can substantially increase foundry product costs and which foreign competitors may not have to bear. Examples of such costs are social security, workman's compensation, unemployment insurance, and health care insurance. 4/

Foreign government programs affecting competition in the U.S. market

Examples of foreign government aids to industry, including subsidies, export promotions, research and development assistance, and trade barriers of major foreign competitors of the U.S. foundry industry, are:

Brazil.--The Carteiro de Comercio Exterior (CACEX) is the government agency that is reportedly responsible for promoting exports and discouraging imports. 5/ A firm that wants to import must receive authorization from CACEX. Approval to import is given when a review of domestic availability indicates that domestic supply does not meet demand and when the company carries surplus in its trade balance. 6/ General benefit programs include rebates of the Industrial Products Tax (IPT) for use in plant expansions and

---

1/ Staff conversations with industry officials.
2/ The effect of such regulations was also extensively discussed at the hearing before the U.S. International Trade Commission, July 18, 1984. See pp. 57, 71-72, 91, and 104.
3/ It is estimated that as much as 30 percent of capital expenditures of foundry operations is devoted to environmental and safety concerns. Hearing before the U.S. International Trade Commission, July 18, 1984, p. 91.
4/ Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 73-4, 136.
5/ "Brazilian Foundries: An Overview - Part II," Foundry Management and Technology," November 1983, pp. 34-39.
6/ U.S. Department of State telegram, U.S. Embassy Brazilia, June 1984.

technological improvements 1/ and government programs designed to stimulate development of technology through low-interest financing. 2/

Canada.--From 1979-83, more than $3.2 million was provided to 16 Canadian foundries under government programs. 3/ More than $3 million of those funds was provided to 12 foundries under the Department of Regional Economic Expansion (DREE) program, which provides incentives to manufacturing operations in designated slow-growth areas of Canada. Contributions are primarily non-repayable. For the establishment of new facilities, 25 percent of eligible capital costs and 15 percent of average salaries in the second and third years for newly created jobs are paid up to a maximum of $4.2 million or $25,000 per job. Eligible capital costs include buildings, equipment, and vehicles. For expansion and modernization, 20 percent of eligible capital costs are paid, up to a maximum of $4.2 million.

The balance of the assistance to foundries was provided under the Enterprise Development Program (EDP) and the Industrial Labour Assistance Program (ILAP). The objective of the EDP is to help the growth of the manufacturing and processing sectors of the Canadian economy by providing assistance to selected firms to make them internationally competitive. The objective of ILAP is to alleviate the distress caused by permanent industry dislocation.

India.--India's Engineering Export Promotion Council (EEPC) has fixed a global target for exports of more than $1.3 billion in 1983-84, and $5.5 billion in 1989-90. 4/ EEPC expects to direct about 10 percent of its export target to the U.S. market and Indian exports of foundry products are expected to account for 45 percent of the U.S. target. In order to encourage exports of foundry products, the Government of India extends several incentives and fiscal and nonfiscal assistance, including refunds of all local taxes to Indian exporters. When domestic prices of raw materials are higher than comparable international rates, the government permits liberal imports and ensures availability of domestic raw materials at international rates. Indian exporters of castings are also eligible to receive cash compensatory support (CCS) until March 31, 1985, for cast-iron sanitary castings (5 percent of export earnings), industrial castings (10 percent), and other special castings (12 percent).

Japan.--According to MITI, there are no assistance programs for the foundry industry as a whole, although MITI announced the Foundry Industry Plan in December 1978, which urged the industry to upgrade production technologies, yields, and qualities of specific castings by the target year of 1984, and the Small Iron Castings Industry Modernization Plan in May 1980, which urged the modernization of the industry by 1985. 5/

1/ Ibid.
2/ Foundry Management and Technology, op. cit.
3/ Prehearing statement of the Canadian Foundry Association, July 1984.
4/ U.S. Department of State telegram, U.S. Embassy Calcutta, June 1984.
5/ U.S. Department of State telegram, U.S. Embassy Tokyo, June 1984.

Japanese foundry companies with fewer than 300 employees or with paid-in capital of $4,348 are eligible for various assistance programs for small business. Major assistance programs available to small businesses, including foundry companies, include: (1) low interest loans from governmental financial institutions for expansions and improvements of facilities, (2) interest-free loans to companies with fewer than 100 employees to enable the company to finance half of the cost of new equipment for modernization, (3) government credit guarantees on loans by private banks, (4) investment assistance by governmental small business investment companies, which take over stocks and convertible bonds issued by small companies, (5) tax relief including a reduction in the rate of corporate tax, (6) technical improvement programs, and (7) government procurement assistance.

Korea.--Imports into Korea require an import license issued by one of the country's foreign exchange banks. In general, applications for import licenses are approved automatically unless the item is restricted under Korea's Annual Trade Plan. The Annual Trade Plan is a negative list system to control imports. Under the plan, imports of restricted items may be approved if recommended by the appropriate ministry or trade association. Foundry products that are classified as restricted include steel balls for use in textile machinery, internal combustion piston engines for automobiles, engines for ships, engines for railway locomotives and rolling stock, self-contained air conditioning machines, chassis fitted with engines for automobiles, and certain parts of tractors for agricultural use. 1/

Taiwan.--The Government of Taiwan has placed the castings industry on its list of strategic industries to receive priority guidance and assistance in the following forms: (1) loan guarantees and a special pool of concessionary credit will be made available to strategic industries through the State Bank of Communications for the technological upgrading of existing plant and processing facilities, training of high-grade manpower, and product planning, (2) technology management and market-expansion assistance, (3) programs to encourage stepped up investments in research and development, (4) reduced import duties on machinery, and (5) tax holidays for new investments and expansions of old facilities. Under one investment scheme, the Ministry of Economic Affairs has stipulated that manufacturing companies with paid-in capital of more than $2.5 million must invest a minimum of 1 percent of annual revenue in research and development. Penalties for noncompliance with the investment target include ineligibility for tax incentives and jeopardizing a firm's chances for government-guaranteed concessionary loans for plant improvements. 2/

International Trade Barriers

U.S. producers of foundry products alleged that their ability to service foreign markets is hampered by numerous foreign trade barriers. Table 22 lists the trade barriers considered in the Commission's survey and provides an indication of those most frequently encountered by U.S. producers in foreign markets. Exchange controls, local content requirements, financial support by

---

1/ U.S. Department of State telegram, U.S. Embassy Seoul, June 1984.
2/ U.S. Department of State telegram, U.S. Embassy Taipei, June 1984.

foreign governments, and laws and practices that discourage imports were the most noticeable barriers experienced in the period of the study. Canada, Mexico, the United Kingdom, West Germany, Brazil, and India were most frequently mentioned as the markets where such nontariff barriers exist.

Exchange and other monetary and fiscal controls were indicated by 48 percent of the respondents as being barriers to international trade. The principal countries indicated were Canada and Mexico. Representatives of the Canadian Foundry Association stated that the value of the Canadian currency relative to the value of the U.S. dollar is the major factor that has helped to make Canadian foundry products more competitive. 1/ Changes in the value of the U.S. dollar vis-a-vis foreign currency can alter the competitiveness of U.S. imports and exports. 2/ Exchange rate changes among selected U.S. trading partners are discussed in appendix D.

Local content requirements were indicated by 44 percent of the respondents as being a barrier to international trade. Representatives of the American Die Casting Institute (ADCI) state that domestic content restrictions preclude U.S. producers from making sales to factories in Mexico, even though the U.S. product is of higher quality. 3/ They also stated that the sales' volume of a particular U.S. firm was cut in half because of the purchasers' need to buy a certain amount of Japanese components going into their equipment to enable them, in turn, to sell their product in Japan. 4/

Twenty-six percent of respondents alleged that foreign foundries have a competitive advantage because of government subsidies that are designed to facilitate exports to the U.S. market. Specific programs provided by foreign governments are discussed in the previous section of this report on structural factors of competition.

More than one-fourth of the respondents indicate that certain foreign laws and practices discourage imports, thereby affecting trade. The importation of products to Brazil is controlled by a government agency, while imports into Korea require an import license issued by one of the country's foreign exchange banks. These controls, and foreign tariff barriers, are discussed further in the individual product analyses contained in this report.

1/ Hearing held before the U.S. International Trade Commission, July 18, 1984, p. 214.
2/ Ibid, p. 195.
3/ Ibid, p. 176.
4/ Ibid, p. 176.

Table 22.--U.S. foundry industry: International trade barriers experienced by U.S. producers in foreign markets, by number of responses and share of total respondents, 1979-84

Category of barriers	Number of respondents indicating barriers	Percent of total respondents
Quantitative restrictions and similar specific limitations:		
Licensing requirements	5	11
Quotas	-	-
Embargoes	2	4
Export restraints	5	11
Exchange and other monetary or financial controls	22	48
Minimum/maximum price regulations	-	-
Local content requirements	20	44
Restrictive business practices	5	11
Discriminatory bilateral agreements	4	9
Discriminatory sourcing	7	15
Other	5	11
Nontariff charges on imports:		
"Border" taxes	2	4
Port and statistical taxes, etc	-	-
Nondiscriminatory use and excise taxes and registrations fees	1	2
Discriminatory excise taxes, government-controlled insurance, use taxes, and commodity taxes	3	7
Nondiscriminatory sales taxes	-	-
Discriminatory sales taxes	-	-
Other taxes and fees	-	-
Government participation in trade:		
Subsidies and other aids	12	26
State trading, government monopolies, and exclusive franchises	8	17
Laws and practices that discourage imports	12	26
Government procurement	1	2
Other	2	4
Standards:		
Health and safety standards	1	2
Product content requirements	3	7
Processing standards	-	-
Industrial standards	2	4
Requirement on weights and measures	-	-
Labeling and container requirements	-	-
Marking requirements	-	-

Table 22.--U.S. foundry industry: International trade barriers experienced by U.S. producers in foreign markets, by number of responses and share of total respondents, 1979-84--Continued

Category of barriers	Number of respondents indicating barriers	Percent of total respondents
Standards--Continued		
Packaging requirements	-	-
Trademark problems	-	-
Customs procedures and administrative practices:		
Antidumping practices	1	2
Customs valuation	3	7
Consular formalities	-	-
Documentation requirements	4	9
Administrative difficulties	3	7
Merchandise classification problems	2	4
Regulations on samples, returned goods, and re-exports	5	11
Countervailing duties	3	7
Emergency action	-	-
Other	2	4
Discriminatory ocean freight rates	1	2
Other	2	4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The U.S. Market

Domestic market profile

The U.S. market for individual foundry products is difficult to gauge, as most ferrous and nonferrous castings are not consumed as such but as component parts in all types of industrial and consumer products. Also, a great portion of foundry products--more than 50 percent in some cases--represents captive production and is consumed within the firm. U.S. producers' shipments by channel of distribution are given in table 23.

Captive production is especially common in the ferrous castings area, such as the automobile and other transportation equipment markets, and accounts for the bulk of the "other" responses in table 23. The portion of both ferrous and nonferrous castings sent to machine shops and other fabricators is lower than for other types of metal-forming industries, partly because casting results in a product closer to net shape than other processes.

Table 23.--U.S. foundry industry: U.S. producers' shipments by channel of distribution for reporting foundries, in percent, by type of foundry, 1981-83

Channel of distribution	Percent of shipments		
	Iron	Steel	Nonferrous
Machine shops/other fabricators	12	4	13
Distributors	13	7	6
Original equipment manufacturers	55	41	77
Other	20	48	4
Total	100	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Census data lists three major end markets for foundry products: automotive, machinery and equipment, and transportation equipment other than automotive. Automobile manufacturers have traditionally been the most important consumers of foundry products, but the proportion of total casting shipments to that market has been declining because of the drop (until recently) in U.S. auto production; the emphasis on smaller, lighter weight cars; the increase in imports of automobiles; and the trend to international sourcing of components by U.S. automobile manufacturers. These factors have resulted in a significant drop in the share of ferrous castings to the automobile market; whereas, nonferrous automotive castings, such as aluminum transmission cases, although hampered by international sourcing and the effect of the downstream importation of automobiles, have been helped by the trend to lighter autos.

In contrast to the automotive market, castings are retaining their uses as essential components of industrial machinery and equipment, valves, and other durable and consumer goods. The Department of Commerce estimates that the U.S. production of ferrous castings will rise steadily, at an annual rate of 2 percent through the 1980's, and that production of nonferrous castings will experience an estimated 5 percent annual increase over the same period. U.S. producers' shipments, by type of market for reporting foundries, is shown in table 24.

Table 24.--U.S. foundry industry: U.S. producers' shipments by type of market for reporting foundries, in percent, by type of foundry, during 1981-83

Market	Percent of shipments		
	Iron	Steel	Nonferrous
Motor vehicles	44	2	57
Farm machinery and equipment	6	1/	1
Mining machinery and equipment	1	5	1/
Construction machinery and equipment	1	8	2
Refrigeration and heating equipment (except pumps and compressors)	1	1/	1
Plumbing equipment	1	-	1
Railway equipment	1/	34	1/
Industrial machinery	6	2	2
Machine tools	2	1/	1
Valves and pipe fittings	6	3	6
Pumps and compressors	5	1	2
Other (municipalities; consumer products related to nonferrous shipments)	27	45	27
Total	100	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption and trade

The estimated value of U.S. consumption of foundry products rose only slightly during 1979-81, from $21.8 billion to $22.6 billion, before declining substantially to $16.3 billion in 1983, representing a drop of 25 percent. Reduced industrial output during the economic downturn resulted in this reduced consumption, and the gradual economic recovery, which began in 1983, had not yet affected the basically capital-goods-oriented foundry industry.

The estimated value of U.S. exports and imports followed different trends in the 1979-83 period. The value of exports increased 59 percent from 1979 to 1981, in part stimulated by the weakness of the U.S. dollar during that period. But the value of exports declined in both 1982 and 1983, as industrial production slowed worldwide and the dollar gained strength relative to other currencies. The value of imports of foundry products increased steadily throughout the period, rising from $211 million in 1979 to $424 million in 1983, an increase of 101 percent. As a share of apparent consumption, the value of imports increased from 1.0 percent of consumption in 1979 to 2.6 percent in 1983, as shown in table 25.

Table 25.--U.S. foundry industry: Domestic shipments, exports, imports, and apparent consumption, 1979-83

(In thousands of dollars)

Year	Domestic shipments	Exports	Imports	Apparent consumption	Ratio (percent) of imports to consumption
1979	21,550,862	507,591	210,526	21,761,388	1.0
1980	20,560,051	748,782	252,924	20,812,975	1.2
1981	22,196,915	805,141	358,187	22,555,102	1.6
1982	16,348,941	683,675	387,427	16,736,368	2.3
1983	15,873,438	614,005	423,977	16,297,415	2.6

Source: Estimated from data submitted in response to questionnaires of the U.S. International Trade Commission and from official statistics of the U.S. Department of Commerce.

Data collected in response to Commission questionnaires on U.S. producers' imports of foundry products are given in tables 26 and 27. Generally, lower price, and price-related factors such as the cost of tooling

Table 26.--U.S. foundry industry: U.S. producers' imports, by type of foundry, 1979-83

Product type	1979	1980	1981	1982	1983
	Delivered value (1,000 dollars)				
Iron foundry products	8,838	5,682	4,682	1,420	3,523
Steel foundry products	2,842	9,059	3,283	76	1,672
Nonferrous foundry products	952	8,924	11,667	9,095	10,441
Total	12,632	23,665	19,409	10,591	15,636

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

and patterns and terms of sale were the major reasons given for the importation of castings by U.S. foundries. Superior quality of foreign castings, however, was identified as the most important reason by reporting steel foundries, and, overall, availability was ranked as the third most important reason for import purchases. The comparatively high rating of this variable is believed to be the result of the significant amount of closures of U.S. foundries in recent years, especially in the iron casting segment of the industry. 1/

1/ Hearing before the U.S. International Trade Commission, July 18, 1984, p. 130.

Table 27.--U.S. foundry industry: U.S. producers' ranking of product-related factors that were the principal reasons for their imports of foundry products, by type of foundry, 1981-84

Reason for importing	Ranking 1/			
	Iron	Steel	Nonferrous	Overall
Lower purchase price (delivered)	1	2	1	1
Cost of tooling/patterns	4	8	2	2
Shorter delivery time	7	5	8	7
Availability (what you want and where you want it)	2	6	4	3
Servicing	8	12	6	9
Favorable terms of sale	3	11	9	5
Favorable product guarantees	11	7	-	11
Favorable exchange rates	5	10	7	6
Historical supplier relationship	9	3	10	10
Product performance features:				
Superior design	12	9	-	12
Quality	6	1	3	4
More durable	13	12	-	13
Other	10	4	5	8

1/ Ranking numbers range from 1 to 13, number 1 indicating the most important reason for importing and number 13 indicating the least important reason for importing.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors of Competition in the U.S. Market

An examination of the individual commodity analyses of product-related factors of competition contained in this report indicates that U.S. producers rated foreign foundry products as having an overall competitive advantage in the U.S. market in 7 of 10 product categories (table 28). This overall advantage was based on the lower prices of foreign castings and on factors related to price. U.S. producers indicated that service and other market-oriented factors, although strongly favoring U.S. products, were not sufficient to overcome the price-related advantages of imports. U.S. producers generally felt that quality-related factors were equal in comparing domestic with foreign castings, except in iron compressor housings, construction castings, and fittings, where U.S. producers face competition primarily from developing countries and domestic products are seen as having a competitive edge. However, superiority in quality-related factors is again seen as insufficient to overcome the price advantage of imports. 1/

1/ Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 119-122.

Table 28.—U.S. foundry industry: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign made foundry products in the U.S. market, by product categories, 1981-84

Item	Competitive advantage 1/									
	Cast-iron engine blocks		Cast-iron compressor housings		Iron construction castings		Cast-iron pipes and tubes		Cast-iron pipes and fittings	
	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	S	F	D	F	S	S	D	F	F
Lower purchase price (delivered)	F	F	F	F	F	F	F	F	F	F
Cost of tooling/patterns	F	F	F	F	F	F	F	F	F	F
Shorter delivery time	2/	D	D	D	D	D	D	D	D	D
Availability	2/	S	D	D	D	D	D	D	D	D
Servicing	D	D	D	D	D	D	D	D	D	D
Favorable terms of sale	S	S	F	S	F	D	F	D	F	S
Favorable product guarantees	F	D	S	S	D	D	D	D	D	S
Favorable exchange rates	F	S	F	S	F	S	F	F	F	S
Historical supplier relationship	2/	S	D	S	D	D	2/	D	S	D
Product performance features:										
Superior design	2/	S	D	S	D	S	S	D	D	S
Quality	S	F	D	S	D	S	S	D	D	S
More durable	2/	S	D	S	D	S	S	F	D	S

Item	Competitive advantage 1/									
	Certain cast-steel valves		Cast-steel construction machinery components		Certain cast-steel rail truck components		Certain copper valves		Cast-aluminium transmission cases	
	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	S	S	F	F	F	S	F	F	S	F
Lower purchase price (delivered)	F	F	F	F	F	S	F	F	F	2/
Cost of tooling/patterns	F	S	F	S	F	D	F	F	F	F
Shorter delivery time	D	S	S	D	D	S	2/	D	F	S
Availability	D	S	S	D	D	S	2/	D	D	S
Servicing	D	S	D	D	D	D	2/	D	S	S
Favorable terms of sale	S	S	F	S	F	S	F	S	S	S
Favorable product guarantees	D	S	F	S	S	S	F	D	F	S
Favorable exchange rates	F	D	F	S	F	S	F	S	F	S
Historical supplier relationship	D	D	D	S	D	D	2/	D	2/	F
Product performance features:										
Superior design	S	S	S	S	S	S	2/	S	D	S
Quality	S	S	S	S	S	S	2/	S	F	S
More durable	S	S	S	S	S	F	2/	S	S	F

1/ D = Domestic advantage; F = Foreign advantage; and S = Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. importers, in ranking the identical factors, indicated that imports held an overall advantage in only 4 of 10 product categories, whereas 4 categories were ranked as equal competitively. Importers generally agreed with U.S. producers that foreign castings possessed advantages in price related factors and that U.S. products had an edge in market-related factors. But importers noticeably differed with U.S. producers in their assessment of quality and related factors, in which they ranked the competitive situation as equal between domestic and foreign products for almost all categories. Given the disagreement between producers and importers as to the overall competitive advantage of the subject product, it is apparent that U.S. importers attribute relatively more importance to nonprice factors in their assessment of the general competitive situation in the U.S. market.

A comparison of the individual commodity analyses on a country basis shows that U.S. producers rank every major foreign supplier as possessing an overall competitive advantage in the U.S. market (table 29). Again, U.S. producers listed the imports' only consistent advantage as lower prices and price-related factors. With the exception of West Germany, U.S. producers rated the United States superior in market response factors, and, except for Japan, Korea, and West Germany, superior in product performance features as well. Again, importers' responses were more mixed, with no overall advantage apparent in the case of five foreign suppliers and with foreign suppliers having the overall advantage in India, Italy, Taiwan, the United Kingdom, and West Germany. Domestic producers were ranked better overall than Mexico. Importers again generally agreed with U.S. producers as to the strong advantages of U.S. products in marketing, and they saw quality-related factors as giving neither U.S. nor foreign products a competitive edge.

Purchasers of U.S.- and foreign-made foundry products overwhelmingly cited lower purchase price as the chief cause for foreign purchases; they also ranked foreign product quality as important in their reasons for foreign purchases (table 30). The principal reasons for domestic purchases were the greater availability of products to meet their market needs and the reliability of their domestic suppliers in providing shorter delivery time.

Table 29.—U.S. foundry industry: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made foundry products in the U.S. market, by major foreign source, 1981-84

Item	Competitive advantage 1/									
	Brazil		Canada		China		India		Italy	
	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	S	F	S	F	S	F	F	F	F
Lower purchase price (delivered)	F	F	F	S	F	F	F	F	F	F
Cost of tooling/patterns	F	F	F	S	F	F	F	F	F	S
Shorter delivery time	D	D	D	S	D	D	D	D	D	D
Availability	D	D	D	F	D	D	D	D	D	D
Servicing	D	D	D	S	D	D	D	D	D	D
Favorable terms of sale	F	F	F	S	F	D	F	D	F	S
Favorable product guarantees	D	S	D	S	D	D	D	D	2/	D
Favorable exchange rates	F	S	F	S	F	F	F	S	F	F
Historical supplier relationship	D	F	D	F	D	D	D	S	D	S
Product performance features:										
Superior design	D	S	D	S	D	S	D	S	2/	S
Quality	D	S	D	S	D	S	D	S	2/	S
More durable	D	S	D	S	D	S	D	2/	2/	S

Item	Competitive advantage 1/													
	Japan		Korea		Mexico		Spain		Taiwan		United Kingdom		West Germany	
	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	S	F	S	F	D	F	S	F	F	F	F	F	F
Lower purchase price (delivered)	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Cost of tooling/patterns	F	S	F	F	F	F	F	2/	F	F	F	S	2/	F
Shorter delivery time	D	D	D	D	D	D	2/	S	D	D	2/	D	S	D
Availability	D	D	D	S	D	D	2/	S	D	D	2/	D	S	S
Servicing	D	D	D	D	D	D	2/	S	D	D	2/	D	D	D
Favorable terms of sale	F	S	F	S	F	D	S	S	F	D	2/	S	S	S
Favorable product guarantees	S	S	S	S	D	D	2/	S	D	D	2/	S	F	S
Favorable exchange rates	F	S	F	S	F	S	S	S	F	S	2/	S	F	S
Historical supplier relationship	D	D	D	D	S	D	2/	D	D	D	2/	S	D	S
Product performance features:														
Superior design	S	S	S	S	D	D	2/	S	D	S	2/	S	S	S
Quality	S	S	S	S	D	D	2/	S	D	S	2/	S	F	F
More durable	S	S	S	S	D	S	2/	S	D	S	2/	S	S	S

1/ D = Domestic advantage; F = Foreign advantage; and S = Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 30.--U.S. foundry industry: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made castings	Foreign-made castings
Lower purchase price (delivered)	6	1
Cost of tooling/patterns	10	6
Shorter delivery time	3	7
Availability	1	3
Servicing	4	9
Favorable terms of sale	8	4
Favorable product guarantees	7	10
Favorable exchange rates	12	5
Historical supplier relationship	2	8
Product performance features:		
Superior design	9	10
Quality	5	2
More durable	11	11

1/ Ranking numbers range from 1 to 12, number 1 indicating the most important reason for purchase and number 12 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors of Competition in Foreign Markets

U.S. exporters of foundry products indicate that lower prices and price-related advantages of foreign products (e.g., cost of tooling and patterns, terms of sale, and exchange rates) give foreign producers a strong overall advantage in major export markets (table 31). 1/ Not surprisingly, domestic producers indicate that they possess no advantage in market-related areas but the competitive situation was rated as equal, except for Korea and Taiwan, where the foreign competition were rated as having an edge. The only area of competitive advantage for U.S. producers in foreign markets was in quality-related factors, especially in developing-country export markets.

1/ In addition to the countries listed in table 29, some data on export markets were received on Belgium, the Netherlands, Portugal, Spain, and the United Kingdom.

Table 31.—U.S. foundry industry: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major U.S. export markets, 1981-83

Item	Competitive advantage 1/										
	Brazil	Canada	China	France	India	Italy	Japan	Korea	Mexico	Taiwan	West Germany
Overall competitive advantage	F	F	F	F	F	F	F	F	F	F	F
Lower purchase price (delivered)	F	F	F	F	F	F	F	F	F	F	F
Cost of tooling/patterns	F	2/	F	S	F	F	F	F	F	F	2/
Shorter delivery time	S	2/	S	S	S	F	S	F	F	F	2/
Availability	S	2/	D	S	S	2/	S	F	S	F	2/
Servicing	S	2/	S	F	S	2/	S	F	S	F	2/
Favorable terms of sale	F	2/	F	F	F	2/	F	F	F	F	F
Favorable product guarantees	S	2/	S	S	D	2/	D	S	S	S	2/
Favorable exchange rates	F	F	F	F	F	F	F	F	F	F	F
Historical supplier relationship	S	2/	S	F	F	S	F	F	F	F	F
Product performance features:											
Superior design	S	2/	D	S	D	2/	S	D	D	D	2/
Quality	D	2/	D	S	D	2/	S	D	D	D	2/
More durable	S	2/	D	S	S	2/	S	D	D	D	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Implications of the Conditions of Competition

Casting as a manufacturing process has many advantages over other types of metal forming, such as the ability to manufacture a great variety and complexity of shapes to close dimensional tolerances. Such advantages lend themselves to the increased quality and performance requirements of the U.S. economy. It is estimated that the demand for ferrous foundry products will grow by 2 percent annually and for nonferrous foundry products by 5 percent annually in the 1980's. 1/ The question is whether the large U.S. market and its growth will be served increasingly by imports or whether the U.S. foundry industry can maintain its traditional advantages in servicing and other market-oriented areas and solve its dilemma in competitive pricing, in order to retain customers and regain the market share that has been lost to imports.

The only competitive disadvantage of the U.S. foundry industry that is consistently cited by producers, purchasers, and importers is the lower price of imports, yet this competitive factor is considered sufficient to provide imported castings with an overall advantage in U.S. and foreign markets. Foreign product price advantages are partially explained by foreign industry advantages in regulatory costs, labor costs, exchange rates, and tooling and pattern costs. On the basis of pricing data submitted on representative products by U.S. purchasers in response to Commission questionnaries, the average prices on imported products range from 15 percent to 28 percent lower than comparable prices on domestically produced products. The information supplied to the Commission on principal cost components of U.S. and foreign foundry production does not, however, fully explain the question of the large margins of underselling alleged by U.S. producers in most representative product categories.

One factor in the current decreased price competitiveness of U.S.-foundry products is the high value of the U.S. dollar relative to foreign currencies which lowers the cost of imports in the U.S. market. Should the dollar fall relative to major trading partner currencies, the prices of foreign foundry products in the U.S. market should rise and could enable U.S. producers to become more price competitive. Another factor in the current price differentials between domestic and foreign foundry products may be foreign-government subsidies and other State aids to foreign foundry competitors. Allegations of such foreign-government assistance were among the most frequently given explanations for price differences in U.S. and foreign markets during testimony before the Commission. 2/

During 1979-83, the estimated value of imports as a percentage of U.S. consumption rose steadily but remained under 3 percent in 1983. However, certain individual foundry products have experienced much higher levels of import penetration, ranging from 10 percent to 37 percent. Import penetration has been and is expected to continue to be most significant in the area of standardized, simple-to-manufacture, price-sensitive castings, such as iron

---

1/ U.S. Department of Commerce, U.S. Industrial Outlook, 1984, pp. 18-7, and 19-17.

2/ Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 57, 58, 129, 131, 142, 164, 175.

construction castings, fittings, and valves, where foreign competitors can take advantage of the large U.S. market, lower labor costs, and other price-related advantages. Assuming for a moment a lack of substantive changes in world economic or political conditions affecting the competitive environment and assuming a continuing price disadvantage for U.S. foundry products, it is likely that U.S. producers will continue to lose market share to imports in the U.S. market and be increasingly precluded from export market opportunities. However, U.S. foundry producers have begun to take steps to become more price competitive.

U.S. producers are responding to price disadvantages in domestic and foreign markets primarily by lowering prices or suppressing price increases and by implementing cost reduction programs. The result of these efforts, coupled with production cut-backs and closures, if successful, will likely result in a smaller, more competitive U.S. foundry industry. Closures of foundries may continue but would be isolated in the less efficient, smaller foundries primarily in the jobbing segment of the industry. However, the pricing and competitive trends that currently exist in the industry tend to suggest that import concerns may also develop for a growing number of U.S. foundry products, even though they are manufactured in efficient, technologically modern facilities. If these new competitive strategies are unsuccessful, the industry could be hampered in its ability to generate the necessary profitability and working capital to fund investment and the research and development needed to maintain technology and product quality to compete effectively with imports. The competitive situation in the industry could also extend to other foundry products and potentially could have a further effect in consuming industries.

The competitive price disadvantage of the U.S. foundry industry relative to other suppliers has caused major consuming industries to shift sourcing patterns. However, castings imported as finished products are only one facet of the total import situation facing the U.S. foundry industry. For many foundry producers, the main concern lies downstream with import competition in related industries. Related industries that rely on castings as components in their production of manufactured goods are also facing competition from imports and are trying to cut costs. Especially in the automotive industry, which is the largest single end market of foundry products, and in other large industrial markets such as construction machinery, firms are increasingly sourcing casting components on an international basis in order to more effectively compete with imports of finished manufactures. The increased importation of finished assemblies and manufactures also represents lost production for U.S. foundries and is believed to have a greater potential impact than the importation of castings themselves. 1/ Such downstream imports affect the high-volume, limited-product production-type foundries, many of whom are captive or rely on a very limited number of industrial customers.

1/ Hearing before the U.S. International Trade Commission, July 18, 1984, p. 76. See also U.S. Department of Commerce, <u>U.S. Industrial Outlook, 1984</u>, pp. 18-6.

I. CAST-IRON ENGINE BLOCKS

Description and Uses

Engine blocks are metal frameworks housing all reciprocating parts contained in an internal combustion engine. Engine blocks are of heavy construction in order to contain the high pressure created within the engine during the combustion process and to maintain the correct alignment of all its internal parts. The combustion process is created within the cylinders 1/ of an engine which forces the pistons downward rotating the crankshaft which in turn moves the vehicle.

The design and construction of an engine block depends upon several factors such as the materials used to construct it, the method of casting, the stroke and compression ratio, and the method of cooling.

Most cyclinder blocks are made of grey iron; others are made of die-cast aluminum. Although metal used to construct these castings is ordinarily referred to as "cast iron" or "aluminum," these terms are used rather loosely because in reality, these metals are usually alloys containing small quantities of nickel, molybdenum, and chromium. These elements are added to restore the strength and hardness of the engine block. Grey iron is the most popular metal used because of its low cost, its high strength/weight ratio, its ability to withstand high temperatures and pressures, and its resistance to corrosion. The use of aluminum as the prime metal in the construction of engine blocks reduces vehicle weight and conducts heat more rapidly than cast-iron blocks. Since aluminum blocks are not as wear resistant as cast-iron blocks, cast-iron steel sleeves or liners are either cast into the block or installed after the block has been constructed.

Iron engine blocks are cast by pouring molten iron into a mold that is usually made of sand. After a period of cooling, the metal solidifies and the sand is broken away to reveal the solidified engine block. Sand molds are manufactured in two sections, the bottom section called the drag and the top section called the cope. The joint that lies between these sections is called the parting line. Molten metal is poured in a hole called a sprue and connecting runners conduct the molten metal to the casting cavity. Gravity causes the liquid metal to run down the sprue and into the cavity. All sandcast molds are expendable and must be destroyed after the solidified casting is removed from the mold. Cores are used in molds wherever it is necessary to produce a hole or undercut in a casting. The cores consist of a firm oven-baked mixture of synthetic sand which have been bonded together by a special process. The core is manually or automatically set into its proper position after the pattern has been withdrawn from the mold. After the casting has solidified the cores are removed from their positions in the casting. During the casting process, there is very little waste of metal material. Metal left around the edges of the block or in other unwanted areas is eliminated and usually melted and recycled.

1/ Cylinders are chambers within the engine block which house the pistons.

Engine block castings for automotive applications are manufactured in a variety of shapes and sizes from small 4-cylinder engine blocks weighing about 100 pounds to engine blocks for large on-highway trucks weighing in excess of 800 pounds. After the engine blocks cool and solidify, they are removed from the mold, cleaned, and heat treated. Depending on their size, sand clinging to the surfaces of engine blocks can be cleaned by rotating them in a tumbling mill or by directing high-pressure water onto their surface. Engine blocks are then heat treated in temperatures of 1100 degress Fahrenheit to relieve the stresses built up during the casting process. Engine blocks are further refined by chipping and/or grinding their surfaces to remove excess or unwanted metal. This final finishing operation is very costly because each casting must be attended to individually.

There are three major types of automotive engine blocks in terms of the arrangement of cylinders. Automotive engine blocks have cylinders arranged either in-line, opposed, or in V-form. The in-line cylinders are arranged one behind the other, opposed cylinders are arranged in a horizontal position on each side of the crankshaft, and V-type blocks are arranged in a V-shape (figs. I-1 and I-2). The compression ratio also affects the design and construction of an engine block. For example, diesel engine blocks are usually heavier and stronger than gasoline engine blocks because the compression ratio in the engine during the combustion process is much higher than those in gasoline engines. The method of cooling influences the construction of an engine block. The air-cooled engine blocks are smaller than liquid-cooled engine blocks and have metal rings which assist in transferring heat away from the cylinders. The shrouds help circulate air around the cylinders to cool the engine. Blocks manufactured for liquid-cooled engines are constructed with water jackets surrounding the cylinders which cool the engine by directing water through passages around the engine block.

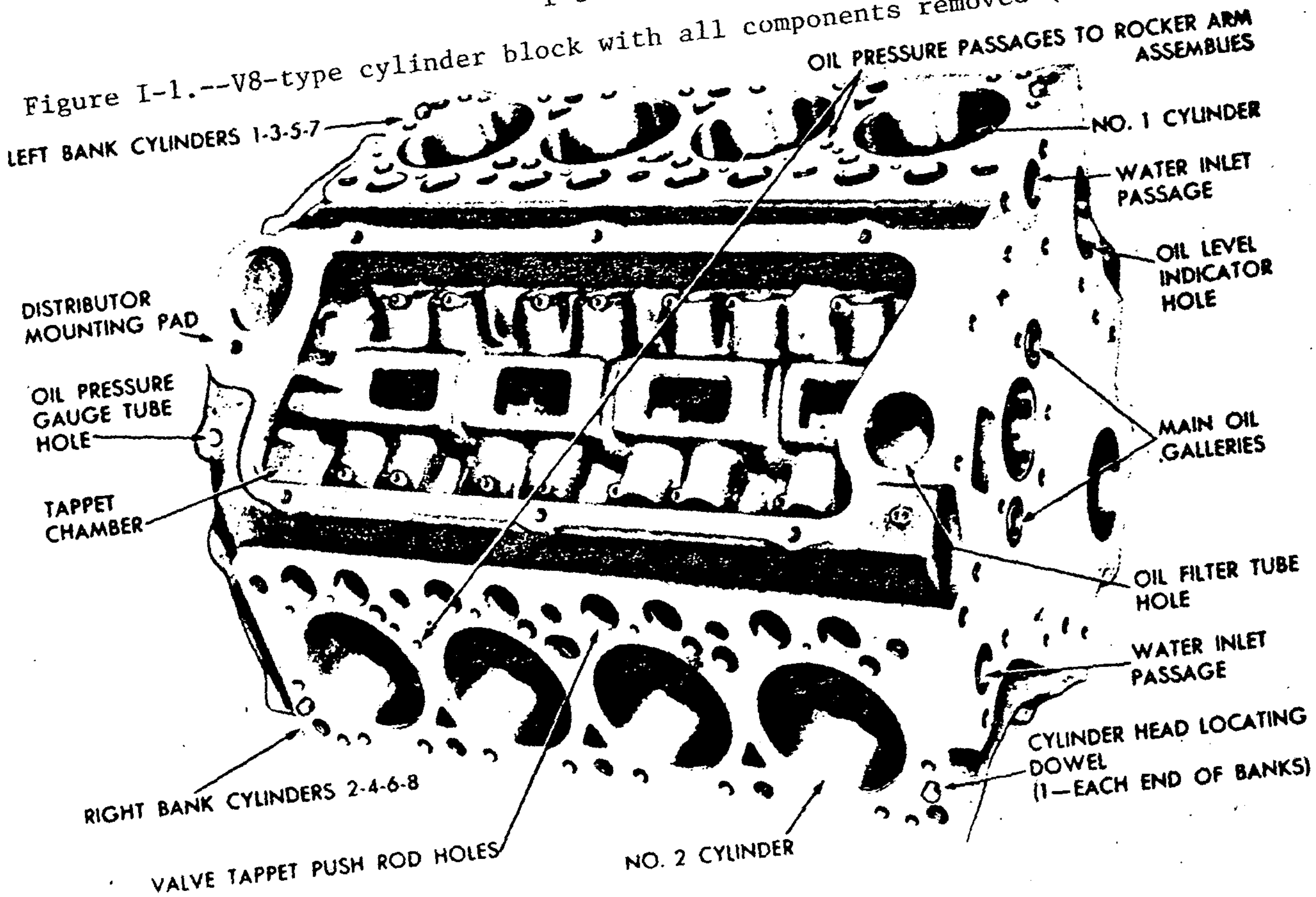
Although cast-iron engine blocks are used in a variety of engines, the products covered in this section of the report are limited to those used in passenger automobiles, trucks, and buses. Cast-iron engine blocks are also used in the manufacture of engines for marine use, lawn and garden care equipment, agricultural equipment, construction equipment, locomotive diesels, and other heavy industrial uses.

Customs Treatment

U.S. tariff treatment

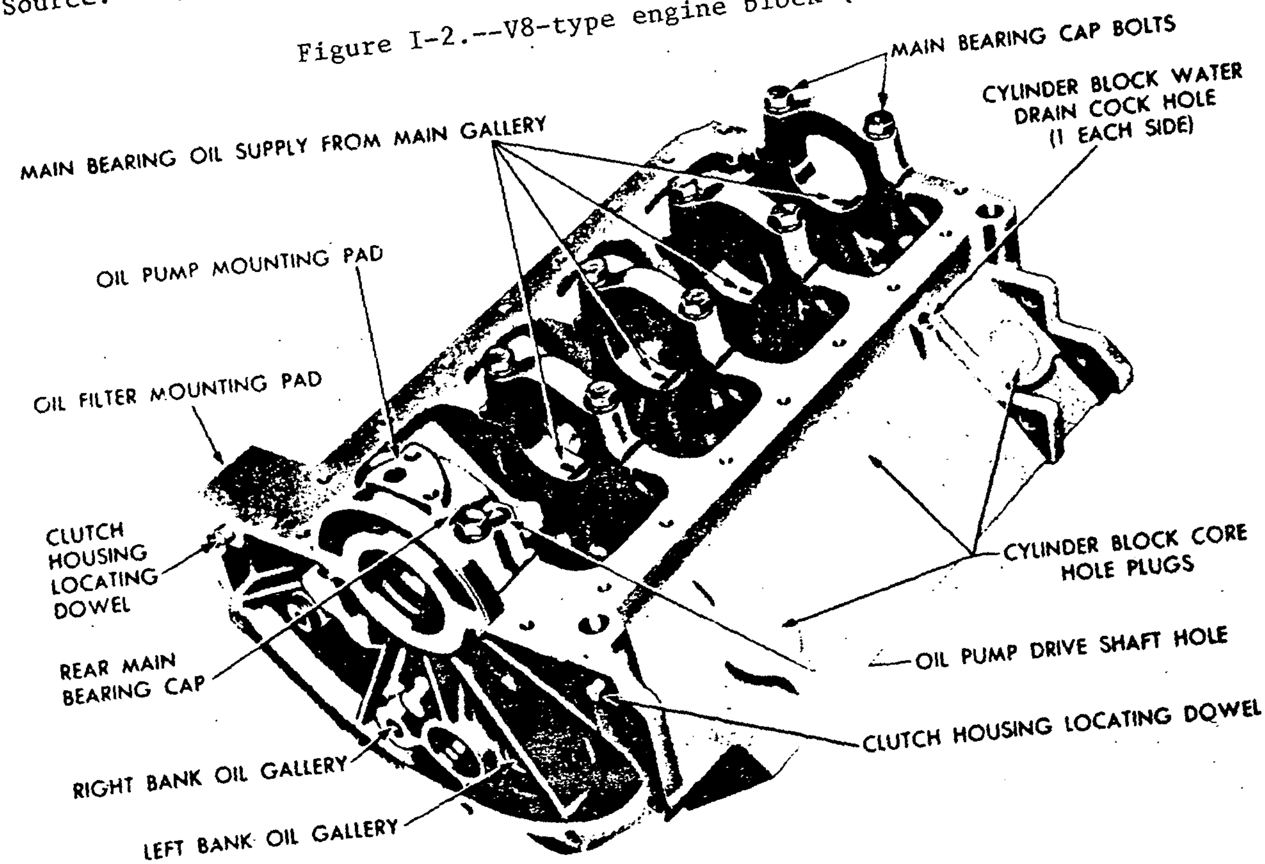
Cast-iron engine blocks for use in automobiles, trucks, and buses are classified under several items of the Tariff Schedules of the United States Annotated (TSUSA). Classification of cast-iron engine blocks primarily depends upon whether they are machined and upon the type of engine the block will be assembled with. All cast-iron engine blocks for use in automobiles are classified under TSUSA item 660.6400 provided they are not alloyed or advanced beyond cleaning or minor machining to eliminate excess metal accumulated on the block during the casting process. If the engine blocks are machined beyond the drilling of holes to permit its location in the final product then it is classified as a part of the type of engine it will be assembled with.

Figure I-1.--V8-type cylinder block with all components removed (top view).



Source: Chrysler Corp.

Figure I-2.--V8-type engine block (bottom view).



Source: Chrysler Corp.

Machined engine blocks for use in compression-ignition engines used in automobiles, trucks, and buses are classified under TSUSA item 660.7118. Machined engine blocks for use in engines other than compression-ignition engines used in automobiles, trucks, and buses are classified under TSUSA item 660.6718.

Most engine blocks of Canadian origin intended for original-equipment use enter the United States duty free. Their customs treatment is authorized by the Automotive Products Trade Act of 1965, an agreement between the United States and Canada to accord duty-free treatment to specified motor-vehicles and original motor-vehicle equipment shipped between the two countries.

The staged column 1 rates of duty are shown in table I-1. These rates of duty were reduced as a result of negotiations in the Tokyo round of the Multilateral Trade Negotiations (MTN). 1/ Detailed tariff descriptions are shown in appendix E.

Foreign tariff treatment

Most of the major foreign sources of cast-iron engine blocks use the Customs Cooperation Council Nomenclature (CCCN) system, which classifies these articles under item No. 84.06 "Parts of internal combustion engines." The present rates of duty applicable to imports of cast-iron engine blocks for use

1/ See explanation in appendix E.

Table I-1.—Cast-iron engine blocks for use in automobiles, trucks, and buses: U.S. rates of duty, by TSUS items

(Percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1—								Col. 2 rate of duty
			1982	1983	1984	1985	1986	1987	1988	1989	
660.64	Cast-iron (except malleable cast-iron) parts, not alloyed and not advanced beyond cleaning and machined only for the removal of fins, gates, sprues, and risers to permit location in finishing machinery.	Free	Free	Free	Free	Free	Free	Free	Free	Free	10%.
660.67A	Parts of piston-type engines other than compression-ignition engines.	4%	3.9%	3.8%	3.7%	3.6%	3.4%	3.3%	3.2%	3.1%	35%.
660.68	If Canadian article and original motor-vehicle equipment.	Free	Free	Free	Free	Free	Free	Free	Free	Free	3/
660.71A	Parts of compression-ignition piston-type engines.	5%	4.8%	4.7%	4.5%	4.4%	4.2%	4%	3.9%	3.7%	35%.
660.72	If Canadian article and original motor-vehicle equipment.	Free	Free	Free	Free	Free	Free	Free	Free	Free	3/

1/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP) and that certain developing countries, specified in general headnote 3(c) of the Tariff Schedules of the United States Annotated, are not eligible for the GSP.
2/ Rate effective prior to Jan. 1, 1980.
3/ Not applicable.

in automobiles, trucks, and buses for major foreign producing countries are shown in the following tabulation (in percent ad valorem):

Item No.	Description	Country	Present rate of duty	Negotiated rate of duty
84.06C2	Parts of internal combustion piston engines, other then for use in aircraft or civil aircraft.	European Community	5.7	4.9
84.06229	Parts of internal combustion piston engines for use in motor vehicles, other than pistons and piston rings.	Japan	7.5	3
84.06B004	Engine blocks for internal combustion engines.	Mexico	10	2/
84.069102	Engine blocks	Brazil	70 1/	2/

1/ Brazil's large rate of duty on imports of engine blocks is part of restrictive trade measures taken by the Brazilian Government to restrain the large current account deficit in the balance of payments. These measures were introduced during the oil crises of 1973 and in addition to high rates of duty include various import restrictions from tariff surcharges to taxes on foreign exchange purchases for the importation of goods and services and import licenses for selected commodities.

2/ Mexico and Brazil did not sign the Multilateral Trade Negotiations Agreement.

Canada classifies imports under its own tariff system, the Tariff Schedules of Canada. The vast majority of cast-iron engine blocks imported from the United States are classified for use as original equipment and eligible for duty-free entry under tariff provisions established by the Automotive Products Trade Act of 1965. The following tabulation provides the present and negotiated rates of duty applicable to Canadian imports of cast-iron blocks (in percent ad valorem):

Description	Country	Present rate of duty	Negotiated rate rate of duty
Engine blocks	Canada	Free-11.4	Free-9.2

Profile of the U.S. Industry and Major Foreign Competitors

United States

Producers of engine blocks can be classified into two major groups: (1) Captive producers which manufacture engine blocks and assemble them with other engine components to form a finished engine assembly, and (2) noncaptive producers that operate foundries and manufacture engine blocks for sale to engine producers or motor-vehicle producers. It is estimated that there are approximately 20 captive and noncaptive producers of automotive engine blocks. The majority of these firms are located in the East North Central States especially in Ohio, Michigan, and Illinois, and in the Middle Atlantic States, especially Pennsylvania and New York. The largest producers of engine blocks are the automobile producers that virtually produce all of the engine blocks used in the production of automobile engines in their own foundries. Noncaptive engine block producers on the other hand primarily serve the engine-block market for trucks and buses.

U.S. production, capacity, and capacity utilization.--Production of cast-iron engine blocks fluctuated during the 5-year period covered by this report. Production of cast-iron engine blocks declined from 11.1 million units in 1979 to 7.9 million units in 1980. Cast-iron engine block production then increased to 9.8 million units in 1981 before declining to 6.9 million units in 1982 (table I-2). During 1983, there were 8.1 million units produced, representing an overall decrease of 26.7 percent for the 5-year period covered by this report. The production of cast-iron engine blocks closely follows the trend in the production of automobiles, trucks, and buses, since the majority of engine blocks are consumed by such equipment.

Capacity utilization was at 80.3 percent in 1979 and then declined annually to a low of 52.6 percent in 1982. Such rates then increased to 56.7 percent in 1983. Automobile producers added new machinery in 1980 and 1981 to increase their production of smaller engine blocks for use in fuel-efficient 4-cylinder engines. The delivery of these machines in 1980 and 1981 contributed to the lower capacity utilization ratios experienced by the industry during 1980 and 1982. The retirement of older machinery and the decrease in the number of producing establishments as a result of the decline in demand for automobiles contributed to the decline in production capacity during 1982. The large increase in capacity during 1983 is primarily attributed to the increase in the production of engine blocks and stable levels of production capacity.

Table I-2.--Cast-iron engine blocks: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production units---:	11,090,243	7,926,914	9,806,037	6,925,873	8,132,105
Production capacity do----:	13,805,066	13,299,066	15,954,056	13,176,466	14,341,466
Capacity utilization percent--:	80.3	59.6	61.5	52.6	56.7

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

A measure of the technological development within the industry is the extent to which producers have installed modern equipment and introduced automated molding lines. Table I-3 aggregates responses to the Commission's questionnaire concerning the age of such equipment in use by U.S. producers, as of January 1, 1984.

Table I-3.--Cast-iron engine blocks: Machinery and equipment in manufacturing facilities of reporting producers, as of Jan. 1, 1984, by age of the machine

(In units)

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	1	0	8	32	8
Molding lines					
Automated	1	6	8	10	7
Manual	0	0	0	3	8
Total	2	6	16	45	23

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The majority of machinery and equipment used to manufacture cast-iron engine blocks is over 10 years old and 25 percent of such machinery is 20 years or older. The number of automated molding lines in use as of January 1, 1984 amounted to 32 and exceeded the number of manual molding lines which totaled 11.

U.S. employment, hours worked, and wages.--The average U.S. cast-iron engine block establishment employs between 1,000 and 1,300 employees. Decreased demand for engine blocks during 1979-83 has contributed to annual declines in employment during this period. Employment declined annually during 1979-82 despite the increase in shipments during 1981. In 1979, there were approximately 35,808 employees in the industry, 31,486 of whom were production workers. Total employment steadily declined to an estimated 19,956 in 1982, 17,373 of whom were production employees. Employment increased to 25,583 workers in 1983. There was an employment decline of 28.6 percent in 1983 over the level of employment in 1979. Employment declines in this industry can be partially explained by increases in productivity. Productivity, as measured in terms of output per production employee, increased by 2.3 percent, from 310 units per production employee in 1979 to 317 units per production employee in 1983. The increase in productivity can be explained by the introduction of newer more efficient foundry machinery. Productivity will continue to increase as more efficient manufacturing methods are adopted by the engine block producers.

Respondents to the Commission's survey reported man-hours worked followed the declining trend in the number of employees, decreasing from 61.9 million hours in 1979 to 32.7 million hours in 1982, and then increased to 46.5

million hours in 1983. Consequently, total wages fell from $692.7 million in 1979, to $484.4 million in 1982, and then increased dramatically to $735.1 million in 1983, as shown in table I-4.

Table I-4.--Cast-iron engine blocks: Numer of employees and production and related workers in operation producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons---------	35,808	29,590	27,683	19,956	25,583
Production and related workers--------------	31,486	25,908	24,387	17,373	22,604
Man-hours worked 1,000 hours---	61,915	50,491	48,587	32,651	46,545
Wages paid 1,000 dollars--	692,693	639,129	669,413	484,360	735,085

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

A comparison of wages paid to production workers in foundries producing cast-iron engine blocks (from questionnaire responses) and wages paid in all operating U.S. manufacturing establishments (from official statistics of the Department of Labor) indicates that production workers in this segment of the U.S. foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Foundries producing cast-iron engine blocks 1/	All operating U.S. manufacturing establishments 2/
1979----------	$9.67	$6.00
1980----------	11.77	7.27
1981----------	12.81	7.99
1982----------	14.09	8.49
1983----------	14.48	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The quantity of cast-iron engine blocks shipped by U.S. producers fluctuated during the period covered by this report, decreasing in 1980, increasing in 1981, decreasing in 1982, and increasing again in 1983. The quantity of U.S. producers' shipments declined from 11.0 million units in 1979 to 7.5 million units in 1983, representing a decline of almost 32 percent. The value of U.S. producers' shipments mirrored the trend in the quantity of U.S. producers' shipments, decreasing from

$847.1 million in 1979 to $650.4 million in 1983, or by 23 percent. The unit value of cast-iron engine blocks produced in U.S. establishments increased from $76.91 in 1979 to $86.50 in 1983, as shown in table I-5.

Table I-5.--Cast-iron engine blocks: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Per unit
1979	11,013,851	847,092	$76.91
1980	7,628,918	613,200	80.38
1981	8,239,483	622,782	75.59
1982	6,849,353	538,239	78.58
1983	7,519,419	650,426	86.50

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Virtually all of the units reported in the Commission's questionnaire as producers' shipments of engine blocks are manufactured for use in automobiles, trucks and buses. The trends in quantity closely followed factory shipments of U.S.-produced automobiles, trucks, and buses, as reported by the Motor Vehicle Manufacturers Association and shown in the following tabulation (in units):

	U.S. factory sales of automobiles	U.S. factory sales of trucks	U.S. factory sales of buses	Total
1979	8,419,226	3,036,706	32,385	11,488,317
1980	6,399,840	1,667,283	34,385	8,101,508
1981	6,255,340	1,700,452	27,295	7,983,087
1982	5,049,184	1,879,180	26,260	6,954,624
1983	6,739,223	2,387,685	26,212	9,153,120

U.S. exports of cast-iron engine blocks closely followed the trend of U.S. shipments during 1979-82. U.S exports decreased from 247,132 million units in 1979 to 199,816 million units in 1980. Exports then increased to their peak in 1981 at 286,656 million units. U.S. exports then decreased significantly to 231,392 million units in 1982 and 116,871 million units in 1983. Comparable shipment value increased from $21.3 million in 1979 to $31.4 million in 1981, and then declined sharply to $7.5 million in 1983. The value of engine blocks increased annually from $86.30 per unit in 1979 to $109.80 per unit in 1982 and then declined in 1983 to $63.90 per unit, as shown in table I-6.

Table I-6.--Cast iron engine blocks: U.S. exports of domestic merchandise, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Per unit
1979	247,132	21,347	$86.3
1980	199,816	20,648	103.3
1981	286,656	31,372	109.4
1982	231,392	25,405	109.8
1983	116,871	7,468	63.9

U.S. producers' inventories.--The combined end-of-period inventories of producer respondents increased irregularly during 1979-83, as shown in the following tabulation:

	Quantity (units)
1979	34,039
1980	118,297
1981	359,581
1982	116,666
1983	225,264

U.S. producers' inventories increased from 34,039 units in 1979 to 359,581 units in 1981, and then decreased to 116,666 units in 1982. During 1983 respondents indicated that their combined end-of-period inventories amounted to 225,264 units, representing an overall increase of 562 percent for the 5 year period covered by this report.

Financial experience of U.S. producers.--Net sales, as reported by respondents to the Commission's questionnaire, decreased from $2.4 billion in 1979 to $1.7 billion in 1980, and then increased to $1.8 billion in 1981. Net sales dipped to their lowest point at $1.4 billion in 1982 and then increased to $2.2 billion in 1983. The decline in net sales during 1980 and 1982 was concurrent with the decrease in shipments of cast-iron engine blocks during those years. Net losses were reported in every year except in 1979 and 1983 when the ratio of net profit to sales reached 6.6 percent and 10.6 percent, respectively. The ratio of net loss to net sales increased from 3.0 percent in 1980 to 7.4 percent in 1981 before decreasing to 1.1 percent in 1982 as shown in table I-7.

Table I-7.--Cast-iron engine blocks: U.S. producers' net sales and net profit (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales 1,000 dollars--	2,352,886	1,723,242	1,790,360	1,425,844	2,234,272
Net operating profit or (loss) 1,000 dollars--	154,548	(50,985)	(132,451)	(16,061)	237,358
Ratio of net operating profit or (loss) to net sales-percent--	6.6	(3.0)	(7.4)	(1.1)	10.6

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic and foreign facilities used in the production of foundry products, as reported in response to the Commission's questionnaires, are shown in table I-8.

Table I-8.--Cast-iron engine blocks: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	5,409	3,593	4,006	2,168	84
Buildings, leasehold improvements	22,275	20,016	5,557	2,821	1,08
Machinery, equipment, and fixtures:					
New	183,987	146,260	103,267	68,951	43,18
Used	7	188	1,176	915	5
Total	211,678	170,057	114,006	74,855	45,16
Facilities in other countries:					
Land, land improvements	0	19	0	3	
Buildings, leasehold improvements	259	136	630	489	10
Machinery, equipment and fixtures:					
New	5,260	2,684	3,678	3,663	3,48
Used	0	0	0	0	
Total	5,519	2,839	4,308	4,155	3,58

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Total capital expenditures on domestic facilities used in the production of foundry products, as reported in response to the Commission's questionnaires, decreased annually from $211.7 million in 1979 to $45.2 million in 1983. Machinery, equipment, and fixtures were the major components of capital expenditures on domestic facilities, representing over 89 percent of all capital expenditures on domestic facilities. Expenditures on new machinery, equipment, and fixtures decreased from $184 million in 1979 to $43.1 million in 1983. Expenditures on used machinery equipment and fixtures increased from $7,000 in 1979 to $915,000 in 1982 and then declined to $56,000 in 1983. Capital expenditures on foreign facilities used in the production of foundry products, as reported in responses to the Commission's questionnaires, decreased irregularly from $5.5 million in 1979 to $3.6 million in 1983. U.S. producers' capital expenditures on foreign facilities represented 3.2 percent of their capital expenditures on all facilities.

Research and development expenditures.--Respondents to the Commission's questionnaires reported decreases in their expenditures on research and development during 1979-83, as shown in data provided by questionnaire respondents (table I-9).

Table I-9.--Cast-iron engine blocks: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

Year	Total expenditures
	1,000 dollars
1979	13,268
1980	13,683
1981	13,370
1982	14,135
1983	12,175

Source: Compiled from official data submitted in response to questionnaires of the U.S. International Trade Commission.

Respondents to the Commission's questionnaires reported a slight increase in producers' research and development expenditures from $13.3 million in 1979 to $13.7 million in 1980, and then a decline in such expenditures to $13.4 million in 1981. R & D expenditures increased to $14.1 million in 1982, their highest level during 1979-83 before decreasing to $12.2 million in 1983.

Major foreign competitors

The major sources of U.S. imports of cast-iron engine blocks are Canada, Japan, West Germany, Mexico, Brazil, and the United Kingdom. Canadian producers have maintained the largest share of the U.S. import market. One major U.S. automobile producer reportedly imports virtually all cast-iron engine blocks from Canada. Well-established foundries which primarily serve local automotive production are located in West Germany, the United Kingdom, and Japan. Mexico and Brazil have recently increased their capacity to produce cast-iron engine blocks. Although Brazil and Mexico have recently emerged as major competitors, some of the most advanced foundries in the world can be found in these countries. Many of these plants are manufacturing engine blocks that are transferred to engine assembly plants, and the finished engines with cast-iron blocks are in turn exported to the United States. U.S. imports of such blocks from Mexico and Brazil have increased dramatically during 1983.

Structural Factors of Competition Between U.S. and Foreign Industries

Industry evaluation of structural factors of competition indicates that the strength of U.S. cast-iron engine block producers primarily stems from their competitive edge with Japan and West Germany in fuel availability and cost, and with Japan in raw material advantages (table I-10). The advantage of foreign producers of cast-iron engine blocks is principally attributed to lower costs for labor, along with various facets of government support. Foreign industries, with the exception of Mexico, are also generally ranked as equal to or better than the United States in production technology and marketing structure. The United States is ranked about evenly with its other major foreign competitors in these structural competitive factors for which a discussion follows.

Table I-10.--Cast-iron engine blocks: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

Item	Competitive advantage 1/				
	Canada	Japan	West Germany	Mexico	Brazil
Fuel:					
Availability	S	D	D	D	S
Cost	F	D	D	F	F
Raw material:					
Availability	S	D	S	S	S
Cost	S	D	S	D	F
Capital:					
Availability	S	F	S	D	D
Cost	S	S	S	D	D
Ability of industry profits to attract funds	S	F	F	D	S
Labor:					
Availability	S	S	S	F	F
Cost	F	F	F	F	F
Production technology	S	F	S	D	F
Marketing:					
Channels of distribution	S	S	D	D	F
Responsiveness to orders	S	F	S	D	S
After-sale service capabilities	S	F	S	D	D
Government involvement:					
Subsidies	S	S	F	F	2/
Research and development assistance	S	F	F	S	S
Tariff levels on imports	S	F	F	F	F
Nontariff barriers to imports	S	F	S	F	F
U.S. Government regulations that increase costs	S	S	F	F	F
Foreign government regulations that increase costs	S	S	F	S	2/

1/ D=Domestic advantage; F=Foreign advantage; S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Raw materials

U.S. producers were asked to assess the availability and cost of raw materials as a factor of competition between the United States and major foreign suppliers. The United States maintains a competitive advantage with Japan in the cost and availability of raw materials and with Mexico in raw-materials cost. The United States is at a competitive disadvantage with Brazil with respect to raw-material costs.

Official statistics on prices of ferrous scrap and pig iron compiled by the United Nations seem to correspond with U.S. producers' competitive assessment on raw materials. Table I-11 shows that the United States maintained a competitive advantage with Japan in the price of ferrous scrap during 1982, whereas the price of ferrous scrap in the United Kingdom was lower than that in the United States during 1980-83. The price of pig iron in the United States was comparatively lower than that of other major foreign competitors.

Table I-11.--Ferrous scrap and pig iron: Prices in selected countries, 1979-83

(Per short ton)

Year	Ferrous scrap			Pig iron			
	United States	United Kingdom	Japan	United States	United Kingdom	Germany	France
1979-----	$90.36	$101.42	1/	$181.08	$216.26	$241.26	$248.00
1980-----	85.90	83.16	1/	181.26	237.80	222.80	247.48
1981-----	89.74	54.70	$86.22	184.20	193.40	193.10	217.64
1982-----	59.56	51.02	81.44	1/	163.00	187.08	213.14
1983-----	69.02	58.44	1/	1/	150.82	171.88	196.62

1/ Not available.

Source: Compiled from official statistics of the United Nations.

A large share of the scrap iron used to make cast-iron engine blocks are melted in cupolas. 1/ Metallurgical coal or coke is a gray infusible product made from the distillation of bituminous coal and petroleum, and used as a fuel in cupola melting. Industry sources indicate that coke accounts for approximately 15 percent of the total cost of production of cast-iron engine blocks. Quarterly prices of metallurgical coal are available for all major foreign competitors of engine blocks except Brazil, Mexico, and the United Kingdom (table I-12).

1/ Cupolas are refractory lined cylinders with openings at the top for the escape of gases and smaller openings on the bottom through which air is blasted and molten metal and slag is released. Beds of coke are laid in the cupola with alternating beds of metal. When the blast is turned in, the temperature in the cupola reaches over 2327 degrees Fahrenheit. Cupolas are the most efficient melting furnaces.

Table I-12.--Metallurgical Coal: Prices to industrial users in selected countries, by quarters, 1979-82

(Per short ton)

Period	United States	Canada	West Germany	Japan
1979:				
January-March	1/	$57.70	$58.60	$54.93
April-June	1/	59.11	57.36	54.83
July-September	1/	58.69	59.84	55.67
October-December	1/	58.28	61.96	55.29
1980:				
January-March	$56.34	60.45	66.25	56.20
April-June	56.52	60.14	64.88	59.88
July-September	56.01	60.74	66.17	61.56
October-December	56.07	59.45	61.47	61.36
1981:				
January-March	60.76	58.96	78.47	61.79
April-June	59.54	64.06	71.95	61.32
July-September	64.38	63.37	67.32	66.32
October-December	65.10	64.70	72.95	68.79
1982:				
January-March	65.05	63.79	75.14	66.82
April-June	66.36	64.51	74.12	67.72
July-September	64.48	64.40	71.04	68.28
October-December	63.18	64.57	70.47	69.27

1/ Not available.

Source: U.S. Department of Energy, Energy Information Administration, International Energy Prices, 1978-82, January 1984, pp. 60 and 61.

The price of metallurgical coal for industrial users in the United States increased from $56.34 in January-March 1980 to $63.18 in October-December 1982. The price of metallurgical coal for industrial consumers in Canada increased from $57.70 in January-March 1979 to $64.57 in October-December 1982. The price of metallurgical coal for industrial users in West Germany increased from $58.60 in January-March 1979 to $70.47 in October-December 1982. The price of metallurgical coal for industrial users in Japan increased from $54.93 in January-March 1979 to $69.27 in October-December 1982.

Energy

The cost of energy accounts for approximately 9 percent of the total cost in the production of cast-iron engine blocks of which natural gas and electricity are the largest components. Natural gas is purchased by the engine block producers to operate furnaces used in the heat treatment of engine blocks. Electricity is used to operate the molding machines, coresetting machines, automatic matchplate machines, and other machinery and equipment used in the production of castings.

Quarterly data on the price of natural gas for industrial use are available for all major foreign competitors of cast-iron engine blocks except Mexico and Brazil. The data indicate that the United States maintains a competitive advantage in the price of natural gas with Japan, the United Kingdom, and West Germany, whereas the United States is at a competitive disadvantage with Canada.

The price of natural gas for industrial users in the United States increased from $1.78 per 1,000 cubic feet in January-March 1979 to $3.91 per 1,000 cubic feet in October-December 1982. The price of natural gas in Canada was the most competitive price, and increased from $1.55 in January-March 1979 to $2.98 in October-December. West Germany's price of natural gas to industrial users increased from $2.84 per 1,000 cubic feet in January-March 1979 to $4.67 per 1,000 cubic feet is October-December 1982. The highest price of natural gas was reported by Japan, which increased from $9.81 in January-March 1979 to $10.21 in October-December 1982. The price of natural gas for industrial users in the United Kingdom exhibited an irregular trend, increasing from $2.43 during January-March 1979 to $4.54 in January-March 1981, and then decreasing to $3.69 in October-December 1982, as shown in table I-13.

Table I-13.--Natural gas: Prices to industrial users in selected countries, by quarters, 1979-82

(Per 1,000 cubic feet)

Period	United States	Canada	West Germany	Japan	United Kingdom
1979:					
January-March	US$1.78	US$1.55	$2.84	$9.81	$2.43
April-June	1.78	1.52	2.78	9.02	2.48
July-September	1.86	1.46	2.90	9.02	2.60
October-December	2.05	1.56	2.98	8.24	2.88
1980:					
January-March	2.37	1.62	3.83	10.55	3.39
April-June	2.44	1.61	3.75	11.06	3.68
July-September	2.61	1.65	3.82	11.58	4.00
October-December	2.64	1.88	3.55	12.09	4.44
1981:					
January-March	2.94	2.21	4.20	12.87	4.54
April-June	2.96	2.20	3.86	11.82	4.20
July-September	3.08	2.33	3.61	11.29	3.72
October-December	3.34	2.47	3.91	11.82	4.02
1982:					
January March	3.59	2.44	4.98	11.29	4.05
April-June	3.61	2.72	4.92	10.73	3.88
July-September	3.71	2.59	4.71	10.21	3.72
October-December	3.91	2.98	4.67	10.21	3.69

Source: U.S. Department of Energy, Energy Information Administration, International Energy Prices, 1978-82, January 1984, pp. 48 and 49.

Mexico maintains a favorable competitive position in natural gas production. During 1981, Mexico produced 1,032 billion cubic feet of natural gas. Mexico exported 105 billion cubic feet and imported only 3 billion cubic feet. Mexico's apparent consumption during 1981 was 930 billion cubic feet. In 1981, Mexican natural gas supported almost all of Mexico's domestic demand for natural gas.

Quarterly data on electricity prices for industrial use indicate that the United States maintains a competitive advantage in the price of electricity with Japan, West Germany, and the United Kingdom, whereas Canada maintains a competitve advantage vis-a-vis the United States. Electricity prices paid by industrial consumers in the United States increased from 2.8 cents per kilowatt hour in 1979 to 5.1 cents per kilowatt hour in October-December 1982. The overall increase in electricity prices during 1979-82 amounted to 82 percent. The price of electricity paid by the industrial sector in Canada increased from 1.7 cents per kilowatt hour in January-March 1979 to 2.4 cents in October-December 1982, or by 41 percent. The price in West Germany increased from 5 cents per kilowatt hour to 5.7 cents per kilowatt hour during July-September 1980 and then declined to 5 cents per kilowatt hour in October-December 1981. Japan's prices on electricity were the highest, increasing irregularly from 6.5 cents per kilowatt hour in January-March 1979 to 10.5 cents per kilowatt hour in January-March 1981, and then declining to 8.8 cents per kilowatt hour in October-December 1982. The price of electricity in the United Kingdom followed a similar trend, increasing from 4.3 cents per kilowatt hour in January-March 1979 to 6.5 cents per kilowatt hour in January-March 1981, and then declining to 5 cents per kilowatt hour in October-December 1982, as shown in table I-14.

Table I-14.--Electricity: Prices to industrial users in selected countries, by quarters, 1979-82

(In U.S. cents per kilowatt hour)

Period	United States	Canada	West Germany	Japan	United Kingdom
1979:					
January-March	2.8	1.7	5.0	6.5	4.3
April-June	2.9	1.7	4.9	6.3	4.0
July-September	3.1	1.7	5.1	6.3	4.4
October-December	3.2	1.7	5.2	5.7	4.9
1980:					
January-March	3.3	1.9	5.7	5.6	5.2
April-June	3.5	2.0	5.6	9.2	5.2
July-September	3.9	2.0	5.7	9.7	5.5
October-December	3.8	1.9	5.3	10.1	6.2
1981:					
January-March	3.9	2.1	5.4	10.5	6.5
April-June	4.1	2.2	5.0	10.0	5.3
July-September	4.5	2.1	4.7	9.5	4.7
October-December	4.4	2.2	5.0	10.0	5.4
1982:					
January-March	4.7	2.3	1/	9.5	5.9
April-June	4.8	2.4	1/	9.3	4.9
July-September	5.1	2.4	1/	8.8	4.7
October-December	5.1	2.4	1/	8.8	5.0

1/ Not available.

Source: U.S. Department of Energy, Energy Information Administration, International Energy Prices, 1978-82, January 1984, pp. 54 and 55.

Capital

The United States maintains a competitive advantage in the area of the cost of capital with Canada, Brazil, and Mexico; the two other major trading partners, West Germany and Japan maintain a competitive advantage with the United States. The cost of capital is important to both domestic and foreign producers in order for them to finance necessary changes and improvements such as opening new production facilities, acquiring new machinery, or expanding into new product lines or market segments. This is especially important to U.S. producers, whose operations are becoming more capital intensive in an effort to compete with imports.

The short-term cost of capital for the United States and its major trading partners for cast-iron engine blocks, derived from the International Monetary Fund, International Financial Statistics, June 1984, are shown in the following tabulation (in percent per annum):

Country	1979	1980	1981	1982	1983
Brazil	32.62	33.03	58.61	67.58	1/
Canada	11.68	12.80	17.72	13.64	9.30
Mexico	17.89	27.73	33.23	57.44	1/
Japan	1/	1/	7.69	7.12	6.72
West Germany	6.69	9.54	12.11	8.86	5.78
United States	11.20	13.36	16.38	12.26	9.09

1/ Not available.

The United States also maintained a competitive advantage with Brazil, Mexico, and Canada in the long-term cost of capital. Although comparable data are not available on Brazil and Mexico, it is believed that the short-term rates are also higher in those countries than those in the United States. The following tabulation derived from the International Monetary Fund, International Financial Statistics, June 1984, lists the long-term interest rates for the United States and its major trading partners (in percent per annum):

Country	1979	1980	1981	1982	1983
Brazil	1/	1/	1/	1/	1/
Canada	10.26	12.49	15.22	14.26	11.79
Mexico	1/	1/	1/	1/	1/
Japan	7.69	9.22	8.66	8.06	7.42
West Germany	7.40	8.50	10.40	9.00	7.90
United States	9.71	11.55	14.44	12.92	11.34

1/ Not available.

Labor

Foreign producers in Canada, West Germany, Japan, the United Kingdom, Brazil, and Mexico had a competitive advantage with U.S. producers in the hourly compensation for production workers during 1983, as shown in table I-15. These data correspond with questionnaire responses of U.S. producers, indicating that these foreign producers maintained a competitive advantage in the cost of labor.

Table I-15.--Average hourly compensation costs for production workers, all manufacturing, 1979-83, by selected countries

(In U.S. dollars)

Country	1979	1980	1981	1982 1/	1983 2/
United States	$9.07	$9.89	$10.95	$11.68	$12.26
Canada	8.13	8.91	9.80	10.68	11.44
West Germany	11.29	12.33	10.54	10.44	10.41
Japan	5.49	5.61	6.18	5.70	6.20
United Kingdom	5.50	7.28	7.13	6.80	6.48
Brazil	1.73	1.70	2.15	2.47	1.68
Mexico	2.33	2.95	3.62	1.97	1.45

1/ Preliminary estimates.
2/ Provisional estimates.

Source: Official statistics of the U.S. Department of Labor.

Hourly compensation costs for production workers in the United States increased from $9.07 in 1979 to $12.26 in 1983, or by 35.2 percent; hourly compensation of Canadian production workers increased by 40.7 percent, increasing from $8.13 in 1979 to $11.44 in 1983. Hourly compensation costs during 1979-83 also increased in Japan and the United Kingdom by 12.9 percent and 17.8 percent, respectively.

Production technology

U.S. producers responding to the Commission's questionnaires indicated that Japan and Brazil had a competitive advantage over the United States in production technology; Mexico was at a competitive disadvantage to the United States. Cast-iron engine block producers indicated that state-of-the art-manufacturing methods can be found in all countries including Mexico and Brazil. Newer technology includes automatic pouring furnaces, automatic molding lines, and automatic coresetting machines which increase the per hour production of castings. U.S. producers indicated that they introduced automated production technology in an attempt to increase productivity and lower labor costs. The introduction of robotics has also increased productivity and achieved a more consisted control on quality. Robots are used: (1) in the core area to set, remove, assemble, and stack cores; (2) in the grinding area for accurate grinding; and (3) at the end of the assembly line to stack and package castings. The introduction of automated equipment has allowed U.S. foundries that have implemented them to increase their productivity. However, the introduction of such machinery has not been sufficient to overcome the advantages of cheaper labor especially in Brazil and Mexico.

Marketing

Cast-iron engine blocks for automobiles, trucks, and buses are generally distributed to two major types of customers. Engine blocks are sold to either the automotive producers or to engine manufacturers. In the aftermarket, engine blocks are sold to automobile dealers or to automobile repair shops. The aftermarket accounts for a smaller portion of total U.S. consumption of automobile engine blocks.

The captive producers do not market their products since all engine blocks are produced for the company's consumption. All other engine block producers market their products using a competitive-bid process, and by utilizing an in-house sales force, emphasizing quality and delivery. Foreign manufacturers use U.S. sales agents. These foreign producers generally emphasize quality and offset locational disadvantages with U.S.-based inventories and consignment arrangements.

U.S. producers' inventories of automotive cast-iron engine blocks increased irregularly from 34,039 units in 1979, to peak at 359,581 units in 1981, and then declined to 225,264 units in 1983 (table I-16). U.S. importers' inventories followed a different trend decreasing from 1,325 units in 1979 to 850 units in 1982, and then slightly increasing to 896 units in 1983.

Table I-16.--Cast-iron engine blocks: Inventories held by producers and importers, as of Dec. 31, 1979-Dec. 31, 1983

(In units)

Year	Producers' inventories	Importers' inventories
1979	34,039	1,325
1980	118,297	1,210
1981	359,581	935
1982	116,666	850
1983	225,264	896

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Most of the marketing effort is directed toward the motor-vehicle producers in the Midwestern region of the United States. Since castings are custom designed products, company salesmen are generally also engineers, with a technical ability to read blueprints and to provide consultation to purchasers before the initial production of the casting.

Government involvement

U.S. producers of cast-iron engine blocks indicated that Government involvement in the form of performance requirements was the most frequent problem affecting trade of cast-iron engine blocks. 1/ The United States does not impose any performance requirements on foreign-owned affiliates of the United States at either the Federal or State level. However, legislation being debated in the U.S. Congress would impose local content requirements on most motor vehicles manufactured or sold in the United States.

Trade of engine-blocks between the United States and Canada is covered under the Automotive Products Trade Act of 1965. This law contains two formal requirements regarding the production and sale of automotive equipment in Canada by subsidiaries of U.S. firms. It also contains an informal requirement involving the growth of Canadian automotive production within Canada. The production-sales ratio component of the law requires U.S. automotive producers in Canada to produce automotive equipment in Canada that is equal in value with the automotive products that it sells in Canada. The Canadian value-added provision of the law requires automotive producers to at least maintain the value of the dollar investments agreed upon by the United States and Canada during 1965, the base year of the agreement. The growth requirement calls for U.S. automobile producers to increase their Canadian value added by specified amounts over the base period levels of 1965.

Mexico maintain three important performance requirements on automotive production: (1) domestic content requirement; (2) minimum export levels; and (3) restrictions on import levels. Mexican laws mandate that specified portions of automotive equipment manufactured or assembled in Mexico be produced in Mexico. 2/ Mexico also places restrictions on imports levels. U.S. automotive producers in Mexico are required to export $1 of automotive products for each $1 of its imports. However, as a firms' exports of automotive equipment increases, its quota on imports also increases proportionally. As the firms' exports decreases its quota on imports drops.

Brazil maintains domestic content rules but does not require minimum import or maximum export levels. Brazil's domestic content laws are believed to be the highest in the world. 3/ Although Brazil does not require specific import or export requirements, U.S. automotive firms are required to maintain a positive trade balance in their trade of automotive equipment. 4/ There are no known performance requirements in Japan, the United Kingdom, or West Germany.

1/ There are three primary foreign-trade related performance requirements in use at this time. They include minimum export levels, restrictions on imports, and local content rules.

2/ These domestic content requirements are 75 percent for automobiles and 85 percent for commercial vehicles.

3/ These domestic content requirements are 85 percent on automobiles, 82 percent on light trucks, 80 percent on heavy duty trucks, and 95 percent on all other vehicles.

4/ Performance requirements are not a precondition for foreign investment in Brazil. Brazil maintains a system of incentives to promote priority economic sectors and maintains high duty rates to restrict imports.

U.S. producers of cast-iron engine blocks cited West Germany and Mexico as benefiting from subsidies designed to facilitate exports. Research and development assistance was cited as providing Japan and West Germany a competitive advantage.

Virtually all major sources of cast-iron engine blocks (except Canada) were cited as maintaining higher tariff rates. The responses to the Commission's questionnaires seem to correspond with the data on tariff rates presented in a previous section of this report. These data indicate that tariff rates are higher in all the major importing countries, except for Canada where the majority of U.S. imports are eligible for duty-free treatment. Nontariff barriers were cited by U.S. producers as benefiting producers in Japan, West Germany, Brazil, and Mexico.

A major complaint of U.S. producers was that environmental protection regulations and occupational health and safety rules imposed an unrealistic economic burden on domestic producers. Virtually all U.S. producers indicated that these rules were either less severe or nonexistent in the major foreign countries manufacturing cast-iron engine blocks.

The U.S. Market

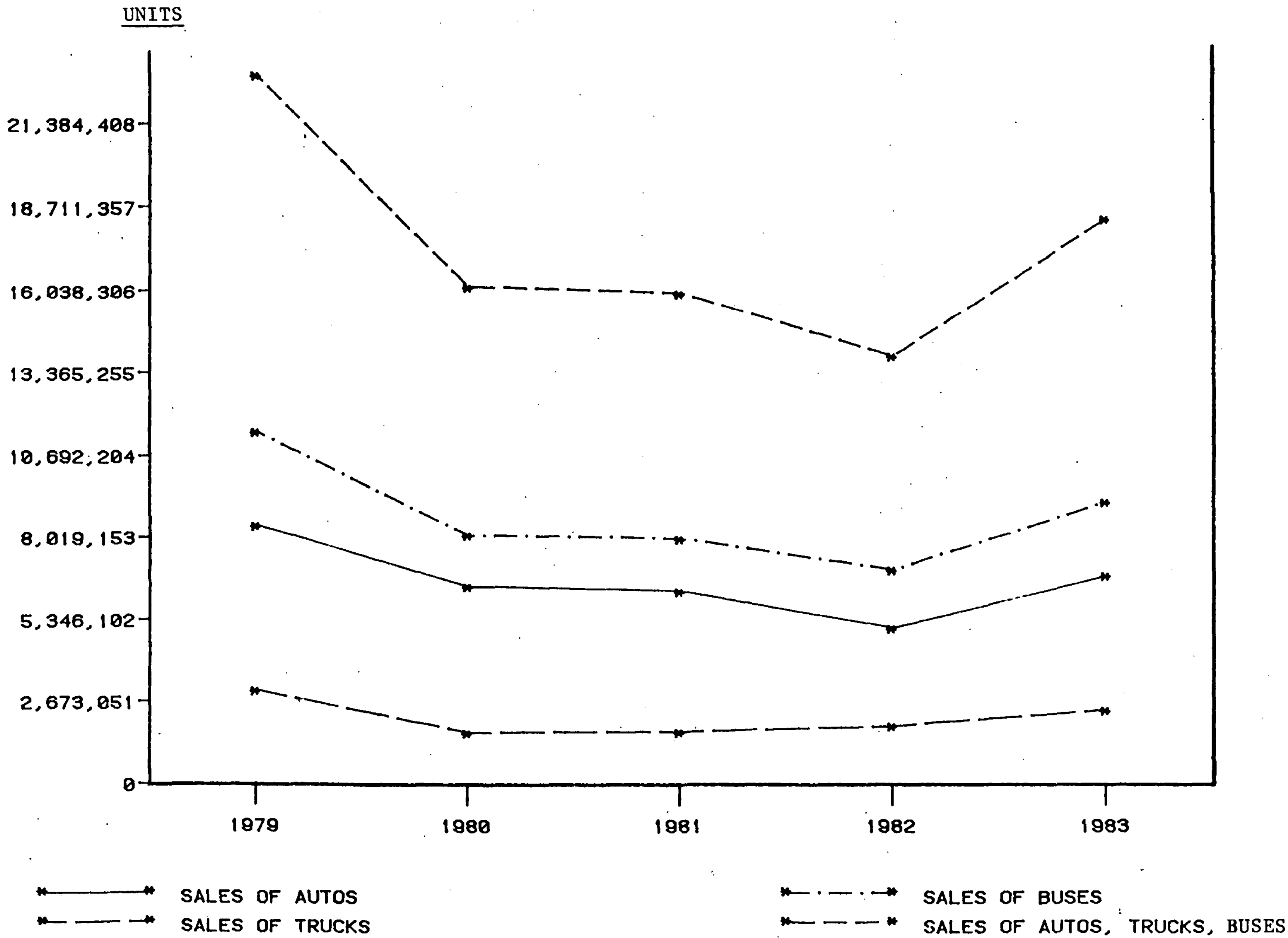
Domestic market profile

Virtually all of the engine blocks produced are consumed by the automobile, truck, and bus producers. Most of the engine blocks produced for automobiles are made in the automobile producers' foundries and transferred to other plants within the company to be assembled into finished engines. The U.S. engine block market showed major fluctuations in economic growth. The demand for engine blocks is directly influenced by the demand for automobiles, trucks, and buses. Declines in consumer purchases of these items during 1980, 1981, and 1982 created a decline in demand for engine blocks. Figure I-3 illustrates the trends in factory sales of automobiles, trucks, and buses. The figure shows that declining demand for automobiles and buses was large enough to offset the continued increase in demand for trucks during 1980-82.

The size of automobile engines has undergone a dramatic shift from V-8 cylinder engines to 4-cylinder engines. During 1979 V-8 cylinder engines accounted for 59 percent of total U.S. automobile production. In 1983, the number of automobiles with V-8 cylinder engines had decreased to only 32.2 percent of all automobiles produced in the United States. During the same period, 4-cylinder engines increased from 17.4 percent of U.S. automobile production to 38.7 percent, as shown in figure I-4. Although downsizing has stimulated the demand for smaller size engine blocks, since 1979 there has been a reduction in the overall demand for all sizes of engine blocks. A large number of facilities have closed because they have been instantly outmoded and replaced with newer plants. The newer plants equipped with new technology have been operating at lower levels of production than the plants that they replaced. 1/

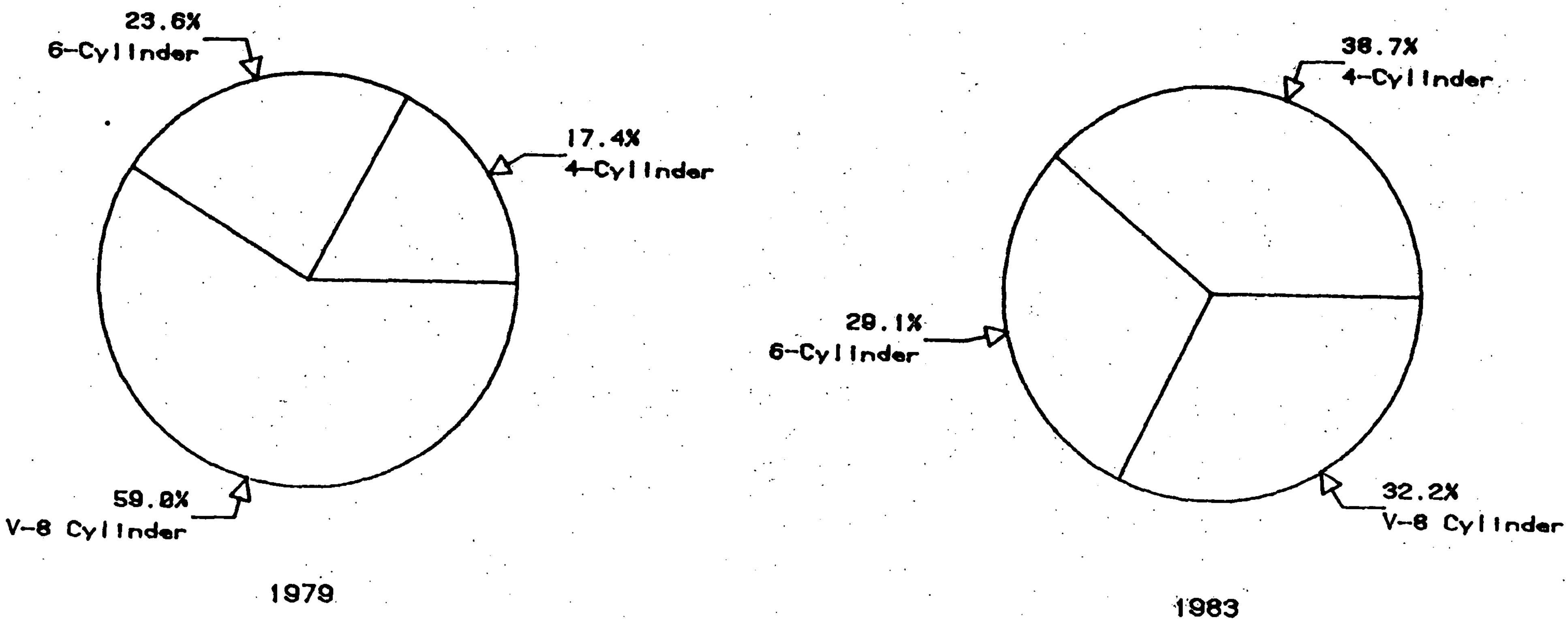
1/ Transcript of the hearing held before the U.S. International Trade Commission, July 18, 1984, p. 68.

Figure I-3.--U.S. factory sales of automobiles, trucks, and buses, 1979-83.



Source: Motor Vehicle Manufacturers Association.

Figure I-4.--U.S. automobile production, by cylinder types, 1979 and 1983.



Source: Ward's Automotive Yearbook, 1984.

Information provided by producers that responded to the Commission's questionnaires indicated that original-equipment manufacturers serve as the major channel of distribution for cast-iron engine blocks, as shown in table I-17.

Table I-17.--Cast-iron engine blocks: U.S. producers' and importers' shipments, by channels of distribution, 1981-83

(In percent)

Channel of distribution	Share of shipments	
	Producers	Importers
Machine shops/other fabricators	0	0
Distributors	0	23
Original equipment manufacturers	100	71
Other	0	6
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers reported that 100 percent of shipments went directly to original-equipment manufacturers. In most cases, these shipments were interplant transfers from the foundries of one firm to the final engine assembly plants of the same firm; a smaller portion were shipments from the foundries of cast-iron engine block producers to final engine assembly plants of automotive producers.

U.S. importers reported that 71 percent of their shipments went directly to original-equipment manufacturers. In most instances these shipments were engine blocks that were imported from foreign sources for use in original equipment produced in the United States. The second largest channel of distribution for U.S. importers of cast-iron engine blocks were distributors that accounted for 23 percent of the value of shipments during 1981-83. Other U.S. importers of cast-iron engine blocks for use in the automotive aftermarket used channels of distribution other than those specified in the Commission's questionnaire. These importers accounted for 6 percent of U.S. imports and were generally domestic dealers of foreign manufacturers that imported to stock up their inventories of cast-iron engine blocks that are used as replacement parts for automobiles, trucks, and buses.

U.S. importers of automotive engines with cast-iron blocks reported that their major channel of distribution was through distributors, accounting for 91 percent of importers' shipments. Other channels included original-equipment manufacturers, accounting for over 8 percent of importers' shipments.

Table I-18.--Automotive engines with cast-iron blocks: U.S. importers' shipments, by channels of distribution, 1981-83

(In percent)

Channel of distribution	Percent of importers' shipments
Machine shops/other fabricators	-
Distributors	91
Original-equipment manufacturers	8
Other	1/
Total	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Since by definition the products covered in this section of the report are confined to cast-iron engine blocks produced for automobiles, trucks, and buses, U.S. producers and importers reported that the motor-vehicle market accounted for all of their shipments, as shown in table I-19.

Table I-19.--Cast-iron engine blocks: U.S. producers' and importers' shipments, by types of markets, 1981-83

Type of market	Share of shipments	
	Producers	Importers
Motor vehicles	100	100
Farm machinery and equipment	0	0
Mining machinery and equipment	0	0
Construction machinery and equipment	0	0
Refrigeration and heating equipment (except pumps and compressors)	0	0
Plumbing equipment	0	0
Railway equipment	0	0
Industrial machinery	0	0
Machine tools	0	0
Valves and pipes fittings	0	0
Pumps and compressors	0	0
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Transport costs are estimated to account for approximately 3-6 percent of the selling price of cast-iron engine blocks, and are not considered to be an important factor in the marketing of these products.

U.S. consumption

U.S. consumption of cast-iron engine blocks, as shown in table I-20. Exhibited an irregular rate of decrease, declining from $1.3 billion in 1979 to $687 million in 1982, and then increasing to $901 million in 1983. U.S. producers' shipments of engine blocks for automobiles, trucks, and buses followed a somewhat similar pattern, decreasing from $1.2 billion in 1979 to $874.5 million in 1980, and then increasing to $900.4 million in 1981 before decreasing to $671 million in 1982 and increasing to $927.8 million in 1983. U.S. producers' shipments declined by 26.7 percent during 1979-83. The U.S. imports' share of total U.S. cast-iron engine block consumption decreased irregularly from 8.6 percent of the U.S. market in 1979 to 5.9 percent in 1983.

Table I-20.--Cast-iron engine blocks: U.S. producers' domestic shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1979-83

Year	Producers' shipments	Exports	Imports	Apparent consumption	Ratio of imports to consumption
	1,000 dollars				Percent
1979------	1,156,632	83,936	109,381	1,266,013	8.6
1980------	805,073	69,476	103,106	908,179	11.4
1981------	808,228	92,216	81,886	890,114	9.2
1982------	609,670	61,360	77,447	687,117	11.3
1983------	847,417	80,430	53,248	900,667	5.9

Source: Estimated by the staff of the U.S. International Trade Commission.

U.S. imports

The major suppliers of cast-iron engine blocks for automobiles, trucks, and buses were Canada, West Germany, Japan, the United Kingdom, Brazil, and Mexico, which together accounted for over 91 percent of the total value of U.S. imports in 1983. Engine block imports decreased annually from their peak in 1979, $109.4 million, to $53.2 million in 1983. U.S. imports from Canada decreased from $27.6 million in 1979 to $13.4 million in 1983. U.S. imports from West Germany also decreased from $27.5 million in 1979 to $13.4 million in 1983. U.S. imports from Japan declined from $17.6 million in 1979 to to $8.6 million in 1983. The fourth largest source of U.S. imports of automotive cast-iron engine blocks during 1983 was the United Kingdom. U.S. imports from that source decreased from $14.7 million in 1979 to $7.1 million in 1983. U.S. imports of automotive cast-iron engine blocks from Brazil declined annually from $8.3 million in 1979 to $4.0 million in 1983. U.S. imports of automotive cast-iron engine blocks from Mexico decreased from $4.5 million in

1979 to $2.2 million in 1983, as shown in the following tabulation (in thousands of dollars):

Country	1979	1980	1981	1982	1983
Canada	27,564	25,983	20,635	19,517	13,418
West Germany	27,454	25,880	20,553	19,439	13,365
Japan	17,611	16,600	13,184	12,468	8,573
United Kingdom	14,657	13,816	10,973	10,374	7,135
Brazil	8,313	7,836	6,223	5,884	4,047
Mexico	4,485	4,227	3,357	3,175	2,183
All other	9,297	8,764	6,961	6,590	4,527
All countries	109,381	103,106	81,886	77,447	53,248

The quantity of imported cast-iron engine blocks and finished assemblies shipped into the United States, as reported by respondents to the Commission's importer questionnaire, 1/ increased irregularly during 1979-83, as shown in the following tabulation:

Year	Quantity of importer's imports		Value of importer's imports	
	Cast-iron engine blocks	Finished engines with cast blocks	Cast iron engine blocks	Finished engines with cast blocks
	Units		1,000 dollars	
1979	35,395	180,664	6,215	74,220
1980	24,382	233,673	5,269	108,747
1981	38,645	216,834	12,913	128,873
1982	26,642	107,418	15,732	58,145
1983	31,062	144,201	12,491	83,953

The value of imported cast-iron engine blocks increased from $6.2 million in 1979 to $12.5 million in 1983. U.S. importers reported a decrease in the quantity of imports of finished engines with cast-iron blocks from 180,664 units in 1979 to $144,201 units in 1983. The value of imports increased from $74.2 million in 1979 to $84.0 million in 1983.

The import share of apparent U.S. consumption on a product basis is difficult to determine with any degree of accuracy, since official statistics are not reported by product category. However a trend in the ratio of imports

1/ Reported imports of cast-iron engine blocks represent an average of 16.7 percent of total import value during 1979-83. Reported imports of automotive engines with cast-iron blocks represent an average of 6.8 percent of total import value during 1979-83.

can be estimated based on the three types of vehicles with which they are assembled. By using the domestic shipments of automobiles, trucks, and buses and by applying each year's proportion of product category shipments to estimated U.S. imports, we can estimate U.S. imports, by product category, as shown in the following tabulation (in thousands of dollars):

	Automobiles	Trucks	Buses
1979----------	$80,163	$28,912	$306
1980----------	81,443	21,210	453
1981----------	64,163	17,443	280
1982----------	56,225	20,927	295
1983----------	39,215	13,875	157

Estimated U.S. imports of automobile cast-iron engine blocks decreased from an estimated $80.2 million in 1979 to $39.2 million in 1983. Estimated U.S. imports of cast-iron truck engine blocks decreased irregularly from $28.9 million in 1979 to $13.9 million in 1983. Estimated U.S. imports of cast-iron engine blocks for buses decreased irregularly from $306,000 in 1979 to $158,000 in 1983.

U.S. producers of cast-iron engine blocks accounted for a generally decreasing share of these total U.S. castings imports during 1979-83, according to data submitted in response to the Commission's questionnares, as shown in the following tabulation:

	Quantity (units)	Value (1,000 dollars)	Producers' imports as a share of total U.S. imports (Percent)
1979------	108,108	7,880	7.2
1980------	2,981	726	2.9
1981------	2,721	683	3.3
1982------	0	0	0
1983------	0	0	0

U.S. producers of castings decreased their share of total U.S. imports of cast-iron engine blocks from 7.2 percent in 1979 to 2.9 percent in 1980 and increased that share to 3.3 percent in 1981. The U.S. producers responding to the Commission's questionnaires did not report any imports of these products for 1982 and 1983.

U.S. producers of cast-iron engine blocks have asserted that imports of fully assembled engines containing foreign-made cast-iron engine blocks have affected their competitive position in the U.S. market. Available data on U.S. imports of gasoline engines for automobiles, trucks, and buses seem to affirm this allegation. U.S. imports of diesel engines, on the other hand do not seem to correspond to this assertion. U.S. imports of engines for use in automobiles, trucks, and buses, by types are shown in figure I-5 and in the following tabulation (in thousands of dollars):

Year	Diesel	Gasoline	Total
1979-------------	$92,221	$793,773	$885,994
1980-------------	43,354	590,878	634,232
1981-------------	62,923	748,066	810,989
1982-------------	53,010	1,112,625	1,165,635
1983-------------	43,657	1,836,956	1,880,613

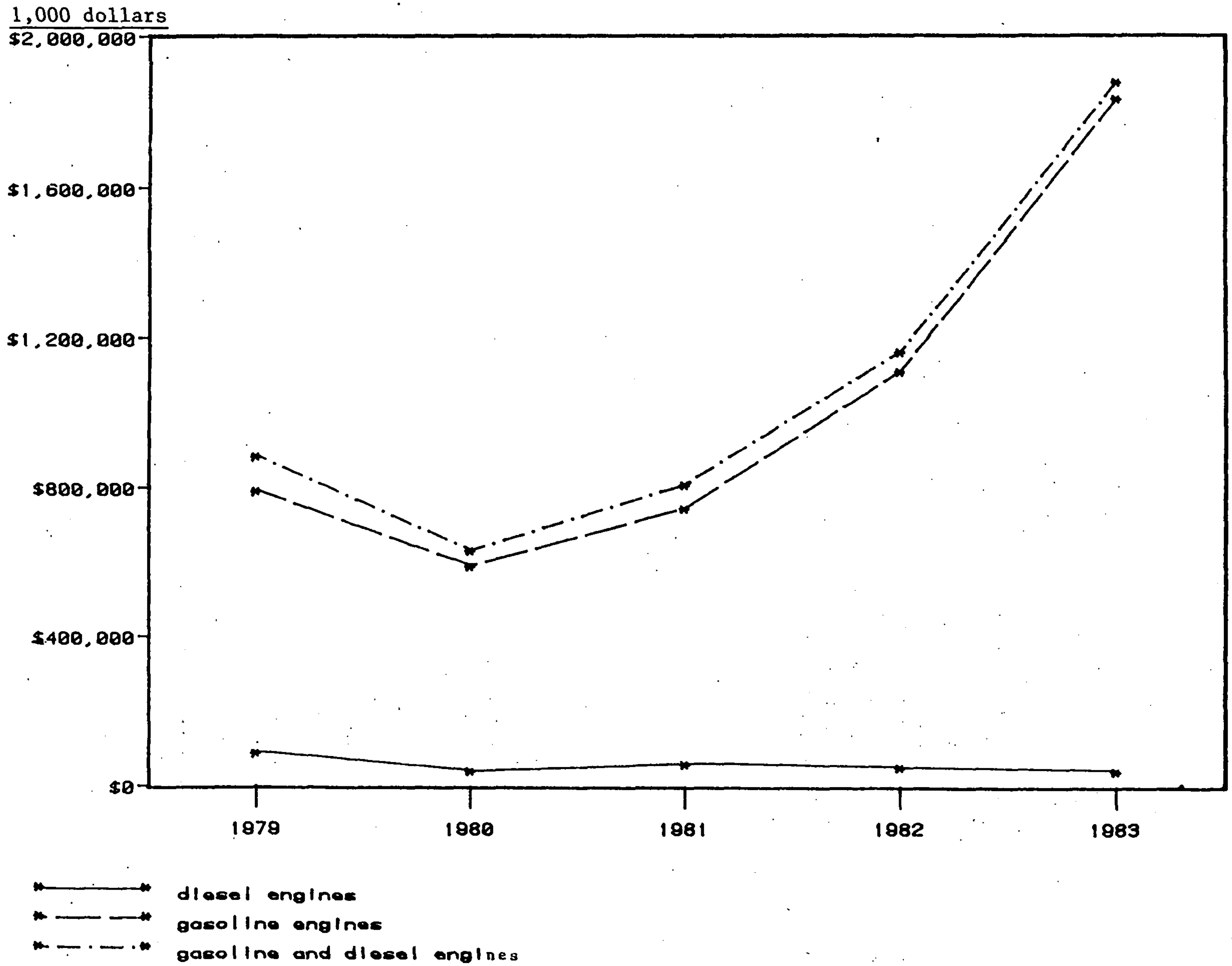
U.S. imports of diesel engines decreased from a high of $92.2 million in 1979 to $43.4 million in 1980 and then increased to $62.9 million in 1981. U.S. imports of those engines then declined annually to $43.7 million in 1983. The decline in popularity of the diesel engine for use in automobiles, trucks, and buses can be attributed to several factors including the decline in sales of diesel-powered automobiles, the decline in gasoline prices, and the increased fuel efficiency of gasoline engines in new automobiles, trucks, and buses. U.S. imports of gasoline engines declined from $793.8 million in 1979 and then increased annually to $1.8 billion in 1983. During 1983, Canada accounted for over 55 percent of such imports, Mexico represented over 22 percent and Brazil accounted for over 10 percent. During 1982 and 1983, Mexico and Brazil emerged as the largest and fastest growing sources of gasoline engines for automotive use. The trend of U.S. imports of engines for use in automobiles, trucks, and buses, as measured in units, seems to correspond with the trend in values, as shown in the following tabulation (in units):

	Diesel	Gasoline	Total
1979-------------	50,871	1,354,030	1,404,901
1980-------------	34,074	910,015	944,089
1981-------------	65,980	1,022,425	1,088,405
1982-------------	43,212	1,206,834	1,250,046
1983-------------	32,275	1,991,969	2,024,244

It is important to note that U.S. imports of gasoline engines continued to climb during 1980-82, when U.S. factory sales of automobiles, trucks, and buses decreased to their lowest levels since 1960. During 1979, U.S. imports of cast-iron engine blocks accounted for 12.3 percent of the value of U.S. imports of gasoline and diesel engines. By 1983, that ratio had declined to 2.8 percent as shown in figure I-6. The decrease in U.S. imports of cast-iron engine blocks can be partly attributed to the increase in U.S. imports of gasoline and diesel engines for use in automobiles, trucks, and buses. The cost of engine blocks account for approximately 6 to 8 percent of the cost of a fully assembled engine.

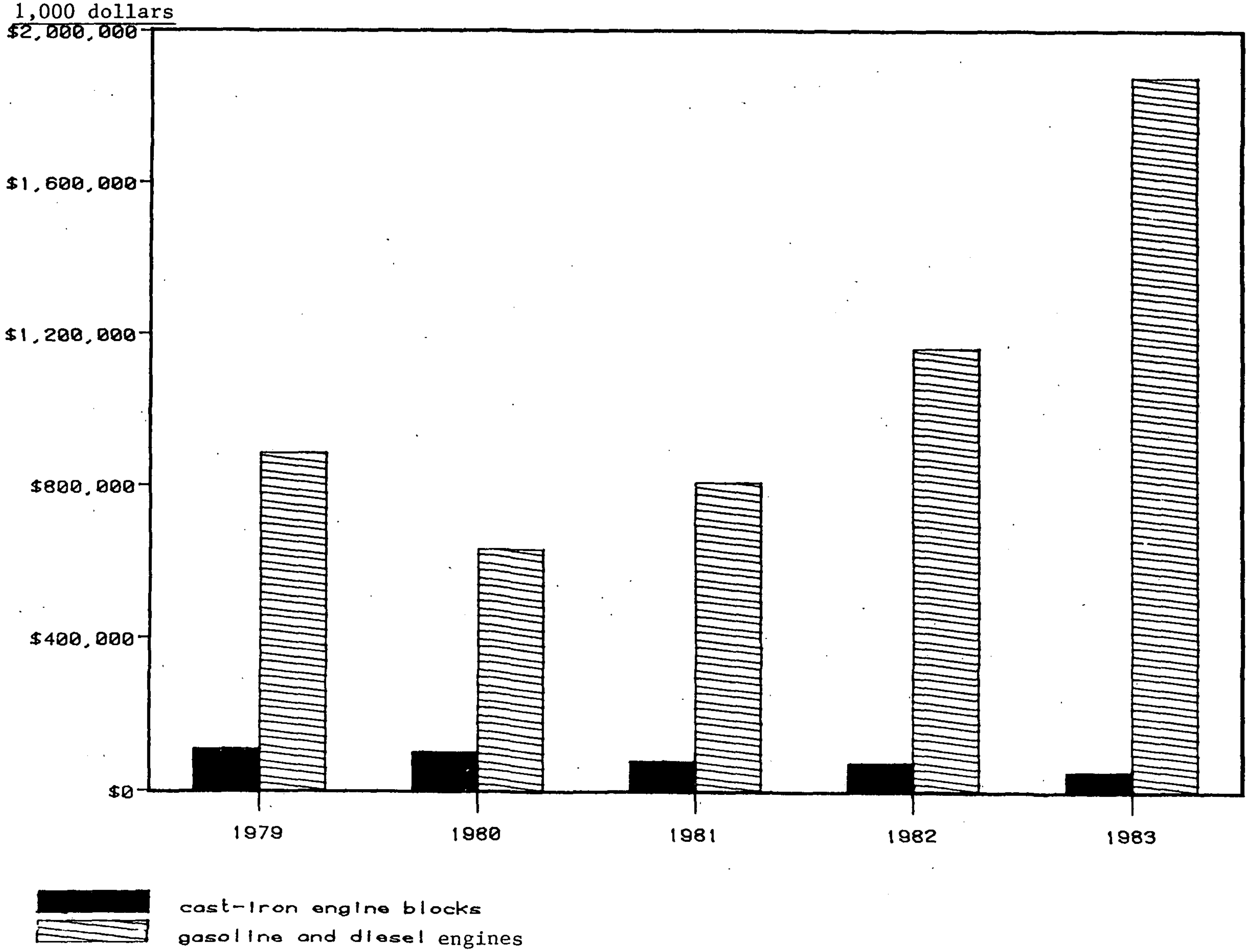
In the Commission's survey of U.S. producers of cast-iron engine blocks, respondents indicated that the U.S.-Canada Automotive Products Trade Agreement, lower purchase price, and the ability to provide products in a responsive fashion were the most important reasons for importing. Table I-21 presents the factors considered in the Commission's survey and ranks them in order of their importance to domestic producers. One U.S. producer indicated that they maintain production facilities throughout the world and their decision to import is primarily based on efficiently rationalizing their worldwide production facilities. Another U.S. producer indicated that they maintain foreign foundries but those facilities are producing cast-iron engine blocks for local consumption and not for export.

Figure I-5.--U.S. imports of internal combustion engines for use in automobiles, trucks, and buses, by type, 1979-83



Source: Estimated from official statistics of the U.S. Department of Commerce.

Figure I-6.--U.S. imports of cast-iron engine blocks and gasoline and diesel engines for use in automobiles, trucks, and buses, 1979-83.



Source: Data on cast-iron engine blocks estimated by the staff of the International Trade Commission. Data on gasoline and diesel engines are compiled from official statistics of the U.S. Department of Commerce.

Table I-21.--Cast-iron engine blocks: U.S. producers' ranking of product-related factors that were the principal reasons for their imports, 1981-83

Reason for importing	Ranking 1/
Lower purchase price (delivered)	2
Cost of tooling/patterns	6
Shorter delivery time	3
Availability (what you want and where you want it)	7
Servicing	-
Favorable terms of sale	-
Favorable product guarantees	-
Favorable exchange rates	-
Historical supplier relationship	4
Product performance features:	
Superior design	-
Quality	5
More durable	
Other	1

1/ Ranking numbers range from 1 to 7, number 1 indicating the most important reason for importing and number 7 indicating the least important reason for importing.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Foreign Markets

Data on major markets for U.S.-produced engine blocks are not available from data on U.S. exports. The major U.S. markets for U.S.-produced cast-iron engine blocks are Canada, Mexico, Brazil, United Kingdom, West Germany, and Japan. The majority of such exports went to subsidiaries of U.S. automobile producers. World consumption of engine blocks is concentrated in countries where the majority of automobile production occurs. The following tabulation lists the major U.S. export markets of cast-iron engine blocks and the production of automobiles, trucks, and buses within those markets by selected countries (in units):

	United States	Canada	West Germany	Japan 1/	United Kingdom	Brazil	Mexic
1981	7,942,916	1,322,780	3,897,007	11,179,662	1,184,205	779,836	597,1
1982	6,985,313	1,235,668	4,062,665	10,737,034	1,156,477	860,593	472,6
1983	9,225,698	1,502,325	4,170,551	11,111,659	1,289,111	896,314	285,4

1/ U.S. automobile producers maintain assembly facilities in all countries mentioned above, except Japan. Since interplant transfers account for a large p of international trade, it is probable that U.S. exports of cast-iron engine bloc to Japan are smaller than all other markets.

Competitive Assessment of Product-Related Factors in the U.S. Market

When U.S. producers and importers of automotive cast-iron engine blocks examined specific product-related factors, they generally agreed that foreign automotive cast-iron blocks have the competitive advantage in pricing factors, the cost of tooling, favorable product guarantees, and favorable exchange rates. Despite the competitive strength of U.S.-made cast-iron engine blocks in servicing and availability, importers and producers cite lower purchase price as sufficient to provide an overall competitive advantage to cast-iron engine blocks from virtually all foreign sources (table I-22).

Table I-22.--Cast-iron engine blocks: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made automotive cast-iron engine blocks in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/									
	Canada		Japan		West Germany		Mexico		Brazil	
	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	F	F	2/	F	F	2/	2/	F	S
Lower purchase price delivered	F	F	F	2/	F	D	2/	2/	F	F
Cost of tooling/ patterns	2/	F	F	2/	F	S	2/	2/	S	S
Shorter delivery time	2/	F	2/	2/	F	D	2/	2/	2/	D
Availability	2/	F	D	D	D	S	2/	2/	D	D
Servicing	2/	F	D	2/	D	D	2/	2/	D	D
Favorable terms of sale	2/	S	F	2/	S	S	2/	2/	2/	F
Favorable product guarantees	2/	F	2/	F	F	S	2/	2/	F	S
Favorable exchange rates	F	S	F	F	F	S	F	2/	F	F
Historical supplier relationship	2/	D	2/	2/	D	S	2/	2/	2/	F
Product performance features:										
Superior design	2/	D	2/	2/	D	S	2/	2/	2/	S
Quality	2/	F	2/	2/	2/	F	2/	2/	2/	S
More durable	2/	S	2/	2/	S	S	2/	2/	2/	S
Other	2/	2/	2/	2/	2/	2/	2/	2/	F	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. importers of automotive engines with cast-iron engine blocks indicated that most of the foreign-produced engine assemblies have an overall competitive advantage in the U.S. market. A large number of U.S. importers indicated that a historical supplier relationship was the most important product-related factor of competition for foreign-made finished assemblies imported into the U.S. market. Servicing and favorable terms of sale were indicated by most U.S. importers as competitive strengths of U.S. producers of automotive engines with cast-iron blocks.

In the Commission's survey of U.S. purchasers of both domestic and foreign-made cast-iron engine blocks for automobiles, trucks, and buses, respondents indicated that a historical supplier relationship was the most important reason in their decision to purchase U.S.-made cast-iron engine blocks. Table I-23 lists the factors considered in the Commission's survey and ranks them in order of their importance to domestic producers. Purchasers responded that the principal reasons for purchasing foreign-made cast-iron engine blocks were the historical relationship between them and their suppliers, lower purchase price, and the quality and superior design of the imported product. U.S. purchasers of domestic- and foreign-made automotive engines with cast-iron blocks indicated comparable reasons for domestic or foreign sourcing of these finished assemblies.

Table I-23.--Cast-iron engine blocks: U.S. purchasers' ranking 1/ of product-related factors that were the principal reasons for their purchases, 1981-83

Reason for purchase	U.S.-made engine blocks	Foreign-made engine blocks
Lower purchase price (delivered)	-	2
Cost of tooling/patterns	-	-
Shorter delivery time	4	-
Availability	2	-
Servicing	3	-
Favorable terms of sale	-	-
Favorable product guarantees	-	-
Favorable exchange rates	-	-
Historical supplier relationship	1	1
Product performance features:		
Superior design	-	4
Quality	-	3
More durable	-	-

1/ Ranking numbers range from 1 to 4, number 1 indicating the most important reason for purchase and number 4 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Purchasers reported a decrease in the quantity of U.S- and foreign-produced cast-iron engine blocks during 1979-83; declines in purchase of U.S.-produced cast-iron engine blocks were more pronounced. The increase in purchases of foreign-produced finished engines was proportionally larger than the increase in purchases of U.S.-produced engines, as shown in table-I-24.

Table I-24.--Cast-iron engine blocks and finished assemblies: Purchases of domestically produced and foreign-produced foundry products by U.S. purchasers, 1979-83

Year	Cast-iron engine blocks		Finished automotive engines with cast-iron blocks	
	U.S.-produced	Foreign-produced	U.S.-produced	Foreign-produced
	Quantity (units)			
1979------	4,455,288	468,780	93,352	4,499
1980------	4,083,169	375,064	114,505	4,003
1981------	4,737,019	284,720	100,274	4,455
1982------	3,742,596	186,173	103,232	10,571
1983------	4,042,679	152,520	106,564	31,254
	Value (1,000 dollars)			
1979------	285,863	93,222	412,427	15,114
1980------	284,154	88,464	373,516	13,240
1981------	368,681	61,529	373,947	21,967
1982------	288,571	54,674	418,585	43,798
1983------	329,477	35,916	473,607	77,601

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Pricing considerations

Purchasers were asked to provide delivered prices on specific U.S.- and foreign-made castings, which are shown in table I-25.

Table I-25.--Cast-iron engine blocks: Average lowest net delivered price reported by purchasers, 1981-83

(Price per unit)

Period	Cast-iron block as used in 4-cylinder gasoline powered, spark-ignition, water-cooled engine, for use in passenger automobiles	
	Domestic	Foreign
1981:		
Jan-March	53.05	-
April-June	53.43	-
July-Sept	53.92	-
Oct.-Dec	55.80	-
1982:		
Jan-March	55.80	-
April-June	55.80	-
July-Sept	57.81	-
Oct.-Dec	59.37	-
1983:		
Jan-March	59.61	-
April-June	58.62	-
July-Sept	56.68	-
Oct.-Dec	56.84	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Prices on cast-iron engine blocks are used in 4-cylinder gasoline-powered, spark-ignition, water-cooled engines, for use in passenger automobiles increased from $53.05 in January-March 1981 to $59.61 in January-March 1983, and then decreased to $56.84 in October-December 1983.

Pricing data was not reported by purchasers of foreign-produced cast-iron engine blocks. U.S. producers have indicated that the prices on foreign-produced cast-iron engine blocks are significantly lower than those of U.S.-produced cast-iron engine blocks. Most producers' and importers' terms of sale are net sales due in 30 days or less.

U.S. producers' responses to import competition in the U.S. market

U.S. producers of cast-iron engine blocks for automobiles, trucks, and buses reported that the most frequent steps taken to respond to import competition in the U.S. market included implementing cost-reduction efforts and improving the quality of the products. Other steps taken include cutting back production, lowering prices or suppressing price increases to maintain market share, closing production lines, and shifting to more advanced types of castings, as shown in table I-26.

Table I-26.--Cast-iron engine blocks: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses
	Percent
Took no or few actions because your firm----	
Had already shifted production to more advanced type of castings----------------	-
Had already shifted production to other lines of castings------------------------	-
Lacked capital funds to counter foreign competition-----------------------------	-
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share-------	25
Reduced or dropped plans to expand capacity--------------------------------	-
Cut back production-----------------------	50
Closed production lines or manufacturing---	25
Shifted to more advanced types of castings---------------------------------	25
Implemented cost-reduction efforts---------	75
Improved quality of the products-----------	75
Imported-----------------------------------	-
Opened a plant to manufacture abroad--------	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

When U.S. producers examined specific product-related attributes, they generally agreed that two factors provided an overall competitive advantage to all foreign producers in foreign markets. Producer respondents indicated that a lower purchase price, the cost of tooling and patterns, and favorable exchange rates constitute the most important product-related competitive strength of foreign-made engine blocks in foreign markets, as shown in table I-27.

Table I-27.--Cast-iron engine blocks: U.S. producers' competitive assessment of product-related factors of competition for U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-84

Item	Competitive advantage 1/				
	Canada	Japan	West Germany	Mexico	Brazil
Overall competitive advantage	F	F	F	F	F
Lower purchase price delivered	2/	F	F	F	F
Cost of tooling/ patterns	2/	F	F	2/	F
Shorter delivery time	2/	2/	2/	2/	2/
Availability	2/	F	2/	2/	2/
Servicing	2/	F	2/	2/	2/
Favorable terms of sale	2/	2/	F	2/	2/
Favorable product guarantees	2/	2/	F	2/	F
Favorable exchange rates	F	F	F	F	F
Historical supplier relationship	2/	2/	2/	2/	2/
Product performance features:					
Superior design	2/	2/	2/	2/	2/
Quality	2/	2/	2/	2/	D
More durable	2/	2/	2/	2/	2/
Other	2/	2/	2/	F	F

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to increased competition in foreign markets

U.S. producers of cast-iron engine blocks for automobiles, trucks, and buses reported that the most frequent steps taken to respond to import competition in foreign markets included implementing cost-reduction efforts, improving the quality of the products, and taking little or no action because the firm lacked the capital funds to counter foreign competition in foreign markets, as shown in the following table.

Table I-28.--Cast iron engine blocks: U.S. producers' responses to increased competition in their foreign markets, 1981-84

Nature of response	Share of responses
	Percent
Took no or few actions because your firm----	
Had already shifted production to more advanced type of castings----------------	-
Had already shifted production to other lines of castings------------------------	-
Lacked capital funds to counter foreign competition------------------------------	33
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share--------	-
Reduced or dropped plans to expand capacity------------------------------------	-
Cut back production------------------------	-
Closed production lines or manufacturing---	-
Shifted to more advanced types of castings----------------------------------	-
Implemented cost-reduction efforts---------	66
Improved quality of the products-----------	66
Imported------------------------------------	-
Opened a plant to manufacture abroad--------	-

1/ Data (on basis of value) supplied by 3 firms which accounted for 10 percent of U.S. exports in 1983.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

II. CAST-IRON COMPRESSOR HOUSINGS

Description and Uses

Cast-iron compressor housings range in size from approximately 80 to 800 pounds for refrigeration and air-conditioning compressors in the 2 to 125 horsepower range, and up to many thousands of pounds for large air and gas compressors that go up to approximately 4,000 horsepower. The housings are normally made of grey iron (class 40 perlitic) and are made to withstand pressure 5 times the maximum design pressure of the system in which they will be used.

There are few apparent physical differences between domestically produced and imported cast-iron compressor housings since the housings are generally made to manufacturers' specifications.

Compressors with cast-iron housings generally weigh from 300 to 2,000 pounds for refrigeration and air-conditioning compressors in the 2 to 125 horsepower range, and up to several tons for large air and gas compressors.

Cast-iron compressor housings are used in refrigeration, air, and gas compressors. These compressors can be classified as reciprocating, rotary, jet, centrifugal, or axial flow, depending on the mechanical means used to produce compression of the fluid. There has been little modification in compressor housings, except for changes in size due to changes in the compression requirements of compressors. Most changes to compressors occur in the internal moving parts that aid in the compression of the gas, vapor, or mixture of the two.

The industries that use cast-iron compressor housings in the manufacture of their products include refrigeration and air-conditioning manufacturers and air and gas compressor manufacturers. Compressors with cast-iron housings are used mainly for refrigeration-type applications (i.e., supermarket and restaurant refrigerators and freezers and commercial air-conditioning units) and for compressing air (for such applications as paint spraying, tire inflation, and pneumatic tools).

The majority of U.S. foundries producing cast-iron compressor housings use sand casting as their casting process (some use shell molding; some use both), and their melting process is generally electric, (some use the duplex method and some, the cupola method). Most foundries do not perform any finishing operations on the cast-iron compressor housings except for removal of gates, sprues, and risers; and cleaning the casting. Instead, they ship unfinished castings to compressor manufacturers.

Automation of foundries producing cast-iron compressor housings has been slow, according to industry sources, because of a lack of capital for necessary improvements. Manual molding lines generally outnumber automated molding lines by 2 to 1 in this industry. To automate these manual molding lines would require automating the pouring cycle, incorporating automatic core setters, and taking the handling of finished castings from manual transfer by truck to transfer by transfer line, incorporating robot grinders. In addition, manually controlled squeezer boards could be replaced by automated squeezer boards for packing sand around the mold. Molds could then be made up at the rate of 140-180 per hour instead of 140-180 per day. However, the cost of automating a foundry operation is such that it is not cost effective if the foundry is operating below 70 percent capacity, and most have not been operating above 70 percent for at least the past 3 or 4 years.

Customs Treatment

U.S. tariff treatment

Imported cast-iron compressor housings are classified under TSUSA item 661.1090. Complete compressors with cast-iron housings are classified under items 661.1001-.1069. Table II-1 shows the staged reductions in the rates of duty as a result of the Multilateral Trade Negotiations (MTN). The current rates of duty (1984) and detailed tariff descriptions are shown in appendix E.

Table II-1.--Cast-iron compressor housings and complete compressors with cast-iron housings: U.S. rates of duty, by TSUS items

(Percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--			
			1980	1981	1982	1983
666.10A	Refrigeration, air-conditioning, air and other types of compressors, over 1/4 HP, and parts----------	4.5%	4.4%	4.2%	4.1%	4%

TSUS item No. 1/	Description	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--Continued				Col. 2 rate of duty
		1984	1985	1986	1987	
661.10A	Refrigeration, air-conditioning, air and other types of compressors, over 1/4 HP, and parts----------	3.8%	3.7%	3.5%	3.4%	35%.

1/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP) and that all beneficiary developing countries are eligible for the GSP.

2/ Rate effective prior to Jan. 1, 1980.

Workers in the compressor industry have filed a few petitions with the U.S. Department of Labor under the Trade Adjustment Assistance program for workers. Since 1975, there have been 8 certifications, affecting 864 workers, 29 denials, affecting 3,876 workers, and 1 termination, affecting 128 workers.

Foreign tariff treatment

Foreign rates of duty applicable to imports of compressors and parts from the United States vary considerably. In the top three markets for U.S.-made products in 1983 (Canada, West Germany, and Mexico), the rates of duty ranged from zero to 11.4 percent ad valorem. The negotiated rates of duty 1/ for these markets ranged from zero to 9.2 percent ad valorem.

Profile of the U.S. Industry and Major Foreign Competitors

United States

There are approximately 50 foundries in the United States which produce cast-iron compressor housings. Of these, one-half are located in Ohio, Pennsylvania, Michigan, and Indiana. The majority of these foundries are multi-product foundries, which are normally labor intensive because sand casting, the primary method of casting iron compressor housings, is more labor than capital intensive. The top five foundries producing cast-iron compressor housings account for approximately 40 percent of production. In response to the Commission's questionnaire, producers of cast-iron compressor housings reported seven plant closings and no plant openings during 1979-83.

U.S. production, capacity, and capacity utilization.--U.S. producers of cast-iron compressor housings, in response to the Commission's questionnaire, reported that production decreased 47 percent from 12.4 million units in 1979 to 6.6 million units in 1982 and increased 14 percent to 7.5 million units in 1983 (table II-2). Likewise, producers reported a decrease in capacity utilization from 54 percent in 1979 to 33 percent in 1982, with an increase to 38 percent in 1983. Most producers attribute their decline in both production and capacity utilization to imports of both compressor housings and complete compressors.

1/ Final rate negotiated under the Multilateral Trade Negotiations (MTN).

Table II-2.--Cast-iron compressor housings: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production-----1,000 units--	12,364,745	8,850,607	9,281,237	6,577,474	7,523,788
Production capacity---do----	22,931,934	21,210,067	19,363,514	19,739,047	19,811,632
Capacity utilization percent--	54	42	48	33	38

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers of cast-iron compressor housings reported only 5 percent of their manufacturing machinery and equipment to be 2 years old or less. Over 50 percent of their machinery and equipment is between 10 and 20 years old, and 19 percent is over 20 years old. Respondents indicated that increased imports have had an adverse impact on profits, thus limiting available capital for new equipment.

Table II-3.--Cast-iron compressor housings: Machinery and equipment in manufacturing facilities of reporting producers, as of January 1, 1984, by age of the machine

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces--------	3	1	13	7	4
Molding lines:					
Automated--------------	4	2	11	29	1
Manual-----------------	0	1	5	33	21
Total---------------	7	4	29	69	26

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--The average U.S. foundry producing cast-iron compressor housings employed an estimated 1,200 production and related workers in 1979, compared with 700 in 1983, according to questionnaire respondents. A few respondents reported less than 100 production workers and a few reported over 2,000 production workers. Total employment and production workers decreased substantially during 1979-82, but both showed a slight increase in 1983 (table II-4). Total man-hours worked and wages paid followed the same trend, decreasing during 1979-82, with a substantial drop in 1980 and a slight increase in 1983. Man-hours worked per production worker per year dropped from 1,849 in 1979 to 1,743 in 1980, and increased to 2,020 in 1983. 1/

Table II-4.--Cast-iron compressor housings: Number of employees, and production and related workers in operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons	10,809	8,141	7,735	6,764	7,089
Production and related workers	9,237	6,737	6,365	5,409	5,665
Man-hours worked---1,000 hours	17,082	11,742	12,109	9,512	11,442
Wages paid-------1,000 dollars	138,190	106,386	120,249	94,361	120,366

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

A comparison of wages paid to production workers in foundries producing cast-iron compressor housings and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S. foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Foundries producing cast-iron compressor housings 1/	All operating U.S. manufacturing establishments 2/
1979	$8.09	$6.00
1980	9.06	7.27
1981	9.93	7.99
1982	9.92	8.49
1983	10.52	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The quantity of domestic shipments of cast-iron compressor housings decreased from 12.2 million units in 1979 to 6.5 million units in 1982, and then increased slightly to 7.4 million units in 1983 (table II-5). The value of domestic shipments, according to questionnaire respondents, increased from $38.7 million in 1979 to $52.1 million in 1981, then decreased to $42.9 million in 1982, and increased to $49.4 million in 1983. The unit value increased significantly from $3.16 in 1979 to $6.68 in 1983.

1/ Man-hours per person per year based on a 40-hour work week and a 50-week work year equals 2,000 hours.

Table II-5.--Cast-iron compressor housings: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Dollars per unit
1979	12,230,565	38,686	3.16
1980	8,608,686	47,983	5.57
1981	8,951,911	52,072	5.82
1982	6,480,983	42,891	6.62
1983	7,387,816	49,370	6.68

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers of cast-iron compressor housings reported no exports of these products during 1979-83. U.S. producers have indicated that, generally, only completed compressors and replacement parts are exported. Cast-iron housings are not considered replacement parts because the entire compressor is usually replaced if the housing requires replacement.

U.S. producers' inventories.--The combined end-of-period inventories of producer respondents increased during 1979-83, as shown in the following tabulation:

	Quantity (units)
1979	74,131
1980	65,583
1981	134,875
1982	129,776
1983	242,552

U.S. producers' inventories increased steadily during 1979-83 as imports increased and U.S. producers lost their market share. U.S. producers have stated that major compressor manufacturers have started buying compressor parts from foreign suppliers because of lower cost.

Financial experience of U.S. producers.--U.S. producers, in response to the Commission's questionnaire, reported overall net losses on operations producing foundry products in 1980 (net loss $6.4 million) and 1982 (net loss $24.1 million) (table II-6). In the other years for which data were supplied, these producers' ratio of net profit to net sales was just above 4 percent.

Table II-6.--Cast-iron compressor housings: U.S. producers' net sales and net profit (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales----------1,000 dollars--	511,767	395,295	450,927	355,765	452,407
Net profit (loss)-----------do----	21,786	(6,432)	19,930	(24,131)	18,675
Ratio of net profit to net sales percent--	4.3	-	4.4	-	4.1

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic facilities used in the manufacture of cast-iron compressor housings decreased 47 percent from $25.9 million in 1979 to $13.7 million in 1981 (table II-7). Capital expenditures increased slightly to $15.8 million in 1982, but decreased to $12.8 million in 1983. U.S. producers reported no capital expenditures for facilities in other countries during 1979-83. Two U.S. producers of cast-iron compressor housings reported investment in foreign companies in the form of a licensing arrangement for one producer and a foreign subsidiary for the other. One U.S. producer reported that a foreign company has an investment in the U.S. company in the form of a licensing arrangement.

Table II-7.--Cast-iron compressor housings: U.S. producers' capital expenditures on domestic facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements------------	82	133	82	37	48
Buildings, leasehold improvements--	5,937	3,687	1,158	2,817	1,641
Machinery, equipment, and fixtures:					
New------------------------------	19,432	21,896	12,247	12,775	10,905
Used-----------------------------	415	48	261	200	230
Total-------------------------	25,866	25,764	13,748	15,829	12,824

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Most of the capital expenditures during 1979-83 were for new machinery, equipment, and fixtures. Capital expenditures on these items were 75 percent of the total in 1979 and 85 percent of total capital expenditures in 1983.

Research and development expenditures.--Respondents to the Commission's questionnaire reported a significant increase in expenditures for research and development in 1980 and somewhat smaller expenditures during 1981-83 (table II-8). In 1980, research and development expenditures were abnormally high due to some firms' experimental research of manufacturing processes and testing of improved manufacturing methods and materials. Research and development expenditures increased 83 percent from $872,000 in 1979 to $1.6 million in 1983.

Table II-8.--Cast-iron compressor housings: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

Year	Value (1,000 dollars)
1979	872
1980	3,825
1981	1,474
1982	1,511
1983	1,559

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Structural Factors of Competition Between U.S. and Foreign Industries

Competition in the U.S. market between domestically produced cast-iron compressor housings and those produced in foreign countries 1/ generally favors foreign producers, according to respondents to the Commission's questionnaire. U.S. producers indicated that their competitive strength lies mainly in responsiveness to orders and after-sale service capabilities. Foreign producers' competitive strength, according to U.S. producer respondents, lies primarily in the availability and cost of capital and in government involvement in the industry (subsidies, research and development assistance, tariff levels on imports, nontariff barriers to imports, and U.S. government regulations which increase costs for U.S. producers) (table II-9).

1/ Countries identified by respondents to the Commission's producer questionnaire include Taiwan, Japan, Republic of Korea (Korea), Brazil, and The Netherlands.

Table II-9.--Cast-iron compressor housings: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

	Competitive advantage 1/				
	Taiwan	Japan	Korea	Brazil	Netherlands
Fuel:					
Availability	S	D	S	D	S
Cost	D	D	D	F	2/
Raw material:					
Availability	S	S	S	D	S
Cost	F	S	D	S	2/
Capital:					
Availability	F	F	F	F	F
Cost	F	F	F	F	2/
Ability of industry profits to attract funds	S	S	S	F	S
Labor:					
Availability	S	S	F	F	F
Cost	S	F	F	F	F
Production technology	S	D	S	S	F
Marketing:					
Channels of distribution	S	D	S	D	F
Responsiveness to orders	D	D	D	D	D
After-sale service capabilities	D	D	D	D	D
Government involvement:					
Subsidies	F	F	F	F	F
Research and development assistance	F	F	F	F	2/
Tariff levels on imports	F	F	F	F	2/
Nontariff barriers to imports	2/	F	F	F	2/
U.S. Government regulations which increase costs	F	F	F	F	2/
Foreign government regulations which increase costs	2/	2/	2/	F	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Generally, respondents to the Commission's questionnaire indicated that neither U.S. producers nor foreign producers have a competitive advantage in raw material availability and cost.

U.S. producers generally indicated that they have a competitive advantage over all other countries assessed in terms of their channels of distribution, responsiveness to orders, and after-sale service capabilities.

U.S. producers and importers of cast-iron compressor housings maintain inventories of their products to better serve customers. Both U.S. producers' and importers' inventories of cast-iron compressor housings increased during 1979-83 (table II-10). Importers' inventories of complete compressors, as reported in response to the Commission's importer questionnaire, decreased substantially from 288,663 units in 1979 to 186,123 units in 1983 (table II-11). This decrease reflects the fact that more U.S. manufacturers are ordering foreign-made compressors, therefore depleting the number of compressors kept on hand by importers.

Table II-10.--Cast-iron compressor housings: Inventories held by producers and importers, as of Dec. 31, 1979-Dec. 31, 1983

(Quantity)

Year	Producers' inventories	Importers' inventories
1979	74,131	762
1980	65,583	815
1981	134,875	1,240
1982	129,776	36,725
1983	242,552	92,400

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table II-11.--Compressors with cast-iron housings: Inventories held by importers, as of Dec. 31, 1979-Dec. 31, 1983

Year	Quantity (units)
1979	288,663
1980	221,096
1981	287,984
1982	195,477
1983	186,123

Respondents to the producers' questionnaire indicated unanimously that producers of cast-iron compressor housings in Tawian, Japan, the Republic of Korea (Korea), Brazil, and the Netherlands have a competitive advantage over U.S. producers in terms of capital availability and cost. Most respondents stated that low labor rates were the primary reason for the low prices of foreign-made merchandise.

In response to the Commission's questionnaire, U.S. producers indicated that producers in Taiwan, Japan, Korea, Brazil, and the Netherlands all have a competitive advantage over U.S. producers in terms of government subsidies. In terms of research and development assistance, tariff levels on imports, and U.S. Government regulations which increase costs, producers in Taiwan, Japan, and Korea were all reported to have a competitive advantage over U.S. producers. U.S. producers reported that Government regulations which increase their costs include Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulations which are not required of foreign producers. Witnesses at the Commission's hearing 1/ stated that they have no first-hand knowledge or hard evidence of foreign governments providing these benefits to their industries.

The U.S. Market

Domestic market profile

U.S. producers and importers do not distribute the bulk of their products through the same channels. U.S. producers distribute 100 percent of their products through original equipment (compressor) manufacturers. U.S. importers primarily distribute their products through distributors (62 percent) and through other channels (direct distribution) (table II-12). U.S. producers generally manufacture compressor housings to order from compressor manufacturers, whereas importers generally depend on distributors to market their products.

Table II-12.--Cast-iron compressor housings: U.S. producers' and importers' shipments, by channel of distribution, 1981-83

(In percent)

Channel of distribution	Share of shipments	
	Producers	Importers
Machine shops/other fabricators	0	3
Distributors	0	62
Original equipment manufacturers	100	7
Other	0	28
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ Transcripts of the hearing held before the U.S. International Trade Commission, July 18, 1984, p. 91.

U.S. producers shipped the highest percentage (55 percent) of their cast-iron compressor housings to pump and compressor manufacturers, while U.S. importers shipped the highest percentage (61 percent) of their cast-iron compressor housings to refrigeration and heating equipment manufacturers (table II-13). According to industry sources, transport costs are estimated to account for about 3-4 percent of the selling price of cast-iron compressor housings, and are not considered to be an important factor in the marketing of these products.

Table II-13.--Cast-iron compressor housings: U.S. producers' and importers' shipments, by type of market, 1981-83

(In percent)

Type of market	Share of shipments	
	Producers	Importers
Motor vehicles	0	0
Farm machinery and equipment	0	0
Mining machinery and equipment	25	0
Construction machinery and equipment	25	0
Refrigeration and heating equipment (except pumps and compressors)	0	61
Plumbing equipment	0	0
Railway equipment	0	0
Industrial machinery	0	0
Machine tools	0	0
Valves and pipe fittings	0	0
Pumps and compressors	50	39
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

U.S. apparent consumption of parts of compressors, including cast-iron compressor housings, increased from $1.2 billion in 1979 to $1.6 billion in 1982 and decreased to $1.2 billion in 1983 (table II-14). Apparent consumption, in terms of value, was slightly less in 1983 than in 1979. U.S. producers' shipments of parts of compressors increased from $1.4 billion in 1979 to $1.9 billion in 1982 and decreased to $1.4 billion in 1983.

U.S. exports increased from $260 million in 1979 to $359 million in 1981 and decreased to $262 million in 1983. The primary markets for U.S. exports of cast-iron compressor housings and other parts of compressors during 1979-83 were Mexico and Canada.

Table II-14.--Cast-iron compressor housings: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1979-83 1/

(In thousands of dollars)

Year	Producer shipments 2/	Exports	Imports	Apparent consumption	Ratio (percent of imports to consumption
1979	1,444,000	260,121	61,131	1,245,010	4.9
1980	1,446,000	282,107	73,855	1,237,748	6.0
1981	1,757,000	359,040	70,380	1,468,340	4.8
1982	1,869,000	355,119	67,003	1,580,884	4.2
1983	1,364,000	262,394	78,183	1,179,789	6.6

1/ Includes all parts of compressors, including compressor housings, classified in TSUSA item 661.1090.
2/ Estimated by the staff of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce and data submitted in response to questionnaires of the U.S. International Trade Commission, except as noted.

U.S. imports

U.S. imports of parts of compressors, including cast-iron compressor housings, increased from $61 million in 1979 to $74 million in 1980; then decreased to $67 million in 1982; and then increased to $78 million in 1983 (table II-15). The principal sources for imports of cast-iron compressor housings and other compressor parts during 1979-83 were Japan and Canada, which together accounted for 40 percent of imports during the period.

Table II-15.--Cast-iron compressor housings: U.S. imports for consumption, by principal sources, 1979-83 1/ 2/

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Japan	12,590	15,020	17,442	17,363	19,499
Canada	9,146	13,312	11,442	10,762	15,002
Sweden	2,356	1,889	1,654	1,631	8,560
United Kingdom	11,827	13,169	14,543	12,423	6,234
All other	25,212	30,465	25,299	24,824	28,888
Total	61,131	73,855	70,380	67,003	78,183

1/ Includes all parts of compressors, including compressor housings, classified in TSUSA item 661.1090.
2/ Quantity and unit value data are not available.

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. imports increased in 1983 as compressor manufacturers shifted more of their buying of compressor housings and other parts from foreign producers. 1/ The import share of U.S. consumption increased from 4.9 percent in 1979 to 6.6 percent in 1983 (see table II-14).

Respondents to the Commission's importer questionnaire report their imports of cast-iron compressor housings, in terms of quantity, increased from 2,908 units in 1979 to 367,786 units in 1983. In terms of value, importer respondents indicated their imports increased from $329,000 in 1979 to $41.4 million in 1983. However, importers imports of finished compressors with cast-iron housings steadily decreased, in both quantity and value, during 1979-82, and increased slightly in 1983. Imports of finished compressors with cast-iron housings decreased from 975,035 units (valued at $37.9 million) in 1979 to 624,801 units (valued at $18.3 million) in 1982, and increased to 957,376 units (valued at $31.6 million) in 1983.

The quantity of imported cast-iron compressor housings increased significantly during 1979-83. Imports of finished assemblies shipped into the United States, as reported by respondents to the Commission's importer questionnaire, 2/ decreased during 1979-82 and then increased significantly in 1983, as shown in the following tabulation:

Year	Quantity of importer imports		Value of importer imports	
	Cast-iron compressor housings	Finished compressors with cast-iron housings	Cast-iron compressor housings	Finished compressors with cast-iron housings
	Units		1,000 dollars	
1979	2,908	975,035	329	37,886
1980	2,771	852,491	316	34,262
1981	22,224	870,436	2,437	32,027
1982	122,818	624,801	13,494	18,322
1983	367,786	957,376	41,431	31,603

1/ Information obtained in interviews with industry executives.

2/ Reported imports represent an average of 16 percent of the value of total U.S. imports during 1979-83.

U.S. imports of complete compressors, including those with cast-iron housings, increased 93 percent in terms of quantity, from 2.8 million units in 1979 to 5.4 million units in 1983 (table II-16). In terms of value, imports increased 71 percent from $152.5 millicn in 1979 to $261.4 million in 1983. The major sources of U.S. imports during the period were Japan, Italy, Canada, and Singapore.

Table II-16.--Compressors with cast-iron housings: U.S. imports for consumption, by principal sources, 1979-83 1/

Source	1979	1980	1981	1982	1983
	Quantity (units)				
Japan	1,540,444	1,288,588	1,972,311	1,639,851	2,508,515
Italy	775,881	594,712	712,162	741,349	1,062,985
Canada	92,091	84,259	37,719	147,135	171,811
Singapore	159,726	475,443	695,894	644,427	1,008,718
All other	263,175	475,853	566,396	521,596	616,076
Total	2,831,317	2,918,855	3,984,482	3,694,358	5,368,105
	Value (1,000 dollars)				
Japan	59,406	58,327	91,715	85,207	117,747
Italy	22,565	19,234	23,500	23,682	26,143
Canada	10,943	12,381	12,011	22,852	25,068
Singapore	4,145	14,006	23,168	20,627	24,465
All other	55,415	68,917	56,660	50,515	67,956
Total	152,474	172,865	207,054	202,883	261,379
	Unit value (dollars)				
Japan	38.56	45.26	46.50	51.96	46.94
Italy	29.08	32.34	33.00	31.94	24.59
Canada	118.83	146.94	318.43	155.31	145.90
Singapore	25.95	29.46	33.29	32.01	24.25
All other	210.56	144.83	100.04	96.85	110.30
Average	53.85	59.22	51.97	54.92	48.69

1/ Imports include all compressors, including those with cast-iron housings, classified in TSUS items 661.09 and 661.10.

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. producers of cast-iron compressor housings, in response to the Commission's questionnaire, reported no imports of compressor housings during 1979-83. However, U.S. producers did state that more U.S. producers of finished compressors are importing parts, including housings, from foreign sources.

Foreign Markets

The major export markets for U.S.-produced cast-iron compressor housings and other parts of compressors during 1979-83 were Mexico and Canada. U.S. exports of compressor parts to these countries is considerably dependent on the health of the energy- and chemical-related industries, which are major users of compressors. The lack of growth in these industries in foreign countries in 1983 kept U.S. export levels below those of 1980-82. 1/ Continued economic growth in foreign countries, which includes growth in energy and related industries, will provide a market for U.S.-made cast-iron compressor housings and other compressor parts, provided U.S. manufacturers can compete in terms of price, delivery time, financing, and service in those foreign markets. 2/

Competitive Assessment of Product-Related Factors in the U.S. Market

In response to the Commission's questionnaire, U.S. producers and importers indicated that imports of cast-iron compressor housings from all sources have an overall competitive advantage in the U.S. market compared with domestically-produced housings (table II-17). Japan, according to U.S. producers, is the major foreign source.

With respect to cast-iron compressor housings, U.S. producers and importers reported that foreign producers have a competitive advantage in terms of lower delivered purchase price, cost of tooling/patterns, and favorable exchange rates. According to industry sources, the price advantage alone is enough to give foreign competitors an overall competitive advantage. The U.S. industry seems to have a competitive advantage in terms of product performance features, when comparing assessments made by both U.S. producers and importers.

With respect to finished assemblies (table II-18), U.S. importers indicated that U.S. producers had an overall competitive advantage in the U.S. market compared with Italy, but that India and Japan have an overall competitive advantage in the U.S. market compared with U.S. producers. Such importers reported that India and Japan had a competitive advantage with respect to lower purchase price, cost of tooling/patterns, and favorable exchange rates. Again, price was reported as the most significant competitive advantage for India and Japan. Also, importers rated U.S.-made products as more competitive in terms of product performance features than those of Italy, and equal to those of India and Japan.

1/ U.S. Department of Commerce, U.S. Industrial Outlook 1984 pp. 22-25.
2/ Ibid.

Table II-17.--Cast-iron compressor housings: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-and foreign-made castings in the U.S. market, by major supplying countries, 1981-84

	Competitive advantage 1/															
	Taiwan		Japan		Korea		Brazil		Netherlands		West Germany		Italy		United Kingdom	
	P	I	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	2/	F	2/	F	2/	F	2/	F	2/	2/	F	2/	F	2/	F
Lower purchase price (delivered)	F	2/	F	2/	F	2/	F	2/	F	2/	2/	F	2/	F	2/	F
Cost of tooling/ patterns	F	2/	F	2/	F	2/	F	2/	F	2/	2/	F	2/	F	2/	F
Shorter delivery time	D	2/	D	2/	F	2/	D	2/	F	2/	2/	D	2/	D	2/	D
Availability	D	2/	D	2/	F	2/	D	2/	F	2/	2/	D	2/	D	2/	D
Servicing	D	2/	D	2/	F	2/	S	2/	F	2/	2/	D	2/	D	2/	S
Favorable terms of sale	S	2/	S	2/	F	2/	S	2/	F	2/	2/	S	2/	F	2/	S
Favorable product guarantees	S	2/	S	2/	S	2/	S	2/	S	2/	2/	S	2/	S	2/	F
Favorable exchange rates	F	2/	F	2/	S	2/	F	2/	2/	2/	2/	F	2/	F	2/	S
Historical supplier relationship	D	2/	D	2/	2/	2/	S	2/	F	2/	2/	S	2/	S	2/	S
Product performance features:																
Superior design	D	2/	D	2/	D	2/	S	2/	D	2/	2/	S	2/	S	2/	S
Quality	D	2/	D	2/	D	2/	S	2/	D	2/	2/	S	2/	S	2/	S
More durable	D	2/	D	2/	D	2/	S	2/	D	2/	2/	S	2/	S	2/	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table II-18.--Compressors with cast-iron housings: U.S. importers' competitive assessment of product-related factors of competition for U.S.-produced and foreign-made finished assemblies in the U.S. market, by major supplying countries, 1981-84

	Competitive advantage 1/		
	Italy	India	Japan
Overall competitive advantage	D	F	F
Lower purchase price (delivered)	D	F	F
Cost of tooling/ patterns	S	F	F
Shorter delivery time	D	D	F
Availability	D	D	D
Servicing	D	F	S
Favorable terms of sale	F	S	S
Favorable product guarantees	F	F	D
Favorable exchange rates	D	F	F
Historical supplier relationship	D	S	D
Product performance features:			
Superior design	D	S	S
Quality	D	S	S
More durable	D	S	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Purchasers of cast-iron compressor housings, in response to the Commission's questionnaire, gave shorter delivery time as their most important reason for purchasing domestic products. The second most important reason cited for such purchases was availability (table II-19).

U.S. purchasers cited lower delivered purchase price and favorable exchange rates as their two primary reasons for purchasing foreign-made cast-iron compressor housings.

Table II-19.--Cast-iron compressor housings: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made compressor housings	Foreign-made compressor housings
Lower purchase price (delivered)	7	1
Cost of tooling/patterns	7	2
Shorter delivery time	1	-
Availability	2	-
Servicing	4	-
Favorable terms of sale	-	-
Favorable product guarantees	6	2
Favorable exchange rates	-	2
Historical supplier relationship	3	1
Product performance features:		
Superior design	-	-
Quality	5	-
More durable	-	-

1/ Ranking numbers range from 1 to 7, number 1 indicating the most important reason for purchase and number 7 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Purchasers responding to the Commission's questionnaire indicated that purchases of U.S.-produced cast-iron compressor housings increased from $28.9 million in 1979 to $33.1 million in 1983, or by 14.5 percent (table II-20). In terms of quantity, such purchases increased from 2.6 million units in 1979 to 3.4 million in 1983, or by 30.8 percent. The average unit value of these housings decreased from $10.99 in 1979 to $9.84 in 1983.

Purchases of foreign-produced housings decreased from 4,615 units in 1979 to 429 units in 1983. The average unit value of these foreign-made housings increased from $115.28 in 1979 to $860.14 in 1983.

Table II-20.--Cast-iron compressor housings: Purchases of domestically produced and foreign produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (units)	
1979	2,633,967	4,615
1980	2,513,947	4,316
1981	3,391,517	782
1982	2,696,301	457
1983	3,363,933	429
	Value (1,000 dollars)	
1979	28,936	532
1980	26,625	486
1981	24,513	594
1982	27,780	374
1983	33,109	369

Purchasers responding to the Commission's questionnaire preferred U.S.-produced to foreign-produced finished assemblies, in terms of quantity (table II-21). Such purchases of U.S.-produced finished assemblies declined from 63,757 units in 1979 to 62,388 units in 1983. By value, purchases of U.S.-made finished assemblies increased from $1.2 million in 1979 to $1.6 million in 1983. Purchases of foreign-produced assemblies, as reported in the Commission's questionnaire, increased from 1,680 units in 1979 to 7,354 units in 1981; then they declined to 4,300 units in 1982, and increased slightly to 5,360 units in 1984. The value of purchases of foreign-made finished assemblies increased steadily from $393,000 in 1979 to $3.2 million in 1983.

Table II-21.--Compressors with cast-iron housings: Purchases of domestically-produced and foreign-produced, finished assemblies by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (units)	
1979	63,757	1,680
1980	63,613	7,552
1981	73,551	7,354
1982	59,101	4,300
1983	62,388	5,360
	Value (1,000 dollars)	
1979	1,200	393
1980	1,300	1,383
1981	1,431	1,573
1982	1,535	3,090
1983	1,641	3,172

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Pricing considerations

Product prices.--Purchasers responding to the Commission's questionnaire reported prices for different sizes of cast-iron compressor housings. Even within one company, U.S.-made cast-iron compressor housings purchased were not for the same type compressor as the foreign-made housings purchased. It is, therefore, not possible to compare prices of similar U.S.-made and foreign-made compressor housings. However, witnesses testifying before the Commission reported that prices of foreign-made foundry products are 30 percent to 50 percent lower than similar U.S.-made foundry products. 1/

Cost of tooling and patterns.--The cost of tooling and patterns is generally higher in the United States than in foreign countries, primarily because of higher wage rates in the United States. Patterns are normally made of wood by hand by a skilled craftsman and tooling is heavily dependent on labor. These higher costs increase the cost of the finished product significantly. A number of producers, in response to the Commission's questionnaire, indicated that higher labor costs in the U.S. foundry industry are the primary reason for price differentials between U.S.-made and foreign-made foundry products.

Terms of sale.--U.S. producers and importers of cast-iron compressor housings reported that they require net payment from purchasers in 30 days or

1/ Transcript of the hearing held before the U.S. International Trade Commission, July 18, 1984, p. 75.

less. Producers indicated that they give discounts for volume purchases and for prompt payment, and importers do not. Producers reported penalties for late payment, whereas importers provided pre-paid freight with respect to both cast-iron housings and finished assemblies.

Exchange-rate changes.--Both producers and importers of cast-iron compressor housings reported, for the most part, a foreign advantage due to exchange-rate changes. Only for Taiwan and Korea (producers) and the United Kingdom (importers) was the competitive position considered the same with respect to exchange rate changes. U.S. importers of finished assemblies from India indicated that a foreign advantage exists due to exchange rates.

U.S. producers' responses to import competition in the U.S. market

In response to import competition in the U.S. market, 19.5 percent of the U.S. producers responding reported that they lowered their prices or suppressed price increases to maintain market share and implemented cost-reduction efforts (table II-22). Other significant steps taken in response to import competition included production curtailment, product quality improvement, and closing production lines or manufacturing (14.6 percent). The least significant response rates involved shifting production to other lines of castings or more advanced types of castings (2.4 percent).

Table II-22.--Cast-iron compressor housings: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses (percent)
Took no or few actions because your firm:	
Had already shifted production to more advanced types of castings	0
Had already shifted production to other lines of castings	2.4
Lacked capital funds to counter foreign competition	4.9
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	19.5
Reduced or dropped plans to expand capacity	7.3
Cut back production	14.6
Closed production lines or manufacturing	14.6
Shifted to more advanced types of castings	2.4
Implemented cost-reduction efforts	19.5
Improved quality of the products	14.6
Imported	0
Opened a plant to manufacture abroad	0

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

U.S. producers of cast-iron compressor housings indicated that all of the foreign producers assessed (Taiwan, Korea, the Netherlands, and Brazil) have the overall competitive advantage over U.S. producers in foreign markets (table II-23). The foreign producers were rated as having the competitive advantage over U.S. producers under all categories except product performance features. U.S. producers indicated that foreign-made products are approaching the quality of U.S.-made products, and U.S. producers will lose an even greater market share when the product performance features of U.S.-made and foreign-made compressor housings are comparable. 1/

Table II-23.--Cast-iron compressor housings: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-83

	Competitive advantage 1/			
	Taiwan	Korea	Netherlands	Brazil
Overall competitive advantage	F	F	F	F
Lower purchase price (delivered)	F	F	F	F
Cost of tooling/ patterns	F	F	F	F
Shorter delivery time	F	F	F	2/
Availability	F	F	F	2/
Servicing	F	F	F	2/
Favorable terms of sale	F	F	F	2/
Favorable product guarantees	S	S	S	2/
Favorable exchange rates	2/	F	F	2/
Historical supplier relationship	F	2/	2/	2/
Product performance features:				
Superior design	D	D	D	2/
Quality	D	D	D	2/
More durable	D	D	D	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ Information obtained in interviews with industry executives.

U.S. producers' responses to increased competition in foreign markets

Although U.S. producers, in response to the Commission's questionnaire, did not report any exports of cast-iron compressor housings during 1979-83, some producers indicated that they would have to take certain actions in order to export their products. These actions include implementing cost-reduction efforts and improving the quality of their products. Other producers indicated they have not exported because they lacked the capital funds to compete in foreign markets or that their price structure prohibited them from competing in foreign markets with low priced foreign-made cast-iron compressor housings.

III. IRON CONSTRUCTION CASTINGS

Description and Uses

Iron construction castings include two categories of products produced by different foundry methods. The first group, which are produced by the sand cast method, include manhole covers and frames, catch basin grates and frames, and cleanout covers and frames. Manhole covers and frames constitute the bulk of both domestic production and imports. All these articles are usually manufactured in sets consisting of a cover and a frame, and sometimes accessory parts such as rings, and are used for drainage or access purposes in public utility, water, and sanitary systems. The second group of articles, produced by either the shell mold or the permanent mold process, include valve and meter boxes. These products are also manufactured in sets, usually containing 3 pieces - a base, a straight midsection, and cover upon which lettering and a pattern is usually cast. These products are used to encase water, gas, or other valves, and water or gas meters beneath ground. Although they can be manufactured in a range of dimensions, they are usually much lighter and smaller than manhole covers and other construction castings, and are relatively standardized nationwide. Figures showing examples of these products are on page III-2.

Customs Treatment

U.S. tariff treatment

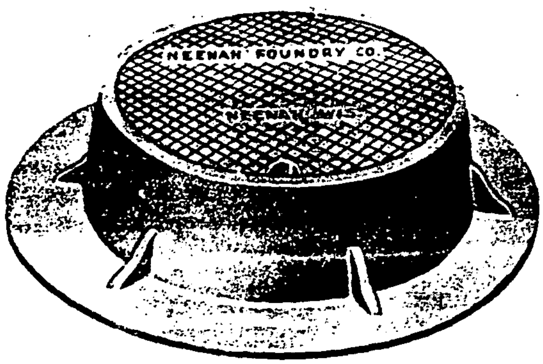
Imported iron construction castings are classified under item 657.09 of the Tariff Schedules of the United States. This item includes manhole covers, rings, and frames (657.0950) and other construction castings such as catch basin grates and frames, and water and valve meter boxes (657.0990). Item 657.0990 also includes a variety of other non-malleable cast-iron goods such as dampers and clamps. The column 1 (most-favored-nation) rate of duty for this TSUS item is free. The column 2 rate (applicable to imports from certain Communist-dominated countries) is 10 percent ad valorem. The rates of duty on this item are not affected by the Multilateral Trade Negotiations (MTN). The current rate of duty is shown in table III-1. Detailed tariff descriptions are shown in appendix E.

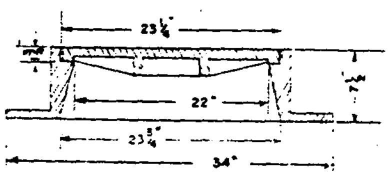
On May 10, 1979, the U.S. Customs Service of the U.S. Department of Treasury published a notice in the Federal Register (44 F.R. 27385) regarding specific country-of-origin marking requirements for imported manhole covers and frames. Customs ruled that effective on or after August 8, 1979, imported manhole covers and frames must be permanently and legibly marked with the country of origin by die stamping, molding, or etching. Customs took this action following complaints from domestic producers that origin-marking requirements were not being uniformly applied, and that many imported castings entered U.S. ports with no markings, or with the country of origin merely painted on them. Some distributors were found to be painting out the country-of-origin marking. Such country-of-origin markings are significant, in that some public works contracts are subject to "Buy American" provisions.

On February 19, 1980, the Commission and the U.S. Department of Commerce received a petition from Pinkerton Foundry, Inc., Lodi, Calif., alleging that bounties or grants were being paid with respect to certain iron construction

Figure 1.--Types of Iron Construction Castings

MANHOLE SET





VALVE BOX SET
WITH RISER

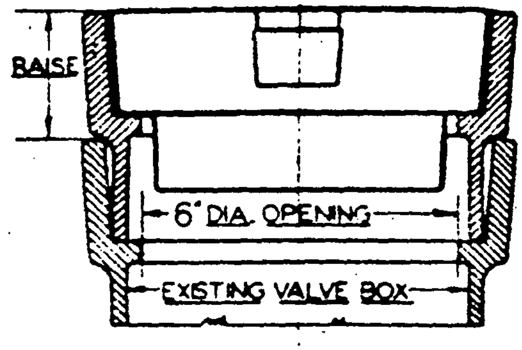
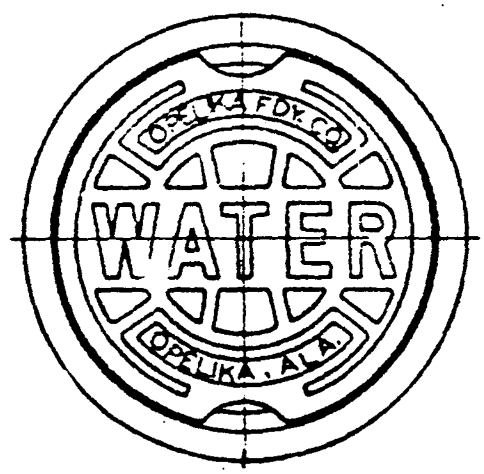
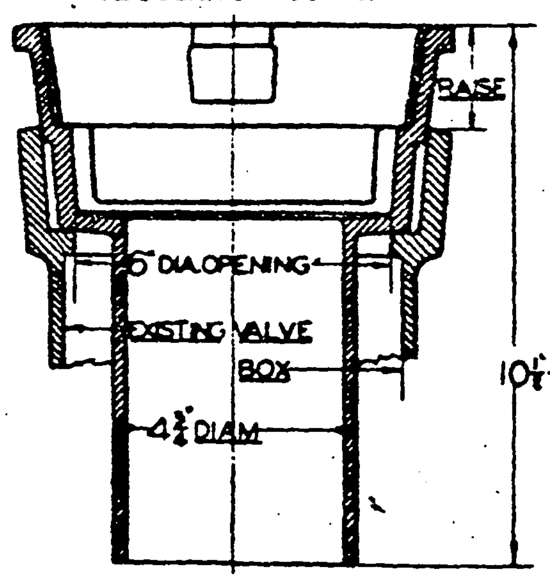


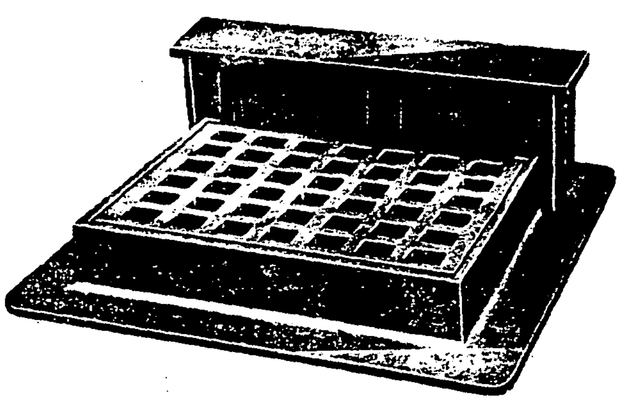
FIG. 6016-B

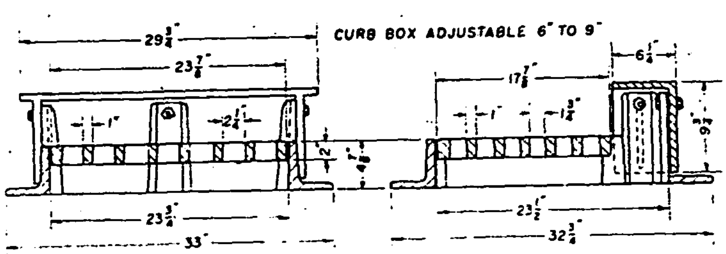


REGULAR 5¼" COVER



CURB INLET FRAME,
GRATE, CURB BOX





Courtesy Neenah and Opelika Foundries

castings 1/ imported from India. Following its investigation, Commerce issued a final countervailing duty determination on August 14, 1980, which found that benefits are being granted by the Government of India which constitute bounties or grants ranging from 12.9 to 16.8 percent of the f.o.b. India price. 2/ On September 29, 1980, the Commission, by a 4-to-1 vote, determined in investigation No. 303-TA-13 (Final) that an industry in the United States is materially injured, or is threatened with material injury, by reason of imports of certain iron-metal castings from India which were subject to the Commerce subsidy determination.

On November 19, 1980, the Commission and the U.S. Department of Commerce received a petition from Pinkerton Foundry, Inc., Lodi, Calif., alleging that certain iron construction castings from India were being, or were likely to be, sold in the United States at less than fair value (LTFV). On December 18, 1980, the Commission determined that there was a reasonable indication that an industry in the United States was materially injured, or threatened with injury, by reason of alleged LTFV imports from India. On September 29, 1980, however, the Department of Commerce issued a negative determination as to the existence of less than fair value sales, and the investigation was terminated.

On September 10, 1982, the Department of Commerce received a petition from a group of foundries representing the iron construction castings industry, alleging that bounties or grants were being paid with respect to certain iron construction castings imported from Mexico. Following its investigation, Commerce issued a final countervailing duty determination on February 7, 1983, which found that benefits are being granted by the Government of Mexico which constitute bounties or grants of 2.85 percent of the f.o.b. Mexican price.

Foreign tariff treatment

Most of the major foreign sources of iron construction castings use the Customs Cooperation Council Nomenclature (CCCN) system, which classifies these articles under item No. 73.40A, "Iron castings in the rough state." There were no duty reductions for iron construction castings established during the Tokyo round of the MTN. The current rates of duty applicable to imports of construction castings for major foreign producing countries of these castings are shown below (in percent ad valorem):

Item No.	Description	Country	Present rate of duty
73.40A	Iron castings in a rough state, n.o.p.	India	140
		Brazil	170
		China	30
		Mexico	40

1/ The iron construction castings included in these investigations were manhole covers, rings, and frames; catch basin grates and frames; and cleanout covers and frames. The investigations did not include water or valve meter boxes.

2/ This countervailing duty was subsequently reduced. The current countervailing duty being applied to imports of iron construction castings from India is 2.85 percent.

Table III-1.--Iron construction castings: U.S. rates of duty, by TSUS items

(Percent ad valorem)

TSUS item No.	Description	Pre-MTN col. 1 rate of duty 1/	Col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--								Col. 2 rate of duty
			1980	1981	1982	1983	1984	1985	1986	1987	
	Articles of iron or steel, not coated or plated with metal:										
	Cast-iron articles, not alloyed:										
657.09	Not malleable----------------	Free	Free	Free	Free	Free	Free	Free	Free	Free	10%.

1/ Rate effective prior to Jan., 1, 1980.

Canada classifies imports under its own tariff system, the Tariff Schedules of Canada, as follows (in percent ad valorem):

44603-1	Manufactures, articles or wares, of iron or steel or of which iron or steel or both are the component materials of chief value	Canada	12.9

In addition to the above-stated duties, all of the major foreign producing countries, with the exception of Canada, maintain a system of import licensing for imports to their countries. According to Department of Commerce sources and State Department telegrams, such licensing systems effectively prohibit the importation of construction castings into India, Brazil, and Mexico.

All importation of goods into China is done by means of negotiated prices with state trading companies, and duties charged on imports are included as part of the negotiated prices. Furthermore, Department of Commerce officials indicate, it is difficult to import goods which are already produced in China.

Profile of the U.S. Industry and Major Foreign Competitors

United States

There are approximately 40 foundries in the United States which produce iron construction castings on a regular basis. In addition, there are other numerous small, jobber foundries which possess patterns of construction castings for local municipalities and utilities, and manufacture such items on an intermittent basis.

In recent years many jobber foundries have abandoned the production of the relatively low unit value, competitively priced construction castings. Production has become increasingly concentrated in several of the larger foundries, which account for a growing proportion of total iron construction casting production. The eight largest iron construction castings foundries accounted for approximately 80 percent of U.S. production of these products in 1983. 1/

Iron construction castings producers tend to specialize in the production of these products. Of 24 producers who responded to Commission questionnaires, 20 reported that construction castings accounted for 75 percent or more of their total foundry production. For the eight largest foundries reporting, five reported that construction castings accounted for 75 percent or more of their total foundry production.

Although it is possible for iron construction castings producers to make other iron castings, it is not economically feasible for the majority to do so. Iron construction foundries must be designed to manufacture and handle castings within certain size and weight ranges in order to be able

1/ Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission.

economically to produce castings in the highly price competitive construction materials' market. Since economies also dictate that the heavier construction castings, such as manhole frames and covers, be produced by the sand-cast process, producers are restricted in the number of alternate products they can produce. Rolls for rolling mills, or pipes and tubes, for example, could not be produced in sand-cast foundries. Barriers also exist between producers of the lighter iron construction castings, such as valve boxes, and the heavier castings, because most valve boxes and similar products are manufactured by the shell mold process. These producers, some of which manufacture significant quantities of other foundry products, do so in separate facilities or on separate equipment within the same plant.

In recent years the industry has become increasingly concerned about imports of construction castings and has formed an industry-wide group, The Municipal Castings Fair Trade Coalition, which monitors international trade in construction castings and has filed several unfair trade petitions against imports of iron construction castings from India and Mexico.

U.S. production, capacity, and capacity utilization.--U.S. production of iron construction castings declined steadily from 229,150 tons in 1979 to 163,131 tons in 1982, before rebounding somewhat to 186,827 tons in 1983. Throughout the period, however, capacity to produce such castings increased from 388,884 tons in 1979 to 412,158 tons in 1983, or by 6 percent. Capacity additions reported by U.S. producers represent modest investments in more modern, automated machinery, complementing existing molding, pouring, and shake-out lines. Several of the larger producers, however, are implementing investment projects which will significantly increase their facilities' capacities and, they state, enable them better to combat imports by reducing unit costs and shortening delivery times. 1/

Given the decline in production and the increase in capacity, the capacity utilization of iron construction castings' producers also followed a general downward trend from 1979 to 1982 with a mild recovery in 1983. Capacity utilization, however, was below 50 percent for each year during 1981-1983, as indicated by table III-2.

Table III-2.--Iron construction castings: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production--------short tons--:	229,150	199,204	180,319	163,131	186,827
Production capacity short tons--:	388,884	395,351	400,467	408,186	412,158
Capacity utilization percent--:	58.9	50.4	45.0	40.0	45.3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 130-132.

Table III-3 shows the age of U.S. producers' machinery and equipment. It indicates a gradual shift from the manual packing and handling of sand molds to more automated, higher volume methods employing sand slingers or vacuum injection technology. Equipment is still relatively old, however, and producers indicate significant investments will be needed to maintain efficiency and to comply with Government pollution regulations.

Table III-3.--Iron construction castings: Machinery and equipment in manufacturing facilities of reporting producers, as of Jan. 1, 1984, by age of the machine

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	5	4	5	21	14
Molding lines:					
Automated	8	7	17	25	2
Manual	1	2	4	53	82
Total	14	13	26	92	84

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--U.S. employment in the iron construction casting industry declined steadily from 5,244 persons in 1979 to 4,035 persons in 1983, or by 23 percent. The decline in employment of production and related workers was even more severe, 26 percent, from 4,221 workers in 1979 to 3,106 workers in 1983. Man-hours worked and wages paid in the iron construction casting industry also declined steadily from 1979 to 1982, as shown in table III-4, but showed increases in 1983 from 1982 levels.

Table III-4.--Iron construction castings: Number of employees and production and related workers in operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons	5,244	4,810	4,682	4,084	4,035
Production and related workers	4,221	3,822	3,661	3,101	3,106
Man-hours worked---1,000 hours	8,272	7,255	6,884	5,655	5,949
Wages paid-------1,000 dollars	56,538	54,211	56,931	47,661	52,403

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Declines in employment in the iron construction casting industry may be somewhat attributable in part to the trend toward automation as indicated by table III-3. Man-hours per ton, a common measure of productivity, improved markedly in the iron construction casting industry, dropping from 36 hours per ton in 1979 to 32 hours per ton in 1983, a 12 percent decline.

A comparison of wages paid to production workers in foundries producing iron construction castings and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S. foundry industry had been receiving wages slightly above the average for U.S. manufacturing establishments from 1979 to 1981. However, in 1982 average hourly wages in the iron construction castings industry slipped below the national average, and continued below that average in 1983, as shown in the following tabulation (per hour):

	Foundries producing iron construction castings 1/	All operating U.S. manufacturing establishments 2/
1979----------	$6.83	$6.00
1980----------	7.47	7.27
1981----------	8.27	7.99
1982----------	8.43	8.49
1983----------	8.81	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The Commission received usable data from 26 producers representing approximately 90 percent of the domestic industry producing these products. The quantity of U.S. producers' domestic shipments declined from 224,620 tons in 1979 to 170,421 tons in 1982, a drop of 24 percent, before increasing by 11 percent, to 189,578 tons in 1983. The value of U.S. producers' shipments of iron construction castings also declined from 1979 to 1982, and increased in 1983. Table III-5 shows the quantity and value of U.S. producers' shipments of these items.

Table III-5.--Iron construction castings: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Short tons	1,000 dollars	Dollars per ton
1979----------	224,620	135,880	604.93
1980----------	196,164	128,545	655.29
1981----------	180,131	122,746	681.43
1982----------	170,421	120,679	708.12
1983----------	189,578	133,394	703.64

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Only five respondents to Commission questionnaires reported exports of iron construction castings in the 1979-83 period. Exports amounted to 1 percent of U.S. producers' shipments from 1979 to 1983. Exports of these products are negligible due to high transport costs relative to the value of the castings, high unit values of U.S. castings relative to foreign castings, and formidable tariff and other trade barriers, especially in those developing countries that are major exporters of these items to the U.S. market. The only construction casting producers reporting significant exports relative to domestic shipments were the producers of the lighter, more standardized valve and water meter box products. Principal export markets are Canada and the Middle East, where some large-scale construction projects contracted to U.S. firms specify certain castings developed by U.S. producers. The quantity and value of U.S. exports of iron construction castings are given in table III-6.

Table III-6.--Iron construction castings: U.S. exports of domestic merchandise, 1979-83

Year	Quantity	Value	Unit value
	Short tons	1,000 dollars	Dollars per ton
1979	1,207	1,044	864.95
1980	3,398	2,876	846.38
1981	1,923	1,863	968.80
1982	1,750	1,523	870.29
1983	1,472	1,476	1,002.72

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers of construction castings who do export reported that foreign competitors maintained a strong competitive advantage in those markets, stemming from advantages in lower prices and price related factors. U.S. producers indicated they have cut or suppressed prices to attempt to retain export markets, but with limited success.

U.S. producers' inventories.--The combined end-of-period inventories of producer respondents remained relatively stable from 1979 to 1983, as shown in the following tabulation:

	Quantity (short tons)
1979	53,166
1980	55,475
1981	56,988
1982	52,476
1983	53,998

Most U.S. producers of construction castings try to keep a 1 month inventory on hand of their high volume castings, in order to better serve their customers.

In recent years, some producers stated they were forced to decrease inventories because of the increased cost of maintaining them.

Financial experience of U.S. producers.--The Commission collected profit-and-loss data on all foundry operations in facilities in which iron construction castings are produced; however, for 22 of 26 respondents, iron construction castings accounted for 75 percent or more of total foundry production. Hence the profit and loss data presented in table III-7 are representative of the product as well as the industry producing the product.

Table III-7.--Iron construction castings: U.S. producers' net sales and net operating profit (loss) on operations producing foundry products, 1979-83

	1979	1980	1981	1982	1983
Net sales------1,000 dollars--	226,097	204,439	207,699	159,783	181,142
Net operating profit (loss) 1,000 dollars--	22,707	12,314	12,538	(4,238)	2,688
Ratio of net operating profit (loss) to net sales percent--	10.0	6.0	6.0	(2.7)	1.5

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table III-7 shows net sales of U.S. iron construction castings producers declining from $226 million in 1979 to $160 million in 1982, a 29 percent drop. Net sales rebounded in 1983 to $181 million, an increase of 13 percent over 1982 sales, but still 20 percent below sales in 1979. Net profits followed the same general trend as net sales, but the decline from 1979 to 1982 was more severe, with the industry as a whole experiencing a $4.2 million loss in 1982. Net profits in 1983 rebounded to $2.7 million. The ratio of net operating profit to net sales dropped from 10.0 percent in 1979 to a negative 2.7 percent in 1982, before a modest recovery in 1983 to 1.5 percent of sales.

Capital expenditures.--Capital expenditures of U.S. producers of iron construction castings declined from $10.7 million in 1979 to $5.2 million in 1983, or by 52 percent. Increases in expenditures for land and buildings were more than offset by substantial declines in new machinery and equipment purchases, as shown in table III-8. Also, U.S. producers reported no capital expenditures for facilities in other countries during 1979-83.

Table III-8.--Iron construction castings: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	34	481	90	54	359
Buildings, leasehold improvements	1,012	912	1,290	759	1,309
Machinery, equipment, and fixtures:					
New	9,428	5,307	4,785	3,740	3,245
Used	252	540	1,390	2,156	273
Total	10,726	7,240	7,555	6,709	5,186

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Of the 26 U.S. producers who responded to the Commission questionnaires, 9 stated that the declines in their capital expenditures were directly related to the suppression of prices in their markets caused by imported castings. 1/ The low import prices affected capital expenditures and the ability of firms to raise capital in two ways: (1) the price suppressive effect of imports caused insufficient profits to be generated to finance expenditures from retained earnings; (2) the resultant low or negative profits made banks reluctant to loan producers money for capital investment projects. Despite the difficulties being experienced in securing investment funds, several U.S. producers have indicated they will significantly increase capital investment in the near future. 2/

Research and development expenditures.--U.S. producers' expenditures on research and development declined from 1979 to 1981, but have increased since then, reaching $1.7 million in 1983, a 65 percent increase over the $1.1 million spent for such purposes in 1979. These expenditures are shown in table III-9.

1/ See also Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 102-04.

2/ Other producers have indicated that their capital investment projects await a satisfactory solution to the import problem: See Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 130-132, and 103.

Table III-9.--Iron construction castings: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

Year	Value (1,000 dollars)
1979	1,054
1980	798
1981	790
1982	823
1983	1,737

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As in the capital expenditure area, research and development expenditures in the iron construction castings industry were greatly influenced by the presence of imports. According to questionnaire responses, most R&D expenditures were devoted to the development and design of new patterns, which are to be used to differentiate U.S. producers' castings from imports. 1/

Major foreign competitors

Data on imports, and industry sources indicate that India is the dominant foreign supplier of such castings to the U.S. market. In the past 2 years, import competition has also surfaced from Brazil, Mexico, and China. Canada is a traditional source of such castings in the Great Lakes area.

High relative transportation costs preclude significant international trade in iron construction castings among developed countries. Iron construction castings exporters will remain those countries enjoying very low labor costs and other alleged advantages. 2/

Structural Factors of Competition Between U.S. and Foreign Industries

U.S. producers responding to Commission questionnaires showed near unanimous agreement on the factors which provide a competitive advantage to domestic and foreign casting manufacturers (table III-10). First, nearly all respondents in the U.S. industry producing construction castings identified

1/ Ibid., p. 137.

2/ An importer of Indian construction castings testified that the main advantages of imports were simplicity of production, low labor costs, and availability of raw materials. However, U.S. producers maintain that foreign producers' advantages cannot be completely explained by lower labor costs, or that labor costs are even the most important factor in the growing presence of imports in the U.S. market. Rather, it is subsidies and other governmental assistance, allege U.S. producers, that are responsible for the low prices of imported castings in the U.S. market: See Hearing before the U.S. International Trade Commission, pp. 115, 128 and 129, 240 and 241.

India as the primary foreign competitor; and nearly all who responded listed Mexico, Canada, China, Brazil, and Taiwan, (in that order) as other foreign castings manufacturers impacting the U.S. market.

In general, the industry considered its strengths to be in the areas of production technology and marketing. In the availability and cost of industrial inputs such as fuel, and raw materials, there was little advantage indicated for either U.S. or foreign producers. For capital and labor availability and cost, however, foreign construction castings producers are given an advantage over their U.S. competitors, and are also indicated to have a strong advantage in terms of both U.S. Government regulations and foreign government involvement. Chief among the policies of the U.S. Government noted by industry representatives as providing foreign competition with an advantage were costs associated with environmental protection and worker health and safety. U.S. producers of iron construction castings are regulated by both Federal and local government agencies on water, air, noise, and disposal of hazardous waste. These regulations and allowable waste limits have changed over the past several years, and Federal and local regulations often conflict. This has led to continued research and investment of earnings by producers in new technologies and investments for environmental control and worker safety. Major foreign competitors of U.S. producers, with the exception of Canada, face minimal regulations as to pollution control and worker health and safety, and hence are able to save that portion of earnings associated with regulatory compliance measures.

U.S. Government involvement in international lending agencies such as the International Monetary Fund (IMF) and World Bank were also seen by U.S. producers as providing low-interest loans to developing countries, which build foundries to compete with U.S. producers. Finally, U.S. Government and State laws and policies relating to company set-asides for Social Security, worker disability and health insurance, and other welfare plans increase costs to U.S. foundries, preventing them from being cost competitive with imports, especially from India and other developing countries.

Table III-10.--Iron construction castings: U.S. producers' assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

Item	Competitive advantage 1/					
	India	Brazil	China	Mexico	Canada	Taiwan
Fuel:						
Availability	S	S	S	F	S	F
Cost	F	S	F	F	S	F
Raw material:						
Availability	S	S	S	S	S	F
Cost	F	F	F	F	F	F
Capital:						
Availability	F	F	F	F	F	F
Cost	F	F	F	F	F	F
Ability of industry profits to attract funds	F	F	F	F	F	F
Labor:						
Availability	F	F	F	F	S	S
Cost	F	F	F	F	F	F
Production technology	D	D	D	D	D	D
Marketing:						
Channels of distribution	D	D	S	D	S	S
Responsiveness to orders	D	D	D	D	D	D
After-sale service capabilities	D	D	D	D	D	D
Government involvement:						
Subsidies	F	F	F	F	F	F
Research and development assistance	F	F	F	F	S	F
Tariff levels on imports	F	F	F	F	F	F
Nontariff barriers to imports	F	F	F	F	F	F
U.S. Government regulations which increase costs	F	F	F	F	F	F
Foreign government regulations which increase costs	F	F	F	F	F	F

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The U.S. Market

The marketing of iron construction castings in the United States differs from that of most other foundry products. First, the items are consumed in nearly the same condition and dimensions in which they have been cast - there is minimum machining and finishing operations on these items. Second, the vast bulk of construction castings are ultimately purchased and consumed by public utilities, municipalities, and other publically-owned entities to be used for civil construction purposes. Hence, iron construction castings have limited channels of distribution and end markets. Respondents to producer questionnaires reported that almost all of their shipments of construction castings went to distributors, or directly to end users such as firms constructing municipal water and other utility systems (table III-11). Importers who responded to the questionnaire, however, reported that 60 percent of their shipments went to distributors. The higher proportion of sales to distributors by importers is typical of metalworking industries' markets. Since the national identity of the castings is often lost at the distributor level, the effect of import sales and prices on U.S. producers of similar products is often difficult to gauge.

Table III-11.--Iron construction castings: U.S. producers' and importers' shipments, by channel of distribution, 1981-83

(In percent)

Channel of distribution	Share of shipments	
	Producers	Importers
Machine shops/other fabricators	1/	3
Distributors	35	60
Original equipment manufacturers	1	1/
Other	64	36
Total	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' and importers' sales of iron construction castings by type of market are also heavily concentrated in a single market, that of public utilities and municipalities, as shown in table III-12 below.

Table III-12.--Iron construction castings: U.S. producers' and importers' shipments, by type of market, 1981-83

(In percent)

Type of market	Share of shipments	
	Producers	Importers
Motor vehicles	-	-
Farm machinery and equipment	1	1
Mining machinery and equipment	1	-
Construction machinery and equipment	1	-
Refrigeration and heating equipment (except pumps and compressors)	2	-
Plumbing equipment	1	5
Railway equipment	1	-
Industrial machinery	1	-
Machine tools	-	-
Valves and pipe fittings	-	1
Pumps and compressors	-	-
Other (utilities, municipalities)	92	93
Total	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

Apparent U.S. consumption of iron construction castings declined steadily, from 285,000 tons in 1979 to 207,000 tons in 1982, or by 27 percent, before increasing 16 percent to 241,000 tons in 1983 (table III-13). The quantity of both U.S. producers' domestic shipments and imports declined over the 5-year period, while exports remained stable at very low levels. The ratio of imports of construction castings to apparent consumption remained stable at about 21 percent for 1979 and 1980, then fell to 18 percent in 1981 and 1982, but rose again, to 21 percent of domestic consumption, in 1983.

Table III-13.--Iron construction castings: Domestic shipments, exports, imports, and apparent consumption, 1979-83

Year	Producer shipments	Exports	Imports	Apparent consumption	Ratio (percent of imports to consumption
	Quantity (1,000 short tons)				
1979	225	1	60	285	21.1
1980	196	3	51	247	20.6
1981	180	2	40	220	18.2
1982	170	2	37	207	17.9
1983	190	1	51	241	21.2
	Value (1,000 dollars)				
1979	135,880	1,044	22,434	158,314	14.2
1980	128,545	2,876	18,463	147,008	12.6
1981	122,746	1,863	17,226	144,972	11.9
1982	120,679	1,523	18,439	139,118	13.3
1983	133,394	1,476	24,218	157,612	15.4

Source: Calculated from data submitted in response to questionnaires of the U.S. International Trade Commission, and official statistics of the U.S. Department of Commerce.

U.S. imports

U.S. imports of iron construction castings declined from 60,069 short tons in 1979 to 37,160 short tons in 1982, before increasing 36 percent to 50,675 short tons in 1983 (table III-14). Import data indicate that the upward trend accelerated in the first 5 months of 1984. 1/ India was by far the dominant import source, accounting for 78 percent of the total quantity of imports of construction castings from 1979 to 1983. However, as table III-14 indicates, more import sources of iron construction castings were developing during 1979-83, including China, Mexico, Canada, and Brazil. In 1983, the unit value of imports of construction castings from Brazil, China, and Mexico were all lower than that of India.

1/ Prehearing brief of Municipal Castings Fair Trade Council, pp. 22 and 23.

Table III-14.--Iron construction castings: U.S. imports for consumption, by principal sources, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (short tons)				
India	52,675	45,300	32,602	26,170	29,187
Canada	2,320	2,710	3,403	4,778	6,928
China	-	-	-	2,079	5,864
Mexico	3,533	2,763	2,128	2,554	4,170
Brazil	-	45	-	-	936
All other	1,542	379	2,065	1,579	3,590
Total	60,069	51,197	40,198	37,160	50,675
	Value (1,000 dollars)				
India	12,986	12,170	10,379	9,423	10,485
Canada	2,974	1,899	2,547	3,931	4,726
China	-	-	-	678	1,665
Mexico	1,708	1,390	1,096	1,312	1,777
Brazil	-	34	-	-	255
All other	4,766	2,970	3,204	3,095	5,310
Total	22,434	18,463	17,226	18,439	24,218
	Unit value				
India	246.53	268.65	318.35	360.07	359.24
Canada	1,281.90	700.74	748.46	822.73	682.16
China	-	-	-	326.12	283.94
Mexico	483.44	503.08	515.04	513.70	303.04
Brazil	-	755.56	-	-	272.44
Average	373.47	360.63	428.53	496.21	477.91

Source: Derived from official statistics of the U.S. Department of Commerce.

U.S. producers of iron construction castings accounted for a declining share of total U.S. castings imports during 1979-83, as shown in the following tabulation:

	Quantity (short tons)	Value (1,000 dollars)	Share of imports (in percent)
1979	7,500	2,563	12.5
1980	6,298	2,194	12.3
1981	7,064	2,796	17.6
1982	4,756	2,252	12.8
1983	4,458	2,266	8.9

U.S. producers reported that they imported iron construction castings primarily because of price and price-related factors such as terms of sale. Several stated that they could import such castings, delivered, for less than their cost of production for certain models (table III-15). Another important reason for U.S. producers' imports (listed as "other" in table III-15) is for defensive purposes - by importing castings for their own account, they are attempting to control the distribution of imported castings in their marketing area. This practice allows them to control somewhat the influx of imports and channels of distribution while U.S. producers finalize expansion and modernization projects. After the completion of such projects, producers hope to be able to replace imports with domestically-produced castings from their own foundries. In the meantime, imports are used as "loss leaders" whereby U.S. producers can offer an entire line of castings from one source. This strategy partly explains the relatively high ranking of availability in table III-15, and the declining trend of producer imports in 1982 and 1983.

Table III-15.--Iron construction castings: U.S. producers' ranking of product-related factors that were the principal reasons for their imports, 1981-84

Reason for importing	Ranking 1/
Lower purchase price (delivered)	1
Cost of tooling/patterns	4
Shorter delivery time	13
Availability (what you want and where you want it)	3
Servicing	5
Favorable terms of sale	2
Favorable product guarantees	11
Favorable exchange rates	6
Historical supplier relationship	7
Product performance features:	
Superior design	9
Quality	9
More durable	11
Other	7

1/ Ranking numbers range from 1 to 13, number 1 indicating the most important reason for importing and number 13 indicating the least important reason for importing.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in the U.S. Market

U.S. producers evaluating product specific factors of competition in the U.S. market were consistent as to relative advantages of U.S.-made castings versus those produced by major foreign competitors. Price and price-related factors were listed as providing foreign castings with an overall competitive advantage in the U.S. market place (table III-16). These factors were more than sufficient to outweigh U.S. advantages, which were more numerous, and included marketing-oriented factors and product performance features. For the countries of India, Brazil, and China, U.S. producers also listed the existence of foreign government subsidies (listed as "other") as contributing to the overall advantage enjoyed by foreign castings in the U.S. market. A strong advantage of U.S. construction castings, states the U.S. industry, is product liability of domestic castings, for which most U.S. producers carry insurance. Such liability is usually unenforceable for imported castings, should manhole covers or other items be defective when put into service. 1/ Nonetheless, this and other factors do not overcome the advantages of lower prices on these items, which are sold to specification, and hence are relatively fungible.

Responses to Commission questionnaires from importers were limited for some major supplying countries. However, data that were received indicate that importers consider U.S. and foreign-produced iron construction castings to be on a generally equal competitive footing in the U.S. market except for those from India, which were judged to have an overall advantage against U.S.-made products (table III-16). U.S. producers and importers agreed that domestically-produced castings had an advantage in terms of marketing factors, but saw foreign castings as equal in quality and price-related factors such as terms of sale and exchange rate advantages. Importers indicated that foreign castings had a clear advantage only in the area of the cost of tooling and patterns.

1/ Some importers, however, have product liability programs similar to domestic producers. Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 120 and 121, 234.

Table III-16.--Iron construction castings: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made products in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/											
	India		Brazil		China		Mexico		Canada		Taiwan	
	P	I	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	F	F	S	F	S	F	D	F	S	F	D
Lower purchase price (delivered)	F	F	F	F	F	S	F	S	F	S	F	F
Cost of tooling/ patterns	F	F	F	F	F	F	F	F	F	S	F	F
Shorter delivery time	D	D	D	S	D	D	D	D	D	S	D	D
Availability	D	D	D	D	D	D	D	D	D	S	D	D
Servicing	D	D	D	D	D	D	D	D	D	S	D	D
Favorable terms of sale	F	F	F	S	F	S	F	D	F	S	F	D
Favorable product gaurantees	D	D	D	S	D	S	D	D	D	S	S	D
Favorable exchange rates	F	S	F	S	F	S	F	S	F	S	F	S
Historical supplier relationship	D	F	D	D	S	D	S	D	D	S	2/	D
Product performance features:												
Superior design	D	S	D	S	D	S	D	D	D	S	D	S
Quality	D	S	D	S	D	S	D	D	D	S	D	S
More durable	D	S	D	S	D	S	D	D	D	S	D	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Purchasers, including municipalities, distributors, and construction firms, ranked their reasons for purchasing domestic versus foreign-made iron construction castings as shown in table III-17. The quantity and value of purchases of domestic and foreign-made iron construction castings of respondents are provided in table III-18.

Table III-17.--Iron construction castings: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made construction castings	Foreign-made construction castings
Lower purchase price (delivered)	4	1
Cost of tooling/patterns	8	-
Shorter delivery time	1	2
Availability	1	2
Servicing	5	4
Favorable terms of sale	5	-
Favorable product guarantees	5	-
Favorable exchange rates	-	4
Historical supplier relationship	1	-
Product performance features:		
Superior design	-	-
Quality	5	-
More durable	-	-

1/ Ranking numbers range from 1 to 8, number 1 indicating the most important reason for purchase and number 8 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table III-18.--Iron construction castings: Purchases of domestically-produced and foreign-produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (short tons)	
1979	5,309	1,083
1980	4,856	998
1981	4,859	1,441
1982	5,146	1,304
1983	4,547	2,659
	Value (1,000 dollars)	
1979	3,653	759
1980	3,513	618
1981	3,518	774
1982	3,654	623
1983	2,951	1,147

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table III-17 indicates that purchasers generally disagree with importers as to the importance of price-related factors in their purchasing decisions. Although purchasers rated shorter delivery time, availability, and buyer-seller relationship ahead of price as factors important in their purchases of U.S.-made iron construction castings, they stated unanimously that lower purchase price was the dominant factor in their decision to purchase foreign castings. Table III-18 indicates that whereas the unit values for U.S.-made and foreign-made purchases were roughly equal in 1979, foreign unit values fell substantially, and by 1983 were 33 percent below U.S. unit values.

Pricing considerations

Pricing considerations are paramount in iron construction castings purchases, far outdistancing product performance, marketing, and service capability in most purchasing decisions. To a large extent, this is due to the system by which consumers of these castings, primarily local government utility, road, and other construction entities, purchase castings and let bids for civil construction projects. In purchasing construction castings directly, the municipality or other civic entity typically awards purchase contracts on the basis of closed bids, and is mandated to choose the lowest bidder meeting the required specifications. The bidding system is the same for general construction contracts, in which sewer or road systems' contracts are bid by general contractors. In these cases, the general contractor will try to maximize profit on the bid project by cutting costs, and will bargain with a number of competing construction castings distributors to secure the lowest possible purchase price.

Pricing data on a specific casting produced by both domestic and foreign producers tend to support U.S. producers' claims that foreign-made construction castings sell for lower prices than U.S.-made castings (table III-19).

Table III-19.--Iron construction castings: Average lowest net delivered price reported by purchasers, 1981-83

(Price per pound)

Period	Manhole assembly of cast iron, no rock traffic type, approx. 270 lb; approx. 31.5 inches at base, 26.25 inches surface diameter, 1 3/8 inches thick at center. Frame approx. 32", 4 1/2" high, 24" clear opening. Cover 25" diameter 1 1/8 thick center.	
	Domestic	Foreign
1981:		
January-March	$0.25	$0.18
April-June	0.25	0.18
July-September	0.25	0.18
October-December	0.25	0.18
1982:		
January-March	0.26	0.19
April-June	0.26	0.19
July-September	0.26	0.19
October-December	0.26	0.19
1983:		
January-March	0.26	0.22
April-June	0.24	0.22
July-September	0.24	0.20
October-December	0.24	0.19

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Prices on the designated manhole assembly have remained relatively stable for purchases of U.S.-made products until the last half of 1983 when they fell below 1981 levels. Prices on import purchases were also stable, at around 27 percent below U.S. prices for 1981 and 1982, before rising in early 1983, then falling in the last half of 1983 to 21 percent below U.S. prices. 1/ Staff discussions with U.S. producers, importers, and purchasers provide further evidence that imported iron construction castings have a clear advantage in

1/ U.S. producers allege that the lowered prices on imports from India, and the increase in such imports, was timed to occur after completion of the Department of Commerce annual review of the countervailing duty on Indian castings. Hearing before the U.S. International Trade Commission, July 18, 1984, p. 98.

the cost of patterns, favorable exchange rates and terms of sale. Price advantages are being lessened in some markets, however, as U.S. producers are suppressing prices in order to retain or regain market share. Most producers' and importers' terms of sale are net sales due in 30 or less days; many producers and importers grant discounts for prompt payment, and pre-pay freight on some transactions.

Product performance features

Because most iron construction castings are sold to dimensional and performance specifications, both domestic and imported construction castings are roughly fungible in terms of design, quality, and durability, and such considerations are overshadowed by price-related factors as a variable in the marketplace. U.S. producers of construction castings are devoting an increasing amount of funds to the development of new patterns of castings, which they feel will help differentiate their castings from imports and develop new markets. However, these new casting patterns would still have to be specified by municipalities and other consumers before they could be produced in commercial volume.

U.S. producers of iron construction castings have alleged that imports are of inferior quality, not as durable, and fail more readily than U.S.-produced castings. To substantiate this assertion, U.S. producers have submitted to the Commission's staff tensile strength and other tests on Chinese grate castings performed by the Gray Iron Research Institute, Inc., Columbus, Ohio. These tests show the imported casting to be of significantly lower strength than comparable U.S.-made castings, and the report suggests that the foreign casting only be used when load bearing requirements are "unimportant." 1/ Similar tests on Indian construction castings were provided the Commission subsequent to a request made at the Hearing. They showed the Indian test castings to be more susceptible to brittleness and cracking than were similar U.S. castings. 2/

Market response

Both producers and importers indicate that market response factors, such as delivery times, availability, servicing, and historical supplier relationship represent advantages of U.S.-made iron construction castings. These factors derive from the proximity of U.S. producers to the market, and their provision of product liability insurance. Other factors strengthening U.S. producers marketing and services position relate to safety and quality testing demanded by municipality utility and road construction departments, and include

---

1/ Letter from Mr. William Shaw, Gray Iron Research Institute Inc., to Mr. Gordon Dubberstein, Neenah Foundry Co., Jan. 18, 1984, p. 4. An importer, however, testified that U.S. and foreign-made castings are about equal in quality. Hearing before the U.S. International Trade Commission, July 18, 1984, p. 233.

2/ Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 121 and 122.

provision of test bars and inspection, certification of tensile strength, weight, and design specifications.

Testimony and evidence presented at the Commission's Hearing demonstrated several methods by which Indian producers, importers, or others in the distribution channel of Indian castings attempt to nullify U.S. producers' marketing advantages. 1/ These practices, some of which are alleged by U.S. producers to be fraudulent, 2/ include the removal or obscuring of country-of-origin markings, and the counterfeiting of U.S.-made castings, complete with U.S. model and pattern numbers, in order to misrepresent these items as U.S.-made, and misdeclaring items for Customs purposes.

Transportation factors

Not surprisingly for such bulky and heavy items as construction castings, transportation costs are an important factor in international trade, 3/ and play a key role in defining the market area of U.S. producers and limiting competition among them. Domestic producers estimated that at current trucking rates, freight costs represent 10 percent of net sales cost. Such relatively high transport costs make a construction casting less price competitive the further it must travel from a plant location to the market. Hence, most efficient foundries producing such castings can maintain a marketing area of only 300 sq. miles or less from the manufacturing facility. Competition is especially keen in those areas located equidistant from two competing foundries. 4/

By comparison, international ocean rates for construction castings from India are estimated to be $110 a ton, or over 28 percent of the current average selling price for large Indian castings. Inland transportation costs dictate that import penetration of these castings be focused in coastal areas, such as New York, Houston, and the West Coast. Nonetheless, there are major importers of construction castings in Utah and Colorado. Such importers maintain sizeable inventories in different market areas to better serve customers.

1/ Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 106 and 107.

2/ Post-hearing brief of MCFTC. Many of these allegations were corroborated at the Commission's Hearing by an importer of Indian castings. See Hearing before the U.S. International Trade Commission, pp. 238, 242 and 243.

3/ Hearing before the U.S. International Trade Commission, July 18, 1984, p. 238.

4/ An example of such a market is said to be the Atlanta, Ga., market, served by two large construction foundries located in southern Florida, and central Louisiana.

U.S. producers' responses to import competition in the U.S. market

U.S. producers of iron construction castings who responded to the Commission questionnaires listed 69 separate responses to import competition in their markets; only 9 percent of the responses involved taking no action at all, as reflected in table III-20. The action most often taken against imports was to lower or suppress U.S. prices of such castings to retain or regain market share. This response is consistent with producer assertions that suppression of prices caused lowered profits in recent years and thwarted capital investment. Almost an equal amount of responses mentioned implementing cost reduction efforts in an attempt to maintain or regain profit margins. Other responses included cutting back production in the face of import competition, and, related directly by questionnaire respondents to price suppression, the modifying, delaying, or cancelling of plans to expand capacity. 1/

Table III-20.--Iron construction castings: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses (percent) 1/
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	1
Had already shifted production to other lines of castings	1
Lacked capital funds to counter foreign competition	4
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	20
Reduced or dropped plans to expand capacity	12
Cut back production	16
Closed production lines or manufacturing	4
Shifted to more advanced types of castings	4
Implemented cost-reduction efforts	19
Improved quality of the products	10
Imported	4
Opened a plant to manufacture abroad	-
Other	3

1/ Totals do not add to 100 due to rounding.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ See also Hearing before the U.S. International Trade Commission, July 18, 1984, pp. 101-104.

IV. CAST-IRON PIPES AND TUBES

Description and Uses

Cast-iron pipes and tubes consist of soil pipe and pressure pipe. Gray iron is the principal raw material in soil pipe castings. Most of the cast-iron soil pipe is made from ordinary iron containing less than 0.1 percent sulphur, and under 0.9 percent phosphorus, with carbon and silicon contents controlled to give the required mechanical properties. Cast-iron soil pipes are available in 5- and 10-foot lengths, with inside diameters of 2 to 15 inches. The pounds per square inch (psi) rating for soil pipe is low (up to 20 psi) since soil pipes are of the gravity type. Pressure or ductile cast-iron pipe is available in 18- or 20-foot lengths, with nominal inside diameters of 3 to 54 inches, and with working pressures between 150 and 350 psi. Ductile iron is the principal type of iron used in manufacturing, since it is more resistant to fracture from ground movement and shock, and to soil corrosion. Alloy cast-iron pipe is a wear-resistant ductile pressure pipe, produced by adding aluminum and chromium to ductile iron.

Cast-iron soil pipes are used in plumbing, sewer, water systems, and in commercial buildings for the purpose of conducting waste material and storm water from buildings. In recent years, cast-iron soil pipe has lost market share to plastic (PVC) pipe, especially for use in residential and smaller commercial buildings. Cast-iron soil pipes are more corrosion resistant and durable than plastic pipes, whereas plastics are lighter, less expensive, and easier to use. Cast-iron pressure pipe is used principally by municipalities in water distribution systems; over 85 percent is consumed in water and sewer systems, with the remaining used in miscellaneous applications such as sprinkler systems and electric power plants for ash handling systems. Prestressed concrete pipe is competitively priced and is considered a substitute for cast-iron pressure pipe. PVC and pipes made of cement and asbestos are also replacing ductile pressure pipes. In 1983, cast-iron pressure pipe and soil pipe accounted for 79 percent and 21 percent of domestic shipments, respectively, according to industry sources.

Cast-iron soil pipe and pressure pipe are produced principally by the centrifugal casting process. The production process begins with the melting of scrap iron or pig iron in a cupola furnace. The molten iron is continuously tapped into a reservoir, and then may be desulfurized, if conversion to ductile iron is desired. Casting is accomplished in horizontal rotating molds with the wall thickness of the pipe being controlled by predetermined amounts of metal poured into the mold. The centrifugal force generated by rapid rotation of the mold holds the metal against the mold wall where it solidifies, cools, and is stripped from the mold. Pressure pipes are then annealed in heat-treating ovens in controlled time and temperature cycles, usually hydrostatically tested, and normally coated on the outside

In most domestic production facilities, pollution control and energy saving recovery equipment are required. Chemical and spectographic analysis of the molten iron is a routine procedure, as well as tensile, external loading, impact, hardness, and microstructure testing, all of which contribute to the high-quality standards of the U.S. products.

Customs Treatment

U.S. tariff treatment

Cast-iron pipes and tubes are classified under items 610.56 and 610.58 of the Tariff Schedules of the United States (TSUS). Detailed tariff descriptions are shown in appendix E. Table IV-1 provides the staged reductions in the rates of duty as a result of the Multilateral Trade Negotiations (MTN).

Foreign tariff treatment

Most of the major foreign sources of cast-iron pipes and tubes use the Customs Cooperation Council Nomenclature (CCCN) system, which classifies these articles under item No. 73.17, "Tubes and pipes, of cast iron". The current rates of duty applicable to imports of cast-iron pipes and tubes for major producing countries of these castings are shown in the following tabulation (in percent ad valorem):

Item No.	Description	Country	Present rate of duty
73.17	Tubes and pipes, of cast iron	Taiwan	30% based on 110% of c.i.f. value + 4% harbor tax.
		Korea	20%
		Japan	5.2%
		India	100% + 40% auxiliary duty

Canada classifies imports under its own tariff system, the Tariff Schedules of Canada, as follows:

Item No.	Description	Country	Rate of duty 1984
39600-1	Pipes and tubes of cast iron whether or not coated or lined	Canada	10.3

In addition to the above-stated duties, all of the above-named countries (except Canada) maintain a system of import licensing to their countries.

Table IV-1.—Cast-iron pipes and tubes: U.S. rates of duty, by TSUS items 1/

(Percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1— 1980	1981	1982	1983	1984	1985	1986	1987	Col. 2 rate of duty
610.56A	Cast-iron pipes and tubes:										
	Other than alloy cast iron.	10%	10%	10%	9%	8%	7%	6%	5%	4%	25%.
610.58A	Alloy cast iron————	12% + additional duties	12% + additional duties	12% + additional duties	11.1% + additional duties	10.2% + additional duties	9.3% + additional duties	8.3% + additional duties	7.4% + additional duties	6.5% + additional duties	33% + additional duties.

1/ The Tariff Schedules of the United States should be consulted for a complete description of the additional duties.
2/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the Generalized System of Preference (GSP) and that all beneficiary developing countries are eligible for the GSP.
3/ Rate effective prior to Jan. 1, 1980.

Profile of the U.S. Industry and Major Foreign Competitors

United States

There are currently about 9 U.S. firms manufacturing cast-iron pipe and tube with approximately 20 establishments, representing little change since 1979 when there were an estimated 11 firms and 24 manufacturing establishments, according to industry sources. These firms account for an estimated 90 percent or more of U.S. domestic shipments of cast-iron soil pipe and pressure pipe. In addition, an undetermined number of jobber foundries produce cast-iron pipes and tubes intermittently in small quantities. U.S. producers are specialized and production of cast-iron pipes and tubes represents between 75 and 100 percent of their total production, with the remainder consisting of cast-iron soil pipe and pressure pipe (fittings and customs castings). This industry is heavily concentrated with the top five producers accounting for more than 70 percent of total U.S. production. Approximately 50 percent of U.S. production is concentrated in Alabama, whereas the remainder of the production facilities are located in the Eastern United States (Pennsylvania, North Carolina, Tennessee, Ohio, New Jersey, Virginia) and in California and Texas.

U.S. production, capacity, and capacity utilization.--Cast-iron pipes and tubes traditionally account for about 13 percent of total iron foundry production in the United States. A reduced level of U.S. economic activity and public construction expenditures resulted in curtailed demand for cast-iron soil and pressure pipes and contributed to a fluctuating decline in production from 1979-83. U.S. production, as reported by questionnaire respondents, declined from 1,069,917 short tons in 1979 to 895,846 tons in 1983, or by 16 percent (table IV-2).

Practical capacity to produce cast-iron pipes and tubes peaked at 1.5 million tons in 1983. As producers added capacity, benefited from productivity improvements, and experienced generally declining production levels during 1979-83, their ratio of capacity utilization fell to 61 percent in 1983, representing a decline of 18 percent from capacity utilization of about 74 percent in 1979 (table IV-2).

Foundry equipment in cast-iron pipe and tube producing establishments, principally of melting (cupola) furnaces and molding lines, is largely betweeen 10 and 20 years or older (table IV-3). A typical cast-iron pipe facility is automated or semiautomated, its molding lines were built during the past 15 years, and it employs state-of-the-art molding equipment and automated machining; yet the industry is still considered labor intensive since much of the support operations are manual. The industry currently is not in the process of technological transformation, since completely automated iron pouring and related functions, robotics, and other hands-off type of operations are currently not feasible, according to industry sources.

Table VI-2.--Cast-iron pipes and tubes: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production--short tons	1,069,917	919,557	957,870	805,409	895,846
Production capacity short tons	1,440,854	1,349,157	1,349,615	1,353,892	1,468,255
Capacity utilization percent	74.3	68.2	71.0	59.5	61.0

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IV-3.--Cast-iron pipes and tubes: Machinery and equipment in manufacturing facilities of reporting producers, by age of the machines, as of Jan. 1, 1984

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	4	0	11	16	14
Molding lines:					
Automated	5	4	9	46	40
Manual	3	1	3	17	20
Total	12	5	23	79	74

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--Decreased demand contributed to steadily declining employment in the cast-iron pipe and tube industry during 1979-83. The employed production workers were reduced by 23 percent, from 10,596 in 1979 to 8,196 production workers in 1983 (table IV-4). Employment declines are also attributable to improvements in casting efficiency. 1/ Recent technological improvements in the pipe production process, such as improved centrifugal pipe casting equipment and automated controls, have contributed to growth in productivity.

A comparison of wages paid to production workers in foundries producing cast-iron pipes and tubes and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S.

1/ According to staff conversations with industry officials.

foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Foundries producing cast-iron pipes and tubes	All operating U.S. manufacturing establishments
1979----------	$7.22	$6.00
1980----------	8.06	7.27
1981----------	8.78	7.99
1982----------	9.42	8.49
1983----------	9.60	8.33

Hours worked fell 27 percent, from 22.2 million hours in 1979 to 16.2 million hours in 1983. Total wages paid were reported to have peaked in 1979, as illustrated in table IV-4.

Table IV-4.--Cast-iron pipes and tubes: Number of employees and production and related workers in operations producing foundry products, and man-hours worked, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons----------------------	12,650	11,403	10,693	10,635	10,262
Production and related workers--	10,596	9,234	8,817	8,540	8,196
Man-hours worked--1,000 hours--	22,178	18,431	18,114	15,816	16,172
Wages paid--------1,000 dollars--	159,980	148,438	159,053	148,972	155,111

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' shipments and exports.--Respondents' shipments of all pipe and tube products (on the basis of quantity) declined irregularly during 1979-82, but rose to 843 million tons in 1983 (table IV-5). The increase was mainly the result of increased demand for cast-iron pipes and tubes in Government and commercial construction.

Table IV-5.--Cast-iron pipes and tubes: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Per unit
1979	1,029,243	391,769	381
1980	903,991	368,204	407
1981	905,496	383,604	424
1982	699,183	324,357	464
1983	842,582	354,222	420

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The trend in respondents' shipments followed the trend of shipments, as reported by the Bureau of Census (which provides greater product detail), which declined steadily from 1.7 million tons in 1979 to 1.2 million tons in 1982, before increasing to 1.3 million tons in 1983. Cast-iron pressure pipes represented the largest category of these domestic shipments, accounting for approximately 78 percent of the quantity and 81 percent of the value of U.S. shipments throughout 1979-83.

The quantity and value of U.S. exports of all pipe and tube products reported by respondents increased 80 percent during 1979-83, as follows:

	Quantity (short tons)	Value (1,000 dollars)
1979	24,991	8,638
1980	40,134	15,453
1981	33,913	13,975
1982	61,214	27,432
1983	44,934	19,911

Census statistics show that the value of U.S. exports of cast-iron pipes and tubes rose 74 percent, from 34,153 tons in 1979 to 59,266 tons in 1983 (table IV-6). Principal export markets in 1979-83 were Egypt, Saudi Arabia, and Syria, although the Syrian market became almost negligible in 1983. Other markets showing substantial increases were Kuwait and Trinidad. Cast-iron soil pipe accounted for the greatest portion of these U.S. exports during the period, ranging from 30 percent of the total in 1979, peaking at 90 percent in 1981, and representing 68 percent in 1983.

U.S. producers' inventories.--U.S. producers of cast-iron pipes and tubes typically maintain relatively large inventories in order to provide responsive delivery and service to customers, and because of the diverse nature of the product line. Shorter delivery time is an important competitive advantage for

Table IV-6.--Cast iron pipes and tubes: U.S. exports of domestic merchandise, by principal markets, 1979-83

Market	1979	1980	1981	1982	1983
	Quantity (short tons)				
Egypt	55	7,899	4,201	28,413	12,213
S Arab	7,568	8,460	11,690	24,959	12,680
Kuwait	164	215	585	2,479	17,714
Trinid	29	3,207	316	0	7,017
Canada	1,728	1,894	2,221	1,524	2,047
Singapr	0	0	12	289	1,291
Iraq	110	0	0	949	1,109
Syria	8,835	5,195	6,036	20,586	294
All other	15,664	21,384	42,018	9,730	4,901
Total	34,153	48,254	67,079	88,929	59,266
	Value (1,000 dollars)				
Egypt	63	5,984	2,023	23,875	9,768
S Arab	6,163	8,490	10,940	19,284	9,337
Kuwait	155	230	728	1,275	8,997
Trinid	59	1,876	213	1	6,909
Canada	1,936	2,001	2,356	1,695	1,605
Singapr	-	4	8	302	1,014
Iraq	254	-	-	763	632
Syria	8,942	2,297	2,838	13,775	600
All other	10,672	16,675	25,325	11,158	5,786
Total	28,244	37,557	44,430	72,134	44,649
	Unit value (per short ton)				
Egypt	$1,153.51	$757.59	$481.63	$840.29	$799.77
S Arab	814.41	1,003.55	935.86	772.63	736.38
Kuwait	944.76	1,069.43	1,243.84	514.48	507.92
Trinid	2,018.79	584.98	672.65	-	984.68
Canada	1,120.33	1,056.37	1,060.59	1,112.16	784.22
Singapr	-	-	645.25	1,044.70	785.51
Iraq	2,306.90	-	-	809.12	570.11
Syria	1,012.13	442.16	470.24	669.15	2,041.87
All other	681.31	779.81	602.71	1,146.77	1,180.53
Average	826.99	778.33	662.35	811.14	753.37

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. producers in their principal export markets since it helps to offset foreign competitors' price advantages. 1/

The combined end-of-period inventories of producers increased irregularly and generally followed the export trend of U.S. producers during 1979-83, as shown in the following tabulation:

	Quantity (short tons)
1979	132,391
1980	113,827
1981	136,243
1982	131,599
1983	141,380

Inventories peaked in 1983 at 141,380 tons following a 26-percent decline in exports and an upturn in domestic demand in 1983. The largest increase in inventories occurred during 1981 in which domestic manufacturers experienced a 16-percent decline in exports and only a marginal increase in domestic demand.

Financial experience of U.S. producers.--Net sales, as reported by respondents to the Commission's questionnaires, decreased from $728.0 million in 1979 to $691.2 million in 1983 (table IV-7). The 12-percent decline of net sales in 1982-83 was concurrent with the 10-percent decrease in the unit value of domestic shipments in 1983. Net operating profit peaked in 1980 at $68.9 million, then decreased to $16.7 million in 1983. As a share of net sales, net operating profit increased from 8.7 percent in 1979 to 9.9 percent in 1980, before steadily declining to 2.4 percent in 1983.

Table IV-7.--Cast-iron pipes and tubes: U.S. producers' net sales and net profit (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales----1,000 dollars--	728,032	696,752	734,196	782,693	691,248
Net profit----do----	63,202	68,872	49,328	37,940	16,741
Ratio of net operating profit to net sales----percent--	8.7	9.9	6.7	4.9	2.4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic facilities used primarily in the production of cast-iron pipes and tubes declined from $31.0 million in 1979 to $26.7 million in 1983, although it reached a peak of $32.2 million in 1982 (table IV-8). The increase in capital

1/ Discussion by staff members of the U.S. International Trade Commission with the largest U.S. exporters.

expenditures in 1982 appears to be evidence of the industry's efforts to move towards more capital-intensive production as a way to achieve a more competitive status in domestic and export markets. 1/ A major thrust of capital expenditures in the industry is the installation of new equipment throughout the manufacturing process, with the goal of increased productivity and lower manufacturing costs. U.S. producers reported no capital expenditures in facilities in other countries during 1979-83.

Table IV-8.--Cast-iron pipes and tubes: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	395	120	409	288	138
Buildings, leasehold improvements	7,917	4,061	4,418	4,177	9,334
Machinery, equipment, and fixtures:					
New	22,408	19,321	24,102	27,361	17,081
Used	341	182	33	399	145
Total	31,021	23,684	28,962	32,225	26,698

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures.--Respondents to the Commission's questionnaires reported an increase in research and development expenditures from 1979 to 1983 (table IV-9). The $2.7 million spent on research and development in 1983 represented a 62-percent increase over expenditures in 1979. Producers increased their research and development expenditures despite a downward trend in domestic shipment, from 1979 to 1982.

Table IV-9.--Cast-iron pipes and tubes: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

(In thousands of dollars)

Year	Expenditures
1979	1,673
1980	1,337
1981	1,779
1982	2,213
1983	2,703

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ According to staff discussions with industry sources.

Major foreign competitors

Canada is the major foreign supplier to the U.S. market, accounting for approximately 95 percent of total soil pipe imports (100 tons) and almost 100 percent of all other cast-iron pipe imports (approximately 1,400 tons) of which the majority was alloy pipe used in electric power plants in 1983. There were 9 Canadian producers of cast-iron pipes and tubes in 1983 with an estimated total employment of 1,200 persons. Average hourly wage rates are estimated at $8.80 per hour, not including fringe benefits of approximately $2.60 per hour. The two largest cast-iron pipe and tube firms in Canada are the Pipe Division of Canron, Inc., and Stanton Pipes Limited. 1/

Structural Factors of Competition Between U.S. and Foreign Industries

U.S. producers face intense competition in export markets principally from producers in France, West Germany, and Japan. Questionnaire respondents assessed the structural factors of competition between the United States and foreign industries in markets such as the Middle East, as shown in table IV-10.

Competition in foreign markets is influenced principally by energy, facets of capital formation and labor advantages, and government involvement. The overall strength of U.S. producers largely stems from their competitive edge in the area of fuel availability and cost, which averaged nearly 50 percent less in the United States than in foreign countries during 1979-82. 2/ Domestic producers have a clear competitive edge in raw-material availability and cost in the case of Japan, but compete on an equal basis with France and West Germany. A unique marketing advantage of U.S. producers, which fundamentally places them on an equal footing with their foreign competitors in offshore markets, is their ability to provide products on a short notice to their customers in export markets due to the large inventories they carry (table IV-11). Advantages of foreign cast-iron pipe and tube producers are lower cost of capital, which averaged approximately 14 percent less than interest costs in the United States during 1979-83, and the availability of government subsidies, which are discussed in detail in the overview discussion. Labor availability favored foreign producers and although producers indicated an advantage in labor cost for France and a comparable cost position with the United States for Japan and West Germany, data show that labor costs in the United States averaged nearly 35 percent more than in foreign countries during 1979-1982. 3/

1/ According to staff conversation with the Canadian Foundry Association.

2/ Energy Information Administration, International Energy Prices 1978-1982, January 1984.

3/ Bureau of Labor Statistics, Hourly Compensation Costs for Production Workers, unpublished data, 1982.

Table IV-10.--Cast-iron pipes and tubes: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

	Competitive advantage 1/		
	France	Japan	West Germany
Fuel:			
Availability	D	D	D
Cost	D	D	D
Raw material:			
Availability	S	D	S
Cost	S	D	S
Capital:			
Availability	S	F	S
Cost	F	F	F
Ability of industry profits to attract funds	S	F	S
Labor:			
Availability	F	F	F
Cost	F	S	S
Production technology	S	S	S
Marketing:			
Channels of distribution	S	S	S
Responsiveness to orders	S	S	S
After-sale service capabilities	S	F	S
Government involvement:			
Subsidies	F	F	S
Research and development assistance	F	S	S
Tariff levels on imports	S	S	S
Nontariff barriers to imports	S	S	S
U.S. Government regulations that increase costs	S	S	S
Foreign government regulations that increase costs	S	S	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IV-11.--Cast-iron pipes and tubes: Inventories held by producers and importers, as of Dec. 31, 1979-Dec. 31, 1983

(In short tons)

Year	Producers' inventories	Importers' inventories
1979	132,391	117
1980	113,827	233
1981	136,243	476
1982	131,599	680
1983	141,380	632

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The U.S. Market

Domestic market profile

Foreign competition in the U.S. cast-iron pipes and tubes market was negligible in 1983. The import share of U.S. consumption was less than 0.5 percent between 1979 and 1983. Foreign producers are a relatively minor factor in U.S. markets mainly due to the high transportation cost of heavy pipe products. Also, foreign producers cannot sell products dimensioned in the metric system in the U.S. market since the United States has not adopted the system. 1/

The demand for cast-iron pipe and tube is directly influenced by public construction, which followed a moderate decline from 1979 to 1982 and bottomed-out in 1983.

Producers indicate that 71 percent of their shipments were distributed through pipe contractors to construction industry consumers, and to direct users such as municipalities and investor-owned utilities and their general contractors, whereas importers directed 80 percent of their shipments to distributors (table IV-12). U.S. producers and importers reported that 93 percent and 100 percent, respectively, of their shipments were shipped to markets such as water, waste water, and sewer systems (table IV-13).

1/ The adoption of the metric system in the United States for pipe and tube production is currently being considered by the Metric Committee of the American Municipal Water Works Association. The adoption of the metric system would require a major retooling by U.S. producers, and would open the market to greater import competition. According to some members of the Metric Committee, the adoption of the metric system could come about as early as 1985.

Table IV-12.--Cast-iron pipes and tubes: U.S. producers' and importers' share of shipments, by channels of distribution, 1981-83

Channel of distribution	Share of shipment	
	Producers	Importers
Machine shops/other fabricators	1/	
Distributors	27	80
Original-equipment manufacturers	2	-
Other (public waterworks, utilities, etc.)	71	20
Total	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IV-13.--Cast-iron pipe and tube: U.S. producers' and importers' share of shipments, by type of markets, 1981-83

(In percent)

Type of market	Share of shipment	
	Producers	Importers
Motor vehicles		
Farm machinery and equipment		
Mining machinery and equipment		
Construction machinery and equipment		
Refrigeration and heating equipment (except pumps and compressors)	1/	
Plumbing equipment	3	
Railway equipment		
Industrial machinery		
Machine tools		
Valves and pipe fittings	4	
Pumps and compressors		
Other (municipal water works, electric utilities, etc.)	93	100
Total	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

Apparent U.S. consumption of pipes and tubes fell 24 percent between 1979 and 1983, representing a greater decline than producers' shipments which registered a 22 percent drop from 1979 and 1983. Although imports fell during the 5-year period, their share of consumption was less than one-half percent throughout the period (table IV-14). Soil and pressure pipe imports in 1983 were negligible (less than 200 tons for each of the products) and imports consisted almost entirely of alloy and other cast-iron pipes and tubes from Canada.

Table IV-14.--Cast-iron pipes and tubes: Domestic shipments, exports, imports, and apparent consumption, 1979-83

(Quantity in thousands of units; value in thousands of dollars)

Year	Producers' shipments 1/	Exports	Imports	Apparent consumption	Ratio (percent of imports to consumption
	Quantity				
1979	1,682	34	4	1,652	0.3
1980	1,471	48	2	1,425	0.1
1981	1,365	67	3	1,301	0.2
1982	1,203	89	2	1,116	0.2
1983	1,307	59	2	1,250	0.2
	Value				
1979	630,735	28,244	1,891	606,382	0.3
1980	592,040	37,557	1,819	556,302	0.3
1981	598,191	44,430	1,616	555,377	0.3
1982	572,586	72,134	1,233	501,685	0.3
1983	683,540	44,646	948	639,842	0.2

1/ Estimated by the staff of the U.S. International Trade Commission based on data compiled from official statistics of the U.S. Department of Commerce.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. imports.--Canada was the dominant exporter of cast-iron pipes and tubes to the United States from 1979 to 1983. Taiwan, Japan, the Republic of Korea, and the United Kingdom each supplied less than 5 percent of the U.S. market in this period (table IV-15). U.S. producers of cast-iron pipes and tubes did not report any imports of cast-iron pipe and tube products during 1979-83.

Table IV-15.--Cast iron pipes and tubes: U.S. imports for consumption, by principal sources, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (short tons)				
Canada	4,019	2,154	2,703	1,975	1,489
U King	6	21	35	127	10
Taiwan	0	0	7	0	23
Japan	1	172	1	31	19
Kor Rep	0	0	0	0	18
China M	0	0	0	3	8
Italy	0	0	0	0	6
Nethlds	3	43	0	0	0
All other	130	43	44	74	0
Total	4,159	2,433	2,790	2,210	1,573
	Value (1,000 dollars)				
Canada	1,754	1,297	1,415	1,028	853
U King	15	19	46	36	19
Taiwan	-	-	8	-	18
Japan	12	227	15	68	12
Kor Rep	-	-	-	-	11
China M	-	-	-	14	10
Italy	-	2	7	9	9
Nethlds	3	174	1	-	6
All other	107	98	125	78	8
Total	1,891	1,819	1,616	1,233	948
	Unit value (per short ton)				
Canada	$436.52	$602.29	$523.31	$520.56	$573.04
U King	2,558.67	927.33	1,313.34	285.35	1,926.90
Taiwan	-	-	1,082.00	-	769.83
Japan	11,527.00	1,317.78	14,719.00	2,184.71	627.00
Kor Rep	-	-	-	-	621.50
China M	-	-	-	4,723.33	1,298.25
Italy	-	-	-	-	1,570.00
Nethlds	987.67	4,056.70	-	-	-
All other	823.25	2,284.37	2,844.02	1,048.99	-
Average	454.74	747.44	579.08	557.80	602.49

Source: Compiled from official statistics of the U.S. Department of Commerce.

The quantity of imported cast-iron pipes and tubes, as reported by importer respondents to the Commission's questionnaire, 1/ increased more than five times from 1979 to 1983, as shown in the following tabulation:

	Quantity of imports (short tons)	Value of (1,000 dollars)
1979	117	59
1980	233	119
1981	476	273
1982	700	467
1983	632	410

Competitive Assessment of Product-Related Factors in the U.S. Market

U.S. purchaser respondents increased their purchases of U.S.-made cast-iron pipe and tube products 98 percent (on the basis of quantity) from 1979 to 1983; they decreased their foreign-produced purchases 51 percent, during the same period (table IV-16). Purchasers listed lower purchase price as the most important reason to buy foreign-made pipes and tubes (table IV-17), and equally ranked market response factors and product performance features as additional reasons for foreign purchases. For their U.S.-made purchases, however, lower purchase prices were considered by purchasers as one of the least important reasons, whereas availability, historical supplier relationship and reliability in delivery and servicing were rated the most important. Product prices on a representative cast-iron pipe and tube product during 1981-83 show that the average lowest net delivered price for U.S.-made pipe was 27 cents per pound in 1981 and 28 cents in 1982 and 1983 (table IV-18). No prices for foreign made pipes and tubes were reported by respondents to the Commission's questionnaires.

1/ Reported imports represent an average of 18 percent of total import value during 1979-83.

Table IV-16.--Cast-iron pipes and tubes: Purchases of U.S.-produced and foreign-produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (short tons)	
1979	20,875	3,700
1980	26,991	2,800
1981	27,676	4,900
1982	36,440	1,500
1983	41,401	1,800
	Value (1,000 dollars)	
1979	8,846	1,123
1980	11,263	852
1981	27,019	1,941
1982	16,830	446
1983	19,818	560

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IV-17.--Cast-iron pipes and tubes: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign-produced castings, 1981-84

Reason for purchase	U.S.-made pipes and tubes	Foreign-made pipes and tubes
Lower purchase price (delivered)	7	1
Cost of tooling/patterns	-	-
Shorter delivery time	3	-
Availability	1	2
Servicing	3	2
Favorable terms of sale	7	2
Favorable product guarantees	5	2
Favorable exchange rates	-	-
Historical supplier relationship	1	-
Product performance features:		
Superior design	7	2
Quality	5	2
More durable	11	-
Other	10	-

1/ Ranking numbers range from 1 to 11, number 1 indicating the most important reason for purchase and number 11 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IV-18.--Cast-iron pipes and tubes: Average lowest net delivered price reported by purchasers, 1981-83

(Per pound)

Period	Cast-iron pipes and tubes: 12-inch diameter, compression push-on joint ductile cast-iron pipe, 18-foot length, 250 psi	
	Domestic	Foreign
1981:		
January-March	$0.27	-
April-June	.27	-
July-September	.27	-
October-December	.27	-
1982:		
January-March	.28	-
April-June	.28	-
July-September	.28	-
October-December	.28	-
1983:		
January-March	.28	-
April-June	.28	-
July-September	.28	-
October-December	.28	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

U.S. producers of cast-iron pipes and tubes increased exports 145 percent between 1979 and 1982, despite the overall competitive advantage of foreign products attributed to price and related factors, (table IV-19) that generally made U.S. products more expensive in foreign markets. Staff interviews with major producer exporters revealed that comparable quality, superior design, and responsive delivery time associated with U.S.-made products relative to competing foreign products typically provided the most significant reasons for these export increases. U.S. producers' major export markets are the Middle East countries, where they market products on a competitive-bid basis against Japanese, West German, and French engineering construction companies. Although U.S. producers emphasized that they have an excellent competitive position 1/ on U.S.-financed engineering projects, (for example, Agency for International Development financing), they also indicate that foreign firms in

1/ According to staff interviews with industry sources.

Table IV-19.--Cast-iron pipes and tubes: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-83

	Competitive advantage 1/		
	Japan	West Germany	France
Overall competitive advantage	F	F	F
Lower purchase price (delivered)	F	F	F
Cost of tooling/ patterns	S	2/	S
Shorter delivery time	S	2/	S
Availability	S	F	S
Servicing	S	2/	F
Favorable terms of sale	F	F	F
Favorable product guarantees	S	2/	S
Favorable exchange rates	F	F	F
Historical supplier relationship	S	F	F
Product performance features:			
Superior design	S	2/	2/
Quality	S	2/	2/
More durable	S	2/	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

West Germany, Japan, and France have an overall competitive advantage (table IV-19). However, U.S. Government financing, which may tie funds to the purchase of U.S.-made products, apparently gives U.S. producers an edge in certain instances.

V. CAST-IRON PIPE AND TUBE FITTINGS

Description and Uses

Cast iron pipe and tube fittings consist of fittings for soil pipes, water main pressure pipes, and commercial, residential, or industrial pipes. Soil pipe fittings are usually available in nominal inside diameters of 2 to 15 inches. Configurations include bends, tees, variations of Y's, crosses, reducers, and others. Fittings are made of gray iron castings of compact close grain that permits cutting and drilling by ordinary methods. Fittings are covered with coatings that are not brittle and without a tendency to scale. Pressure pipe fittings are made principally of gray iron castings and are available in a variety of sizes, most commonly from 3 to 54 inches in diameter, and in pressure ratings up to 350 psi (pounds per square inch). They are available in the same configurations as soil pipe fittings.

Commercial, residential, and industrial pipe fittings are made of malleable and cast iron. Malleable fittings are commonly produced with inside diameters of 1/8 inch to 6 inches; other diameters are available on special order. These fittings are produced in both black (ungalvanized) and galvanized form. Although the most common types of malleable pipe fitting are threaded, they are also available in threadless form. Malleable fittings are available in many hundreds of shapes and sizes, the most common being 90-degree elbows, tees, couplings, and unions. The major advantage of malleable fittings are that they are lighter in weight than cast iron and more ductile. They are used where shock and vibration resistance is required and where fittings are subject to quick temperature changes. Cast-iron fittings have little or no ductility and can be broken apart with the blow of a hammer. They are usually available from 1/4 inch to 54 inches in diameter and up to 250 psi. Configurations include flanged fittings, flanges, and unions among others.

Pipe fittings are used to join pipes in straight lines, change, divert, divide, or direct the flow of oil, water, gas, or steam in piping systems, and to provide access for cleaning. Fittings for commercial, residential, or industrial applications are used in construction, sprinkler systems, and the chemical, pulp, paper, petroleum refining, iron and steel, and other industries. In the 1950's and 1960's, plastic and/or copper fittings displaced malleable fittings in certain uses, especially in residential utility systems. In recent years however, there has been no significant displacement of malleable fittings. Pressure pipe fittings are used principally in municipal water and waste water systems. Soil pipe fittings are used in drain, waste, vent, and sewer piping. Larger gray iron fittings are used with steel pipes in major industry markets (chemical, oil, and gas).

Sand-casting is the predominant method used in the making of fittings. The casting process begins with the making of the pattern which is of the same configuration as the desired fitting. Molding sand is mixed with a binder and is spread around the pattern in a mold, then rammed by a machine to compact the sand. The pattern is withdrawn, leaving a cavity in which molded cores are inserted to form the internal shape of the fitting. The two mold halves are put together and molten iron is poured into the cavity. After the iron solidifies the still red hot fitting is dropped on a "shaker" table or belt which shakes off the sand. Then the fitting is cleaned and machined as required.

Malleable and other types of cast-iron fittings are made principally from iron or steel scrap, then annealed following casting, cooling, and cleaning. The annealing process improves the ductility and durability of the metal by reducing its brittleness. Almost all malleable cast-iron fittings are advanced (machined) after the casting stage. This advancement usually involves threading, grooving, or other operations. Nonmalleable ductile and cast-iron fittings are usually not advanced beyond the casting stage.

Customs Treatment

U.S. tariff treatment

Cast-iron pipe and tube fittings are classified under items 610.62, 620.63, 610.65, 610.66, 610.70, 610.71, and 610.74 of the Tariff Schedules of the United States (TSUS). Detailed tariff descriptions are shown in appendix E. Table V-1 provides the current and staged reductions in the rates of duty as a result of the Multilateral Trade Negotiations (MTN).

Imports of cast-iron pipe and tube fittings from designated beneficiary countries have been eligible for duty-free treatment under the Generalized System of Preferences (GSP) since January 1, 1976. Since that time there have been several exclusions. Between April 1, 1981, and April 9, 1982, the Republic of Korea (Korea) was not eligible for GSP treatment for exports of products under TSUS item 610.62. In addition, Israel was not eligible for GSP treatment for exports of products under TSUS items 610.66 and 610.71 between March 13, 1978, and March 13, 1979. Effective March 30, 1984, Korea graduated from GSP eligibility under TSUS item 610.65, Taiwan under TSUS item 610.70, and Korea and Taiwan under TSUS item 610.74.

On January 7, 1980, the United States International Trade Commission received advice from the Department of Commerce, that a countervailing duty investigation had resulted in a preliminary determination that the Government of Japan was giving benefits that might constitute bounties or grants on the manufacture, production, or exportation of certain malleable pipe fittings, estimated to be 0.6 percent ad valorem. Accordingly, effective January 1, 1980, the Commission instituted investigation No. 701-TA-9 (Final) under section 705 of the Tariff Act of 1930, to determine whether an industry in the United States was being materially injured or was threatened with material injury, or whether the establishment of an industry was materially retarded by reason of the importation of such merchandise into the United States. On March 20, 1980, the Commission terminated the investigation upon written request by counsel for petitioners (The American Pipe Fittings Association).

Foreign tariff treatment

Most of the major foreign sources of cast-iron pipe and tube fittings use the Custom Cooperation Council Nomenclature (CCCN) system, which classifies these articles under item No. 73.20, "Tube and pipe fittings (e.g. joints, elbows, unions and flanges), of iron or steel". There were no duty reductions for cast-iron pipes and tubes established during the Tokyo round of MTN, 1/

1/ Brazil granted concessions to Latin American countries only.

Table V-1.--Cast-iron pipe and tube fittings: U.S. rates of duty, by TSUS items 1/

(Percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1— 1980	1981	1982	1983	1984	1985	1986	1987	Col. 2 rate of duty
	Pipe and tube fittings of iron or steel:										
	Cast-iron fittings, not malleable:										
	For cast-iron pipe:										
610.62A	Cast-iron, other than alloy cast iron.	10%	10%	10%	9.3%	8.6%	7.9%	7.2%	6.5%	5.8%	25%.
610.63A	Alloy cast-iron	12% + additional duties (AVE-4/)	12% + additional duties	12% + additional duties	11.1% + additional duties	10.2% + additional duties	9.3% + additional duties	8.3% + additional duties	7.4% + additional duties	6.5% + additional duties	33% + additional duties.
	Not for cast-iron pipe:										
610.65A	Cast-iron, other than alloy cast iron.	3%	3%	3%	2.9%	2.8%	2.8%	2.7%	2.6%	2.5%	20%.
610.66A	Alloy cast iron	5% + additional duties	5% + additional duties	5% + additional duties	4.8% + additional duties	4.6% + additional duties	4.4% + additional duties	4.1% + additional duties	3.9% + additional duties	3.7% + additional duties	28% + additional duties.
	Cast-iron fittings, malleable:										
	Not advanced in condition by operations or processes subsequent to the castings process:										
610.70A	Cast-iron, other than alloy cast-iron.	8%	8%	8%	7.5%	7%	6.6%	6.1%	5.6%	5.1%	20%.
610.71A	Alloy cast-iron	10% + additional duties (AVE-4/)	10% + additional duties	10% + additional duties	9.3% + additional duties	8.6% + additional duties	7.9% + additional duties	7.2% + additional duties	6.5% + additional duties	5.8% + additional duties	28% + additional duties.
610.74A	Advanced in condition by operations or processes subsequent to the casting process.	11%	11%	11%	10.2%	9.4%	8.6%	7.8%	7%	6.2%	45%.

1/ The Tariff Schedules of the United States should be consulted for a complete description of the additional duties.

2/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences and that all beneficiary developing countries are eligible for the GSP.

3/ Rate effective prior to Jan. 1, 1980.

4/ Depending on the content of certain metals, the duty may include a maximum of 1% ad valorem equivalent additional duty.

except for Canada. The current rates of duty applicable to imports of cast-iron pipe and tube fittings for major producing countries of these castings are shown in the following tabulation (in percent ad valorem):

Item No.	Description	Country	Present rate of duty
73.20	Tubes and pipe fittings (e.g. joints, elbows, unions, and flanges) of iron or steel.	Brazil	55% of c.i.f. value + 8%.
		Japan	5.8%
		Taiwan	25% based on 110% of C.I.F. value + 4% harbor tax.
		Korea	20%
		India	100% + 40% auxiliary duty.

Canada classifies imports under its own tariff system, the Tariff Schedules of Canada, as follows (in percent ad valorem):

Item No.	Description	Country	1984
40,000-1	Fittings and couplings of iron or steel n.o.p. for pipes and tubes; parts therefore: alloy, include cast-iron.	Canada	14.9
40,000-2	Other (include cast-iron)		13.9

In addition to these duties, all of the above-named countries with the exception of Canada and Japan maintain a system of import licensing for exports to their countries, according to the Department of Commerce. Such licensing systems effectively prohibit the importation of cast-iron pipe and tube fittings into India. Import licenses are evaluated on a case-by-case basis in Brazil.

Profile of the U.S. Industry and Major Foreign Competitors

United States

Currently there are 21 cast-iron pipe and tube fitting manufacturers, representing little change in the number of manufacturing establishments since

1979, when there were an estimated total of 25 firms. Of these 21 firms, 8 principally produce fittings for soil and pressure pipes, 8 produce fittings for commercial, residential, and industrial use, and the remaining firms are believed to produce cast-iron pipe and tube fittings intermittently and in small quantities, in addition to other cast products. Of the 340,550 short tons of domestic cast-iron pipe and tube fitting shipments in 1983, soil pipe fittings represented 23 percent, pressure pipe fittings 53 percent, malleable 14 percent, and all other fittings 10 percent (principally cast-iron fittings). Production is concentrated in Pennsylvania, Alabama, and California, with other cast-iron pipe and tube fitting manufacturers in Texas, South Carolina, Oregon, Michigan, Kansas, Missouri, and Virginia.

U.S. production, capacity, and capacity utilization.--The reduced level of U.S. economic activity contributed to a decline in industry production by 1982, and continued to decline in 1983. U.S. production as reported by questionnaire respondents fell from 205,993 short tons in 1979 to 147,624 tons in 1983, or by 28 percent (table V-2). Practical capacity to produce cast-iron pipe and tube fittings rose slightly during 1979-82, to 358,535 million tons, before falling 5 percent between 1982 and 1983 to 341,205 tons. Capacity utilization in the industry fell to 43.3 percent in 1983, representing a decline of 32 percent from capacity utilization in 1979.

Table V-2.--Cast-iron pipe and tube fittings: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production------------short tons--	205,993	208,033	194,225	165,427	147,624
Production capacity---------do----	323,192	334,181	352,366	358,535	341,205
Capacity utilization-----percent--	63.7	62.3	55.1	46.1	43.3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Foundry equipment in cast-iron pipe and tube fitting producing establishments consists principally of melting furnaces and molding lines. Most of the melting furnaces, which are basically cupola furnaces, are between 10 and 20 years old (table V-3). Most of the molding lines in operation are manual, and few employ state-of-the-art molding technology. Completely automated pouring of iron and all related functions, robotics, and other hands-off type of operations are not yet in the planning stage.

Table V-3.--Cast iron pipe and tube fittings: Machinery and equipment in manufacturing facilities of reporting producers, by age of the machines as of Jan. 1, 1984

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	5	2	12	24	6
Molding lines:					
Automated	2	2	12	15	2
Manual	2	2	2	20	48
Total	9	6	26	59	56

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--Decreased demand and more intense import competition in certain products contributed to declining employment in the cast-iron pipe and tube fitting industry in 1983. In the peak employment year of 1979, there were 10,192 persons employed of whom 8,269 were production workers; total employment fell to 7,302 by 1983 and production workers declined to 5,570 (table V-4).

Employment declines in the cast-iron pipe and tube fittings industry are also attributable to improvements in casting efficiency. 1/ Technological improvements in all phases of the pipe fitting production process have contributed to increased productivity through expanded use of computer technology and improvements in new labor-saving equipment. The use of more automation, including robotics, is possible but its short-term application may be limited in view of an uncertain market, rising costs, and the expanding role of imports in the market, according to industry sources.

A comparison of wages paid to production workers in foundries producing cast-iron pipe and tube fittings and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S. foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Foundries producing cast-iron pipe and tube fittings	All operating U.S. manufacturing establishments
1979	$8.83	$6.00
1980	9.21	7.27
1981	9.00	7.99
1982	10.33	8.49
1983	11.19	8.33

Hours worked fell from 15.1 million hours in 1979 to 11.9 million hours in 1983. Total wages paid peaked in 1983, as illustrated in table V-4.

1/ According to staff conversations with industry sources.

Table V-4.--Cast-iron pipe and tube fittings: Number of employees and production and related workers in operations producing foundry products, and man-hours worked, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons	10,192	9,764	9,344	8,143	7,302
Production and related workers	8,269	7,848	7,687	6,479	5,570
Man-hours worked---1,000 hours	15,126	14,221	15,261	12,178	11,865
Wages paid-------1,000 dollars	133,455	131,743	137,743	125,269	132,763

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

<u>U.S. producers' shipments and exports</u>.--U.S. producer respondents' domestic shipments (on the basis of quantity) declined steadily, from 212,804 tons in 1979 to 157,702 tons in 1983, or by 26 percent (table V-5). This trend followed that reported in Commerce statistics, which declined about 20 percent, from 422,000 tons in 1979 to 341,000 tons in 1983. Cast-iron pressure pipe fittings represented the largest category of domestic shipments, and accounted for approximately 53 percent of the quantity and 54 percent of the value of U.S. shipments from 1979 to 1983. 1/

Table V-5.--Cast-iron pipe and tube fittings: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Per unit
1979	212,804	245,607	$1,154
1980	212,683	258,946	1,218
1981	197,725	271,108	1,371
1982	176,622	245,386	1,389
1983	157,702	224,455	1,423

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. exports of cast-iron pipe and tube fittings rose from 26,493 tons in 1979 to 34,589 tons in 1980, and then declined 35 percent to 22,604 in 1983. The principal export markets between 1979 and 1983 have been Saudi Arabia, Canada, and Mexico (table V-6). Over the 1979-83 period, approximately 48 percent of U.S. exports consisted of nonmalleable pipe and tube fittings.

1/ Estimated by the staff of the U.S. International Trade Commission based on industry sources.

Table V-6 --Cast iron pipe and tube fittings: U.S. exports of domestic merchandise, by principal markets, 1979-83

Market	1979	1980	1981	1982	1983
	Quantity (short tons)				
S Arab	7,793	8,482	7,190	6,735	8,912
Canada	7,422	7,118	6,635	4,534	3,633
Mexico	731	1,284	3,133	1,078	1,747
Venez	1,093	983	1,392	822	647
Trinid	99	512	341	134	701
Kor Rep	55	124	389	735	622
Singapr	223	140	120	314	1,279
Egypt	43	5,776	346	2,779	464
All other	9,034	10,170	6,710	5,741	4,599
Total	26,493	34,589	26,256	22,872	22,604
	Value (1,000 dollars)				
S Arab	15,977	20,601	16,587	19,060	19,737
Canada	17,851	21,252	21,320	14,393	11,746
Mexico	3,207	6,029	13,638	4,540	5,709
Venez	4,112	3,725	4,573	5,032	4,082
Trinid	287	1,112	1,121	513	2,899
Kor Rep	465	822	1,262	1,951	2,306
Singapr	629	929	916	1,445	2,098
Egypt	90	3,022	846	8,427	1,699
All other	30,580	29,716	28,801	23,572	19,363
Total	73,199	87,207	89,064	78,933	69,639
	Unit value (per short ton)				
S Arab	$2,050.17	$2,428.81	$2,306.90	$2,829.93	$2,214.69
Canada	2,405.10	2,985.72	3,213.19	3,174.53	3,233.12
Mexico	4,387.50	4,695.48	4,353.16	4,211.30	3,267.80
Venez	3,762.52	3,789.23	3,285.28	6,121.89	6,308.42
Trinid	2,903.96	2,171.66	3,286.91	3,828.28	4,135.71
Kor Rep	8,461.82	6,625.54	3,244.87	2,654.27	3,707.52
Singapr	2,818.47	6,633.18	7,632.76	4,601.97	1,640.10
Egypt	2,095.95	523.13	2,445.34	3,032.41	3,661.88
All other	3,385.00	2,921.96	4,292.24	4,105.90	4,210.34
Average	2,762.95	2,521.24	3,392.13	3,451.07	3,080.83

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. producers' inventories.--U.S. producers typically maintain relatively large inventories in order to provide responsive delivery and service to customers, and due to the extensive nature of their product line. The combined end-of-period inventories of respondents decreased irregularly during 1979-83, as shown in the following tabulation:

	Quantity (short tons)
1979----------------------	58,132
1980----------------------	55,898
1981----------------------	59,894
1982----------------------	53,426
1983----------------------	49,124

Inventories peaked in 1981 at about 60,000 tons, following a 24-percent decline in exports and a 7-percent decline in shipments in 1981. The largest decrease occured from 1981 to 1983, a period in which domestic manufacturers anticipated a significant decrease in demand; shipments and exports fell 20 percent and 14 percent, respectively.

Financial experience of U.S. producers.--Net sales of U.S. producers increased from $460.0 million in 1979 to $511.1 million in 1981, then fell 25 percent to $385.1 million in 1983 (table V-7). Net operating profit peaked in 1981 at $57.9 million, then decreased to $27.0 million in 1982 and $9.1 million in 1983. As a share of net sales, net operating profit declined steadily, from 11.6 percent in 1979 to 2.4 percent in 1983.

Table V-7.--Cast-iron pipe and tube fittings: U.S. producers' net sales and net profit or (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales-----------1,000 dollars--	459,992	470,047	511,059	434,650	385,131
Net profit-------------------do----	53,471	52,934	57,965	27,008	9,068
Ratio of net operating profit to net sales---------------percent--	11.6	11.3	11.4	6.2	2.4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic facilities used primarily in the production of cast-iron pipe and tube fittings are shown in table V-8. Capital expenditures increased from $18.3 million in 1979 to $21.2 million in 1983, and peaked at $23.1 million in 1982. The increase in capital expenditures in 1981 reflects the cast-iron pipe and tube fitting industry's efforts to move towards more capital-intensive production methods, as a way to achieve a more competitive status in the domestic market. 1/ A major thrust of capital expenditures in

1/ According to staff discussions with industry members.

the industry is the installation of new equipment and machinery with the goal of increasing productivity and lowering manufacturing costs. U.S. producers reported negligible expenditures in other countries in 1982 and 1983.

Table V-8.--Cast-iron pipe and tube fittings: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	70	120	83	114	58
Buildings, leasehold improvements	1,950	988	1,442	6,779	2,516
Machinery, equipment, and fixtures:					
New	16,057	12,886	19,382	15,894	18,441
Used	231	157	140	274	171
Total	18,308	14,151	21,047	23,061	21,186

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures.--Respondents to the Commission's questionnaires reported generally increasing research and development expenditures from 1979 to 1983, as shown in table V-9. The $2.2 million spent on research and development in 1983 represented an 83-percent increase over expenditures in 1979. Respondents increased their research and development expenditures during 1979-83, despite a downward trend in domestic shipments of cast-iron pipe and tube fittings.

Table V-9.--Cast-iron pipe and tube fittings: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

(In thousands of dollars)

Year	Expenditures
1979	1,180
1980	1,254
1981	1,666
1982	1,851
1983	2,154

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Major foreign competitors

Japan, Taiwan, Korea, India, and Brazil are the major supplying countries to the United States, accounting for 82 percent (924,398 short tons) of all the cast-iron pipe and tube fittings imports in 1983. Lesser quantities were supplied by the United Kingdom and Thailand. Additional industry information on the major foreign competitors is provided in the following profiles.

Japan.--Japan was the largest supplier of U.S. cast-iron pipe and tube fittings imports in 1983, accounting for 33 percent (8,993 short tons) of the U.S. total. Information from State Department telegrams indicates that the malleable cast-iron pipe and tube fitting industry in Japan decreased production from 180,000 short tons in 1979 to 142,000 tons in 1983, as shown in the following tabulation:

	Quantity (short tons)	Value (1,000 dollars)
1979	180,000	211,000
1980	181,000	270,000
1981	158,000	209,000
1982	151,000	182,000
1983	142,000	200,000

Taiwan.--Taiwan was the third largest supplier of U.S. cast-iron pipe and tube fittings imports, accounting for 18 percent (4,832 short tons) of total U.S. imports in 1983. In that year, there were 33 firms producing cast-iron pipe and tube fittings in Tiawan. Among the five largest firms exporting cast-iron fittings were Taiwan Fitting Foundry Corp; Rhy Dong Industrial and Jie Jwe Enterprise; De Ho Metal Industrial; Yang Jou Foundry; Yuan Gang Industrial Co; and Kwang Yu Foundry. 1/ Many of these firms are small, family-type operations, and much of the foundry work is done without the benefit of automated equipment. Labor rates in Taiwan are estimated to be 60 cents per hour not including fringe benefits. 2/ A majority (84 percent) of Taiwan sales to the United States consist of malleable pipe and tube fittings.

Korea.--The Republic of Korea was the fourth largest exporter to the United States of cast-iron pipe and tube fittings, accounting for 16 percent (3,767 short tons) of total U.S. imports in 1983. In that year, there were 30 Korean companies manufacturing cast-iron pipe and tube fittings, with total production estimated at 20,000 tons per year. The Korean industry employs approximately 10,000 persons of which an estimated 70 percent were production and production related workers. 3/ In 1983, the monthly average wage per production worker, including fringe benefits, was $438 compared with the $1,865 per month earned by U.S. workers in the industry. 4/ Most cast-iron pipe and tube fittings plants are at a comparable level of technology as those of U.S. and West European plants.

Brazil.--Brazil was the fifth largest exporter to the United States of cast-iron pipe and tube fittings, accounting for 6 percent (1,750 short tons)

1/ U.S. Department of State telegram, U.S. Embassy Taipai, June 1984.
2/ Staff discussions with technical personnel of the Korea Foundry Exhibition Center in Atlanta, GA.
3/ Ibid.
4/ U.S. Department of State telegram, U.S. Embassy Seoul, June 1984.

of total U.S. imports in 1983. Fundicao TPY is the major Brazilian manufacturer of pipe fittings with reported annual capacity to produce cast-iron products of all types at 80,000 tons, and a reported capacity utilization of 60 percent. Tupy's primary products are pipe fittings, and castings for automobiles and agriculture. The plant has the ability to cast malleable, gray, and ductile iron products. Its principal export markets are South America, Australia, the United States, Europe, South Africa, and the Middle East. Tupy is the largest exporter of cast-iron fittings to the United States, distributing and retailing its products through its U.S. subsidiary TUPY American Foundry Corp., Lancaster, Pennsylvania. 1/

Hourly labor rates in Brazil in the foundry industry were $1.65 per hour in 1983, which included benefits like free transportation to work, food, clothing, and medical care. The value of Government-provided assistance is estimated at 5 cents per pound for exported castings, equating to about $175,000 in 1983, and encompasses programs such as low energy rates, permission to import raw materials cheaper than those available on the home market, tax benefits, and invoice payment assistance. 2/

India.--India was the second largest exporter to the United States of cast-iron pipe and tube fittings, accounting for 18 percent (5,327 tons) of total U.S. imports in 1983. Following the growth of the domestic market and as a result of new export opportunities, the Indian iron foundry industry experienced a steady increase in exports to the United States, from 2,105 tons in 1979 to 5,327 tons in 1983. 3/ The average wage for foundry workers is an estimated 30 cents per hour. Although while industry sources estimate R&D expenditure as negligible overall, some of the export-oriented foundries have developed research facilities and have modernized production facilities.

Structural Factors of Competition Between U.S. and Foreign Countries

The competition that exists in the U.S. market between domestically produced cast-iron pipe and tube fittings and those produced in foreign countries varies with the type of fitting. For example, the import share of malleable fittings is estimated at 32 percent of U.S. consumption in 1983. On the other hand, the import share of all other cast-iron fittings is estimated at 3 percent of U.S. consumption in 1983.

Competition is influenced by a variety of structural factors: the most important of which are labor costs, marketing capability, capital formation and technology, and, government involvement (table V-10). The U.S. industry indicates that their competitive edge largely stems from a reliable distribution system and responsive service capabilities (table V-10). In addition, the United States is viewed as equal to or better than its foreign competitors in the application of production technology. Producers evaluated all of their principal competitors as having competitive advantages in lower labor cost and availability, as well as in most facets of government assistance -- especially alleged subsidies and R&D funding.

1/ Statement Sep. 21, 1983, p. 1-2 by Counsel for Fundicao Tupy, SA. GSP Investigation TA-503(a)-11.
2/ According to staff discussions with industry members.
3/ U.S. Department of State telegram, U.S. Embassy New Delhi, June 1984.

Table V-10.--Cast-iron pipe and tube fittings: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

	Competitive advantage 1/			
	Taiwan	Japan	India	Korea
Fuel:				
Availability	D	D	S	S
Cost	F	D	S	S
Raw material:				
Availability	D	D	S	S
Cost	F	D	S	S
Capital:				
Availability	F	S	F	S
Cost	F	F	2/	S
Ability of industry profits to attract funds	S	S	F	S
Labor:				
Availability	F	F	F	F
Cost	F	F	F	F
Production technology	D	S	S	D
Marketing:				
Channels of distribution	D	D	D	D
Responsiveness to orders	D	D	D	D
After-sale service capabilities	D	D	D	D
Government involvement:				
Subsidies	F	F	F	F
Research and development assistance	F	F	F	F
Tariff levels on imports	F	F	D	F
Nontariff barriers to imports	F	F	D	F
U.S. Government regulations that increase costs	F	F	D	D
Foreign government regulations that increase costs	F	F	2/	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital

U.S. producers indicate that foreign producers generally have the competitive advantage in the cost and availability of capital which has tended to restrict expanded use of computer technology and further improvements in labor-saving equipment; both (computer technology and labor-saving equipment) are especially important to U.S. producers whose operations are becoming more capital intensive in an effort to more effectively compete in their domestic and export markets.

The overall cost of capital appears to be higher in the United States than in Japan and West Germany, but lower than in France, as shown in the following tabulation of industrial rates from the Organization for Economic Cooperation and Development (in percent per annum):

Country	1979	1980	1981	1982	1983
United States----------	9.64	11.49	13.72	10.55	9.3
Japan------------------	8.64	9.41	7.93	7.50	6.9
West Germany-----------	7.90	8.90	9.70	7.90	6.0
France-----------------	12.14	14.71	17.00	15.71	12.9

Technology

Although production technology in the cast-iron pipe and tube fittings industry is rated the same in the United States as it is in Japan and India, domestic producers are believed to have the technological advantage compared with Taiwan and Korea. State-of-the-art foundry techniques in the U.S. industry include automated molding and automated machining centers to minimize labor costs. However, the industry believes that it has still not reached a sufficiently high capital-intensive status with full automation in order to more successfully challenge the developing nations that have rather significant cost advantages due to cheaper labor costs and the absence of environmental, safety, and labor benefit costs.

Marketing

The domestic industry has a competitive advantage in all facets of marketing structure compared with Taiwan, Japan, India, and Korea. Marketing by U.S. producers is accomplished by their own sales forces through distributors and to end users. Foreign producers also sell to distributors, or in the case of large foreign manufacturers, through their wholly owned subsidiaries in the United States. A unique ability of U.S. producers is their ability to provide products on short notice to their customers in both domestic and export markets. This is made possible by the large inventories they carry (table V-11).

Table V-11.--Cast-iron pipe and tube fittings: Inventories held by producers and importers, as of Dec. 31, 1979-Dec. 31, 1983

(In short tons)

Year	Producers' inventories	Importers' inventories
1979	58,132	1,219
1980	55,898	1,260
1981	59,894	1,706
1982	53,426	2,265
1983	49,124	2,098

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Government involvement

U.S. cast-iron pipe and tube fittings producers allege that foreign producers have a competitive advantage in government subsidies which are designed to facilitate their exports. The countries that were cited as benefiting from subsidies were Japan, Taiwan, India, and Korea.

Available information on tariffs suggests that the rates of duty on cast-iron pipe and tube fittings in the United States vary considerably from the rates of duty in other cast-iron pipe and tube fittings producing countries. For example, the rate levied on cast-iron pipe and tube fittings in Japan is 5.2 percent, in Taiwan 25 percent, in Korea 20 percent, in India 140 percent and in Brazil 63 percent, whereas the rates of duty on these products entering the United States range from 2.8 percent ad valorem to 9.3 percent ad valorem. U.S. rates of duty are applied against the customs value of imports, which does not include charges for freight, insurance, and other charges incurred in transporting merchandise from the port of exportation to the port of importation. Foreign tariff rates are usually applied against c.i.f. value which does include such charges. Hence, the foreign rate is a higher effective rate, yielding a higher duty collected (in absolute terms) for any given rate.

Government regulations such as environmental and worker-health and safety regulations were also perceived by questionnaire respondents to be a major competitive advantage of foreign industries.

The U.S. Market

Domestic market profile

Producers and importers indicate that 85 percent and 88 percent, respectively, of their shipments were sold to distributors, with the remaining shipments largely distributed to machine shops and original-equipment manufacturers on a comparable basis (table V-12).

Table V-12.--Cast-iron pipe and tube fittings: U.S. producers' and importers' share of shipments, by channels of distribution, 1981-83

(In percent)

Channel of distribution	Share of shipment	
	Producers	Importers
Machine shops/other fabricators	7	5
Distributors	85	88
Original-equipment manufacturers	5	4
Other	3	3
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers reported that 85 percent of their shipments were used in the valve and pipe fittings market and 11 percent in the plumbing equipment market (table V-13). Importers shipped 55 percent of their products to the valve and pipe fittings market, 18 percent to the plumbing equipment market, and 26 percent to other markets that principally include industrial end users such as the chemical and oil industries.

Table V-13.--Cast-iron pipe and tube fittings: U.S. producers' and importers' share or shipments, by type of markets, 1981-83

(In percent)

Type of market	Share of shipments	
	Producers	Importers
Motor vehicles	1/	-
Farm machinery and equipment	1/	-
Mining machinery and equipment	1/	-
Construction machinery and equipment	1/	-
Refrigeration and heating equipment (except pumps and compressors)	1/	-
Plumbing equipment	11	18
Railway equipment	1/	-
Industrial machinery	1/	-
Machine tools	1/	-
Valves and pipe fittings	85	55
Pumps and compressors	1/	-
Other	3	26
Total	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

The demand for cast-iron pipe and tube fittings is directly influenced by demand for commercial, residential, and industrial construction. Apparent U.S. consumption of pipe and tube fittings fell 17 percent between 1979 and 1983, which represented a slightly smaller decline than producers' shipments. As imports increased during the 5-year period, imports' share of consumption for all fittings rose from 5.5 percent in 1979 to 8.1 percent in 1983 (table V-14).

Table V-14.--Cast iron pipe and tube fittings: Domestic shipments, 1/ exports, imports, and apparent consumption, 1979-83

(Quantity in thousands of units; value in thousands of dollars)

Year	Producer shipments	Exports	Imports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity (thousands of units)				
1979	422	26	23	419	5.5
1980	404	35	21	390	5.4
1981	398	26	22	394	5.6
1982	334	23	26	337	7.7
1983	341	23	28	346	8.1
	Value (1,000 dollars)				
1979	471,861	73,199	23,495	422,157	5.6
1980	489,200	87,207	23,460	425,453	5.5
1981	518,347	89,064	26,526	455,809	5.8
1982	466,520	78,933	29,502	417,089	7.1
1983	494,280	69,639	29,372	454,013	6.5

1/ Estimated by the staff of the U.S. International Trade Commission based on data compiled from official statistics of the U.S. Department of Commerce and data supplied by the American Pipe Fitting Association.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission, and official statistics of the U.S. Department of Commerce.

In addition, the import-to-consumption ratio for malleable fittings is estimated by staff as follows:

	1979	1980	1981	1982	1983
Malleable fittings	24.0	24.9	22.9	32.0	31.6
All other fittings	1.4	1.3	1.9	2.5	3.0

Malleable pipe fitting producers are more vulnerable to import penetration than producers of other fittings, because malleable fittings are lighter, higher value per unit weight items, easily mass produced and attractive to low-cost labor suppliers who can profitably absorb transport costs to the United States. According to the American Pipe Fitting Association, Foreign malleable fittings manufacturers are heavily subsidized. During the 1981-83 recession high U.S. interest rates may also have been a factor favoring the foreign producer.

U.S. imports

U.S. imports of pipe fittings increased 21 percent from 1979 to 27,559 tons ($29.4 million) in 1983 (table V-15). In 1983, Japan accounted for 32 percent (8,993 tons) of all U.S. imports, Taiwan 18 percent (4,832 tons), South Korea 14 percent (3,767 tons), and India 18 percent (5,056 tons). Imports of cast-iron pipe and tube fittings by U.S. producers were negligible during 1979-83.

Competitive Assessment of Product-Related Factors in the U.S. Market

U.S. producers and importers agree that foreign-made pipe and tube fittings have the competitive advantage in lower purchase price and cost of tooling, with the exception of Brazil, where producers rated the cost of tooling as a domestic advantage (table V-16). U.S. purchasers also listed

Tabl- V-15.--Cast iron pipe and tube fittings: U.S. imports for consumption, by principal sources, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (short tons)				
Japan	9,852	9,125	9,634	8,407	8,993
Taiwan	3,631	2,948	3,500	4,796	4,832
Kor Rep	3,869	4,862	2,505	2,874	3,767
India	2,105	2,189	3,462	3,339	5,056
Brazil	124	141	329	263	1,750
Canada	1,404	826	1,048	1,675	1,005
Thailnd	0	195	322	451	687
U King	322	288	247	1,432	226
All other	1,386	848	1,409	2,523	1,243
Total	22,693	21,422	22,456	25,760	27,559
	Value (1,000 dollars)				
Japan	10,798	10,916	12,021	11,098	11,343
Taiwan	4,056	3,503	4,631	6,019	6,207
Kor Rep	3,776	4,468	2,688	3,010	3,869
India	720	1,016	1,658	1,730	2,310
Brazil	100	138	408	363	1,542
Canada	1,883	1,458	1,540	2,305	1,470
Thailnd	-	186	313	446	778
U King	731	735	664	1,653	519
All other	1,432	1,039	1,603	2,878	1,335
Total	23,496	23,460	25,526	29,502	29,372
	Unit value (per short ton)				
Japan	$1,095.98	$1,196.29	$1,247.76	$1,320.04	$1,261.26
Taiwan	1,116.99	1,188.20	1,323.12	1,255.06	1,284.48
Kor Rep	975.95	918.99	1,073.13	1,047.18	1,027.06
India	342.03	464.22	478.80	518.24	456.93
Brazil	807.42	977.19	1,240.50	1,380.14	881.10
Canada	1,341.22	1,765.38	1,469.89	1,376.06	1,462.99
Thailnd	-	955.16	973.57	989.63	1,132.01
U King	2,269.57	2,552.89	2,688.23	1,154.22	2,294.99
All other	1,033.37	1,225.24	1,137.54	1,140.75	1,073.73
Average	1,035.36	1,095.12	1,136.73	1,145.26	1,065.77

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table V-16.--Cast-iron pipe and tube fittings: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made castings in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/									
	Taiwan		India		Japan		Korea		Brazil	
	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	F	F	2/	F	F	F	F	F	2/
Lower purchase price (delivered)	F	F	F	2/	F	F	F	F	F	2/
Cost of tooling/patterns	F	F	F	2/	F	F	F	F	D	2/
Shorter delivery time	D	D	D	2/	D	D	D	D	D	2/
Availability	D	D	D	2/	D	D	D	D	D	2/
Servicing	D	D	D	2/	D	D	D	D	S	2/
Favorable terms of sale	F	S	S	2/	F	S	F	S	S	2/
Favorable product guarantees	D	2/	D	2/	D	S	D	S	D	2/
Favorable exchange rates	F	D	S	2/	F	D	F	S	D	2/
Historical supplier relationship	D	D	D	2/	F	S	S	D	D	2/
Product performance features:										
Superior design	D	S	D	2/	D	S	D	S	D	2/
Quality	D	S	D	2/	D	S	D	S	D	2/
More durable	D	S	D	2/	D	S	D	S	D	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

lower purchase price along with favorable sales terms and tooling costs as the most important reasons for buying foreign-made pipe and tube fittings (table V-17). Both producers and importers attribute the competitive advantage to U.S. producers in market response factors, such as shorter delivery time, availability, and servicing (table IV-16), and the reliability of domestic producers in supplying market needs is also ranked by U.S. purchasers as the most important reason for purchasing U.S. made cast-iron pipe and tube fittings (table V-17).

Table V-17.--Cast-iron pipe and tube fittings: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign-produced castings, 1981-84

Reason for purchase	U.S.-made cast-iron pipe and tube fittings	Foreign-made cast-iron pipe and tube fittings
Lower purchase price (delivered)	6	1
Cost of tooling/patterns	8	3
Shorter delivery time	2	5
Availability	1	5
Servicing	3	-
Favorable terms of sale	6	2
Favorable product guarantees	5	-
Favorable exchange rates	-	5
Historical supplier relationship	2	-
Product performance features:		
Superior design	8	-
Quality	4	3
More durable	-	-
Other	8	-

1/ Ranking numbers range from 1 to 8, number 1 indicating the most important reason for purchase and number 8 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Product prices provided by U.S. purchasers for a representative malleable cast-iron pipe and tube fitting showed the average lowest net delivered domestic price ranging from 76 cents to 80 cents per pound in 1981-83 compared with the foreign price of 57 cents to 64 cents during the period (table V-18). The domestic price averaged 31 percent higher than the delivered foreign price on this item during the period.

Table V-18.--Cast-iron pipe and tube fittings: Average lowest net delivered prices reported by purchasers, 1981-83

(Per unit)

Period	Cast iron pipe and tube fittings: 1 inch diameter, 90 degrees malleable cast-iron pipe fitting, machined, 150 psi	
	Domestic	Foreign
1981:		
January-March	$0.76	$0.57
April-June	.76	.57
July-September	.76	.57
October-December	.76	.57
1982:		
January-March	.79	.58
April-June	.79	.58
July-September	.79	.58
October-December	.79	.58
1983:		
January-March	.80	.64
April-June	.80	.64
July-September	.80	.64
October-December	.80	.64

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The purchasing trend of U.S. buyers reporting on the Commission's questionnaires indicates relatively stable domestic purchases during 1979-83, whereas foreign purchases show a steady decline since 1981 (table V-19). Although U.S. producers consistently evaluated product performance features of superior design, quality, and durability as a domestic advantage with all foreign competitors, importers rated products from Japan, Taiwan and South Korea as comparable with the United States in these product attributes. Purchasers also ranked quality as relatively important reasons for their purchases of foreign-made cast-iron pipe and tube fittings products.

Table V-19.--Cast-iron pipe and tube fittings: Purchases of domestically produced and foreign-produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (short tons)	
1979	6,248	354
1980	6,223	439
1981	6,916	659
1982	6,033	178
1983	6,744	120
	Value (1,000 dollars)	
1979	7,770	374
1980	8,810	526
1981	9,975	755
1982	8,038	257
1983	8,797	218

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to import competition in the U.S. market

U.S. producers of pipe and tube fittings reported that the most frequent steps taken during 1981-84 in response to import competition in the U.S. market included cost reductions (21 percent), lowered prices (23 percent), and production cutbacks (19 percent). Other steps included improving products, closing production lines, and shifting to more advanced type of castings (table V-20). In addition, the reported levels of capital expenditures and research and development expenditures suggest that the U.S. industry is devoting resources to improving its competitive position in the U.S. market.

Table V-20.--Cast-iron pipe and tube fittings: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses
	Percent
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	2
Had already shifted production to other lines of castings	-
Lacked capital funds to counter foreign competition	2
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	23
Reduced or dropped plans to expand capacity	6
Cut back production	19
Closed production lines or manufacturing	4
Shifted to more advanced type of castings	2
Implemented cost-reduction efforts	21
Improved quality of the products	17
Imported	4
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

U.S. producers of cast-iron pipe and tube fittings experienced increases in exports during 1979-83. Staff interviews with major producers indicated that the quality associated with U.S.-made products has typically provided the most significant contribution to the growth in exports. U.S. producers responding to the Commission questionnaires indicated that their principal advantage derived from the quality, design, and durability of U.S.-made fittings, but that these advantages were not sufficient to overcome the price-related advantages of foreign producers (table V-21). U.S. producers assessed foreign producers as having the overall competitive advantage principally based on lower prices and costs of tooling, favorable exchange rates, and historical supplier relationships.

Table V-21.--Cast-iron pipe and tube fittings: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-83

Item	Competitive advantage 1/			
	Korea	Japan	India	Taiwan
Overall competitive advantage	F	F	F	F
Lower purchase price (delivered)	F	F	F	F
Cost of tooling/patterns	F	F	F	F
Shorter delivery time	F	S	2/	F
Availability	F	S	2/	F
Servicing	F	S	2/	F
Favorable terms of sale	S	F	F	S
Favorable product guarantees	S	D	2/	S
Favorable exchange rates	F	F	F	F
Historical supplier relationship	F	F	2/	F
Product performance features:				
Superior design	D	D	2/	D
Quality	D	D	2/	D
More durable	D	D	2/	D

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to increased competition in foreign markets

U.S. producers most commonly responded to increased competition in foreign markets by lowering prices or suppressing price increases (27 percent of respondents) and by cutting back production or improving product quality (each 18 percent). Three percent of producers reported they lacked capital funds to counter foreign competition (table V-22).

Table V-22.--Cast-iron pipe and tube fittings: U.S. producers' responses to increased competition in their foreign markets, 1981-84 1/

Nature of response	Share of responses
	Percent
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	3
Had already shifted production to other lines of castings	-
Lacked capital funds to counter foreign competition	3
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	27
Reduced or dropped plans to expand capacity	6
Cut back production	18
Closed production lines or manufacturing	6
Shifted to more advanced types of castings	-
Implemented cost-reduction efforts	13
Improved quality of the products	18
Imported	3
Opened a plant to manufacture abroad	-
Other	3

1/ Data supplied by 7 firms which accounted for 15 percent of U.S. exports in 1983 (on basis of value).

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

VI. CERTAIN CAST-STEEL VALVES

Description and Uses

Valves are mechanical devices used for controlling the flow of liquids, gases, and other shifting materials through pipes or piping systems. Valves are used to either start and stop the flow of these substances or to determine or adjust the quantity, pressure, time, or direction of flow. Flow control is attained by moving a disc, wedge, plug, cylinder, or other flow-controlling element within the valve assembly to open, close, or partially obstruct the passageway. Valves range in size from only a fraction of an inch to more than 30 feet in diameter. They are used at pressures ranging from a vacuum to the highest pressures attainable by man today and at temperatures from those of cryogenics to those of molten metal.

There are several different types of valves, including check, gate, globe, plug, ball, butterfly, and other special types. Because of the wide variety of valves that are marketed in the United States, it was necessary, for the purposes of this study, to select a standard valve for comparison of domestically produced and imported products. On the basis of discussions with domestic producers and importers, the following valve was chosen: a cast, carbon steel wedge gate valve (4-inch, 150-pound, flanged, standard trim). The remainder of the discussion of valves will address all cast carbon steel valves and this particular carbon steel valve, hereinafter referred to as the 4-inch wedge gate valve.

The 4-inch wedge gate valve is a multiturn valve used for on-off control of the flow of substances through a system. The gate valve starts or stops flow through the system through the action of a disc, or gate, which slides perpendicular to the direction of flow through the pipe. Gate valves are not normally used to throttle flow through a system.

Cast-steel valves may be manufactured from all grades of steel. The grades of steel are defined by the Tariff Schedules of the United States (TSUS) principally on the basis of their chromium content, as shown in the following tabulation:

Grade	Chromium content	Carbon restrictions
	Percent, by weight	
Stainless	More than 11.5	Less than 1 percent carbon.
Other than stainless:		
Alloy	0.20-11.5, inclusive 1/	None.
Carbon	0.20 or less	None.

1/ Alloy grade may consist of over 1.65 percent of manganese, over 0.25 percent of phosphorus, over 0.35 percent of sulphur, over 0.60 percent of silicon, over 0.60 percent of copper, over 0.30 percent of aluminum, over 0.30 percent of cobalt, over 0.35 percent of lead, over 0.50 percent of nickel, over 0.30 percent of tungsten, or over 0.10 percent of any other metallic element.

Generally, steel valves manufactured for pipes with outside diameters of more than 2 inches are produced from steel castings. Those manufactured for pipes with outside diameters of 2 inches or less are normally produced from steel forgings. Therefore, most of the discussion in this section pertains to valves manufactured for pipes with outside diameters of more than 2 inches.

Valves are generally produced according to standards and specifications determined by a number of U.S. organizations, including the American Society for Testing & Materials (ASTM), the American Petroleum Institute (API), and the American National Standards Institute (ANSI). Comparable foreign organizations in Japan, the United Kingdom, and other countries have also developed standard specifications for steel valves that are compatible with U.S. standards and specifications.

Valves are used primarily in piping systems in the petroleum refining, petrochemical, electric power generation, marine, pharmaceutical, and pulp and paper manufacturing industries. Valves used in these industries' systems can be expensive high-alloy valves or inexpensive low-alloy valves. Under mild conditions a high-alloy valve may last for years, whereas, under harsh conditions, a low-alloy valve may last only a few hours. The end user's choice of steel grade is normally determined by a combination of initial cost considerations, the expected life of the valve, and the location of the valve in the system. Valves situated in hard-to-reach sections of piping (as in nuclear plants) or in geographically remote locations may be of high-alloy steel because of its durability.

The 4-inch wedge gate valve is a general service valve used most often in water, steam, and gas pipelines in the chemical, power, and refinery industries.

<u>Product and manufacturing process</u>

The vast majority of valve manufacturers use the sand-casting (green sand and shell molding) process to manufacture steel valves. The shell mold process is used for castings that weigh 100 pounds or less and is geared for high-volume work. The green sand process is used for castings that weigh more than 100 pounds and is geared for low-volume specialty castings. The two most common types of melting equipment used in foundries producing steel valves are electric and induction furnaces. A few foundries also use argon oxygen decarburizing melting equipment for further refining of the steel.

Most foundries manufacturing valve castings do not provide for finishing operations other than removal of gates, fins, risers, and sprues and for cleaning of the rough casting. Finishing operations, such as drilling bolt holes and machining surfaces, are performed by the valve manufacturer who purchases the rough castings.

Foundries producing valve castings are basically labor intensive. Although some automation is possible for production castings, much of the work to get the sand mold ready for the pour is done by hand. Most foundries producing valve castings are jobber-type foundries, and automation is generally limited because of the diversity of production.

When a valve customer requests a specific type of valve or requests modifications to an existing valve, the valve manufacturer provides drawings of the valve to the foundry. A pattern maker at the foundry makes a pattern, usually out of wood, from the drawings. The pattern is then pressed into a mold box with sand packed around it. This process is very labor intensive. Pouring the molten steel into the mold, shaking out, and cleaning of the casting are relatively labor intensive tasks.

Customs Treatment

U.S. tariff treatment

Imported cast-steel valves are classified under item 680.17 of the Tariff Schedules of the United States Annotated. Table VI-1 shows the staged reductions in the rates of duty as a result of the Multilateral Trade Negotiations (MTN). The current rates of duty (1984) and detailed tariff descriptions are shown in appendix E.

On September 22, 1983, counsel for the Valve Manufacturers Association Fair Trade Council and 11 U.S. producers filed a petition with the U.S. International Trade Commission and the U.S. Department of Commerce alleging that an industry in the United States is materially injured by reason of imports from Japan of certain steel valves and certain parts thereof that are allegedly being sold at less than fair value (LTFV). Accordingly, effective September 22, 1983, the Commission instituted preliminary antidumping investigation No. 731-TA-145 (preliminary) under section 731 of the Tariff Act of 1930. On the basis of information obtained in the investigation, the Commission determined on November 7, 1983, that there was a reasonable indication that industries in the United States are materially injured by imports from Japan of steel wedge gate, globe and swing check valves and certain parts thereof 1/ (other than bellows seal valves and nonmachined valve bodies), provided for in item 680.17 of the Tariff Schedules of the United States, which are alleged to be sold in the United States at less than fair value. The Commerce Department ruled in the second week of June 1984 that all steel gate and globe valves imported from Japan are being dumped at weighted-average margins of 2.5 percent. On April 2, 1984, the Commission instituted a final investigation (investigation No. 731-TA-145 (Final)), and on July 23, 1984, under section 735(b) of the Tariff Act of 1930, determined that an industry in the United States is not materially injured by reason of imports of certain steel valves and parts thereof from Japan being sold at less than fair value. By virtue of the Commission's determination, no antidumping order will be issued by the Department of Commerce against imports of certain steel valves and parts thereof from Japan.

1/ The term "certain parts" means "partially completed" valves. "Partically completed" valves, in turn, are machined forged or cast valve bodies imported alone or together with one or more of the following parts: bonnet, stem, wedge, handle, and seat rings. Excluded from the definition are "rough", i.e., non-machined valve bodies, the above designated parts imported alone, and miscellaneous minor parts such as fasteners.

Table VI-1.--Certain cast-steel valves: U.S. rates of duty, by TSUS items, 1980-87

(Percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rates of duty effective with respect to articles entered on or after Jan. 1--			
			1980	1981	1982	1983
680.17A	Taps, cocks, valves, and similar devices, used to control the flow of liquids, gases, or solids, all the foregoing and parts thereof, of iron or steel.	11%	11%	10.5%	10%	10%
680.18	Taps, cocks, valves,and similar devices,..., if Canadian article and original motor-vehicle equipment.	Free	3/	3/	3/	3/

TSUS item No. 1/	Description	Staged col. 1 rates of duty effective with respect to articles entered on or after Jan. 1--Continued				Col. 2 rate of duty
		1984	1985	1986	1987	
680.17A	Taps, cocks, valves, and similar devices, however operated, used to control the flow of liquids, gases, or solids, all the foregoing and parts thereof of iron or steel.	9.5%	9%	8.5%	8%	45%.
680.18	Taps, cocks, valves, and similar devices, ..., if Canadian article and original motor-vehicle equipment.	3/	3/	3/	3/	4/

1/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP) and that all beneficiary developing countries are eligible for the GSP.
2/ Rate effective prior to Jan. 1, 1980.
3/ Rate not negotiated in the Tokyo round of the Multilateral Trade Negotiations.
4/ Not applicable.

The Department of the Treasury conducted two preliminary countervailing duty investigations concerning imports from Japan and Italy of valves and parts thereof. On August 23, 1979 (44 F.R. 49550), and October 24, 1979 (44 F.R. 61279), Treasury announced preliminary affirmative determinations concerning imports of such merchandise from Japan and Italy, respectively. The petitioners in these two investigations withdrew their petitions on January 31, 1980. Consequently, no final determinations were made in these previous investigations regarding injury or bounties or grants.

Workers in the valve industry have filed a number of petitions with the U.S. Department of Labor under the Trade Adjustment Assistance program for workers. The petitions alleged that the workers were being injured by increased imports. Since 1975 there have been 32 certifications, affecting 5,227 workers; 70 denials, affecting 5,598 workers; and 5 terminations, affecting 188 workers. One case, which affected 25 workers, was withdrawn.

Foreign tariff treatment

Foreign rates of duty applicable to imports of valves from the United States vary considerably from one country to another. In the primary markets for U.S.-made valves (Saudi Arabia, the Republic of Korea, and Canada), the rates of duty vary from 4 percent ad valorem to 20 percent ad valorem. The final rate negotiated under the MTN for Canada, scheduled to go into effect January 1, 1987, is 10.2 percent ad valorem.

There is no negotiated rate for Saudi Arabia and the Republic of Korea since these countries have not acceded to the MTN agreements.

Profile of the U.S. Industry and Major Foreign Competitors

United States

There are approximately 100 foundries in the United States that produce steel valve castings. About 50 of these foundries produce 80 percent of the tonnage of valve castings; the top five foundries produce about 25 percent of the total tonnage. The total monthly capacity of all foundries producing cast-steel valves is approximately 60,000 tons. Not all of this tonnage is valves, however, since most foundries producing valve castings are multiproduct foundries. The greatest concentration of capacity is in Texas, which has 20 percent of the tonnage capacity in nine foundries. Other major areas of concentration are Pennsylvania (13 percent of tonnage capacity in seven foundries) and Louisiana (8.5 percent of tonnage capacity in four foundries).

U.S. production, capacity, and capacity utilization.--U.S. producers of cast-steel valve bodies reported decreasing production levels and decreasing capacity utilization from 1981-83 (table VI-2). Most manufacturers attribute this trend to both increasing imports and the general state of the economy. The decline in expenditures of the major consumers of valves (petro-chemical, power generation, and the pulp and paper industries) resulted in a decreased demand for valves.

Table VI-2.--Certain cast steel valves: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production--(units)--	2,174,025	2,349,787	2,405,759	1,885,716	1,299,251
Production capacity (units)--	2,651,083	2,736,747	2,819,890	2,951,000	3,000,600
Capacity utilization percent--	82	86	85	64	43

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Respondents to the Commission's questionnaire reported only 12 percent of their machinery and equipment to be 4 years old or less (table VI-3). Respondents reported that 53 percent of the machinery and equipment used in manufacturing facilities is 20 years old or older. Questionnaire respondents reported that a lack of capital and low levels of automation have kept them from purchasing more new manufacturing equipment.

Table VI-3.--Certain cast-steel valves: Machinery and equipment in manufacturing facilities of reporting producers, by age of the machine, as of January 1, 1984

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces----------	4	0	7	12	20
Molding lines:					
Automated---------------	2	4	10	2	2
Manual------------------	2	3	8	6	45
Total-----------------	8	7	25	20	67

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--The average U.S. foundry producing steel valve castings employed an estimated 340 production workers in 1979 compared with 195 production workers in 1983, according to questionnaire respondents. Few respondents varied from this estimate, and those few were primarily on the low side. Total employment reported by questionnaire respondents declined steadily from 3,592 persons in 1979 to 2,126 in 1983 (table VI-4). Likewise, production workers declined steadily from 3,068 to 1,757 in the same time period. Very little of this decline can be attributed to improvements in manufacturing efficiency, since most manufacturers have not significantly improved their production processes.

Table VI-4.--Certain cast-steel valves: Number of employees and production and related workers in operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons---------	3,592	3,500	3,485	2,853	2,126
Production and related workers--	3,068	2,963	2,953	2,383	1,757
Man-hours worked 1,000 hours--	6,758	6,553	6,123	4,791	3,432
Wages paid 1,000 dollars--	52,426	53,278	55,495	44,940	32,088

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Respondents reported a decreasing trend in the number of hours worked from 1979-83; man-hours worked decreased from 6.8 million in 1979 to 3.4 million in 1983. Wages decreased from $52.4 million in 1979 to $32.1 million in 1983. A comparison of wages paid to production workers in foundries producing certain cast-steel valves and wages paid in all operating U.S. manufacturing establishments indicates that production workers producing cast-steel valves are receiving wages above the average for U.S. manufacturing establishments, although the difference decreased during 1979-83, as shown in the following tabulation (per hour):

	Foundries producing certain cast-steel valves 1/	All operating U.S. manufacturing establishments 2/
1979-----------	$7.76	$6.00
1980-----------	8.13	7.27
1981-----------	9.06	7.99
1982-----------	9.38	8.49
1983-----------	9.35	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The quantity of domestic shipments of steel valve castings, as reported by producers in response to the Commission's questionnaire, increased slightly from 2,128,235 pieces in 1979 to 2,365,829 pieces in 1981, and then decreased steadily to 1,285,702 pieces in 1983 (table VI-5). In terms of value, domestic shipments increased from $81.6 million in 1979 to $95.5 million in 1981 and decreased to $45.8 million in 1983. Unit value, however, increased from $38.35 in 1979 to $40.85 in 1982, and then decreased to $35.64 in 1983.

Table VI-5.--Certain cast steel valves: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Dollars per unit
1979	2,128,235	81,616	38.35
1980	2,309,281	90,640	39.25
1981	2,365,829	95,512	40.37
1982	1,835,463	74,978	40.85
1983	1,285,702	45,828	35.64

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Questionnaire respondents reported decreasing quantities of exports of steel valve castings, with a decline from 39,100 units in 1979 to 8,400 units in 1983 (table VI-6). The value of exports reported fluctuated with a peak of $6.2 million in 1981 and a low of $795,000 in 1983. Unit value also fluctuated with a high of $280 per unit in 1981 and a low of $34 in 1980.

Table VI-6.--Certain cast-steel valves: U.S. exports of domestic merchandise, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Dollars per unit
1979	39,100	5,406	138.26
1980	29,300	997	34.03
1981	22,300	6,236	279.64
1982	24,000	3,569	148.71
1983	8,400	795	94.64

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' inventories.--Respondents to the Commission's producers' questionnaire reported declining inventories of steel valve castings from 1980 to 1983, reflecting the decreased demand for these products from major consuming industries. Inventories of respondents decreased from 151,011 units in 1980 to 91,092 units in 1983. See the following tabulation:

	Quantity (units)
1979	139,453
1980	151,011
1981	131,206
1982	96,502
1983	91,092

Financial experience of U.S. producers.--Net sales, as reported by respondents to the Commission's questionnaire, increased from $156.1 million in 1979 to $163.5 million in 1981, and decreased to $94.9 million in 1983 (table VI-7). Net profit peaked in 1981 at $7.5 million, when domestic shipments were relatively high, and decreased to a net loss of $10.0 million in 1983. The net loss of $10.0 million in 1983 represents a decrease of 233 percent from the $7.5 million net profit of 1981. As a share of net sales, net profit decreased from 4.7 percent in 1979 to 2.4 percent in 1980 and increased to 4.6 percent in 1981.

Table VI-7.--Certain cast-steel valves: U.S. producers' net sales and net profit (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales 1,000 dollars--	156,120	157,226	163,503	133,953	94,909
Net profit (loss) 1,000 dollars--	7,304	3,789	7,528	(8,473)	(10,019)
Ratio of net profit to net sales percent--	4.7	2.4	4.6	-	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic facilities used in the manufacture of steel valve castings, as reported in response to the Commission's questionnaire, are shown in table VI-8. Respondents reported no capital expenditures for facilities in other countries.

Table VI-8.--Certain cast-steel valves: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

U.S. facilities	1979	1980	1981	1982	1983
Land, land improvements	200,174	13	124	13	14
Buildings, leasehold improvements	1,678	1,365	2,164	937	678
Machinery, equipment, and fixtures:					
New	348,637	135,544	5,314	5,336	2,407
Used	1,188	201	273	220	83
Total	551,677	137,123	7,875	6,506	3,182

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers reported a significant decrease of 99 percent in capital expenditures from $551.7 million in 1979 to $3.2 million in 1983. This decrease is mainly reflected in expenditures on purchases of new machinery, equipment, and fixtures. Decreased profits have had a major effect on the ability of manufacturers to invest in new plants and equipment.

Reasearch and development expenditures.--Respondents to the Commission's questionnaire reported fluctuating expenditures for research and development during 1979-83, as shown in table VI-9.

Table VI-9.--Certain cast-steel valves: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

(In thousands of dollars)

Year	Value
1979	910
1980	758
1981	1,107
1982	968
1983	802

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures seem to have increased in 1981-82, when U.S. producers were heavily affected by imports. In 1983, a lack of profits kept research and development expenses relatively low.

Structural Factors of Competition Between U.S. and Foreign Industries

The competition in the U.S. market between domestically produced steel valve castings and those produced in foreign countries 1/ is influenced by various structural factors. U.S. producers responding to the Commission's questionnaire indicated that, with respect to all countries assessed, U.S. producers' competitive strength lies mainly in after-sale service capabilities. Foreign producers' competitive strengths, according to U.S. producer respondents, are concentrated in the availability and cost of capital and labor, foreign government involvement in the industry (subsidies, research and development assistance, tariff levels on imports, nontariff barriers to imports), and U.S. and foreign government regulations that increase costs (table VI-10).

1/ Countries identified by respondents to the Commission's producer questionnaire include the Republic of Korea, Japan, Belgium, Italy, and Portugal.

Table VI-10.--Certain cast-steel valves: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

Item	Competitive advantage 1/				
	Korea	Japan	Belgium	Italy	Portugal
Fuel:					
Availability	D	S	D	S	D
Cost	S	S	F	F	D
Raw Material:					
Availability	S	S	S	S	D
Cost	S	S	S	F	D
Capital:					
Availability	F	F	F	S	F
Cost	F	F	F	F	F
Ability of industry profits to attract funds	S	F	F	S	S
Labor:					
Availability	F	S	F	S	F
Cost	F	F	F	F	F
Production technology	S	S	S	S	D
Marketing:					
Channels of distribution	S	D	D	S	S
Responsiveness to orders	D	S	D	S	D
After-sale service capabilities	D	D	D	D	D
Government involvement:					
Subsidies	F	F	F	F	F
Research and development assistance	F	F	F	S	F
Tariff levels on imports	F	F	F	F	F
Nontariff barriers to imports	S	F	D	F	F
U.S. Goverment regulations that increase costs	F	F	F	F	F
Foreign government regulations that increase costs	S	F	S	F	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S International Trade Commission.

Raw materials, energy, and technology

The availability and cost of raw materials and energy was judged by U.S. producer respondents to be somewhat evenly balanced between the U.S. producers and their major competitors in the U.S. market. Also, respondents indicated that neither U.S. producers nor their foreign competitors have a competitive advantage in the U.S. market in terms of production technology.

Capital

Foreign producers, for the most part, were given the advantage in both availability and cost of capital. U.S. producers have indicated that foreign producers generally have better access to low interest loans than U.S. producers and have somewhat more leverage than U.S. producers. 1/ These factors seem to contribute substantially to foreign firms' access to capital and their lower cost of capital, according to U.S. producers. Japanese and Belgian producers reportedly are better able to attract funds because of industry profits than are U.S. producers. Korean, Italian, and Portuguese producers are equal with U.S. producers in the ability of industry profits to attract funds.

Labor

A clear advantage in terms of both availability and cost of labor was given to the Republic of Korea, Belgium, and Portugal, according to respondents. The availability of labor was reported by respondents as the same for U.S., Japanese, and Italian producers, but the cost of labor was reported to be more of an advantage for both Italian and Japanese producers over US. producers. Testimony given before the Commission indicates that labor rates in foreign countries are one-fifth to one-tenth of the labor rates in the United States. 2/

Marketing

In the area of marketing, respondents indicated that, for the most part, U.S. producers have a clear advantage over most foreign competitors. This is primarily because of U.S. producers' long established channels of distribution and superior after-sale service capabilities, according to questionnaire respondents.

U.S. producers and importers of steel valve castings maintain inventories in order to provide reasonable delivery and service to customers. Producers' inventories have historically been larger than those of importers since producers attempt to maintain inventories of their complete product line, whereas importers tend to limit inventories to certain standard high-volume valves. However, with an increasing market share in standard-type valves,

1/ Information gathered in discussions with industry executives.
2/ Hearing held before the U.S. International Trade Commission, July 18, 1984.

importers' inventories exceeded U.S. producers' inventories in 1982 and 1983. Since lead times are generally the same for both U.S. and foreign producers, U.S. producers have an advantage over importers, in terms of shorter delivery time, for specialty valves they may have in inventory.

Inventories held by U.S. producers and by importers during 1979-83 are shown in table VI-11.

Table VI-11.--Certain cast-steel valves: Year end inventories held by producers and importers, 1979-83

(In units)

Year	Producers' inventories	Importers' inventories
1979	139,453	63,810
1980	151,011	95,698
1981	131,206	119,079
1982	96,502	126,352
1983	91,092	101,831

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Approximately two-thirds of the importers responding to the Commission's survey indicated that they import primarily for inventory rather than to fulfill contractual obligations or orders.

Government involvement

U.S. producers, in response to the Commission's questionnaire, indicated that foreign producers generally have an overwhelming competitive advantage over U.S. producers in terms of government subsidies, tariff levels on imports, and U.S. Government regulations that increase costs. A number of U.S. producers indicated that their cash flow had been adversely affected by continuing Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulations. These regulations reportedly take capital that could have been committed to improve production processes.

In addition, U.S. producer respondents indicated that foreign producers have an advantage over them in terms of research and development assistance. Foreign government regulations that increase costs were reported to be more advantageous for Japanese and Italian producers rather than for U.S. producers.

The U.S. Market

Domestic market profile

U.S. producers and importers vary in the channels by which they distribute their products. U.S. producers shipped 60 percent of their steel valve castings to original equipment manufacturers and 33 percent to machine shops and other fabricators. Importers, on the other hand, shipped 49 percent of their valves and valve castings through distributors and 27 percent through original equipment manufacturers. Importers shipped 24 percent through other channels (primarily oil and petro-chemical related industries). The primary reason for this variance is that U.S. producers' shipments (as reported in response to the Commission's questionnaire) are valve castings while importers shipments are mainly complete valves (table VI-12).

Table VI-12.--Certain cast-steel valves: U.S. producers' and importers' shipments, by channel of distribution, 1981-83

Channel of distribution	Percent of shipments	
	Producers	Importers
Machine shops/other fabricators	33	1/
Distributors	-	49
Original equipment manufacturers	60	27
Other	7	24
Total	100	100

1/ Less than 1 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers and importers shipped their highest percentage (99.8 percent and 93 percent, respectively) of their products to the valve and pipe fittings market. U.S. importers shipped their next highest percentage to the oil and petro-chemical market and a negligible amount to the farm machinery and equipment market, the mining machinery and equipment market, the refrigeration and heating equipment market, and the pump and compressor market (table VI-13). According to industry sources, transport costs are estimated to account for about 2-3 percent of the selling price of cast steel valves, and are not considered to be an important factor in the marketing of these products.

Table VI-13.--Certain cast-steel valves: U.S. producers' and importers' shipments, by type of market, 1981-83

Type of market	Percent of shipments	
	Producers	Importers
Motor vehicles	-	-
Farm machinery and equipment	-	1/
Mining machinery and equipment	-	1/
Construction machinery and equipment	-	1/
Refrigeration and heating equipment (except pumps and compressors)	-	1/
Plumbing equipment	-	-
Railway equipment	-	-
Industrial machinery	-	-
Machine tools	-	-
Valves and pipe fittings	99.8	93
Pumps and compressors	1/	1/
Other (oil-and petrochemical related industries)	1/	6
Total	100	100

1/ Less than 1 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

The U.S. market for cast-steel valves and steel valve castings declined nearly 17 percent, in terms of units, and 5 percent, in terms of value, during 1979-83, although apparent consumption was greater in 1980-82 than in 1979 (table VI-14). The demand for valves in the United States is directly affected by commercial economic activity, and the economic downturn of the early 1980's had an adverse impact on producer shipments. At the same time producer shipments were declining, imports were increasing, primarily because of low prices. Thus, there was no growth in apparent consumption during 1980-82. The ratio of imports to consumption remained relatively constant during 1979-82 and decreased in 1983 as imports declined significantly.

Table VI-14.--Certain cast-steel valves: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1979-83

Year	Producers' shipments	Exports	Imports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity (thousands of units)				
1979----------	124,100	13,388	59,139	169,851	34.8
1980----------	146,200	18,877	63,240	190,563	33.2
1981----------	139,500	20,088	70,249	189,661	37.0
1982----------	129,900	17,554	68,123	180,469	37.7
1983----------	116,000	14,959	40,426	141,467	28.6
	Value (1,000 dollars)				
1979----------	663,722	71,682	128,332	720,372	17.8
1980----------	846,674	109,221	133,477	870,930	15.3
1981----------	806,194	116,092	152,866	842,968	18.1
1982----------	847,185	114,370	143,832	876,647	16.4
1983----------	679,512	87,657	92,338	684,193	13.5

Source: Compiled from official statistics of the U.S. Department of Commerce and data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers contend that they are increasingly being squeezed out of the standard valve market by lower priced imports and that the specialty valve market is not large enough to support the entire industry. One major producer is known to be in bankruptcy proceedings and expects to shut down its operations by the end of the summer.

U.S. exports of steel valves increased from 1979-81, primarily because of increased demand from such countries as Venezuela, Korea, and Saudi Arabia for specialty valves used in the power generation and petro-chemical industries.

U.S. imports

U.S. imports of cast-steel valves increased 20 percent from $128 million in 1979 to $153 million in 1981, and declined 40 percent to $92 million in 1983 (table VI-15). The principal sources for increasing imports of cast-steel valves during 1979-82 were Japan, Canada, and Italy, while imports from the United Kingdom remained relatively constant. Imports from all sources decreased significantly in 1983, primarily because of decreased demand from valve and pipe fittings manufacturers and the petroleum and petro-chemical industries.

The quantity of certain imported cast-steel valves shipped into the United States, as reported by respondents to the Commission's importer

Table VI-15.--Certain cast-steel valves: U.S. imports for consumption, by principal sources, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (1,000 units)				
Japan	15,157	17,481	19,504	16,971	10,282
Canada	6,678	7,443	9,298	7,175	4,520
United Kingdom	5,463	5,048	5,961	6,366	5,189
Italy	9,115	11,139	12,599	11,870	4,358
All other	22,726	26,794	28,548	31,795	20,918
Total	59,139	63,240	70,249	68,123	40,426
	Value (1,000 dollars)				
Japan	38,043	39,840	50,874	41,399	27,997
Canada	17,496	19,168	22,105	18,604	13,308
United Kingdom	14,476	13,937	14,995	18,991	12,138
Italy	16,407	16,858	22,954	22,880	8,525
All other	41,910	43,674	41,938	41,958	30,370
Total	128,332	133,477	152,866	143,832	92,338
	Unit value (dollars)				
Japan	2.51	2.28	2.61	2.44	2.72
Canada	2.62	2.58	2.38	2.59	2.94
United Kingdom	2.65	2.76	2.52	2.98	2.34
Italy	1.80	1.51	1.82	1.93	1.96
All other	1.84	1.63	1.47	1.32	1.45
Total	2.17	2.11	2.18	2.11	2.28

Source: Compiled from official statistics of the U.S. Department of Commerce.

questionnaire, 1/ increased 221 percent (204 percent by value) during 1979-83, as shown in the following tabulation:

	Quantity of importer respondents' imports (in units)	Value of importer respondents' imports (1,000 dollars)
1979	55,272	21,828
1980	290,707	99,354
1981	158,980	56,939
1982	297,151	110,418
1983	177,347	66,273

1/ Reported imports represent an average of 22 percent of total import value during 1979-83.

U.S. producers of steel valve castings who responded to the Commission's questionnaire reported that they did not import any steel valve castings or finished steel valves during 1979-83. U.S. producers of steel valve castings are not importers of steel valve castings primarily because they feel imported castings are inferior in quality and they do not want to risk their reputations for quality valves on inferior imports. 1/

Foreign Markets

The major export markets for U.S.-produced steel valve castings and cast-steel valves are Saudi Arabia, Korea, and Canada. U.S.-produced steel valves imported by these countries are mainly specialty valves for use in the oil, petro-chemical, and power generation industries. Worldwide expansion in major valve-consuming industries is expected to continue for most of the 1980's, thus providing strong export markets for U.S. products. 2/

Competitive Assessment of Product-Related Factors in the U.S. Market

In response to the Commission's questionnaire, U.S. producers indicated that domestically produced steel valve castings do not have an overall competitive advantage in the U.S. market when compared with steel valve castings imported from any major U.S. source (table VI-16). Importers had a somewhat similar response. Generally, U.S. producers and importers of cast-steel valves reported that the U.S. and Japanese foundries producing steel valve castings are on an equal basis in terms of delivery time, historical supplier relationship, and product performance features. U.S. producers also rated Japan and the United States equal in terms of availability, servicing, favorable terms of sale, and favorable exchange rates. U.S. producers indicated that they had a competitive advantage over Japanese producers in terms of favorable product guarantees, but Japan had a competitive advantage in terms of a lower delivered purchase price and lower cost of tooling and patterns.

Except for two instances, importers judged foreign-made castings to have a competitive advantage over U.S.-made castings or to be equally competitive with U.S.-made castings. Importers and producers generally agreed in their assessment that the design, quality, and durability of their castings were competitively equivalent.

1/ Information obtained in discussions with industry executives.
2/ U.S. Department of Commerce, U.S. Industrial Outlook 1984, p. 24-2.

Table VI-16.--Certain cast-steel valves: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.- and foreign-made castings in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/													
	Taiwan		Japan		Korea		Belgium		United Kingdom		Italy		Spain	
	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	S	F	F	F	F	2/	F	2/	F	S	2/	F	2/	S
Lower purchase price (delivered)	F	F	F	F	F	2/	F	2/	F	F	2/	F	2/	F
Cost of tooling and patterns	F	F	F	F	F	2/	F	2/	F	S	2/	S	2/	S
Shorter delivery time	D	F	S	S	D	2/	D	2/	D	S	2/	D	2/	S
Availability	D	F	S	F	D	2/	D	2/	D	S	2/	S	2/	S
Servicing	D	F	S	F	D	2/	D	2/	D	F	2/	S	2/	S
Favorable terms of sale	D	S	S	F	S	2/	S	2/	S	S	2/	F	2/	S
Favorable product guarantees	D	S	D	F	D	2/	D	2/	D	S	2/	S	2/	S
Favorable exchange rates	S	S	S	F	F	2/	F	2/	D	S	2/	S	2/	S
Historical supplier relationship	D	S	S	S	D	2/	D	2/	2/	S	2/	S	2/	D
Product performance features:														
Superior design	S	S	S	S	S	2/	S	2/	D	S	2/	S	2/	S
Quality	S	S	S	S	S	2/	S	2/	D	F	2/	S	2/	S
More durable	S	S	S	S	S	2/	S	2/	D	F	2/	S	2/	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S International Trade Commission.

Purchasers of steel valve castings and cast-steel valves, in response to the Commission's questionnaire, gave historical supplier relationship as their most important reason for purchasing domestic products. Purchasers responded that a lower delivered purchase price was their principal reason for purchasing foreign products (table VI-17). Shorter delivery time and availability were

Table VI-17.--Certain cast-steel valves: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made	Foreign-made
Lower purchase price (delivered)	6	1
Cost of tooling and patterns	5	-
Shorter delivery time	2	2
Availability	2	2
Servicing	3	2
Favorable terms of sale	4	2
Favorable product guarantees	4	-
Favorable exchange rates	-	-
Historical supplier relationship	1	-
Product performance features:		
Superior design	6	-
Quality	5	-
More durable	-	-

1/ Ranking numbers range from 1 to 6, number 1 indicating the most important reason for purchase and number 6 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

given as purchasers' second most important reason for buying U.S.-made valves and valve castings, while shorter delivery time, availability, servicing, and favorable terms of sale were given as second most important reasons for purchasing foreign-made valves and valve castings. Purchasers who responded that shorter delivery time and availability were their second most important reason for purchasing both domestic and foreign products reflect the dichotomous markets of specialty valves (domestically produced) and standard valves (foreign-produced).

Purchasers responding to the Commission's questionnaire overwhelmingly preferred U.S.-made valves and valve castings over foreign-made products. As indicated in the following table (table VI-18), purchases of U.S.-produced valves and valve castings decreased in terms of units from 1.4 million units in 1980 to 850,649 units in 1983. In terms of value, however, purchases increased from $63.5 million in 1979 to $89.1 million in 1982, reflecting increasing purchases of higher priced valves and decreasing purchases of lower priced valves from domestic producers. Purchases of foreign-made valves and

Table VI-18.--Certain cast-steel valves: Purchases of domestically produced and foreign-produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (in units)	
1979	1,189,165	0
1980	1,404,872	0
1981	1,347,226	2,000
1982	1,103,036	2,400
1983	850,649	6,539
	Value (1,000 dollars)	
1979	63,536	0
1980	73,337	0
1981	74,119	1,853
1982	89,123	847
1983	73,724	265

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

valve castings, on the other hand, increased in quantity from 2,000 units in 1981 to 6,539 units in 1983, but decreased in value from $1.9 million in 1981 to $265,000 in 1983, reflecting increasing purchases of lower priced valves from foreign producers.

Pricing considerations

Product prices.--U.S. purchasers of domestically made and foreign-made valves did not give specific price information on the 4-inch wedge gate valve, citing too diverse a product mix as the primary reason. The 4-inch wedge gate valve, for most purchasers, is one of many valves included in a purchase order, and prices are not normally broken down for specific products. Most purchasers indicated, however, that foreign-made valves and valve castings are priced 30 to 90 percent below comparable U.S.-made products.

Cost of tooling and patterns.--The cost of tooling and patterns is generally higher in the United States than in foreign countries, primarily because of higher wage rates in the United States. Patterns are normally made of wood by hand by a skilled craftsman, and tooling is heavily dependent on labor. These higher costs increase the cost of the finished product significantly. A number of producers, in response to the Commission's questionnaire, indicated that higher labor costs in the U.S. foundry industry are the primary reason for price differentials between U.S.-made and foreign-made foundry products.

Terms of sale.--U.S. producers of steel valve castings and importers of steel valves and valve castings reported that they require net payment from purchasers in 30 days or less. Both producers and importers reported giving discounts for volume purchases, and producers also reported giving discounts for prompt payment, while importers did not. Importers, however, reported giving distributor/wholesaler discounts and providing pre-paid freight, while domestic producers reported they do not provide either of these services.

Exchange-rate changes.--Neither importers nor producers of steel valve castings and cast-steel valves reported an adverse or beneficial effect on their business because of exchange-rate changes. A few producers, however, stated that the artificially low value of the yen gave the Japanese valves and valve castings a slight advantage in price over comparable U.S.-made products.

Product performance features

Superior design.--U.S. producers and importers, in response to the Commission's questionnaire, indicated that design characteristics of domestically made and foreign-made steel valve castings are basically comparable. Since valve manufacturers generally design valves to meet customers' specifications, the foundry, whether domestic or foreign, receiving an order from a valve manufacturer will have to make the valve pattern for the mold according to the manufacturers' specifications. Thus, design is not a factor that foundries have much control over, unless the design incorporates a feature that is impossible to accommodate in the casting process.

Quality and durability.--The quality and durability of imported and domestically produced steel valve castings and complete valves were rated equal by importers responding to the Commission's questionnaire. U.S. producer respondents, however, rated U.S.-made steel valve castings as superior in quality and durability to imported products. U.S. producers are the primary suppliers of specialty valves to the U.S. and world markets and the valves they produce must be of the highest quality to withstand the extreme temperatures and pressures of the systems their customers use. Imported valves are primarily standard-type valves that are not used in special applications.

Market response

Shorter delivery time.--U.S. producers and importers reported that delivery time for both U.S.-produced and imported valves was essentially the same. Both U.S. producers and importers maintain inventories, and lead times on special orders are normally the same whether the order is placed with a U.S. foundry or a foreign foundry.

Availability.--Availability was reported by importers and domestic producers to be the same. U.S. purchasers, however, reported that the availability of U.S.-made products was significantly better than the availability of imported products. Purchasers reported that U.S. producers generally have standard and specialty valve capability, whereas importers normally have only standard valve capability.

Servicing.--Although U.S. producers and importers indicated that U.S. producers and foreign producers have comparable servicing capabilities, U.S. purchasers reported that U.S. foundries have a competitive advantage over importers in servicing capabilities.

Historical supplier relationship.--In response to the Commission's questionnaire, importers indicated that foreign foundries have a competitive advantage because of a historical supplier relationship, while U.S. producers reported they have a competitive advantage in this area. U.S. purchasers, however, responded that U.S. producers have a competitive advantage in this area.

U.S. producers' responses to import competition in the U.S. market

In response to import competition in the U.S. market, 18.4 percent of U.S. producers reported that they had implemented cost-reduction efforts (table VI-19). Other significant steps taken in response to import competition included cutting back production (16.3 percent) and improving the quality of their product (14.3 percent). The least significant response rate involved importing, opening a plant overseas, or taking no action because the firms had already shifted production to more advanced or other lines of castings.

Table VI-19.--Certain cast-steel valves: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses (percent)
Took no or few actions because of the following:	
Had already shifted production to more advanced type of castings	2.0
Had already shifted production to other lines of castings	2.0
Lacked capital funds to counter foreign competition	4.1
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	14.3
Reduced or dropped plans to expand capacity	12.2
Cut back production	16.3
Closed production lines or manufacturing	4.1
Shifted to more advanced types of castings	8.2
Implemented cost-reduction efforts	18.4
Improved quality of the products	14.3
Imported	2.0
Opened a plant to manufacture abroad	2.0

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

Without exception, U.S. producers responding to the Commission's questionnaire reported that foreign manufacturers have the overall competitive advantage in foreign markets over U.S. producers (table VI-20). The major factors indicated by U.S. producers as the reasons for this overall competitive advantage include competitive advantages in lower delivered purchase price and cost of tooling and patterns. U.S. producers reported that in Japan, Italy, and the United Kingdom, U.S. foundries had a competitive advantage over foreign foundries in such areas as shorter delivery times, availability, servicing, and historical supplier relationship. For Japan, Italy, and the United Kingdom, U.S. producers indicated they had a competitive advantage in some areas while foreign producers had competitive advantages in other areas. For Korea and Belgium, however, U.S. producers indicated that they had no competitive advantages over foreign foundries.

Table VI-20.--Certain cast-steel valves: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-84

	Competitive advantage 1/				
	Korea	Japan	Belgium	Italy	United Kingdom
Overall competitive advantage	F	F	F	F	F
Lower purchase price (delivered)	F	F	F	F	F
Cost of tooling and patterns	F	F	F	F	F
Shorter delivery time	F	D	2/	D	D
Availability	2/	D	2/	D	D
Servicing	F	D	2/	D	D
Favorable terms of sale	F	S	F	S	S
Favorable product guarantees	2/	D	2/	S	S
Favorable exchange rates	F	F	2/	S	S
Historical supplier relationship	F	D	F	D	D
Product performance features:					
Superior design	2/	S	2/	S	S
Quality	2/	S	2/	S	S
More durable	2/	S	2/	S	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

In terms of product performance features, U.S. producers responded that U.S.-made products and foreign-made products are comparable in design, quality, and durability for Japan, Italy, and the United Kingdom. U.S. producers made no competitive advantage determination on these factors for Korea or Belgium.

U.S. producers' responses to increased competition in foreign markets

In response to increased competition in foreign markets, 16.1 percent of U.S. producers reported lowering prices or suppressing price increases to maintain market share, and 16.1 percent reported cutting back production (table VI-21). The next most frequent response was implementing cost-reduction efforts.

Table VI-21.--Certain cast-steel valves: U.S. producers' responses to increased competition in their foreign markets, 1981-84 1/

Nature of response	Share of responses (percent)
Took no or few actions because of the following:	
Had already shifted production to more advanced types of castings	3.2
Had already shifted production to other lines of castings	3.2
Lacked capital funds to counter foreign competition	3.2
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	16.1
Reduced or dropped plans to expand capacity	9.7
Cut back production	16.1
Closed production lines or manufacturing	9.7
Shifted to more advanced types of castings	6.5
Implemented cost-reduction efforts	12.9
Improved quality of the products	9.7
Imported	6.5
Opened a plant to manufacture abroad	3.2

1/ Data supplied by 9 firms, which accounted for 1 percent of U.S. exports in 1983 (on the basis of value).

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

VII. CAST-STEEL CONSTRUCTION MACHINERY COMPONENTS

Description and Uses

Cast-steel construction machinery components included in this study consist of idler wheel assembly parts, sprocket teeth and adapters, and tread (track shoes). These components are used primarily by original equipment manufacturers as undercarriage parts on crawler-mounted construction machinery such as tractors (dozers), bucket loaders, hoes, plows, cranes, excavators, and other similar crawler-like earthmoving and material handling equipment (figure 1).

Idler wheel assemblies consist of a cast idler wheel, bearings, seals, and a shaft (figure 2). The majority of all track-type construction machines have two idler wheels (one per side) located in the front of the undercarriage. Several newer models are now being fitted with four idler wheels (two front and two top per side). Front idler wheels guide the track chain, absorb shock, and allow for the adjustment of track chain tension. Top idlers provide support alignment for the track chain as it passes between the sprocket and the front idler. Idler wheels can range between 18 and 42 inches in diameter depending upon the size of the machine.

Located at the rear of the undercarriage is a toothed gear called a sprocket, which provides the crawler with locomotion (figure 2). Each crawler has two sprockets (one per side) which receive power from the penion shaft and transfer it to the track chain. As the sprocket rotates, its teeth engage the track chain and propel the crawler either forward or backward. Sprockets and sprocket teeth can either be cast as a single unit or can be forged as a hub on the perimeter of which four to nine cast segments, consisting of three to nine teeth are bolted. 1/ Sprocket diameter is generally equivalent to that of the front idler, which varies with the size of the crawler.

Tread (track shoes) are formed cast-iron plates which are bolted onto the bottom of the track chain (figure 2). Track shoes are the part of the undercarriage which actually make contact with the ground. Track shoes can vary in weight between 18 and 50 pounds depending upon the size of the crawler. A track shoe can also be produced with grousers or raised cleats on its outer surface to suit varying soil conditions.

According to industry sources, U.S. manufacturers of these components employ basic sand casting as the method used to produce their products. The methods used by the various manufacturers to make castings are principally the same. However, differences can occur from the use of varying degrees of automation in the molding process. For the most part, sand casting is labor intensive, with labor costs accounting for approximately 35 percent of total plant costs. 2/

1/ According to industry sources, the vast majority of sprockets produced today are forged rather than cast.

2/ Transcript of the hearing held before the U.S. International Trade Commission, July 18, 1984, p. 68.

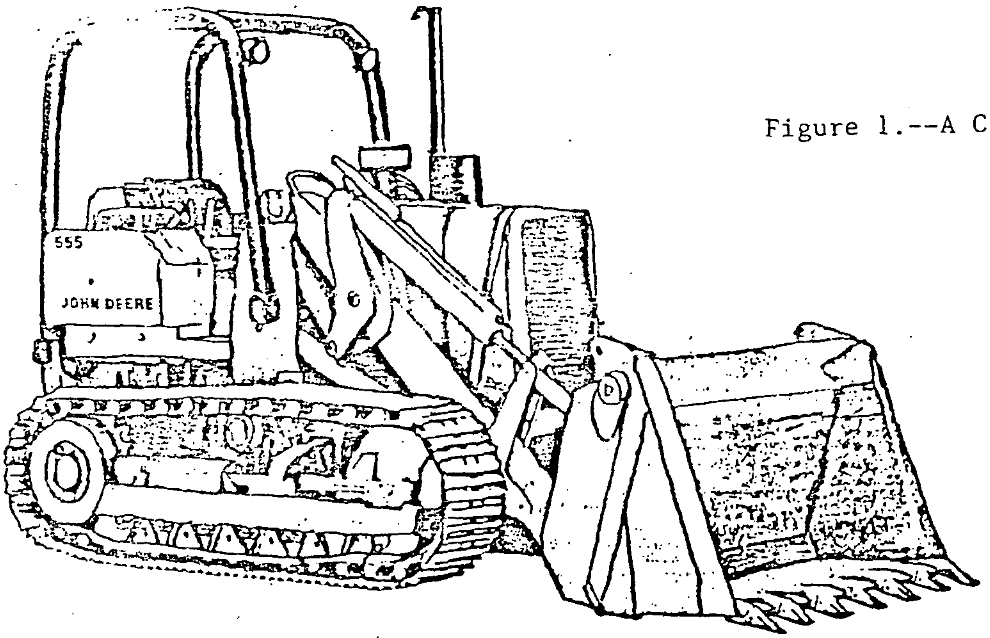
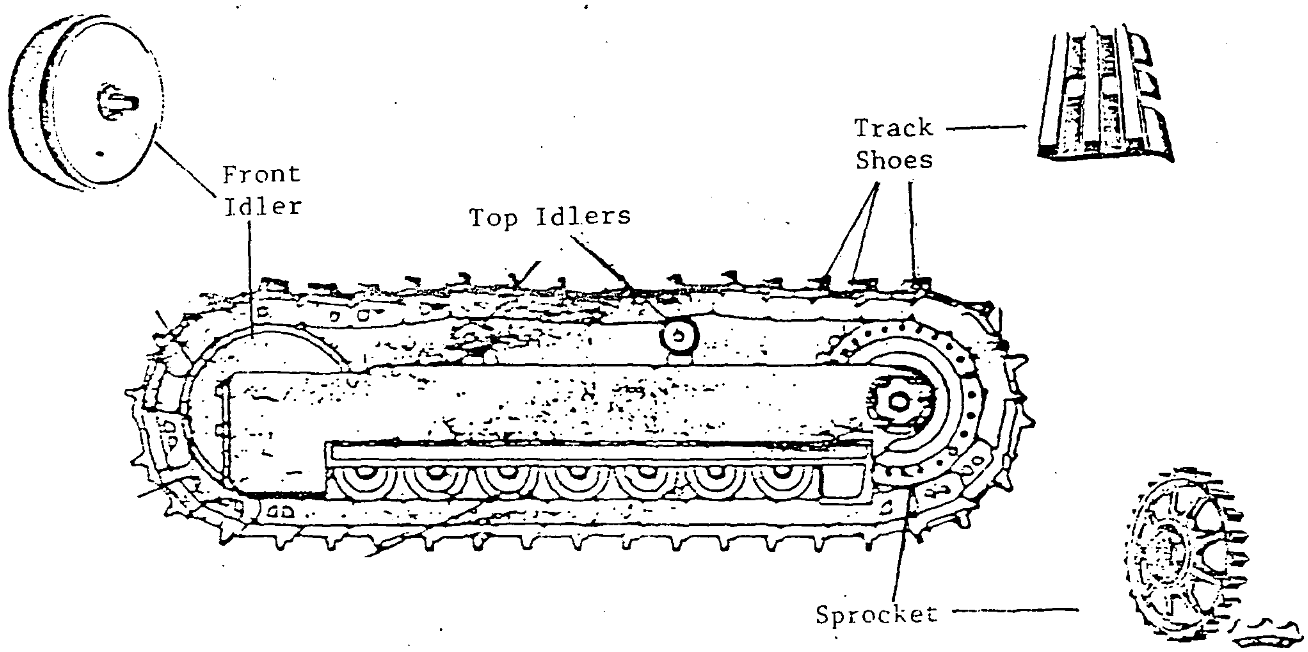


Figure 1.--A Crawler-Mounted Machine

Figure 2 (below).--The Undercarriage of a Crawler-Mounted Machine



Sand casting consists simply of forming a cavity in sand by using a prepared pattern, filling it with molten metal, and allowing it to cool and solidify. Steel and iron are the metals used primarily in sand casting. Alloys such as molybdenum, nickle, manganese, copper, and chromium are added to modify or enhance the molecular structure of the molten metal.

Customs Treatment

U.S. tariff treatment

Idler wheel track assemblies, sprocket teeth and adapters, and tread which are used in crawler-mounted construction machinery are classified under items 664.08, 692.34 and 692.35 of the Tariff Schedules of the United States Annotated (TSUSA). TSUS item 664.08 includes construction and related machinery not specifically provided for elsewhere and parts of such machinery as well as parts for machinery classified under items 664.05 and 664.07. TSUS item 692.34 covers tractors suitable for agricultural use and parts thereof. TSUS item 692.35 includes other tractors and their parts not specifically provided for eleswhere.

Table VII-1 indicates the column 1 rates of duty prior to the most recent Tokyo round of Multilateral Trade Negotiations (MTN), the staged column 1 rate reductions negotiated under the MTN (the final staged rate of duty for column 1 is also the rate of duty shown in the "LDDC" column in app. E), and the column 2 rates of duty for products entered under the TSUS items. The appropriate provisions of the Tariff Schedules of the United States Annotated (1984) (TSUSA) applicable to cast steel construction machinery components are shown in appendix E.

Table VII-1.--Cast construction machinery components: U.S. rates of duty, by TSUS items

(Percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1-- 1980	1981	1982	1983
664.08	Other construction and mining machinery and parts.	5.0%	4.7%	4.4%	4.1%	3.8%
692.34	Agricultural tractors and parts----	Free	2/	2/	2/	2/
692.35A	Other tractors and parts-----------	5.5%	5.1%	4.7%	4.3%	3.9%

TSUS item No. 1/	Description	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--Continued 1984	1985	1986	1987	Col. 2 rate of duty
664.08	Other construction and mining machinery and parts.	3.4%	3.1%	2.8%	2.5%	35%.
692.34	Agricultural tractors and parts----	2/	2/	2/	2/	Free.
692.35A	Other tractors and parts-----------	3.4%	3%	2.6%	2.2%	27.5%.

1/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP) and that all beneficiary developing countries are eligible for the GSP.

2/ Rate effective prior to Jan. 1, 1980.

3/ Rate not modified in the Tokyo round of Multilateral Trade Negotiations.

Within the last 13 years, there have been no statutory investigations conducted by the U.S. International Trade Commission concerning cast-steel undercarriage components. On December 14, 1971, the U.S. Tariff Commission 1/ instituted investigation No. 337-22. On the basis of information obtained in the investigation, the Commission determined that the domestic industry producing cast and forged track chains (linking rollers, segments), track shoes, sprockets, idler wheels, and rollers was not being materially injured, nor was it threatened with material injury by reason of the importation of undercarriage components from Italy.

1/ Prior to 1974, the U.S. International Trade Commission was named the U.S. Tariff Commission.

Foreign tariff treatment

Exports of cast-steel construction machinery components account for a small percentage of total U.S. industry production. The principal foreign markets for those items are the developed countries which have a need for parts for crawler-like machinery for construction projects and surface mining operations. These markets include Canada and the European Community (EC). With the exception of Canada, the remaining countries use the Customs Cooperation Nomenclature (CCCN) as the basis for their classification. In the CCCN, sprocket teeth, idler wheel assemblies, and tread are classified under headings 84.23 and 87.06. These components are classified under Canadian tariff schedule number 42700-6.

The present rate of duty for U.S. exports of these components entering the EC ranges between 7 and 8.8 percent ad valorem. The rate for parts for crawler-like machinery entering Canada is free. The tariff concessions made during the Multilateral Trade Negotiations (MTN) are also presented below (in percent ad valorem):

Item	Description	Country	Present rate of duty
84.23AIC----	Parts of construction and mining machines covered in 84.23.	European Community	5.0
87.06BII----	Parts for track-laying vehicles.	European Community	8.8

Canada classified imports under its own tariff system, the Tariff Schedule of Canada, as follows (in percent ad valorem):

Item	Description	Country	Present rate of duty
42700-6-----	Self-propelled crawler machines (bulldozers) and parts.	Canada	Free

The European Community's tariff rates on imported cast construction machinery components for crawler-type machinery was higher than the U.S. tariff rates on these products. In 1984, European Community rates on crawler components have ranged from 7 to 8.8 percent ad valorem. The rate of duty for these components imported into the United States ranged from free to 3.4 percent ad valorem. The disparity between tariff rates of the United States and the European Community translated into a cost advantage of 5.4 to 8.8 percent to European producers exporting to the U.S. market.

Profile of the U.S. Industry and Major Foreign Competitors

United States

According to industry sources, there are approximately 30 domestic manufacturers producing cast-steel construction machinery components for crawler mounted machinery. Cast construction machinery component manufacturing facilities are located primarily in the Central and North Central United States. The major producing States for these components are Indiana, Illinois, Ohio, and Wisconsin. The manufacturers engaged in the production of cast-steel construction machinery components are primarily captive job shops which produce construction and mining machinery components, plumbing and railway equipment, and a wide variety of castings for other industries. U.S. producers of these products specialize in low-volume highly complex castings. The majority of these producers still rely on the sale of construction machinery components for the bulk of their total annual income.

U.S. production, capacity, and capacity utilization.--U.S. production, as reported by the questionnaire respondents, increased from 2.1 million units in 1979 to 2.4 million units in 1981 before declining to 1.0 million units in 1983 (table VII-2). Production declined by 52.4 percent in 1983 compared to 1979. The production of cast construction machinery components has been adversely affected by declines in the general economy, high interest rates, low capacity utilization rates by original equipment manufacturers (OEMs), by the declines in construction activity, and declines in demand for crawler-mounted machinery.

The production of cast-steel construction machinery components is tied directly to domestic and worldwide sales of crawler-mounted machinery. Sale of construction machinery declined by 47 percent in constant dollar terms from 1980 to 1982. 1/ In addition, total private construction put in place declined by 12 percent (in constant dollar terms), 2/ and total public construction declined by 18 percent. 3/ Another important factor affecting

Table VII-2.--Cast construction machinery components: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production------------1,000 pieces--	2,142	1,403	2,377	1,206	1,022
Production capacity-----------do----	2,692	2,963	3,230	3,145	3,287
Capacity utilization--------percent--	79.6	47.4	73.6	38.3	31.1

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ U.S. Bureau of the Census, "Construction Machinery," Current Industrial Report, Aug. 1983.
2/ U.S. Department of Commerce, Bureau of Industrial Economics, "Construction Review: A Bi-Monthly Industry Review," March-April 1983, table C-6, p. 35.
3/ Ibid., table D-1, p. 45.

demand for these components was that workers at major construction machinery manufacturing facilities were on strike during 1982 and 1983. This caused a dramatic drop in demand for these components.

Facing declining worldwide demand, several major domestic construction machinery producers, in order to reduce costs, have increased foreign buying of material and components and have established licensing or joint venture agreements with foreign manufacturers. These subsidiaries of U.S. companies are presently increasing their share of Third World markets and are competing directly against exports from the United States.

Demand for construction machinery has been adversely affected by delays in new purchases due to the quantity of machinery on hand idled by the recent recession; reduced spending on highway construction, reclamation projects, and water and sewer facilities; deferred capital expenditures made by mining operations because of low commodity prices and weak demand for metals and minerals; the strength of the U.S. dollar vis-a-vis foreign currencies in world markets increasing the price of exported construction machinery in those markets; and a significant decline in the availability of bank loans to developing nations.

Capacity utilization at foundries manufacturing cast-steel construction machinery components decreased irregularly from 79.6 percent in 1979 to 31.1 percent in 1983. The low capacity utilization rates during 1982 and 1983 can be attributed in large part to the lack of demand for crawler-mounted construction machinery and by slowdowns caused by strikes at OEM manufacturing facilities during 1982.

Industry sources indicated that because of a concentration in complex, highly specialized, limited-production castings and the overall labor intensive nature of this industry, these foundries do not lend themselves to extensive automation. This fact is reflected in the following table in which responses are recorded to the Commission's questionnaire on the age of machinery in use as of January 1, 1984 to produce cast construction machinery components.

Table VII-3.--Cast construction machinery components: Machinery and equipment in manufacturing facilities of reporting producers, as of Jan. 1, 1984, by age of the machine

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	2	1	7	9	19
Molding lines:					
Automated	0	3	7	4	10
Manual	0	0	4	16	20
Total	2	4	18	29	49

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The majority of the melting furnaces (primarily electric arc) and molding lines used to produce construction machinery components are 10 years old or older. Respondents reported that approximately 74 percent of the melting furnaces and 78 percent of the molding lines were at least 10 years old. Respondents also reported that 70 percent of the molding lines presently in use are of the manual type.

U.S. employment, hours worked, and wages.--The average U.S. cast construction machinery components manufacturer employed an estimated 540 workers in 1979 and 209 in 1983. Total employment for workers engaged by this industry declined annually from 8,184 workers in 1979 to 3,226 workers in 1983, or by 61 percent (table VII-4). Employment among production workers also declined annually from 5,976 workers in 1979 to 2,196 workers in 1983, or by 63 percent. During 1979-83, foundry workers accounted for an average of 73.4 percent of total employment in these establishments.

Employment declines among workers producing cast construction machinery components were attributable in large part to the decline in demand for construction machinery, to declines in residential and commercial construction starts, to efforts made by manufacturers to increase efficiency and productivity through modernization and automation programs, and to work slowdowns caused by strikes by workers producing construction machinery.

Man-hours by workers engaged in the production of these products declined annually from 12,684 million hours in 1979 to 3,732 million hours in 1983, or by 71 percent. Wages paid to production workers, on the basis of the Commission's survey, decreased from $103.9 million in 1979 to $37.9 million in 1983, or by 64 percent. The fact that wages declined less than hours worked indicates a net increase of approximately seven percent in the hourly wages paid to foundry workers from 1979 to 1983. The survey also revealed that the average hourly wage rate increased from $8.19 per hour in 1979 to $10.16 per hour in 1983.

Table VII-4.--Cast machinery components: Number of employees and production and related workers in operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees:					
All persons	8,184	7,230	6,497	4,118	3,226
Production and related workers	5,976	5,159	4,773	3,372	2,196
Man-hours worked-----1,000 hours	12,684	9,757	9,688	5,768	3,732
Wages paid---------1,000 dollars	103,877	88,896	90,930	59,554	37,932

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

A comparison of wages paid to production workers in the U.S. cast construction machinery component industry (from questionnaire responses) and wages paid in all operating U.S. manufacturing establishments (from official statistics of the Department of Labor) indicates that production workers in the cast construction machinery components industry are receiving wages above the average for all U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Cast construction machinery components 1/ workers average wage	All operating U.S. manufacturing establishments 2/ workers average wage
1979------------	$8.06	$6.00
1980------------	8.92	7.27
1981------------	9.11	7.99
1982------------	9.94	8.49
1983------------	10.00	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The quantity of U.S. producers' shipments, as reported by U.S. producers in response to the Commission's questionnaires, increased from 1.15 million units in 1979 to 1.17 million units in 1981 before declining to 563,790 units in 1983 (table VII-5). U.S. producers' shipments declined primarily because of declining worldwide demand for construction machinery and, strikes at major OEM's during 1982 and 1983. The value of U.S. producers' shipments increased from $86.5 million in 1979 to $107.8 million in 1981 before declining to $48.7 million in 1983. The decline in unit value of shipments during 1980-83, reflects the decline in demand for these products.

Table VII-5.--Cast construction machinery components: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Dollars per unit
1979-----------	1,152,538	86,488	75.04
1980-----------	779,643	73,380	94.12
1981-----------	1,166,674	107,772	92.38
1982-----------	650,224	67,600	103.96
1983-----------	563,790	48,650	86.29

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. exports of cast construction machinery components, as reported by questionnaire respondents, increased in quantity from 96,481 units valued at $7.4 million in 1979 to 111,036 units ($9.6 million) in 1981 before declining to 20,836 units ($2.1 million) in 1983 (table VII-6). Exports represented less than 5 percent of respondent's U.S. shipments in quantity and value during 1979-83. Industry sources indicated that the majority of these exports went to foreign subsidiaries of American-based companies.

Table VII-6.--Cast construction machinery components: U.S. exports of domestic merchandise, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Dollars per unit
1979	96,481	7,398	76.68
1980	109,427	8,554	78.17
1981	111,036	9,599	86.45
1982	66,575	6,444	96.79
1983	20,836	2,061	98.92

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' inventories.--Since the majority of the U.S. manufacturers producing cast construction machinery components are job shops which produce custom products only upon receipt of an order, finished goods inventories were not usually maintained. The combined end-of-period inventories maintained by the remaining respondents decreased irregularly in value and quantity during 1979-83 as shown in the following tabulation:

Year	Quantity (pieces)	Value (1,000 dollars)
1979	22,600	3,095
1980	21,085	2,977
1981	22,999	3,599
1982	13,241	3,341
1983	7,684	1,335

Financial experience of U.S. producers.--Net sales, net operating profits and the ratio of net sales to net operating profits declined during the 1979-83 period (table VII-7). Net sales declined annually from $463 million in 1979 to $164 million in 1983, or by 65 percent. Net operating profits declined irregularly from $41.6 million in 1979 to a loss of $28.1 million in 1983, or by 168 percent. The ratio of net operating profit to net sales dropped annually from an 8.4 percent profit in 1979 to a loss of 17.1 percent in 1983. During 1979-83, such profits declined primarily because of declines in demand due to strikes at major OEMS and because of declines in demand for construction machinery.

Table VII-7.--Cast construction machinery components: U.S. producers' net sales and net operating profit (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales----1,000 dollars--:	462,862	445,249	389,835	230,159	164,192
Net operating profit (loss) 1,000 dollars--:	41,595	18,429	(5,217)	(41,651)	(28,120)
Ratio of net operating profit (loss) to net sales percent--:	8.4	4.1	(1.3)	(18.1)	(17.1)

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic facilities for the production of cast-steel construction machinery components increased from $21.0 million in 1979 to $28 million in 1981 before declining to $2.2 million in 1983 (table VII-8). The declining levels of capital expenditures directly reflected the depressed state of this industry during 1979-83.

Machinery and equipment for domestic facilites accounted for the bulk of capital expenditures during 1979-82, ranging from 85 percent in 1979 to 51 percent in 1982. In 1983, land and land improvements made up the largest share, accounting for 39 percent of total expenditures. Machinery and equipment also accounted for the bulk of capital expenditures for foreign facilities during 1979-81, ranging from 54 percent in 1979 to 100 percent in 1981. Respondents to the questionnaire reported that they made no expenditures in foreign facilities in 1982 and 1983.

Table VII-8.--Cast construction machinery components: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	207	(32)	4	-	102
Buildings, leasehold improvements	2,404	1,016	4,838	1,940	852
Machinery, equipment, and fixtures:					
New	17,888	13,990	23,036	2,472	759
Used	470	405	457	399	494
Total	20,969	15,379	28,335	4,811	2,210
Facilites in other countries:					
Land, land improvements	121	-	-	-	-
Buildings, leasehold improvements	1,125	-	-	-	-
Machinery, equipment, and fixtures:					
New	1,526	1,129	835	-	-
Used	61	-	-	-	-
Total	2,833	1,129	835	-	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures.--Respondents to the Commission's questionnaires reported relatively low expenditures for research and development during 1979-83. Industry sources indicated that research and development costs accounted for less than 5 percent of total expenditures or $1.3 million in 1979, declining to $495,000 in 1983, or by 62 percent (table VII-9). The major types of expenditures made during 1979-83 for product research and development included desulfurization and core mixture equipment experiments, testing of new machinery, and CAD/CAM research.

Table VII-9.--Cast construction machinery components: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

Year	Value (1,000 dollars)
1979	1,304
1980	1,270
1981	972
1982	769
1983	495

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Major foreign competitors

Japan, Italy, and West Germany were cited as the major suppliers of imported cast construction machinery components. Lesser quantities were supplied by Spain and the Republic of Korea (Korea).

Japan was the largest supplier of these components accounting for 59 percent of the total imports during 1983. The number of foundries producing cast construction machinery components is unknown, however, there are approximately 116 Japanese foundries engaged in the production of steel castings. Of the largest 10 firms cited as major manufacturers of steel castings, 2 are also manufacturers of tractors and can be assumed to make parts for construction machinery. Japanese production of steel castings increased from 752,000 metric tons in 1979 to 808,000 metric tons in 1980 before declining to 572,000 metric tons in 1983.

Structural Factors of Competition Between U.S. and Foreign Industries

U.S. producers' indicated that foreign manufacturers generally enjoyed a competitive advantage in the availability and cost of capital and labor, in gaining government subsidies and funds for research and development, in the absence of government regulations which increase costs, and in tariff levels on imports (table VII-10). U.S. producers also indicated that both domestic and foreign manufacturers enjoy a comparable position in terms of marketing, the availability and cost of fuel and raw materials, and production technology.

Table VII-10.--Cast construction machinery components: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

	Competitive advantage 1/			
	Italy	Japan	Brazil	Korea
Fuel:				
Availability	S	D	S	D
Cost	S	S	S	S
Raw material:				
Availability	S	D	S	D
Cost	S	S	S	S
Capital:				
Availability	F	F	F	F
Cost	F	F	F	F
Ability of industry profits to attract funds	S	F	F	S
Labor:				
Availability	S	F	F	F
Cost	F	F	F	F
Production technology	S	S	S	S
Marketing:				
Channels of distribution	S	S	S	D
Responsiveness to orders	S	S	S	D
After-sale service capabilities	S	D	S	F
Government involvement:				
Subsidies	F	F	F	F
Research and development assistance	S	F	F	F
Tariff levels on imports	F	F	F	F
Nontariff barriers to imports	S	F	S	F
U.S. Government regulations which increases costs	F	F	F	F
Foreign government regulations which increase costs	D	S	D	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Raw materials

The principal raw material used in the production of cast construction machinery components is steel. Industry sources indicated that low and high alloy steel are primarily used by manufacturers to produce these components. Alloying elements such as manganese, nickel, copper, molybdenum are added to control the oxygen content and to modify or alter the molecular structure of the molten metal. U.S. producers were felt to have a competitive advantage in the availability of raw materials and a comparable advantage in terms of costs over Japan and Korea. Domestic producers indicated that raw material costs accounted for 19 percent of net sales during 1983.

Energy

The major proportion of energy costs incurred by this industry is accounted for by electricity. Electricity is used by manufacturers to operate electric arc furnaces and a wide variety of finishing machines and tools such as arc-air torches, magnetic partical testers, wheelobraters, heat treat furnaces, and grinding and polishing machines.

The average price paid by industrial users of electricity in the United States increased annually during 1979-82 from 3.0 cents per kilowatt hour in 1979 to 4.9 cents per kilowatt hour in 1983, or by 63.3 percent. The average annual price paid by the industrial sector in Japan increased from 6.2 cents per kilowatt hour in 1979 to 9.1 cents per kilowatt hour in 1983, or by 46.8 percent. The price in West Germany decreased from 5.1 cents per kilowatt hour in 1979 to 5.0 cents per kilowatt hour in 1981; or by 2 percent. 1/ In Italy, the price paid by industrial users increased from 3.9 cents per kilowatt hour in 1979 to 5.5 cents per kilowatt hour in 1983, or by 41.0 percent. The following tabulation shows the average prices of electricity on a market basis:

(In U.S. cents per kilowatt hour)

Period	United States	Japan	West Germany	Italy 1/
1979	3.0	6.2	5.1	3.9
1980	3.6	8.7	5.6	6.0
1981	4.2	10.0	5.0	5.5
1982	4.9	9.1	2/	5.5

1/ Estimated by staff of the U.S. International Trade Commission.
2/ Not available.

Source: U.S. Department of Energy, Energy Information Administration, International Energy Prices, 1978-82, January 1984, pp. 54 and 55, except as noted.

Capital

U.S. producers felt that West Germany and Japan enjoyed a comparative advantage in the availability and cost of capital. The availability and the cost of capital is important to both foreign and domestic manufacturing of cast steel construction machinery components because it enables these firms to make major capital expenditures on new machinery, automation projects, new facilities, expansion of production into new markets and to increase market share in existing markets.

1/ Prices in West Germany for 1982 are not available.

The short term cost of capital for the United States and its major trading partners are shown in the following tabulation:

(In percent per annum)

Country	1979	1980	1981	1982	1983
United States	11.20	13.36	16.38	12.26	9.09
West Germany	6.69	9.54	12.11	8.86	5.78
Italy	11.86	17.17	19.60	20.18	18.47
Japan	1/	1/	7.69	7.12	6.72

1/ Not available.

Source: International Monetary Fund, International Financial Statistics, June 1984, p. 61.

West Germany and Japan also maintained a competitive advantage over the United States in the long term cost of capital. U.S. producers indicated that Japan had a competitive advantage in its ability to attract funds on its industry profits. The following tabulation, based on information from the International monetary fund, 1984, lists the long-term interest rates for the United States, West Germany, Italy, and Japan (in percent per annum):

Country	1979	1980	1981	1982	1983
United States	9.71	11.55	14.44	12.92	11.34
West Germany	7.40	8.50	10.40	9.00	7.90
Italy	14.05	16.11	20.58	20.90	18.02
Japan	7.69	9.22	8.66	8.06	7.42

Labor

According to data provided by the U.S. Department of Labor (Bureau of Labor Statistics), Italy, West Germany, and Japan maintained an advantage over the United States in the hourly compensation for production workers during 1981-83, as shown in the following tabulation compiled from official statistics of the U.S. Department of Labor (in percent per annum):

Country	1979	1980	1981	1982 1/	1983 2/
United States	9.07	9.89	10.95	11.68	12.26
West Germany	11.29	12.33	10.54	10.44	10.41
Japan	5.49	5.61	6.18	5.70	6.20
Italy	7.14	8.14	7.39	7.36	7.59

1/ Preliminary estimates.
2/ Provisional estimates.

Hourly compensation costs, according to the U.S. Department of Labor, for production workers in the United States increased from $9.07 in 1979 to an estimated $12.26 in 1983. The hourly compensation cost of production workers in West Germany exceeded that of the United States in 1979 and 1980, increasing from $11.29 in 1979 to $12.33 in 1980, then it declined annually to $10.41 in 1983.

Technology

Technological innovations such as automatic pouring furnaces, molding lines, and coresetting machines are presently being introduced by the domestic and the foreign industry in an attempt to increase productivity and lower labor costs. Responses to the Commission's questionnaire indicated that comparable methods of manufacture were being employed by U.S. producers and their major foreign competitors. U.S. producers also indicated that many foreign producers are able to produce castings on new machinery in newer production facilities but they cited such factors as availability of capital, and labor, and overhead costs as more important determinants of delivered price than differences in technology.

Marketing

Cast construction machinery components are predominantly distributed to original equipment manufacturers, which finish them into parts ready for mounting onto new machinery or for sale as replacement parts in the aftermarket. A majority of the foundries manufacturing these components are captive foundries which sell little if anything overseas or in the aftermarket. Salesmen, commissioned agents, and manufacturers' respresentatives are most often employed to make direct contact with potential customers. A number of foundries have enjoyed a long-term purchaser-producer relationship with their major customers and do not actively market their products. Aftermarket sales by OEM's of these components is very important because of the high replacement rate caused by the constant stress and frietion these products are subjected to while the crawler is in operation. The average service life of an undercarriage part is about 2,000 hours of operation.

As indicated earlier in this report, U.S. producers of these components do not usually maintain finished-goods inventories. Inventories of cast construction machinery components held by U.S. producers declined annually from 22,600 units in 1979 to 7,684 units in 1982, or by 66 percent (table VII-11). Inventories maintained by importers decreased irregularly from 107,728 units in 1979 to 94,488 units in 1983, or by 12.3 percent. Declining inventory levels are reflective of a worldwide deterioration in demand for crawler-mounted machinery which resulted in reductions in orders for castings from OEM's.

Table VII-11.--Cast construction machinery components: Year-end inventories held by producers and importers, 1979-83

(Quantity)

Year	Producers' inventories	Importers' inventories
1979	22,600	107,728
1980	21,085	187,815
1981	22,999	124,517
1982	13,241	119,526
1983	7,684	94,488

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Government involvement

Respondents to the Commission's questionnaire indicated that foreign governments are taking a more active role in creating an atmosphere within their prospective countries that encourages the exportation of foundry products. These actions, according to U.S. producers, give their foreign competitors an unfair advantage in terms of the cost of capital, labor and raw materials. Some of the advantages cited by U.S. producers that are enjoyed by foreign manufacturers are: (1) direct subsidization, especially of the steel industry in these countries, (2) local content laws, especially in Brazil and Mexico, (3) the creation of a favorable tax climate that encourages production and investment, (4) availability of World Bank and International Monetary Fund loans, (5) industrial targeting programs, and (6) differentials in exchange and duty rates.

Several U.S. producers stated that the United States presently has both inadequate trade laws and ineffective enforement of those already in place. Producers also indicated that while they must conform to OSHA and EPA regulations, which are often costly in both money and manpower, many foreign manufacturers are either not subjected to such regulations or enjoy government financed pollution control programs. Several U.S. producers believe that these expenditures are nonproductive and could be used more profitably elsewhere.

The U.S. Market

Domestic market profile

The U.S. cast construction machinery components market declined irregularly during 1979-83. The demand for these components is directly influenced by economic conditions and by domestic and worldwide demand for crawler machinery. Thus, the declines in demand for construction machinery for building and highway construction, mining, and public works projects, and the general worldwide economic decline during 1981 and 1982 brought about a decline in demand for cast construction machinery components.

There are three major channels through which producers and importers of cast construction machinery components distribute their products--machine shops and other fabricators, distributors, and original equipment manufacturers. According to respondents to the Commission's questionnaire, nearly 76 percent of the producers' shipments were to original equipment manufacturers for inclusion on new machinery or for aftermarket sales (table VII-12). Importers reported that approximately 89 percent of their shipments were to machine shops or other fabricators. Producers reported that most of the remainder (24 percent) went to machine shops or other fabricators. Importers indicated that the remainder of their shipments were almost evenly divided between OEM's (3.0 percent), distributors (4.0 percent), and other sources (4.0 percent), which included direct sales to the end user.

Table VII-12.--Cast construction machinery components: U.S. producers' and importers' shipments, by channel of distribution, 1981-83

Channel of distribution	Percent of shipments	
	Producers	Importers
Machine shops/other fabricators	24	89
Distributors	-	4
Original equipment manufacturers	76	3
Other	-	4
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Information provided by U.S. producers and importers indicated that their shipments were directed to different types of markets. Producers indicated that approximately 55 percent of their casting shipments were intended for the construction machinery and equipment market during 1981-83 and 36 percent for mining machinery and equipment (table VII-13). Importers reported that nearly 95 percent of their cast shipments were intended for the construction machining and equipment market.

Table VII-13.--Cast construction machinery components: U.S. producers' and importers' shipments, by type of market, 1981-83

Type of market	Percent of shipments	
	Producers	Importers
Motor vehicles	-	-
Farm machinery and equipment	-	-
Mining machinery and equipment	36	-
Construction machinery and equipment	55	95
Refrigeration and heating equipment (except pumps and compressors)	-	-
Plumbing equipment	-	-
Railway equipment	2	-
Industrial machinery	-	-
Machine tools	-	-
Valves and pipe fittings	2	-
Pumps and compressors	-	1
Other	5	4
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

Apparent U.S. consumption of cast construction machinery components declined irregularly during 1979-83, closely following the demand for construction-type crawler-mounted machinery. Due to a collapse in domestic and worldwide demand for construction machinery, sales declined rapidly in 1982 and the first half of 1983. The lack of demand, coupled with strikes and high inventory levels at OEM's; the higher value of the U.S. dollar vis-a-vis foreign currencies in major foreign markets; declines in residential and commercial construction, mining and public works projects, directly influenced shipments by cast component manufacturers.

During 1979-83, apparent U.S. consumption of cast construction machinery components increased irregularly from $584 million in 1979 to $616 million in 1981 before declining to $422 million in 1983, an overall decline of 27.8 percent during the period (table VII-14). The import share of apparent U.S. consumption decreased from 9.2 percent in 1979 to 5.2 percent in 1983.

Table VII-14.--Cast construction machinery components: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1979-83

Year	Producers' shipments 1/	Exports 1/	Imports 1/	Apparent consumption	Ratio of imports to consumption
	1,000 dollars				Percent
1979--------	530,200	14,796	54,000	584,200	9.2
1980--------	536,700	17,108	47,100	583,800	8.1
1981--------	570,000	19,198	45,500	615,500	7.4
1982--------	420,000	12,888	34,500	454,500	7.6
1983--------	400,000	4,122	22,000	422,000	5.2

1/ Estimated by the staff of the U.S. International Trade Commission based on information supplied by industry sources.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission, except as noted.

U.S. imports

The major sources for U.S. imports of cast construction machinery components in 1983, according to questionnaire responses, were Japan, West Germany, Italy, France, Spain, and the United Kingdom (table VII-15). Cast construction machinery components from Japan, the largest source of U.S. imports (in value) decreased irregularly from $14.8 million in 1979 to $4.7 million in 1983. Imports from Italy, the second largest source, decreased from $9.2 million in 1979 to $11.6 million in 1980 before declining to $2.6 million in 1983. Imports from Japan have gained greater acceptance in the U.S. market because of Japanese manufacturers' ability to produce a high quality component at a lower price. Transportation costs are estimated by industry sources to account for approximately five percent of the selling price of cast construction machinery components, and are not considered to be an important factor in the marketing of these products.

Table VII-15.--Cast construction machinery components: U.S. imports for consumption, by principal sources, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (units)				
West Germany	6,542	30,156	73,694	71,319	51,706
Japan	11,821	8,474	6,960	3,985	3,935
Italy	200,985	294,822	99,686	118,671	115,199
France	979	1,029	1,131	789	757
Spain	966	1,042	939	914	1,287
United Kingdom	490	514	566	394	378
Total	219,348	336,037	182,976	196,072	173,262
	Value (1,000 dollars)				
West Germany	3,321	4,074	2,491	2,312	1,041
Japan	14,798	10,823	10,505	6,381	4,690
Italy	9,187	11,629	4,287	4,418	2,569
France	53	57	62	48	46
Spain	90	98	88	86	120
United Kingdom	27	28	32	23	22
Total	27,476	26,526	17,283	13,111	8,300
	Unit value (dollars)				
West Germany	507.64	135.10	33.80	32.42	20.13
Japan	1,251.84	1,277.20	1,509.34	1,601.25	1,191.87
Italy	45.71	39.44	43.01	37.23	22.30
France	54.14	55.39	54.82	60.84	60.77
Spain	93.17	94.05	93.72	94.09	93.24
United Kingdom	55.10	54.47	56.54	58.38	58.20
Total	125.26	78.94	94.46	66.87	47.90

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

All of the respondents to the Commission's domestic producers questionnaire indicated that they did not import cast construction machinery components during 1979-83. Those respondents who were contemplating importing indicated that the most significant factors that would influence their decision to purchase imports rather than domestic components were the lower delivered price of imports, and the more favorable terms of sales offered by foreign manufacturers (table VII-16).

Table VII-16.--Cast construction machinery components: U.S. producers' ranking of product-related factors that were the principal reasons for their imports, 1981-84

Reason for importing	Ranking 1/
Lower purchase price (delivered)	1
Cost of tooling/patterns	5
Shorter delivery time	5
Availability (what you want and where you want it)	5
Servicing	5
Favorable terms of sale	1
Favorable product guarantees	5
Favorable exchange rates	5
Historical supplier relationship	5
Product performance features:	
Superior design	3
Quality	2
More durable	5
Other	5

1/ Ranking numbers range from 1 to 5, number 1 indicating the most important reason for importing and number 5 indicating the least important reason for importing.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Foreign Markets

The major export markets for U.S.-produced cast-steel construction machinery components during 1979-82 were Canada and Western Europe. The vast majority of all exports were to subsidiaries of U.S. construction machinery manufacturers located in those countries. U.S. exports of construction machinery components to these countries is directly dependent upon demand for crawler-mounted machinery. Declining demand for construction machinery, coupled with the strength of the U.S. dollar vis-a-vis foreign currencies, and the ability of Japanese, Western European, and Brazilian machinery manufacturers to expand their product lines, to make advances in machinery technology, and to succeed in increasing their share of Third World markets at the expense of U.S. producers, kept 1983 export levels below those of 1979-82.

Competitive Assessment of Product-Related Factors in the U.S. Market

The Commission's survey indicated that foreign manufacturers have an overall competitive advantage in their ability to market these products in the United States (table VII-17). U.S. producers indicated that foreign manufacturers have an overall advantage in their ability to provide cast construction machinery components at a lower delivered price, in the cost of toolings and patterns, in exchange rates, and in terms of sales. U.S. producers have an advantage in their ability to provide servicing, and shorter delivery times; in the availability of their products; and in a historical supplier-customer relationship.

Table VII-17.--Cast construction machinery components: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made cast construction machinery components in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/													
	Italy		Japan		France		Korea		India		West Germany		United Kingdom	
	P	I	P	I	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	F	F	2/	F	2/	F	F	F	2/	2/	F	2/	F
Lower purchase price (delivered)	F	F	F	2/	F	2/	F	F	2/	2/	2/	F	2/	F
Cost of tooling/patterns	F	F	F	2/	F	2/	F	F	D	2/	2/	F	2/	F
Shorter delivery time	D	D	D	2/	2/	2/	S	D	D	2/	2/	D	2/	D
Availability	D	D	D	2/	2/	2/	D	D	D	2/	2/	D	2/	D
Servicing	D	2/	D	2/	2/	2/	D	D	D	2/	2/	S	2/	D
Favorable terms of sale	2/	D	S	2/	F	2/	F	D	F	2/	2/	S	2/	S
Favorable product guarantees	2/	S	2/	2/	2/	2/	2/	D	D	2/	2/	S	2/	S
Favorable exchange rates	F	F	F	2/	2/	2/	F	D	D	2/	2/	S	2/	D
Historical supplier relationship	D	F	D	2/	F	2/	D	D	2/	2/	2/	S	2/	S
Product performance features:														
Superior design	2/	S	2/	2/	2/	2/	S	D	2/	2/	2/	S	2/	S
Quality	2/	S	2/	2/	2/	2/	S	S	F	2/	2/	S	2/	S
More durable	2/	S	2/	2/	2/	2/	S	S	S	2/	2/	S	2/	S
Other	2/	S	2/	2/	2/	2/	2/	S	F	2/	2/	S	2/	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. importers indicated that foreign manufacturers enjoy an overall competitive advantage in their ability to provide a lower delivered purchase price. Importers reported that domestic producers have an advantage in availability and delivery time.

U.S. purchasers of cast construction machinery components indicated that their basic reason for purchasing domestically produced components were shorter delivery times, the historical supplier-consumer relationship, availability, and servicing (table VII-18). Purchasers also indicated that a lower purchase price, favorable exchange rates, better quality, lower cost of toolings and patterns were the primary factors influencing them to purchase imported cast components.

Table VII-18.--Cast construction machinery components: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made components	Foreign-made components
Lower purchase price (delivered)	6	1
Cost of tooling/patterns	6	2
Shorter delivery time	1	4
Availability	3	-
Servicing	4	-
Favorable terms of sale	6	3
Favorable product guarantees	6	-
Favorable exchange rates	-	2
Historical supplier relationship	2	3
Product performance features:		
Superior design	-	3
Quality	5	2
More durable	-	-
Other	-	4

1/ Ranking numbers range from 1 to 6, number 1 indicating the most important reason for purchase and number 6 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. purchasers also reported that their purchases of domestically produced cast construction machinery components irregularly declined annually in quantity and value during 1979-83 (table VII-19). Purchases increased from 14,396 tons valued at $33.9 million in 1979 to 18,011 tons ($39.6 million) in 1982 before declining to 10,284 tons in 1983 ($22.3 million), a net decline of 28.6 percent in quantity and 34.2 percent in value during the period. U.S. purchasers indicated that purchases of imports decreased irregularly in quantity and value. Imports increased from 1,103 tons valued at $11.2 million in 1979 to 1,520 tons ($13.0 million) in 1980 before declining to 793 tons in 1983 ($2.3 million), a net decline of 28.1 percent in quantity and 79.5 percent in value during the period.

Imports represented 24.9 percent of total purchases in value by these firms during 1979, and 9.3 percent in 1983.

Table VII-19.--Cast construction machinery components: Purchases of domestically produced and foreign produced foundry products by U.S. purchasers, 1979-83

Year	Cast construction machinery components: U.S. produced	Cast construction machinery components: Foreign produced
	Quantity (tons)	
1979	14,396	1,103
1980	14,322	1,520
1981	16,158	1,445
1982	18,011	1,048
1983	10,284	793
	Value ($1,000 dollars)	
1979	33,890	11,224
1980	35,993	13,013
1981	39,571	6,901
1982	39,594	6,221
1983	22,275	2,295

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Pricing considerations

A lower purchase price was the single most important reason cited by U.S. purchasers for buying cast construction machinery components from foreign sources. The average lowest net delivered price for domestically produced components as reported in the Commission's questionnaire increased annually from $171.06 per unit in 1981 to $201.09 in 1983 (table VII-20). The average lowest net price for imports increased from $58.03 per unit in 1981 to $108.07 in 1982 to $144.58 in 1983. Purchasers of imported cast construction machinery components enjoyed a $113.03 per unit savings in 1981, $75.01 in 1982, and a $56.51 in 1983.

The majority of U.S. suppliers required payment within 30 days or less, and volume discounts were offered to customers who returned payment in less than 10 days.

Table VII-18.--Cast construction machinery components: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made components	Foreign-made components
Lower purchase price (delivered)	6	1
Cost of tooling/patterns	6	2
Shorter delivery time	1	4
Availability	3	-
Servicing	4	-
Favorable terms of sale	6	3
Favorable product guarantees	6	-
Favorable exchange rates	-	2
Historical supplier relationship	2	3
Product performance features:		
Superior design	-	3
Quality	5	2
More durable	-	-
Other	-	4

1/ Ranking numbers range from 1 to 6, number 1 indicating the most important reason for purchase and number 6 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. purchasers also reported that their purchases of domestically produced cast construction machinery components irregularly declined annually in quantity and value during 1979-83 (table VII-19). Purchases increased from 14,396 tons valued at $33.9 million in 1979 to 18,011 tons ($39.6 million) in 1982 before declining to 10,284 tons in 1983 ($22.3 million), a net decline of 28.6 percent in quantity and 34.2 percent in value during the period. U.S. purchasers indicated that purchases of imports decreased irregularly in quantity and value. Imports increased from 1,103 tons valued at $11.2 million in 1979 to 1,520 tons ($13.0 million) in 1980 before declining to 793 tons in 1983 ($2.3 million), a net decline of 28.1 percent in quantity and 79.5 percent in value during the period.

Imports represented 24.9 percent of total purchases in value by these firms during 1979, and 9.3 percent in 1983.

Table VII-19.--Cast construction machinery components: Purchases of domestically produced and foreign produced foundry products by U.S. purchasers, 1979-83

Year	Cast construction machinery components: U.S. produced	Cast construction machinery components: Foreign produced
	Quantity (tons)	
1979	14,396	1,103
1980	14,322	1,520
1981	16,158	1,445
1982	18,011	1,048
1983	10,284	793
	Value ($1,000 dollars)	
1979	33,890	11,224
1980	35,993	13,013
1981	39,571	6,901
1982	39,594	6,221
1983	22,275	2,295

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Pricing considerations

A lower purchase price was the single most important reason cited by U.S. purchasers for buying cast construction machinery components from foreign sources. The average lowest net delivered price for domestically produced components as reported in the Commission's questionnaire increased annually from $171.06 per unit in 1981 to $201.09 in 1983 (table VII-20). The average lowest net price for imports increased from $58.03 per unit in 1981 to $108.07 in 1982 to $144.58 in 1983. Purchasers of imported cast construction machinery components enjoyed a $113.03 per unit savings in 1981, $75.01 in 1982, and a $56.51 in 1983.

The majority of U.S. suppliers required payment within 30 days or less, and volume discounts were offered to customers who returned payment in less than 10 days.

Table VII-20.--Cast construction machinery components: Average lowest net delivered price reported by purchasers, 1981-83

(Price per unit)

Period	Cast construction machniery components	
	Domestic	Foreign
1981:		
January-March	171.06	58.03
April-June	171.06	58.03
July-September	171.06	58.03
October-December	171.06	58.03
1982:		
January-March	183.08	108.07
April-June	183.08	108.07
July-September	183.08	108.07
October-December	183.08	108.07
1983:		
January-March	201.09	144.58
April-June	201.09	144.58
July-September	201.09	144.58
October-December	201.09	144.58

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to import competition in the U.S. market

Approximately 75 percent of the U.S. producers surveyed by the Commission indicated that they did not take any specific actions in response to competition from imports. Actions taken by the remaining producers included lowering of prices to increase market share, cutting back on production, implementing cost-reduction programs, closing of production lines, improving product quality, and a shifting to more advanced types of castings (table VII-21). Respondents indicated that a lack of capital was the primary factor preventing them from responding to foreign competition.

Table VII-21.--Cast construction machinery components: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses (percent)
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	-
Had already shifted production to other lines of castings	-
Lacked capital funds to counter foreign competition	9
Other	2
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	15
Reduced or dropped plans to expand capacity	13
Cut back production	15
Closed production lines or manufacturing	9
Shifted to more advanced types of castings	2
Implemented cost-reduction efforts	21
Improved quality of the products	15
Imported	-
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

U.S. producers' indicated in their questionnaire responses that Italy, Korea, and Canada enjoy a competitive advantage over domestically produced castings in foreign markets (table VII-22).

Table VII-22.--Cast construction machinery components: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-84

Item	Competitive advantage 1/		
	Italy	Korea	Canada
Overall competitive advantage	F	F	2/
Lower purchase price (delivered)	F	F	F
Cost of tooling/patterns	F	F	F
Shorter delivery time	F	2/	D
Availability	2/	2/	D
Servicing	2/	2/	D
Favorable terms of sale	2/	F	F
Favorable product guarantees	2/	2/	F
Favorable exchange rates	F	F	2/
Historical supplier relationship	2/	2/	F
Product performance features:			
Superior design	2/	2/	F
Quality	2/	2/	F
More durable	2/	2/	F

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to increased competition in foreign markets

Nearly 47 percent of the surveyed U.S. producers indicated that they did not take any specific action in response to increased competition in their foreign markets. The remaining producers indicated that, although they lacked the capital funds necessary to counter foreign competition through increased automation they did, however, cut back production, reduced or dropped plans to expand capacity, closed manufacturing lines, and implemented cost-reduction programs to counter increased competition (table VII-23).

Table VII-23.--Cast construction machinery components: U.S. producers' responses to increased competition in their foreign markets, 1981-84

Nature of response	Share of responses (percent)
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	-
Had already shifted production to other lines of castings	-
Lacked capital funds to counter foreign competition	11
Other	33
Took the following actions:	
Lowered prices or suppressed price increases to mintain market share	-
Reduced or dropped plans to expand capacity	22
Cut back production	11
Closed pproduction lines or manufacturing	11
Shifted to more advanced types of castings	-
Implemented cost-reduction efforts	11
Improved quality of the products	-
Imported	-
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

VIII. CERTAIN CAST-STEEL RAIL TRUCK COMPONENTS

Description and Uses

Cast-steel rail truck components included in this study consist of wheels, side frames, bolsters, couplers, and yokes. Truck is the general term covering the assembly of parts comprising the structures which support a railcar body at each end and provide for attachment of the wheels and axles. Truck components such as draft gears, springs, and axles, which are made from wrought steel, are not considered.

Railcar wheels are flanged rolling elements that carry the weight and provide guidance for rail vehicles; the wheels are either made of cast or wrought steel. 1/ These wheels are utilized by freight car and locomotive manufacturers in their production of new equipment, and by railroads, in their repair and maintenance of existing equipment. In order for a freight car wheel to be used on a U.S. railroad, the product must be approved by the American Association of Railroad (AAR) Wheel and Axle Committee. This organization sets standards regarding form, fitness, composition, and function of nonself-propelled railcar and locomotive wheels used in interchange service.

In the early years of the railroad industry the cast-iron wheel was the standard for American freight cars, and the forged (wrought) steel wheel was used on passenger cars and locomotives. However, the higher loads and speeds, which have characterized the railroad industry during the past 50 years, finally exceeded the capacity of the cast-iron wheel. Since 1957, all freight cars produced in the United States must be fitted with either wrought or cast-steel wheels. In 1961, the U.S. railroads acted to eliminate any cast-iron freight car wheels from interchange service. 2/

There are no physical differences between railcar wheels produced in the United States and those manufactured offshore, primarily due to the stringent AAR standards for this product. However, according to industry sources, the vast majority of wheels produced overseas are made from wrought steel. These products, however, are directly competitive with U.S.-produced cast-steel wheels in the U.S. market.

Side frames are the longitudinal portion of a railcar truck structure on the outside of the wheels which extents from one axle to the other, and to which the bolster is attached (fig. VIII-1). A bolster is the transverse load-carrying part of the truck which receives, through the center plate, the weight of the car or locomotive body, and transmits it (through the suspension) to the truck frame. Both side frames and bolster are made from cast steel and their design must be certified by the AAR Mechanical Division if they are to be used for freight cars and locomotives. Most side frames and bolsters are made from Grade B steel, although a few are produced using the stronger Grade C steel. Unlike other rail truck components, there are no standard models of side frames and bolsters. Although the basic design is the

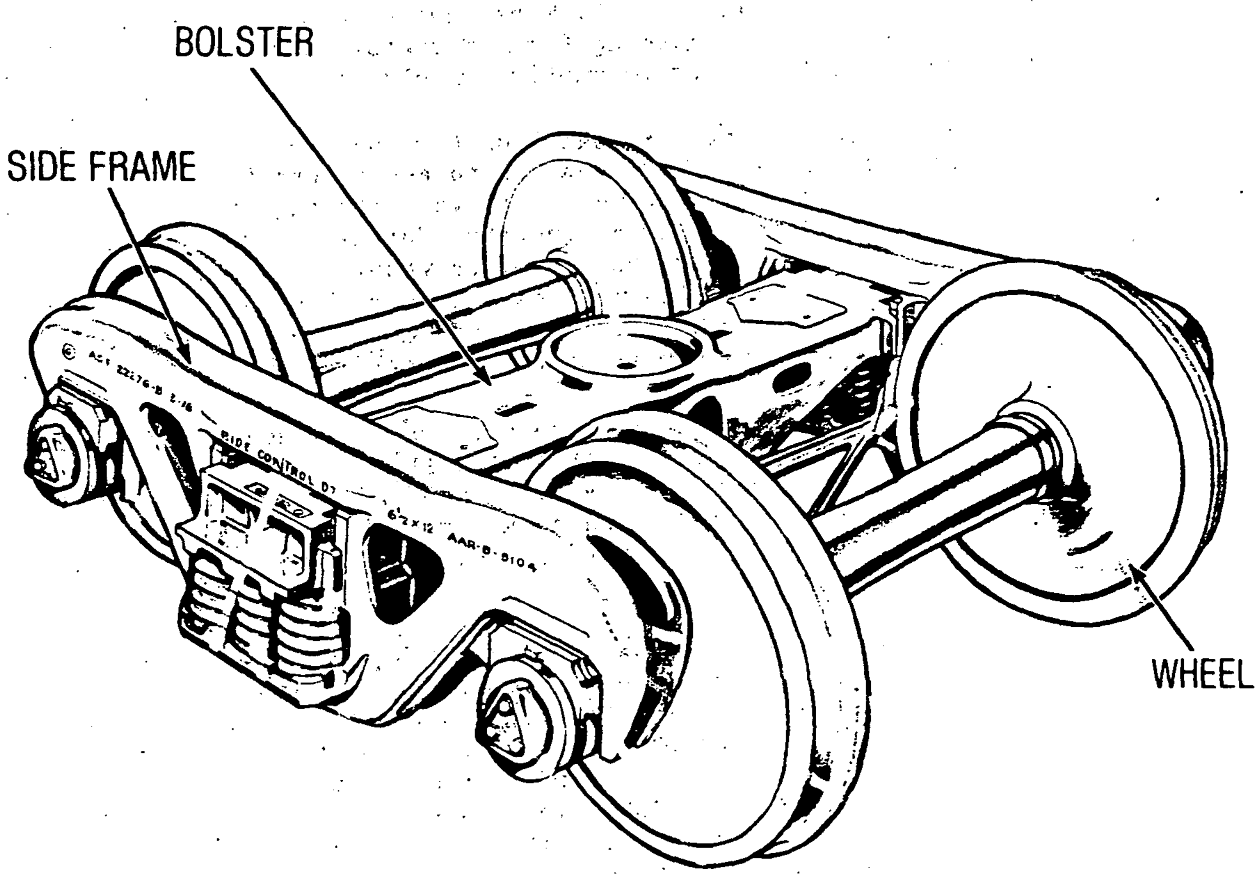
---

1/ According to industry sources, approximately 60 to 70 percent of the railcar wheels currently in use are cast steel.

2/ Association of American Railroads, <u>Encyclopedia of American Practices</u>, 1974, p. S13-1

Figure VIII-1.-- Side frames, bolsters, and wheels.

MODERN FREIGHT CAR TRUCK



Source: American Steel Foundries.

same for a 70,- 100,- or 120-ton truck, these products are specially made to the specifications provided by the purchasers. Locomotive and freight car builders are the principal purchasers of cast-steel side frames and bolsters. Due to the durability of these products, there is a very small market for side frames and bolsters used for replacement or repair.

A coupler is the device by which the connection of one rail vehicle to another is accomplished and maintained (fig. VIII-2). Since the early 1900's, it has been mandatory for railroads engaged in interstate traffic to equip their cars with automatic couplers which are capable of coupling on impact, and un-coupling without the necessity of a man going between cars. Coupler design and manufacture must also meet AAR standards. Couplers basically consist of the coupler body, knuckle, knuckle thrower, lock lift assembly, cotter pins and knuckle pivot pins. The coupler body has two parts, the head and the shank. The head is the circular portion which joins with another coupler; the shank is the cylindrical portion that attaches to the yoke. Couplers are normally cast from Grade C or Grade E steel. According to industry sources, there are 3 basic types of couplers (classified by head type) currently used on freight cars; type E, type F, and type EF, and one variety, type H, used for passenger cars.

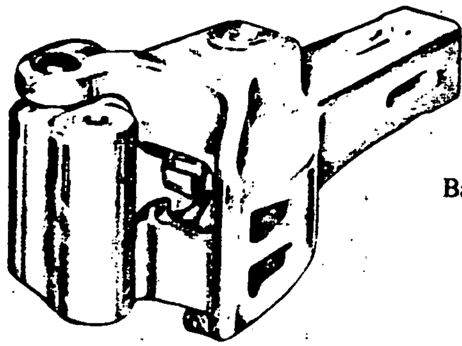
A yoke (also called a coupler yoke and a draft yoke) is the piece of cast steel which is attached to the end of the coupler shank and provides the connection between the coupler rigging and the draft gears (fig. VIII-3). According to industry sources, the primary function of the yoke is to transmit the shocks the coupler receives, during movement of the railcars, to the draft gears which act like a type of shock absorber system.

According to railroad officials, there are no physical differences between side frames, bolsters, couplers, and yokes produced in the United States and those manufactured offshore, primarily due to the stringent AAR requirements for these products.

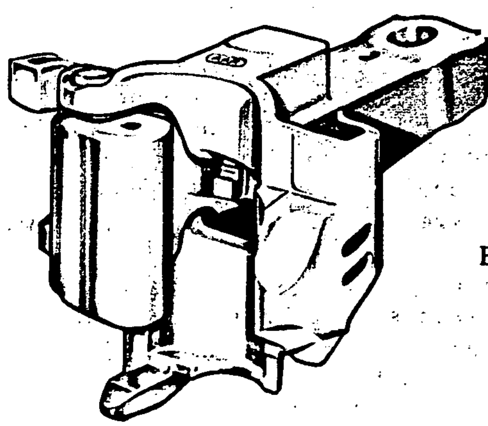
All of the U.S. manufacturers of steel rail truck components except one, use the basic sand-casting method to produce their products. According to industry sources, a slinger is used by a majority of the foundries to ram the sand into the pattern. A slinger is a machine equipped with a wheel, approximately 15 to 18 inches in diameter with cups on its outer circumframe, that picks up the sand and hurls it at a high velocity at the pattern. Slingers used by the manufacturers of rail castings range in hurling capacity from 10,000 to 20,000 pounds a minute. Alternatively, there are a few foundries with plants employing jostling machines to form the molds for these steel castings. A jostling machine is equipped with hydraulic cylinders that moves the flask, pattern, and sand up and down at high speeds to tightly pack the sand around the pattern. After the mold is formed, cores are manually placed as shown by the core prints and markings on the pattern to cast products with hollowed-out sections.

One domestic manufacturer of freight car and locomotive wheels uses a patented process the company developed to produce their castings. In this method, a ladle of molten steel is sealed in an airtight chamber in the plant's floor. Air pressure inside the chamber is increased, forcing the molten metal up through a refractory pouring tube, and into a graphite wheel mold.

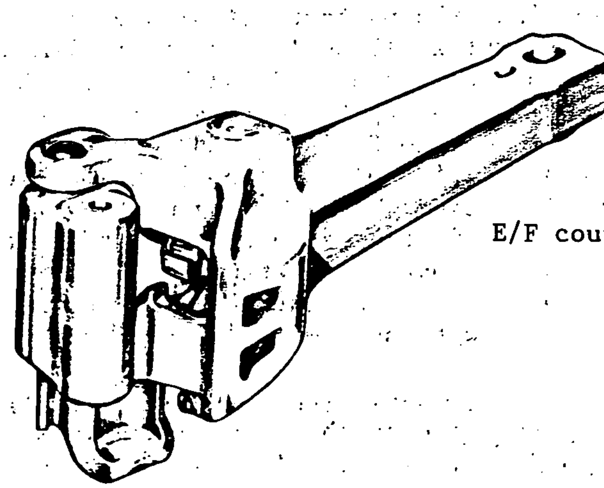
Figure VIII-2.-- Couplers



Basic E coupler



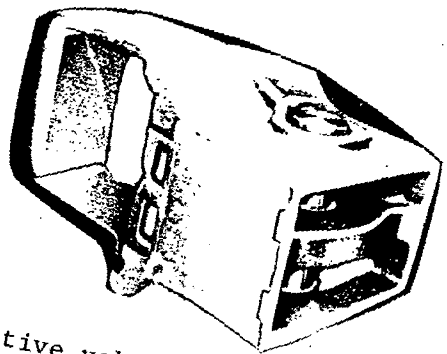
Basic F coupler



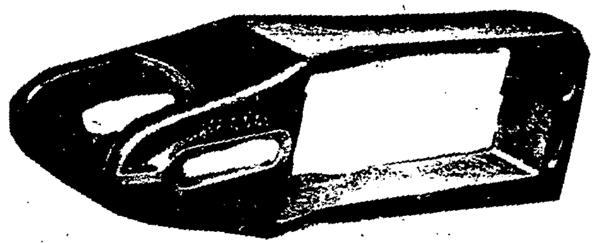
E/F coupler

Source: American Steel Foundries.

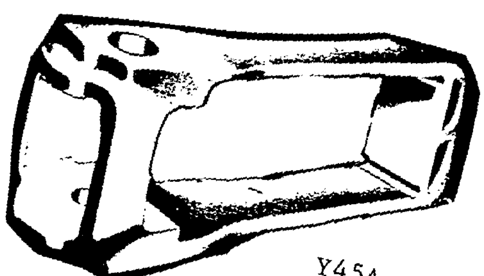
Figure VIII-3.-- Yokes



Locomotive yoke



Y40A yoke



Y45A yoke

ce: Midland Ross Corporation.

In either of these two casting methods, electric arc furnaces, varying in capacity from 15 to 35 tons, are employed to produce the molten alloy steel (Grades B, C, or E) used for the rail truck components. After the castings have been poured, and sufficient time allowed for solidification and cooling, the castings are removed from the mold, and, if sand casting was employed the excess sand is removed using a shakeout machine. Sand-molded casting are then usually subjected to shot blasting, where the abrasive action of the metallic shot on the castings loosens and removes any remaining sand. Risers, gates, and any surface defects are removed using oxyacetylene torches or air arcs. 1/ Rail car castings then undergo heat treatment in a normalizing furnace to refine the grain structure within the metal, so the casting will be more resistant to fracture. Some manufacturers will then shot blast the casting again after heat treatment for a finer surface finish. After this process, the castings are subjected to any final finishing operation necessary, such as chipping and grinding. In the vast majority of domestic foundries producing cast-steel rail truck components, these operations are performed manually, by employees using hand grinders. There is one foundry plant that utilizes mechanized grinding machines for finishing coupler knuckles, however, industry officials indicate that use of this machine is limited. 2/

According to industry sources, the extent of the level of automation in the foundries producing side frames, bolsters, couplers, and yokes can be termed "manually-assisted machines," i.e., employees operated machines, such as controlled hoists and conveyors, that perform the majority of the casting operation. Certain processes, however, such as the placing of the cores and the final finishing procedures, are still done manually.

Customs Treatment

U.S tariff treatment

Cast-steel railcar wheels are classified under TSUS item 690.30, "wheels and parts thereof, of iron or steel; and any of such wheels or parts imported with iron or steel axles fitted in them." The other cast-steel rail truck components considered in this report are classified under TSUS item 690.35 "other parts of cars provided for in item 690.15, except brake regulators," and TSUS item 690.40, "other." The appropriated provisions of the Tariff Schedules of the United States Annotated (1984) (TSUSA) applicable to cast-steel rail truck components are shown in appendix E. Table VIII-1 shows the column 1 rates of duty prior to the most recent (Tokyo) round of Multilateral Trade Negotiations (MTN), the staged column 1 rate reductions negotiated under the MTN (the final staged rate of duty for col. 1 is also the rate of duty shown in the "LDDC" column in app. E), and the column 2 rates of duty for products entered under the TSUS items.

1/ According to The Making, Shaping, and Treating of Steel, the air arc employs a copperclad electrode with which an arc is struck against the casting, while a stream of compressed air directly behind the arc pushes away the slag created by the oxidation of the metal of the casting liquefied by the heat of the arc.

2/ This section draws heavily on The Making, Shaping, and Treating of Steel, United States Steel Corp., and from conversations with plant engineers at the various railcar foundry plants.

Table VIII-1.--Cast-steel rail truck components: U.S. rates of duty, by TSUS items

(Cents per pound; percent ad valorem)

TSUS item No.	Description	Pre-MTN col. 1 rate of duty 1/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--			
			1980	1981	1982	1983
690.30 (pt.)	Wheels and parts thereof, of iron or steel, and any of such wheels or parts imported with iron or steel axles fitted in them.	Free	2/	2/	2/	2/
690.35 (pt.)	Parts of cars provided for in item 690.15, except brake regulators.	9%	8.6%	8.1%	7.7%	7.3%
690.40 (pt.)	Other-------------------	5.5%	5.3%	5.1%	4.9%	4.7%

TSUS item No.	Description	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--Continued				Col. 2 rate of duty
		1984	1985	1986	1987	
690.30 (pt.)	Wheels and parts thereof, of iron or steel; and any of such wheels or parts imported with iron or steel axles fitted in them.	2/	2/	2/	2/	1¢.
690.35 (pt.)	Parts of cars provided for in item 690.15, except brake regulators.	6.8%	6.4%	5.9%	5.5%	45%.
690.40 (pt.)	Other-------------------	4.5%	4.3%	4.1%	3.9%	35%.

1/ Rate effective prior to Jan. 1, 1980.
2/ Rate for this item was not affected by the Tokyo round of Multilateral Trade Negotiations.

Within the past 5 years, there have been no statutory investigations specifically concerning cast-steel rail truck components conducted by the U.S. International Trade Commission. On January 1, 1980, an investigation concerning Rail Passenger Cars and Parts Thereof From Italy and Japan (investigation Nos. 731-TA-5 and 6) was instituted. On February 11, 1980, the Commission determined that there was no reasonable indication that an industry in the United States was being materially injured, or was threatened with material injury, or that the establishment of an industry in the United States was materially retarded, by reason of the importation of these articles allegedly sold at less than fair value. The petitioner appealed this decision to the Court of International Trade on March 24, 1980, and the Court informed the Commission of its decision on December 31, 1980. The Court did not contest the Commission's determination but ordered it to clarify the rationale behind that decision and to conduct a supplementary investigation on parts of rail passenger cars. The Commission subsequently ruled that the information developed in this supplementary investigation would not alter the February 11 decision, and communicated this determination and the other required materials to the court on April 3, 1981. The petitioner then withdrew its petition and the appeal was terminated with prejudice. The Commission also conducted a preliminary investigation (investigation No. 701-TA-82, instituted July 2, 1982) on rail passenger cars from Canada, which included some of the components covered by this report. On August 3, 1982, the Commission made a preliminary determination that there was a reasonable indication that the domestic industry was being injured or threatened with injury by the importation of such equipment. On February 9, 1983, however, the petitioner withdrew its complaint. There have not been any investigations conducted during 1979-83 by the U.S. Department of Commerce nor the U.S. Department of Labor in response to petitions for trade adjustment assistance.

Foreign tariff treatment

The U.S. industry producing cast-steel wheels, side frames, bolsters, couplers, and yokes, exports a very small amount of its production. However, when these products are exported, the principal foreign markets for them are developed countries with car building operations or established railroads. Such markets include Canada, Japan, the European Community (EC), Mexico, and Brazil. With the exception of Canada, all of these countries base their tariff classifications on the Customs Cooperation Council Nomenclature (CCCN) under heading 86.09. The current rates of duty applicabe to imports of cast-steel rail truck components for major producing countries of these castings are shown below (in percent ad valorem):

CCCN Item No.	Description	Market	Present rate of duty
86.09	Parts of rail and tramway locomotives and rolling stock.	Japan	5.2
		EC	4.3-4.6
		Mexico	5.0
		Brazil	37-55

Canada classifies imports under its own tariff system, the Tariff Schedules of Canada, as follows (in percent ad valorem):

Item No.	Description	Present rate of duty
43410-1	Railway locomotives and parts thereof.	15.9
43415-1	Self-propelled railway vehicles, chassis and parts thereof.	15.3
43430-1	Steel wheels and steel wheel blanks, n.e.c.	15.9
43800-1	Railway cars and parts thereof, n.o.p.	17.5

The tariff concessions made during the Tokyo round of the MTN by Japan on the above-listed products will lower the maximum tariff rate applied to U.S. imports to 4.9 percent ad valorem. Similarly, the maximum tariff rate covering these imports into the EC will fall to between 3.8 percent ad valorem and 4.1 percent ad valorem. Mexico and Brazil were not obligated to such concessions since they did not participate in the MTN. Canada's rate of duty will be lowered to between 12.5 and 15 percent ad valorem. As is true of the tariff concessions make by the United States during the MTN, the concessions made by Japan, the EC, and Canada will be implemented in annual stages through January 1, 1987.

Profile of the U.S. Industry and Major Foreign Competitors

United States

According to industry sources, there were approximately 12 firms producing the cast-steel rail truck components covered by this study in the United States in 1983, compared with an estimated 15 firms in 1979. In 1983, the producing firms operated 19 establishments, dropping 27 percent from the 1979 total of 26 establishments. The top five manufacturers are estimated to make up more than 80 percent of total U.S. production of these products. In addition to these primary products, there are a small, but unknown number of establishments in other industries that manufacture cast-steel rail truck components as secondary products. Production facilities are dispersed throughout the United States, but are generally concentrated in the North Central and mid-Atlantic regions. The major producing States for cast-steel rail truck components are Illinois, Pennsylvania, Ohio, Alabama, and Wisconsin. The industry is specialized, with more than 90 percent of establishments principally engaged in producing railroad products. There was no significant merger or firm aquisition activity in this industry during 1979-83.

U.S. production, capacity, and capacity utilization.--U.S. production of cast-steel rail truck components, as reported by questionnaire respondents, decreased annually during 1979-83, from $2.1 million units to 621,000 units, or by 70.0 percent (table VIII-2). The decline is primarily due to decreased orders for freight cars (the principal end market for the cast-steel rail truck components covered in this study). In 1978 and 1979, U.S. railroads

Table VIII-2.--Cast steel rail truck components: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production----------1,000 units--:	2,072	1,818	1,275	768	621
Production capacity--------do----:	2,441	2,502	2,699	2,561	2,192
Capacity utilization----percent--:	84.9	72.7	47.2	30.0	28.3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

increased their equipment stock principally to accommodate rising coal demand. However, decreased shipments of coal, grain, lumber, and automobiles, due to the recession and high interest rates during 1980-82, caused the railroads to operate well below their practical capacity. Therefore, the railroads sharply reduced their orders for both freight cars and locomotives. The following tabulation shows deliveries of freight cars and locomotives during 1979-83 1/

	Freight cars	Locomotives
1979---------------	96,532	1,978
1980---------------	86,628	1,666
1981---------------	45,925	686
1982---------------	18,736	501
1983---------------	1/ 6,000	250

1/ Estimated by the staff of the U.S. International Trade Commission.

Additionally, many railroads delayed repairs to stored equipment to the time when such rolling stock was placed in operation again.

Practical capacity to produce cast-steel rail truck components rose during 1979-81, increasing from 2.4 million units to 2.7 million units, as producers added capacity and benefited from small productivity improvements. Capacity decreased in both 1982 and 1983, as manufacturers were forced to permanently close several manufacturing plants due to decreased orders. The ratio of capacity utilization fell from 84.9 percent in 1979 to 28.3 percent in 1983.

Production technology in the domestic cast-steel rail truck component industry has undergone gradually evolutionary improvement, which has been

1/ Railway Age, February 1984, p. 63.

characterized by decreased production time and increasing automation of certain processes. However, according to industry sources, the majority of railcar foundry operations do not lend themselves to being extensively automated, due to the variations in design for different castings. Responses to the Commission's questionnaires reveal that 151 production machines were used to make cast-steel rail truck components, as of January 1984, 11 percent of these machines were 2 years old or less, 6 percent were 3 to 4 years old, 15 percent were 5 to 9 years old, 17 percent were 10 to 19 years old, and 51 percent were 20 years old or more (table VIII-3). There were 60 electric arc furnaces in use by U.S. producers. The vast majority of these were over 20 years old. Manual molding lines exceeded automated lines by almost a factor of two. The majority of the automated equipment, however, was installed within the past 15 years.

Table VIII-3.--Cast-steel rail truck components: Machinery and equipment in manufacturing facilities of reporting producers, by age of the machines, as of Jan. 1, 1984

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnances	6	3	9	15	27
Molding lines:					
Automated	7	5	9	6	6
Manual	3	1	5	5	44
Total	16	9	23	26	77

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--Depressed demand contributed to declining employment in the railroad castings industry during the 5-year period. In 1979, there were approximately 24,212 employees in the industry, 14,234 of whom were production workers (table VIII-4).

Table VIII-4.--Cast-steel rail truck components: Number of employees and production and related workers in operations producing foundry products, and man-hours worked, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons	24,212	23,001	20,313	16,319	12,613
Production and related workers	14,234	12,965	10,330	7,317	4,704
Man-hours worked---1,000 hours	30,148	25,207	19,852	13,921	10,030
Wages paid-------1,000 dollars	271,506	256,850	211,996	146,301	108,661

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

During 1979-83, the share of total employment accounted for by production workers fell from 59 percent to 37 percent. Respondents to the Commission's survey reported man-hours worked followed a declining trend, falling from 30.1 million hours in 1979 to 10.0 million in 1983.

Total wages paid to persons employed in the production of cast-steel rail truck components fell from $271.5 million to $108.7 million during 1979-83. A comparison of wages paid to production workers in foundries producing cast-steel rail truck components (from questionnaire responses) and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S. foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Foundries producing cast-steel rail truck components	All operating U.S. manufacturing establishments 1/
1979----------	$9.93	$6.00
1980----------	10.32	7.27
1981----------	10.69	7.99
1982----------	10.41	8.49
1983----------	12.03	8.83

1/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The quantity of domestic shipments, as reported by U.S. producers in response to the Commission's questionnaire, decreased from 2.0 million units in 1979 to 548,651 units in 1983, representing a decline of 71.8 percent (table VIII-5). The value of shipments totaled $526.1 million in 1979 compared with $117.8 million in 1983. The unit value of shipments rose from $270.02 per unit in 1979 to $314.24 per unit in 1980. Unit value then declined annually to $214.80 per unit in 1983. The specific categories of cast-steel rail truck components covered in this investigation, for which shipment data were reported by U.S. producers, cannot be identified separately since their publication could disclose confidential data on the operations of individual concerns. However, according to industry sources, in terms of quantity, shipments of freight car wheels make up the largest share of total shipments.

Table VIII-5.--Cast steel rail truck components: U.S. producers' shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Per unit
1979-----------:	1,948,472	526,132	$270.02
1980-----------:	1,614,233	507,260	314.24
1981-----------:	1,252,764	336,715	268.78
1982-----------:	698,415	174,397	249.70
1983-----------:	548,651	117,848	214.80

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. exports of cast-steel rail truck components are very small compared with domestic shipments, amounting to less than * * * percent of shipments, in terms of quantity. * * *. * * *. The unit value of these exports, * * *, followed an increasing trend, rising from * * * 1979 to * * * 1980. A shift in product mix to a greater proportion of more expensive components, such as side frames or bolsters, is cited by industry sources as the reason for the change in unit values. Specific data regarding the foreign markets for these exports are not available.

Table VIII-6.--Cast steel rail truck components: U.S. exports of domestic merchandise, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	
1979	***	***	***
1980	***	***	***
1981	***	***	***
1982	***	***	***
1983	***	***	***

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' inventories.--U.S. producers of cast-steel rail truck components typically maintain inventories in order to provide reasonable delivery and service to railroads and equipment manufacturers. The combined end-of-period inventories of producer respondents fluctuated during 1979-83, as shown in the following tabulation: 1/

	Quantity (units)
1979	***
1980	***
1981	***
1982	***
1983	***

Inventories increased in both 1980 and 1983 as producers mistakenly anticipated a significant increase in demand for these products. Yearend producers' inventories were * * * in 1983 than they were in 1979.

1/ Supplied by U.S. producers that represent an estimated 90 percent of the value of shipments in 1983.

Financial experience of U.S. producers.--Net sales, as reported by respondents to the Commission's questionnaires, decreased from $1,068 million in 1979 to $489.7 million in 1983, or by 54.1 percent (table VIII-7). The decline was concurrent with the decrease in shipments by U.S. producers in those years. Net operating profit before taxes reached its highest level in 1979 at $156.2 million, but decreased during the next 4 years to a loss of $67.4 million in 1983. As a share of net sales, net operating profit before income taxes declined from 14.6 percent in 1979 to a negative 13.8 percent in 1983.

Table VIII-7.--Cast-steel rail truck components: U.S. producers' net sales and net operating profit or (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales----1,000 dollars--	1,067,694	1,025,142	954,991	643,102	489,693
Net operating profit or (loss) 1,000 dollars--	156,236	130,674	12,948	(68,289)	(67,410)
Ratio of net operating profit or (loss) to net sales----------percent--	14.6	12.7	1.4	(10.6)	(13.8)

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures for domestic facilities used primarily in the production of cast-steel rail truck components are shown in table VIII-8. Capital expenditures rose 70.8 percent from 1979 to 1980, reaching $82.4 million. These expenditures decreased slightly in 1981 to $82.0 million. In 1982 and 1983, capital expenditures declined to $26.9 million and $12.9 million, respectively. * * *. The depressed state of the industry during 1982-83 is reflected in the low levels of producers' capital expenditures in those years. According to producers' questionnaire responses, there were no capital expenditures for foreign facilities producing cast-steel rail truck components during 1979-83.

Table VIII-8.--Cast-steel rail truck components: U.S. producers' capital expenditures on domestic and foreign facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	696	731	676	325	288
Buildings, leasehold improvements	5,816	14,290	21,837	5,290	773
Machinery, equipment, and fixtures:					
New	39,114	65,492	58,626	20,272	10,972
Used	2,605	1,887	905	1,006	848
Total	48,231	82,400	82,044	26,893	12,881

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures.--Respondents to the Commission's questionnaires indicated that research and development expenditures totaled $4.8 million in 1979, compared with $4.2 million in 1983 (table VIII-9). U.S. producers indicate that research was conducted to improve casting quality and molding methods, and development of new or special-purpose castings. As a share of the value of shipments, U.S. producers' research and development expenditures increased annually from 0.9 percent in 1979 to 3.6 percent in 1983, despite the downward trend in the industry during this period.

Table VIII-9.--Cast-steel rail truck components: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

(In thousands of dollars)

Year	Expenditures
1979	4,835
1980	5,520
1981	5,664
1982	5,008
1983	4,206

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Major foreign competitors

In order to sell the majority of cast-steel rail truck components covered in this study, foreign (and domestic) manufacturers must receive AAR approval, which consists of having the facilities and actual castings periodically inspected and tested. The following tabulation shows the foreign firms currently having AAR authorization for their products: 1/

Country	Company	Location	Product
Brazil	Fabrica National de Vagoes (FNV)	Cruziero	Yokes
Canada	Dominion Foundries (DOFASCO)	Hamilton, Ontario	Side frames, bolsters, complete couplers, yokes
Canada	Hawker Siddely Canadian Steel Foundries (CSF)	Montreal, Quebec	Side frames, bolsters, complete couplers, yokes
Canada	Griffin Steel Foundries, Ltd	Transcona, Manitoba	Wheels
Canada	Maritime Steel and Foundries, Ltd	New Glasgow, Nova Scotia	Yokes
France	Sambre et Meuse	Feignes	Side frames, bolsters
Japan	Nippon Sharyo	Kinurra	Side frames, bolsters
Mexico	Siderurgica Nacional S.A. (SIDENA)	Saugun	Side frames, bolsters, complete couplers, yokes
Mexico	Fundora Aceros Tepeyac	Mexico City	complete couplers, yokes
Mexico	Fundiciones de Hierro y Acero	Mexico City	Wheels, complete couplers, yokes

1/ Information supplied by Larry Davis, Manager of Car Construction Engineering, and George Monroe, Supervisor of Freight Car Truck Engineering, Operations and Maintenance Department, Mechanical Division, American Association of Railroads.

Country	Company	Location	Product
Portugal	COMETNA	Lisbon	Side frames, bolsters
South Africa	Scaw Metals Ltd	Union Junction	Yokes

In addition, there were 11 other foreign manufacturers that do not currently have AAR certification for their products, but did have approval to sell cast-steel rail truck components for freight cars in the United States during 1979-83, as shown in the following tabulation: 1/

Country	Company	Location	Product
Australia	Bradford Kendal	Brisbane and Kilburn	Side frames, bolsters
Australia	Commonwealth Steel	Lidcombe and Mourooka	Side frames, bolsters
Belgium	Hengicot	Court St. Etienne	Side frames, bolsters
Brazil	Combrasma	Osaco, San Paulo	Side frames, bolsters
Japan	Sumitomo	Osaka	Side frames, bolsters
Spain	Construcciones y Auxiliar de Ferro Carriles (CAF)	Beasin	Side frames, bolsters
Romania	23 August works	Bucharest	Bolsters
Romania	Vulcan works	Bucharest	Side frames
South Africa	South African Railroad	Pretoria	Side frames, bolsters
South Africa	Standard Brass (STANBRAS)	Benoni	Side frames, bolsters
United Kingdom	British Steel	Sheffield	Side frames, bolsters

1/ Ibid.

Additional information on certain foreign competitors is provided in the following profiles. 1/

Brazil.--According to industry sources, there are two firms in Brazil which produced cast-steel rail truck components during 1979-83. FNV, with its foundry operations located at Cruziero, is currently approved by the AAR to make yokes for sale in the United States. Additionally, this firm produces minor draft gears, side frames, bolsters, and some coupler parts which are not AAR certified, and therefore cannot be used by U.S. railroads. FNV is a licensee of a U.S. cast-steel wheel producer, and sells these wheels in the South American market. This firm utilizes electric arc furnaces for melting and sand-casting methods to produce their rail truck components. Combrasma, with its foundry operations located at Osaco, Sao Paulo, is not currently AAR approved to sell railroad castings in the United States. However, at certain times during 1979-83, this firm had AAR approval on its side frames and bolsters.

* * *. * * *. The hourly wage rates for Brazilian production workers in the iron and steel manufacturing industry during 1979-83 are shown in the following tabulation:

	Hourly compensation 1/	Hourly compensation 1/	Index (U.S. wage rate=100)
1979----------	NCr$59.44	US$2.21	22
1980----------	114.20	2.17	21
1981----------	254.76	2.74	26
1982----------	565.10	3.15	30
1983----------	1,237.78	2.15	18

1/ U.S. Department of Labor, Bureau of Labor Statistics, Hourly Compensation Costs for Production Workers in Iron and Steel Manufacturing, 1975-1983, April 1984, pp. 4-8.

Canada.--There were 13 steel foundries producing cast-steel rail truck components in Canada during 1979-83. The largest four include Dominion Foundries, Hawker Siddely Canadian Steel Foundries, Griffin Steel Foundries Ltd., and Maritime Steel. 2/ Dominion Foundries (DOFASCO), located at Hamilton, Ontario, is a large integrated steel mill producing a variety of castings. The rail truck components this firm produces include side frames, bolsters, complete couplers, and yokes. Hawker Siddely Canadian Steel Foundries, with production facilities at Montreal, Quebec, manufactures side frames, bolsters, and complete couplers, as well as a variety of other steel castings. Approximately * * * percent of their total production is believed to be railroad related. This firm has license arrangements with two U.S.

1/ Data in this section are drawn from discussions with Mr. Jack Absalom, Qual-Tech, a consultant to the AAR. Mr. Absalom performs inspections and testing of the foreign foundry operations producing the cited railcar castings.
2/ "Competitive Assessment of the U.S. Foundry Industry Response to Questionnaire from United States International Trade Commission," Canadian Foundry Association, July 1984, p. 5.

producers of these products. Griffin Steel Foundries Ltd. is a subsidiary of an established U.S. railcar casting producer. The firm built its first Canadian pressure pouring plant for steel wheels at St. Hyacinth, Quebec, in 1954. Brake shoes are also manufactured at this foundry that serves Eastern Canada and Newfoundland. In 1959, another plant for steel wheel production was erected at Transiona, Manitoba. Company officials indicate that this plant serves the central and western regions of Canada. Maritime Steel is a small foundry in comparison with the others located in Canada. It produces only yokes at its New Glasgow, Nova Scotia, foundry.

* * *. According to the Canadian Foundry Association, the average hourly wage rate for Canadian steel foundry employees (in U.S. dollars) in 1983 ranged from $7.54 to $10.95 per hour. Currently, however, industry officials indicate that Canadian foundry plants are operating well below capacity, due to the depressed state of the railroad carbuilding industry in the United States and Canada. Steel foundry shipments for use by the railway industry (which include, but are not limited to the products considered in this study) are shown in the following tabulation: 1/

Year	Shipments (1,000 short tons)
1979	130
1980	135
1981	88
1982	68
1983	63

France.--Sambre et Meuse, is one of the largest foundry operations in Western Europe, with plants located at Feignes and Brittany. * * *. * * *. The hourly wage rates for French production workers in the iron and steel manufacturing industry during 1979-83 are shown in the following tabulation:

	Hourly compensation 1/	Hourly compensation 1/	Index (U.S. wage rate=100)
1979	F40.75	US$9.58	96
1980	45.87	10.87	1.05
1981	52.23	9.84	92
1982	64.38	9.79	94
1983	71.86	9.43	78

1/ U.S. Department of Labor, Bureau of Labor Statistics, Hourly Compensation Costs for Production Workers in Iron and Steel Manufacturing, 1979-83, April 1984, pp. 4-8.

* * *. Cast-steel side frames and bolsters are produced by Sambre et Meuse at their foundry plant at Feignes, along with high alloy heat-resistant steel castings for petroleum and chemical applications.

1/ Ibid, p. 9.

Japan.--Of the two major railcar casting operations believed to be operating in Japan, only Nippon Sharyo, is currently AAR approved to import side frames and bolsters into the United States for sale to the railroads. Nippon Sharyo's foundry operations also produce yokes, draft gears, sills, and certain construction castings. Sumitomo Metals Ltd., with its main foundry operations located at Osaka, produces side frames, bolsters, couplers, and yokes. The firm did, however, have AAR approval on certain of these products during 1979-83. Sumitomo produces side frames, bolsters, and forged (wrought) railcar wheels under license from a U.S. producer of these products.

* * *. The hourly wage rates for Japanese production workers in the iron and steel manufacturing industry during 1979-83 are shown in the following tabulation:

	Hourly compensation 1/	Hourly compensation 1/	Index (U.S. wage rate=100)
1979----------	y1,794	US$8.22	83
1980----------	1,931	8.56	83
1981----------	2,111	9.59	90
1982----------	2,151	8.64	83
1983----------	2,221	9.35	78

1/ U.S. Department of Labor, Bureau of Labor Statistics, Hourly Compensation Costs For Production Workers in Iron and Steel Manufacturing, 1979-83, April 1984, pp. 4-8.

Both of the above-mentioned Japanese firms are active in making cast railroad products for the Japanese National Railway System. According to industry sources, Japanese foundry facilities are comparable with U.S. facilities. Electric arc furnaces are used in the melting of the metal, but the industry utilizes a "vacuum molding" procedure to produce the castings. 1/

Mexico.--Currently, there are three known foundries producing AAR approved castings in Mexico. Siderurgica Nacional S.A. (SIDENA), located at Saugun, produces side frames, bolsters, complete couplers, and yokes. Additionally, they produce steel castings used in tractors. * * *. Fundidora de Aceros Tepeyac (Tepeyac) is a large, privately owned firm which makes a large variety of steel castings. In addition to the AAR approved complete couplers, yokes, wheels (produced under license with a U.S. firm) for the railcar industry, this company makes replacement parts for tractors, crawler shoes, crusher parts, and brake beams. The company produces many of these products under license arrangements with U.S. manufacturers. Tepeyac's production facilities are located near Mexico City. Fundiciones de Hierro y Acero produces complete couplers and yokes for railroad use. Additionally, under license from a U.S. producer, this firm makes cast-steel wheels.

1/ In the vacuum molding process, dry sand is put over the pattern. A film of plastic is then placed over the sand, heated, and drawn down around the pattern by a vacuum process. The pattern is then removed and normal pouring procedures take place.

The Mexican railcar castings industry uses electric arc furnaces and the sand-casting method to produce their cast-steel rail truck components. * * *. Production, however, is currently estimated to total about * * * percent of capacity, with employment at greatly reduced levels. Data regarding the hourly compensation of Mexican production workers are not available. The foundry facilities of the three Mexican producers are believed to be comparable with most U.S. facilities, according to industry sources, but wage rates are much lower.

South Africa.--There are three foundry operations that currently have or had AAR approval on their cast-steel rail truck components during the period covered by this report. Scaw Metals Ltd., located at Union Junction, is part of a large, privately owned steel-producing complex. The railroad castings currently produced by this firm (AAR approved) are yokes and wheels. The wheels are produced under license of a U.S. firm. Additionally, steel castings such as valves, reinforcing rods, and manganese cushion points are produced. Standard Brass (STANBRAS) produces side frames and bolsters at its foundry facilities at Benoni. This firm has several license arrangements with U.S. producers of cast steel rail truck components, as well as other products. However, STANBRAS no longer has AAR approval (but did in certain periods during 1979-83) to sell their railroad castings to U.S.-based railroads. The South African Railroad produces side frames and bolster for their own internal use only. However, they use AAR specifications, and in certain products, sought AAR certification during 1979-83.

Currently, capacity for the South African industry producing cast-steel rail truck components is estimated to exceed * * * annually. According to industry sources, however, production at present is well below this capacity. Data regarding employment and wage rates are not available.

China.--Although specific data on the Chinese industry producing cast-steel rail truck components are not available, industry sources indicate that Chinese manufacturers of locomotive trucks have been active in the U.S. market during 1981-83.

Structural Factors of Competition Between U.S. and Foreign Industries

In terms of competitive advantage, the United States was compared with Canada, Japan, Brazil, and France by U.S. producers of cast-steel rail truck components in response to the Commission's questionnaires (table VIII-10). In general, U.S. producers indicate that they have the same competitive position with these countries with respect to energy, raw materials, and production technology. However, foreign competitors are believed to have a strong advantage in both capital and labor. With regard to marketing, the domestic industry feels they have a clear advantage over foreign producers of cast-steel rail truck components. It was also determined that, in general, foreign producers have the competitive advantage in areas involving government involvement, such as subsidies, research and development assistance, tariffs, and government regulations.

Table VIII-10.--Cast-steel rail truck components: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

Item	Competitive advantage 1/			
	Canada	Japan	Brazil	France
Fuel:				
Availability	S	D	S	S
Cost	S	S	D	S
Raw Material:				
Availability	S	S	S	S
Cost	S	S	F	S
Capital:				
Availability	S	F	F	F
Cost	S	F	F	S
Ability of industry profits to attract funds	F	F	F	F
Labor:				
Availability	S	F	F	S
Cost	S	F	F	F
Production technology	S	D	S	S
Marketing:				
Channels of distribution	S	D	D	D
Responsiveness to orders	S	D	D	D
After-sale service capabilities	S	D	D	D
Government involvement:				
Subsidies	F	F	F	F
Research and development assistance	F	F	F	S
Tariff levels on imports	F	S	F	S
Nontariff barriers to imports	S	2/	2/	F
U.S. Goverment regulations that increase costs	F	F	F	F
Foreign government regulations that increase costs	2/	2/	2/	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S International Trade Commission.

Raw materials

Steel is the principal raw material consumed in the manufacture of rail truck components. The type of steel used is determined by the type and desired quality of the rail casting being produced. The physical properties of alloy steel or carbon steel, which are the most popular types of steel used in rail truck component production, can be varied in such a manner as to impart special characteristics such as increased hardness, and durability. For raw material availability and cost, U.S. producers were felt to have a competitive advantage over Canada, Japan, and France. Although the United States and Brazil were believed to be equally competitive in the availability of raw materials, Brazil was judged to have the advantage in the cost of inputs.

Energy

The cost of energy during production is a concern for the domestic manufacturers of cast-steel rail truck components, however, the U.S. industry held a competitive advantage over most of its major foreign competitors in both fuel availability and cost during 1981-84. Most of the energy consumed in the production of cast-steel rail truck components is in the melting of the steel in an electric arc furnace. In the area of fuel availability, the United States and the cited foreign producers, except Japan, were rated equally competitive. Regarding the cost of fuel, U.S. producers felt they have a competitive advantage over Brazil, but were on an equal footing with Canada, Japan, and France.

Capital

Information solicited from U.S. producers indicates that the railcar castings industry in Japan, Brazil, and France have the competitive advantage in the availability of capital. Regarding the cost of such capital, all of the major competitors cited by U.S. producers, except Canada and France, were believed to have a competitive advantage during 1981-84. Data regarding representative short-term money market rates, i.e., the rate at which short-term borrowings are effected between financial institutions, for the United States and for the major competitors cited by domestic producers are shown in the following tabulation (in percent): 1/

Period	United States	Canada	Japan	Brazil	France
1981----------	16.38	17.72	7.69	58.61	15.26
1982----------	12.26	13.64	7.12	67.58	14.73
1983----------	9.09	9.30	6.72	1/ 97.09	12.63
1984 (April)--	10.29	10.59	6.25	2/	12.65

1/ Rate for the third quarter 1983. More recent data are not available.
2/ Not available.

1/ International Monetary Fund, International Financial Statistics, June 1984, p. 61.

Comparable data on the yields of bonds that would be indicative of longer term rates are shown below (in percent): 1/

Period	United States	Canada	Japan	Brazil	France
1981----------	13.72	15.22	8.66	1/	15.66
1982----------	12.92	14.26	8.06	1/	15.56
1983----------	11.34	11.79	7.42	1/	13.61
1984 (April)--	12.65	13.31	2/ 6.63	1/	2/ 12.89

1/ Not available.
2/ Rate for the third quarter 1983. More recent data are not available.

The overall cost of capital appears to be higher in the United States than in Japan, but less than in Canada, Brazil, or France. U.S. producers also indicated that all of the major competitors have a competitive advantage in their ability of industry profit to attract funds.

Labor

Foreign producers in Japan and Brazil were reported by U.S. producers to have a competitive advantage in both labor availability and cost. As shown in the major foreign competitors' section of this report, the rates are reported, in general, to be much lower than those earned in the United States. In regard to the availability of labor, in comparison with Canada and France, the U.S. industry was ranked equally competitive with its counterparts in these countries.

Technology

According to questionnaire respondents, the United States is more advanced in production technology than cast-steel rail truck component producers in Japan, and equal in production technology to producers in Canada, Brazil, and France. With the exception of Japan, all of these industries use sand-casting procedures in the manufacture of cast-steel rail truck components. Japan utilizes vacuum molding to produce their rail castings.

Production technology in the U.S. cast-steel rail truck component industry has undergone gradual, evolutionary improvements, characterized by automation of certain processes and more rapid materials flow. Most of the capital expenditures made by U.S. producers during 1979-83 are reported to have been used to improve the manufacturing capabilities of the industry and lower manufacturing costs. Two manufacturers indicated that equipment improvements during 1979-83 have helped decrease the number of man-hours involved in their production of railroad castings.

1/ Ibid.

Because of the stringent AAR certification procedures for certain cast-steel rail truck components, AAR-approved foundry facilities are examined each year to assure that they conform to the association's requirements. Certain foundries in all of the major competitors cited by domestic producers have approval on their production of railcar castings.

Marketing

The U.S. industry had a competitive advantage during 1981-84 with respect to channels of distribution, responsiveness to orders, and after-sale service capabilities over foreign cast-steel rail truck component industries in all of the major competing countries, except Canada, where the industry was judged to be equally competitive in these factors. Industry sources indicate that Canada's geographic proximity to the United States is the reason for their competitiveness. U.S. producers generally market their products with a salaried sales force, argumented by commissioned agents, directly to OEM's or railcar owners. Many foreign firms use U.S. agents or trading companies to sell their castings in the U.S. market. Although marketing efforts of domestic producers are concentrated within the Untied States, the U.S. industry asserts that it is interested in increasing its share of foreign markets. Industry representatives have stated, however, that the strength of the U.S. dollar relative to other currencies has had an adverse impact on the industry's ability to export. U.S. exports represented an average of less than * * * percent of the value of producers' shipments during 1979-83. U.S. producers, however, maintain numerous licensing arrangements with foreign manufacturers.

As stated earlier in this report, U.S. producers of cast-steel rail truck components typically maintain inventories in order to provide reasonable delivery and service to railroads and equipment manufacturers. The inventories of U.S. producers and importers are shown in table VIII-11. Importers, however, typically import on a contract or order basis, rather than for inventory. * * *.

Table VIII-11.--Cast-steel rail truck components: Inventories held by producers and importers, as of Dec. 31, 1979-Dec. 31, 1983

(In units)

Year	Producers' inventories	Importers' inventories
1979	***	***
1980	***	***
1981	***	***
1982	***	***
1983	***	***

Source: Compiled from data submitted in response to questionnaires of the U.S. International trade Commission.

Government involvement

U.S. cast-steel rail truck component producers allege that foreign producers have a competitive advantage in government subsidies which are designed to facilitate exports. The countries that were cited as benefiting from subsidies were Canada, Japan, Brazil, and France. Research and development assistance was cited as giving the aforementioned countries, except France, a competitive advantage over domestic producers.

Available information on tariffs suggests that the rates of duty on cast-steel rail truck components in the United States vary considerably with the rates of duty in other producing nations. With regard to tariff levels on imports, respondents to the Commission's questionnaire indicated that Canada and Brazil possessed the competitive advantage. Japan and France were judged to be equally competitive with the United States in this area. U.S. producers cited a variety of nontariff barriers which hinder their exports. Some of these hindrances include border taxes in Canada and Mexico; local content requirements in South Africa; and laws which generally discourage imports into India, Brazil, and Mexico. State trading, government monopolies, and exclusive franchises were cited by U.S. producers as barriers to U.S. exports of cast-steel rail truck components into both Eastern and Western Europe, and Japan.

U.S. Government regulations such as environmental and worker health and safety regulations were also perceived by U.S. producers to be a major competitive advantage of foreign industries. Foreign industries are comparatively less encumbered by these types of regulations, and U.S. producers have voiced complaints about the increasing financial burden of meeting U.S. regulatory requirements, which industry representatives believe puts the U.S. industry at a competitive disadvantage.

The U.S. Market

Domestic market profile

The United States is the largest single market for cast-steel rail truck components in the world. However, the domestic market for these castings has declined significantly during 1979-83. Wheels, side frames, bolsters, couplers, and yokes are purchased by railcar and/or locomotive manufacturers, or for the maintenance of existing equipment by railroads and contract repair firms. In 1979-80, a small portion of the market was supplied by imports because domestic producers could not supply all of the demand for wheels, side frames, and bolsters.

According to industry sources, transportation costs are estimated to account for about 4 1/2-6 1/2 percent of the selling price of cast steel rail truck components, and are considered an important factor in the marketing of these products. Industry officials indicate that companies will grant freight allowances, or even absorb the freight costs in order to secure an order.

Information provided by producers and importers regarding their shipments, by channels of distribution, are shown in table VIII-12. U.S. producers reported that the largest share of their shipments (53 percent) were shipped to original-equipment manufacturers during 1981-83. They further reported that railroads and other railcar owners received 47 percent of their shipments. Importers indicated that 73 percent of their shipments went to original-equipment manufacturers, and 27 percent to railroads. Both producers

Table VIII-12.--Cast-steel rail truck components: U.S. producers' and importers' share of shipments, by channels of distribution, 1981-83

Channel of distribution	Share of shipments	
	Producers	Importers
Machine shops/other fabricators	-	-
Distributors	-	-
Original-equipment manufacturers	53	73
Other (railroad car owners)	47	27
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

and importers reported that their shipments of cast-steel rail truck components were used exclusively in the railway equipment market.

According to industry sources, imports are not an important factor in the U.S. market. Imports, in general, have been successful in penetrating the domestic market only during peak demand periods, such as 1979-80. At these times, domestic carbuilders choose foreign castings to avoid long delays in obtaining similar domestic products.

U.S. consumption

Apparent U.S. consumption of cast-steel rail truck components totaled 2.0 million units, valued at $544.7 million, in 1979 (table VIII-13). Consumption then declined annually in the following years, falling to 552,722 units, valued at $118.8 million, in 1983.

Table VIII-13.--Cast steel rail truck components: U.S. shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1979-83

(Quantity in units; value in thousands of dollars)

Year	Producers' shipments	Exports	Imports	Apparent consumption	Ratio (percent) of imports to consumption
			Quantity		
1979---------	1,948,472	***	50,219	1,998,691	2.5
1980---------	1,614,233	***	63,760	1,677,993	3.8
1981---------	1,252,764	***	15,703	1,268,467	1.2
1982---------	698,415	***	7,529	705,944	1.1
1983---------	548,651	***	4,071	552,722	0.7
			Value		
1979---------	526,132	***	18,600	544,732	3.4
1980---------	507,260	***	15,100	522,360	2.9
1981---------	336,715	***	4,173	340,888	1.2
1982---------	174,397	***	1,974	176,371	1.1
1983---------	117,848	***	957	118,805	0.8

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The domestic market for these castings is very cyclical. The general state of the economy has a great influence on railroad carloadings 1/ and revenue-ton miles 2/, which directly affect the amount of rail truck castings needed to build new railcars and locomotives, or maintain existing equipment. In 1979, class I railroads 3/ in the United States expended $2.3 billion for the purchase of new rolling stock, of all types. However, because of the decrease in rail traffic and carloadings (due to the recession), which began in late 1980, a dramatic oversupply of railcars occurred. In 1983, comparable capital expenditures by these railroads were estimated to total $500 million. 4/

1/ Carloadings are the number of cars that are loaded with a specific commodity and transported by railroads.

2/ One revenue-ton mile is the amount of revenue earned by a railroad in transporting 1 ton of weight 1 mile.

3/ A class I railroad, as currently defined by the Interstate Commerce Commission, is one with annual gross revenues exceeding $50 million. Class I railroads constitute 90 percent of U.S. rail traffic, employment, and carloadings.

4/ _Railway Age_, February 1984, p. 63.

U.S. imports

U.S. imports of cast-steel rail truck components totaled 50,219 units, valued at $18.6 million, in 1979, according to data submitted to the Commission in response to questionnaires (table VIII-14). Imports rose 27.0 percent, in terms of quantity, to 63,760 units in 1980, however, the value of these imports fell to $15.1 million. During 1981-83, the level of imports decreased dramatically from the levels reached during the previous two years. U.S. imports of these castings declined to 4,071 units, valued at $957,000, by 1983. Over the 5-year period, imports decreased a total of 91.9 percent, in

Table VIII-14.--Cast steel rail truck components: U.S. imports for consumption, by principal sources, 1979-83

(Quantity in units; value in thousands of dollars)

Source	1979	1980	1981	1982	1983
			Quantity		
United Kingdom	0	168	172	1	2,685
China	4	4	400	305	572
Canada	12,230	6,861	3,390	6,834	814
France	31,992	25,608	6,333	0	0
Japan	5,373	14,055	1,059	39	0
Brazil	0	9,485	4,200	350	0
Portugal	0	374	0	0	0
Other	620	7,205	149	0	0
Total	50,219	63,760	15,703	7,529	4,071
			Value		
United Kingdom	-	85	83	2	183
China	2	2	66	286	564
Canada	8,629	1,349	743	1,578	210
France	8,400	3,336	1,864	-	-
Japan	1,453	6,563	391	26	-
Brazil	-	2,186	987	82	-
Portugal	-	672	-	-	-
Other	116	907	34	-	-
Total	18,600	15,100	4,173	1,974	957

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

terms of quantity, and 94.9 percent, in terms of value. During 1979-80, freight car manufacturers, and railroads sourced side frames, bolsters, and wheels offshore because of inability to procure domestic products. 1/ However, even during this period of increased demand, imports constituted less than 4 percent of total U.S. consumption. As orders and backlogs for these components dropped in 1980, so did imports; the ratio of imports-to-consumption fell to 0.7 percent, in terms of quantity, and 0.8 percent in terms of value, in 1983. Another factor which discouraged imports was transportation costs. The weight of these castings normally exceeds 200 to 300 pounds; thus it is not economical to ship them long distances. Industry sources indicate that this was one of the reasons that imports during 1979 and 1980 were priced higher than comparable domestic products.

U.S. producers' imports of cast-steel rail truck components, as a share of total U.S. castings imports during 1979-83 fluctuated widely, as shown in the following tabulation of data submitted in response to the Commission's questionnaires:

	Quantity (units)	Value (1,000 dollars)	Producer imports as a share of the value of total imports (percent)
1979	***	***	***
1980	***	***	***
1981	***	***	***
1982	***	***	***
1983	***	***	***

* * *.

Foreign Markets

The major markets for U.S.-produced cast-steel rail truck components are believed to be in Europe and South America. However, the majority of domestic producers do not market their railcar castings outside the United States due to the significant transportation costs involved and the nonstandardized nature of railroad industries outside the United States. Additionally, the majority of U.S. firms have license agreements with firms located throughout the world.

Competitive Assessment of Product-Related Factors in the U.S. Market

In response to the Commission's questionnaire, U.S. producers indicated that domestically produced cast-steel wheels, side frames, bolsters, couplers,

1/ Statement of Robert D. McIntire, Vice President and General Manager, National Castings Division, Midland Ross Corp., before the U.S. International Trade Commission, July 18, 1984, pp. 89-91.

and yokes have an overall competitive advantage in the U.S. market compared with cast-steel rail truck components imported from Canada, Japan, Brazil, Mexico, the United Kingdom, and France (table VIII-15). Importers from Canada, however, responded that neither the United States nor Canada had an advantage over the other. Japanese and French importers felt that they have a competitive advantage over U.S. producers, whereas importers from the United Kingdom gave the overall competitive advantage to the U.S. industry.

Table VIII-15.--Cast-steel rail truck components: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made castings in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/											
	Canada		Japan		Brazil		Mexico		United Kingdom		France	
	P	I	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	D	S	D	F	D	2/	D	2/	D	D	D	F
Lower purchase price (delivered)	S	S	F	F	F	2/	F	2/	D	D	D	F
Cost of tooling/ patterns	F	S	F	D	F	2/	F	2/	F	D	F	F
Shorter delivery time	D	S	D	S	D	2/	D	2/	D	D	D	D
Availability	D	S	D	D	D	2/	D	2/	D	D	D	D
Servicing	D	S	D	D	D	2/	D	2/	D	D	D	D
Favorable terms of sale	S	S	F	S	F	2/	2/	2/	S	S	S	S
Favorable product gaurantees	S	S	S	S	S	2/	S	2/	S	S	S	S
Favorable exchange rates	S	S	F	S	S	2/	S	2/	S	S	S	S
Historical supplier relationship	D	D	D	D	D	2/	D	2/	D	D	D	D
Product performance features:												
Superior design	S	S	S	S	S	2/	2/	2/	2/	F	D	F
Quality	S	S	S	F	S	2/	2/	2/	2/	S	S	S
More durable	S	S	S	S	S	2/	2/	2/	2/	S	D	S

1/ D = Domestic advantage; F = Foreign advantage; and S = Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Purchasers of cast-steel rail truck components, in response to the Commission's questionnaires, gave availability as their most important reason for purchasing both domestic and imported products (table VIII-16). Historical supplier relationship and servicing were given as the next two most important reasons for buying U.S.-made railcar castings. Lower purchase price was cited by purchasers as the second most important reason for buying the foreign-made cast-steel rail truck components, whereas the U.S. producers cited it as the fourth most important reason.

Purchasers responding to the Commission's questionnaire overwhelmingly preferred U.S.-made railcar castings over foreign-made products. As indicated in table VIII-17, purchases of U.S.-produced cast-steel rail truck components decreased annually, in terms of units, from 1.1 million in 1979 to 485,559 units in 1983. In terms of value, purchases fell from $283.5 million in 1979 to $101.9 million in 1983, reflecting decreased railroad activity.

Table VIII-16.--Cast steel rail truck components: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign produced castings, 1981-84

Reason for purchase	U.S.-made rail truck components	Foreign-made rail truck components
Lower purchase price (delivered)	4	2
Cost of tooling/patterns	8	-
Shorter delivery time	3	-
Availability	1	1
Servicing	3	-
Favorable terms of sale	6	-
Favorable product guarantees	5	-
Favorable exchange rates	-	-
Historical supplier relationship	2	-
Product performance features:		
Superior design	6	-
Quality	7	-
More durable	8	-

1/ Ranking numbers range from 1 to 8, number 1 indicating the most important reason for purchasing and number 8 indicating the least important reason for purchasing.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Pricing considerations

U.S. purchasers of domestically produced cast-steel rail truck components gave specific price information on a cast-steel side frame for a 100-ton railcar and for a complete carset 1/ for a 100-ton railcar. Data provided by these purchasers indicate that the average lowest net delivered price for this cast-steel side frame during the period fluctuated between $445.95 and $547.00 (table VIII-18).

Table VIII-17.--Cast-steel rail truck components: Purchases of U.S.-produced and foreign-produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (units)	
1979	1,117,592	26,730
1980	1,003,548	32,975
1981	825,886	3,881
1982	538,579	1,805
1983	485,559	572
	Value (1,000 dollars)	
1979	283,479	37,307
1980	279,273	10,072
1981	196,050	962
1982	121,138	556
1983	101,903	564

Source: Compiled from data submitted in response to questionnaires of the International Trade Commission.

U.S. purchasers of these side frames did not provide comparable data for imported products. The price for a complete carset for a 100-ton railcar was cited by purchasers as $1,746.00 in 1981, $1,846.50 in 1982, and $1,990.00 in 1983. Data regarding import prices for these carsets are not available.

1/ Each carset consists of four side frames and two bolsters.

Table VIII-18.--Cast-steel rail truck components: Average lowest net delivered prices, reported by purchasers, 1981-83

(Price per unit)

	Cast-steel side frame for a 100-ton railcar		Carset for 100-ton railcar	
	Domestic	Foreign	Domestic	Foreign
1981:				
January-March	$504.00	1/	$1,746.20	1/
April-June	504.00	1/	1,746.20	1/
July-September	504.00	1/	1,746.20	1/
October-December	445.95	1/	1,746.20	1/
1982:				
January-March	445.95	1/	1,846.50	1/
April-June	445.95	1/	1,846.50	1/
July-September	547.00	1/	1,846.50	1/
October-December	547.00	1/	1,846.50	1/
1983:				
January-March	547.00	1/	1,990.00	1/
April-June	529.00	1/	1,990.00	1/
July-September	529.00	1/	1,990.00	1/
October-December	529.00	1/	1,990.00	1/

1/ Not available.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The cost of tooling and patterns is believed to be generally higher in the United States than in foreign countries, primarily because of higher wage rates in the United States. These higher costs increase the cost of the finished product.

U.S. producers and importers of cast-steel rail truck components reported that they require net payment from purchasers in 30 days or less. Some producers and importers indicated they provide prepaid freight and discounts for volume purchases. Producers also reported giving discounts for prompt payment; importers did not.

Neither importers nor producers of cast-steel rail truck components reported any significant adverse or beneficial effect on their business due to exchange-rate changes. A few producers, however, stated that the artifically low value of the yen gave Japanese railcar castings a slight price advantage over comparable U.S.-made products.

Product performance features

U.S. producers and importers, in response to the Commission's questionnaire, indicated that design characteristics of U.S.-made and foreign-made cast-steel rail truck components are basically comparable. This is due in large part, to the stringent AAR testing requirements necessary to sell most rail castings to U.S. railroads. Additionally, the somewhat standardized nature of wheels, couplers, and yokes makes design characteristics less diverse. The quality and durability of imported and U.S.-produced cast-steel rail truck components were rated basically equal by both importers and producers responding to the Commission's questionnaire. The AAR approval requirements are the primary factor for this equality.

Market response

U.S. producers reported that delivery time for U.S.-produced cast-steel rail truck components was shorter than comparable foreign-made castings. Importers were divided on this issue, with some giving the advantage in delivery time to the U.S. industry, and others indicating that they were equally competitive with the U.S. industry in this area. Both U.S. producers and importers maintain inventories to help decrease delivery time. Availability, however, was reported by importers and domestic producers to be better for U.S.-made railcar castings. U.S. purchasers also agree with this assessment.

U.S. producers and importers indicated that the domestic industry has better servicing capabilities than its foreign competitors. U.S. purchasers generally agree, citing the numerous geographical locations where the U.S. industry performs necessary service work. Additionally, domestic producers and importers unanimously agreed that U.S. foundries have a competitive advantage in the area of historical supplier relationship.

U.S. producers' responses to import competition in the U.S. market

In response to import competition in the U.S. market, 45.5 percent of U.S. producers indicated that they did not take any action because imports have not been significant enough to warrant any special actions (table VIII-19). According to these producers, imports have only been a factor in the domestic market during periods of peak demand. Lowering prices or reducing plans to expand capacity were cited by 27.3 percent of domestic producers. Approximately 18.2 percent of the producers responding to the Commission's questionnaires indicated that they took no action because they had already shifted production to other lines of castings, and that they implemented cost-reduction efforts and improved product quality. The least significant response, indicated by 9.1 percent of producer respondents, stated that they closed production lines due to imports. However, cast-steel rail truck components were not the primary casting product produced by this firm.

Table VIII-19.--Cast steel rail truck components: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses (percent)
	Percent
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	-
Had already shifted production to other lines of castings	18.2
Lacked capital funds to counter foreign competition	-
Other (no action necessary)	45.5
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	27.3
Reduced or dropped plans to expand capacity	27.3
Cut back production	-
Closed production lines or manufacturing	9.1
Shifted to more advanced types of castings	-
Implemented cost-reduction efforts	18.2
Improved quality of the products	18.2
Imported	-
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaries of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

U.S. producers provided little or no information regarding competitive conditions in foreign markets. The majority of the domestic producers indicated, in their responses to the Commission's questionnaires, that they do not consider foreign markets an important segment of their business. One producer indicated that it did not attempt to sell in foreign markets because some carbuilders and most railroads are government owned, and therefore are more likely to buy domestically produced cast-steel rail truck components. However, a few producers indicated that they are at a competitive disadvantage in comparison with producers in Brazil, Japan, Korea and Mexico (table VIII-20). The major factors indicated by these producers as the reasons for this overall competitive disadvantage included foreign industries' lower delivered price, lower cost of tooling, more favorable terms of sale, and more favorable exchange rates. In terms of product performance features, U.S. producers responded that U.S.-made and foreign-made products are comparable in design, quality and durability.

Table VIII-20.--Cast steel rail truck components: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-83

Item	Competitive advantage 1/			
	Brazil	Japan	Korea	Mexico
Overall competitive advantage	F	F	F	F
Lower purchase price (delivered)	F	F	F	F
Cost of tooling/ patterns	F	F	F	F
Shorter delivery time	S	D	F	D
Availability	S	S	F	S
Servicing	S	S	S	S
Favorable terms of sale	F	F	F	F
Favorable product guarantees	S	S	S	S
Favorable exchange rates	F	F	F	F
Historical supplier relationship	S	D	S	S
Product performance features:				
Superior design	S	S	S	S
Quality	S	S	S	S
More durable	S	S	S	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to increased competition in foreign markets

The only action that 2 U.S. producers indicated they took in response to increased competition in foreign markets was to lower prices or suppress price increases to maintain their market share.

IX. CAST-COPPER VALVES

Description and Uses

Cast-copper valves are pressure-containing devices designed to control the flow of fluid media, such as liquids, gases, vapors, or solids in suspension, and are made from copper or copper-base alloys (metals in which the copper content is, by weight, less than 99.3 percent, but not less than any other metallic element). A number of engineering and manufacturing associations establish minimum standards for valves that apply to the alloys and their physical properties as well as to design and application "musts," such as pressure classes, threads, and flange dimensions.

Materials used to make valves must be selected for tensile strength, especially at elevated temperatures; resistance to corrosion; service without leaching action, which might cause discoloration or impart a taste to the media involved; and economic feasibility. The following alloys, along with their reasons for use, are consistently utilized in producing cast-copper valves. The leaded red brasses and semi-red brasses (76 to 85 percent copper, 5 to 15 percent zinc, 5 to 7 percent lead, and 3 to 5 percent tin) are the most widely used because they offer corrosion resistance, machinability, moderate strength, and good casting characteristics. The leaded yellow brasses (63 to 72 percent copper, 24 to 34.7 percent zinc, 1 to 3 percent lead, 1 percent tin, and 0 to .3 percent aluminum) are characterized by their yellow color, good polishing and machining characteristics, and relatively low cost. However, they only possess moderate strength and are used largely in castings that do not have stringent engineering requirements. Silicon bronze and silicon brass (82 to 92 percent copper, 4 to 14 percent zinc, 4 to 5 percent silicon, and 0 to 1 percent manganese) exhibit corrosion resistance, melt fluidity, clean pouring, minimum dross formation, and unusually clean casting surfaces. Tin bronze and leaded tin bronze (87 to 88 percent copper, 6 to 10 percent tin, 1 to 2 percent lead, and 2 to 4.5 percent zinc) are often used in castings subject to liquid or gas pressures (such as valves) because of their good mechanical properties and corrosion resistance. These high-quality castings must be free of internal porosity, shrinkage, or other defects. Aluminum bronze (81 to 89 percent copper, 9 to 11 percent aluminum, 1 to 4 percent iron, 0 to 5 percent nickel, and 0 to 1 percent manganese) offers high strength and hardness, corrosion resistance, good wearing qualities, and fatigue resistance. The alloys are well suited for service at temperatures up to 750°F. Cupro-nickels (67 to 86.6 percent copper, 10 to 30 percent nickel, 1 to 1.4 percent iron and 1 percent each of columbium and manganese) are used where corrosion resistance, weldability, and mechanical properties are required.

According to the Valve Manufacturers Association, there are 11 types of valves classified by 4 categories: multiturn valves, quarter-turn valves, self-actuated valves, and control valves.

Multiturn valves include gate, globe, pinch, diaphragm, and needle valves. Gate valves are general service valves used primarily for on-off, nonthrottling service. Gate valves are closed by a flat face, vertical disc, or gate that slides down through the valve to block the flow. Globe valves are used for on-off service and handling clean-service throttling applications.

Globe valves close by lowering a plug with a flat or convex bottom onto a matching horizontal seat in the center of the valve. Pinch valves are used on slurries or liquids with large amounts of suspended solids. Pinch valves seal by means of one or more flexible elements that can be pinched to shut off flow. Diaphragm valves handle corrosive, erosive, and dirty services. Diaphragm valves close by lowering the valve stem with a flexible diaphragm attached to a compressor onto a weir. Needle valves are volume control valves that restrict flow in small lines. The fluid going through needle valves turns 90 degrees and passes through an orifice (positioning the cone in relation to the seat changes its size) that is the seat for a rod with a cone-shaped tip.

Quarter-turn valves are plug, ball, and butterfly valves. Plug valves are used primarily for on-off service and some throttling services. Plug valves control flow by a quarter turn of a cylindrical or tapered plug with a hole in the center that lines up with the flow path of the valve to permit flow. Ball valves are used for on-off and some throttling services. Ball valves operate similarly to plug valves but use a rotating ball with a hole through it that is rotated 90 degrees to block the flow passage. Butterfly valves are used both for on-off and throttling services. Butterfly valves control flow by using a circular disc or vane with its pivot axis at right angles to the direction of flow in pipes.

Self-actuated valves are check and relief valves. Check valves are designed to prevent backflow. Fluid flow in the desired direction opens the valve, while backflow forces the valve closed. Relief valves are designed to provide protection from overloading steam or gas lines. Relief valves "let off steam" when safe pressures are exceeded, then close again when pressure drops to a preset level.

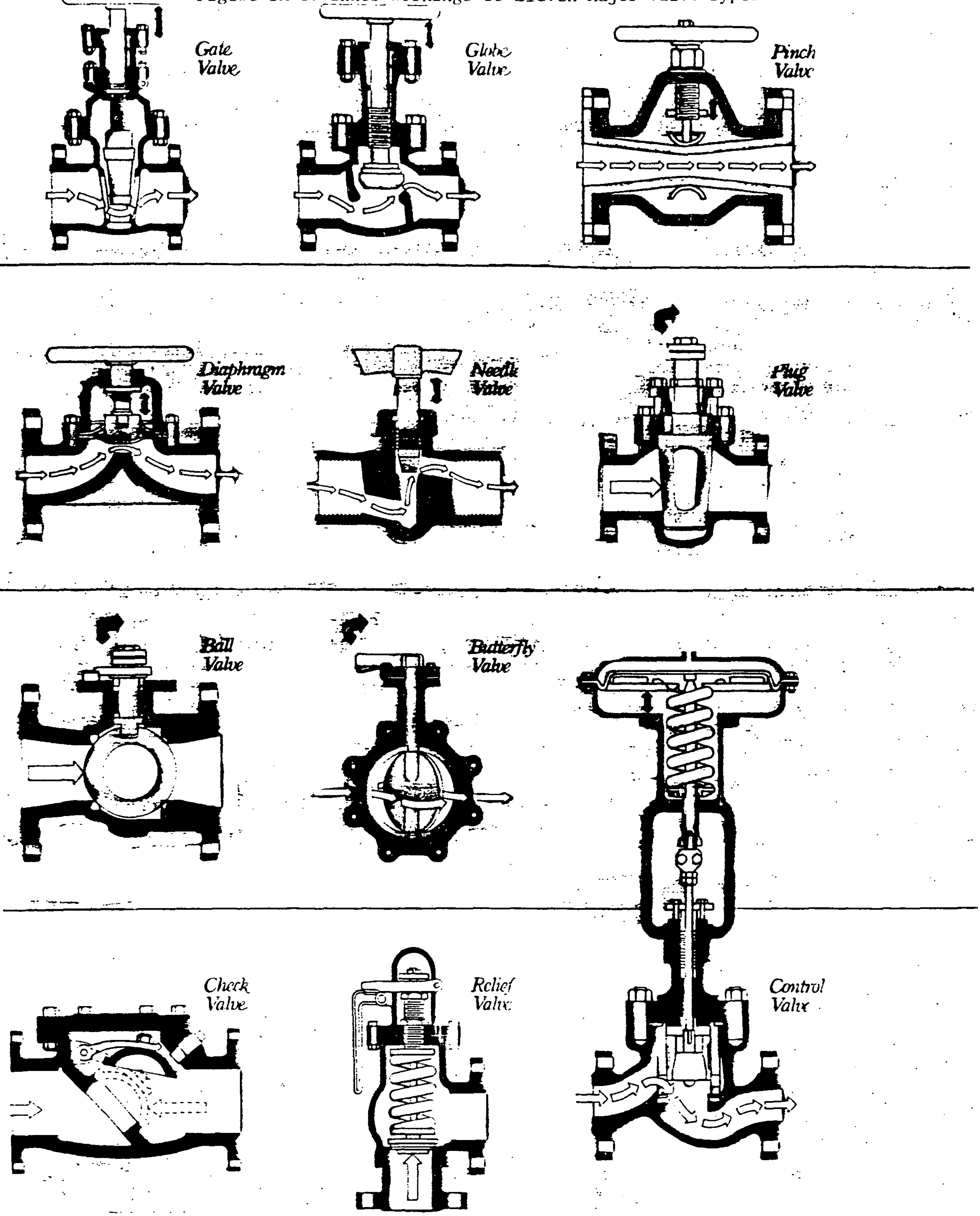
Control valves are designed to ensure an accurate, proportioned control of flow. Control valves automatically vary the rate of flow on the basis of signals they receive from sensing devices in a continuous process.

Figure IX-1 shows the inner workings of the valves described above. There are no apparent physical differences between leading import and domestic valves. An external view of the most prominently traded valves (gate, globe, check, butterfly, and ball valves) is provided in figure IX-2. Of these valves, gate valves are the most widely used valves in industrial applications and the type most affected by imports. Figure IX-3 shows the parts of a typical bronze gate valve. The cast parts include the body (the largest and most visible part), disc, bonnet, stem, and packing nut.

Valves are available in a broad spectrum of sizes and materials. They can range in size from a fraction of an inch to as large as 30 feet in diameter and can vary in complexity from a simple brass valve to a precision-designed, highly sophisticated coolant system control valve, made of an exotic metal alloy. They can withstand temperatures from those in the cryogenic region to those of molten metal, and pressures from high vacuum to thousands of pounds per square inch.

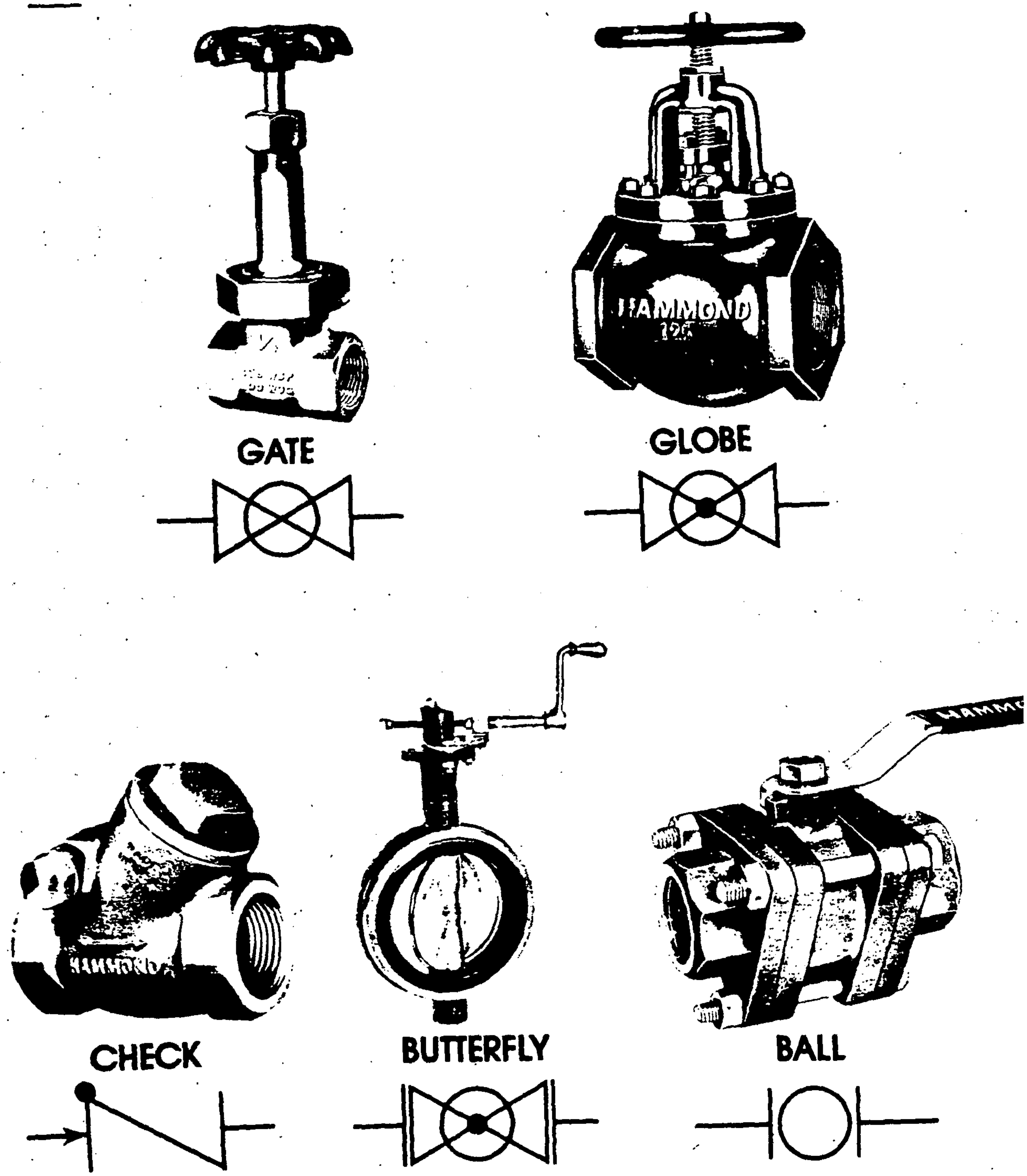
Each valve design has its own advantages, and selection of the proper valve for a particular application is critical. Because of this, customers and manufacturers generally work together to determine the particular valve

Figure IX-1.-Inner Workings of Eleven Major Valve Types



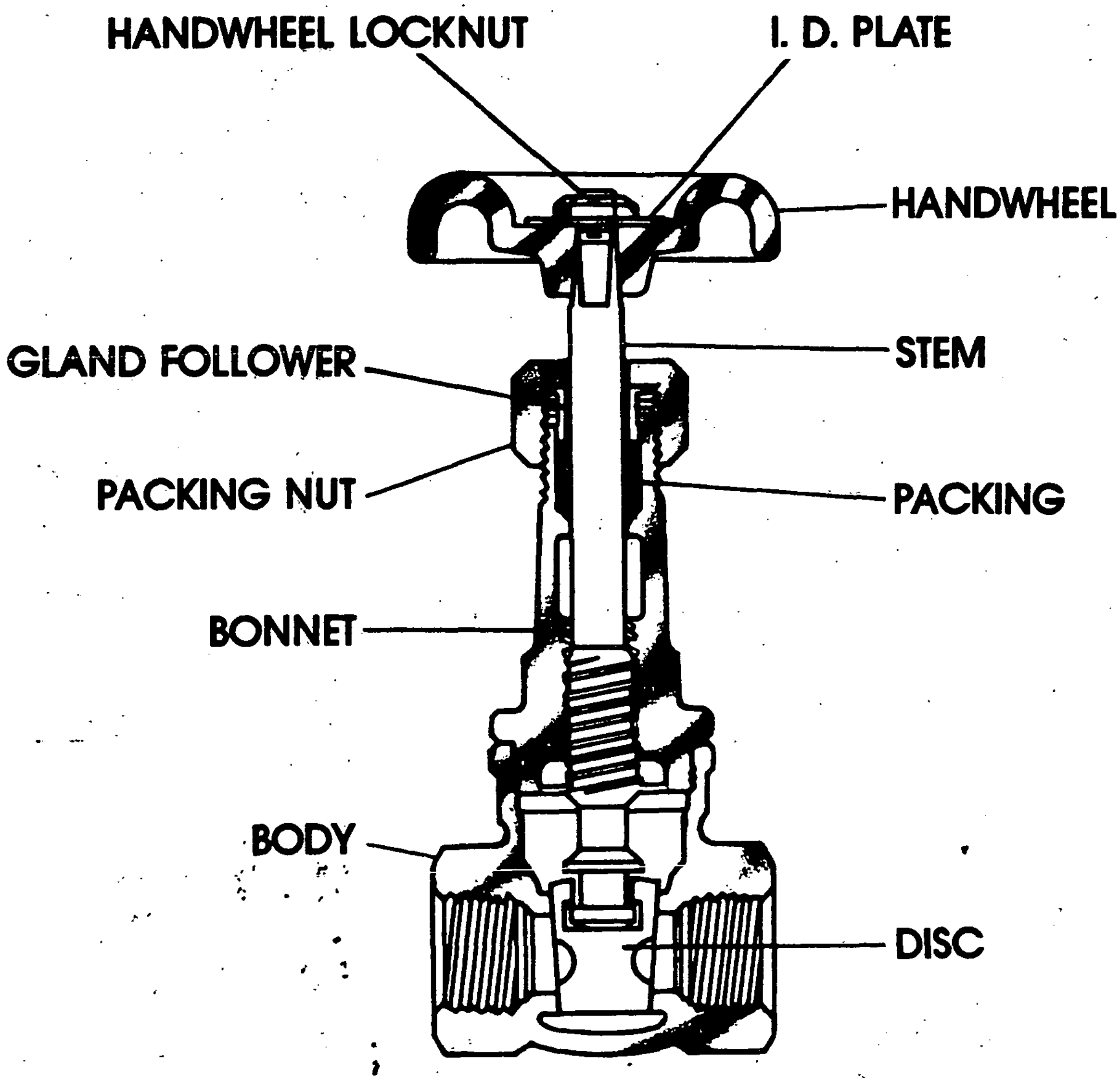
Source: Valve Manufacturers Association

Figure IX-2.-External View Of Five Most Prominently Traded Valves



Source: Hammond Valve Corp.

A TYPICAL BRONZE GATE VALVE IS COMPOSED OF THESE PARTS:



Source : Hammond Valve Corporation

best suited for the application. The criteria generally considered in the selection of a valve and its principal end-use are: the substance to be handled and the required flow rate; the requirement that the valve control and/or shut off the flow in the manner needed by the service conditions; the ability of the valve to withstand the maximum working pressure and temperature; the ability of the valve to resist attack by corrosion or erosion; actuator requirements; and maintenance and repair requirements.

Foundries design, develop, and produce the raw castings that will be machined to provide the body and components of a valve. Four casting processes are most often used: sand (green, dry, carbon dioxide, no-bake), shell mold, investment, and die casting. Currently, sand-casting methods account for the largest number of cast-copper valves. Figure IX-4 shows diagrams of the aforementioned casting processes.

Scrap copper is the raw material feed used in the melting and casting portions of cast-copper valve production. This operation is completely in-house. First, pattern molds are designed and made to specification. Then, if needed, cores (sand inserts around which metal forms a pattern) are made, cleaned, and sorted. Scrap copper is melted in huge furnaces. The melt is tested, minor quantities of other metals are added, and the melt is sampled until the proper alloy composition is achieved. Cores are then laid in the molds, and molten copper is poured in. Once the metal solidifies, it is freed from the mold. The product, a valve body, is cleaned, ground, and sorted. It is then analyzed by spectrometer for quality control. Valve bodies must be imprinted with an identifiable pressure rating, size identifier, metal type, and manufacturer identity. Some valve bodies will also have the customer's name imprinted. They are then inventoried. For many smaller foundries, the manufacturing process ends here.

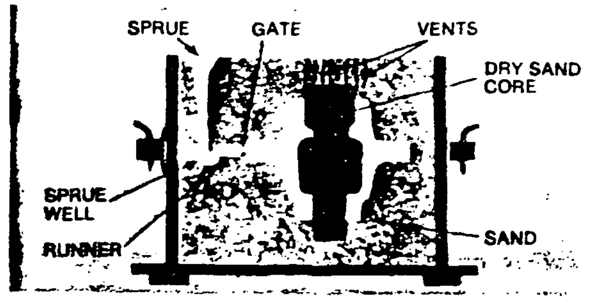
For the larger foundries that are becoming increasingly automated, or the many valve companies that operate their own foundries, machining and assembling operations are also done in-house. In machining, the valve bodies are threaded, weighed, and then warehoused. In assembling, screw machine parts are added to the valve bodies, and the product is prepared for finished-goods warehousing. At this stage, the cast-copper valve is ready for shipment to the end-use customer.

Customs Treatment

U.S. tariff treatment

Tariff provisions and duty rates applicable to cast-copper valves are found in part 4, subpart J, of schedule 6 of the Tariff Schedules of the United States (TSUS). Detailed tariff descriptions are shown in appendix E. Table IX-1 shows the pre-Multilateral Trade Negotiation (MTN) rates of duty that apply to imports of cast-copper valves from those countries having most-favored-nation (MFN) status (col. 1), the negotiated column 1 rates of duty under the most recent MTN, and the rates of duty that apply to imports from countries designated in the TSUS as being under Communist domination or control (col. 2). The Generalized System of Preferences (GSP) provides for duty-free treatment of eligible articles imported directly from designated beneficiary developing countries. Eligible articles are identified in the column entitled "TSUS item No." by an "A" or "A*".

Figure IX-4.-Most Often Used Casting Processes



Green sand mold, closed and ready to pour.

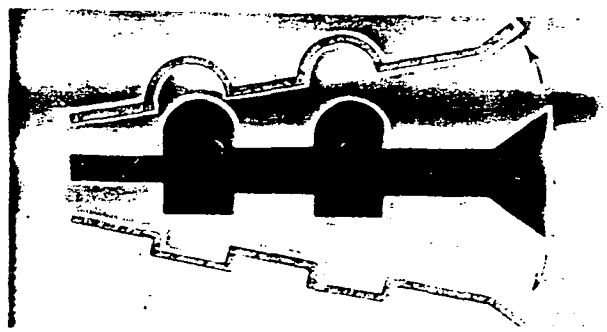


Diagram of the shell molding process.

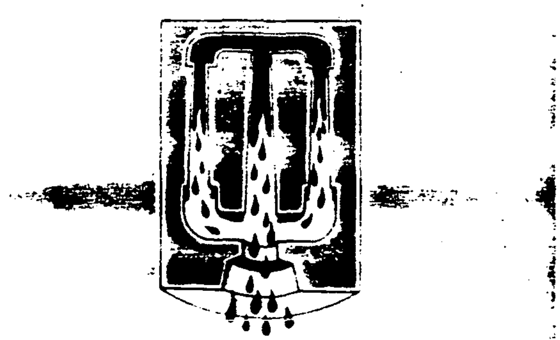


Diagram of investment casting, involving a wax pattern that is melted out of the hardened mold.

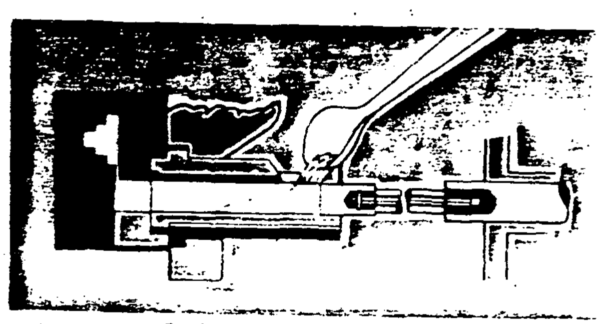


Diagram of die-casting process.

Source: ASARCO, Inc.

Table IX-1.--Cast-copper valves: U.S. rates of duty, by TSUS items

(Cents per pound; percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1-- 1980	1981	1982	1983	1984	1985	1986	1987	Col. 2 rate of duty
680.14A	Taps, cocks, valves, and similar devices, however operated, used to control the flow of liquids, gases, or solids, all the foregoing and parts thereof, of copper.	0.6¢ + 9%	8.8%	8.4%	7.9%	7.5%	7%	6.5%	6.1%	5.6%	47%.
680.16	Taps, cocks, valves, and similar devices, ..., if Canadian article and original motor-vehicle equipment.	Free	3/	3/	3/	3/	3/	3/	3/	3/	4/

1/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP) and that all beneficiary developing countries are eligible for the GSP.

2/ Rate effective prior to Jan. 1, 1980.

3/ Rate not negotiated in the Tokyo round of the Multilateral Trade Negotiations.

4/ Not applicable.

On January 23, 1984, a petition was filed with the U.S. International Trade Commission and the U.S. Department of Commerce by counsel on behalf of Badger-Powhatan, a division of Figgie International, Inc., Charlottesville, Va., alleging that an industry in the United States is material injured, or is threatened with material injury, by reason of imports from Italy of brass interior fire-protection products, that are allegedly being sold at less than fair value prices. Accordingly, the Commission instituted a preliminary investigation under section 733(a) of the Tariff Act of 1930, to determine whether there is a reasonable indication that an industry in the United States is materially injured, or is threatened with material injury, or the establishment of an industry in the United States is materially retarded, by reason of the importation of certain valves, nozzles, and connectors of brass from Italy for use in fire-protection systems, provided for in items 657.35, 680.14, or 680.27 of the TSUS.

On the basis of the record developed in investigation No. 731-TA-165 (Preliminary), the Commission determined on March 1, 1984, pursuant to section 733(a) of the Tariff Act of 1930 (19 U.S.C. 1637b(a)), that there is a reasonable indication that industries in the United States are being materially injured by reason of imports from Italy of fire-hose couplings, fog/straight stream nozzles, angle-type hose valves, wedge disc hose gate valves, single and double clapper siamese fire department connections, and pressure restricting valves, all of the foregoing of brass and for use in fire-protection systems, provided for in items 657.35, 680.14, or 680.27 of the TSUS, which are allegedly being sold in the United States at less than fair value (LTFV). The Commission further determined that there is a reasonable indication that an industry in the United States is threatened with material injury by reason of imports from Italy of pressure-regulating valves of brass, provided for in item 680.27 of the TSUS, which are alleged to be sold in the United States at LTFV.

On January 23, 1984, the U.S. Department of Commerce also initiated an antidumping investigation on the above case. The U.S. Department of Commerce made an affirmative preliminary determination on July 2, 1984, that certain valves, couplings, nozzles, and connections of brass, from Italy, suitable for use in interior fire-protection systems, provided for in items 657.35, 680.14, or 680.27 of the TSUS, are being, or are likely to be, sold in the United States at LTFV.

The Department of Commerce will make its final determination of sales at less than fair value in this case on or before September 17, 1984, and the Commission will make its final injury determination by November 6, 1984.

Foreign tariff treatment

Most of the major trading countries (the United States and Canada are exceptions) use the Customs Cooperation Council Nomenclature (CCCN) as the basis for their tariff classifications. Cast-copper valves are found in chapter 84 of the CCCN.

In the Canadian tariff schedules, cast-copper valves are classified in item 35200-1 (brass and copper nails, tacks, rivets and burrs or washers; bells and gongs, n.o.p.; and manufactures of brass or copper, n.o.p).

The present and negotiated rates of duty for Canada, Saudi Arabia, the European Community (EC), and Taiwan--major markets for U.S. exports of cast-copper valves--are shown in table IX-2.

Profile of the U.S. Industry and Major Foreign Competitors

United States

There are approximately 484 companies with 500 establishments producing brass, bronze, and copper castings in the United States, according to the latest Census of Manufactures. Of these, it is estimated that about 100 firms, or 20 percent, currently produce cast-copper valves. The majority of these foundries were located in California, Pennsylvania, Illinois, New York, and Ohio.

The brass, bronze, and copper foundries produce rough and semifinished castings for use as raw materials to cast-copper valve manufacturers, which, in turn, produce primarily brass and bronze plumbing and heating valves and industrial valves. Most of the copper foundries producing castings for copper valves are small, jobbing-type foundries producing on order only. There are, however, a few large foundries (many of which are linked to valve manufacturers) that mass produce copper valve castings for captive consumption or sale to valve manufacturers. Foundries producing copper valve castings have tended to have multiple product lines because of the low unit value and highly competitive nature of the copper valve market, whereas cast-copper valve manufacturers have remained specialized in the production of these products. It is estimated that the production of copper valve castings represents 25 to 33 percent of total brass, bronze, and copper foundry production.

In response to Commission questionnaires on changes within the valve industry structure, one plant opening and one plant liquidation and subsequent purchase and reopening was reported. One firm reported that all of its high-volume work would be purchased overseas beginning in 1984 (affecting 30 jobs), while another firm reported eliminating 5 product lines, including valve body castings.

A more detailed look at the cast-copper valve industry, as provided in responses to Commission questionnaires, follows:

U.S. production, capacity, and capacity utilization.--Domestic production of copper valve castings declined 7 percent during 1979-83. Production was 21.3 million castings in 1979, peaked at 23.2 million castings in 1981, and then declined to 19.8 million castings in 1983 (table IX-3). Continued replacement of brass and bronze by stainless steel, lined (teflon, glass, porcelain) ductile iron, and plastic valves have contributed to the production decline.

Domestic production capacity for copper valves rose 16 percent during 1979-83, increasing from 31.4 million cast-copper valves in 1979 to 36.5 million cast-copper valves in 1983 (table IX-3). The bulk of the increase in domestic production capacity was attributable to the upgrading of machinery and equipment in manufacturing facilities, which increased efficiency,

Table IX-2.--Cast-copper valves: Selected rates of duty, present and negotiated, in principal foreign markets for U.S. exports

Market	Description of commodity and foreign tariff item number	Present rate of duty 1/	Negotiated rate of duty 2/
Canada	Brass and copper nails, tacks, rivets and burrs or washers; bells and gongs, n.o.p.; and manufactures of brass or copper, n.o.p. (35200-1).	12.9% ad val.	10.2% ad val.
Saudi Arabia	Taps, cocks, valves, and similar appliances, for pipes, boiler shells, tanks, vats, and the like, including pressure-reducing valves and thermostatically controlled valves (84.61):		
	A. Taps and cocks for fire-fighting.	Free	3/
	B. Valves for cylinders (transportation).	4% ad val.	3/
		4% ad val.	3/
	C. Accessories for pipes	4% ad val.	3/
	D. Other	4% ad val.	3/
EC	Taps, cocks, valves, and similar appliances, for pipes, boiler shells, tanks, vats, and the like, including pressure-reducing valves and thermostatically controlled valves (84.61):		
	A. Pressure-reducing valves.	5% ad val.	4.4% ad val.
	B. Other	5.3% ad val.	4.6% ad val.
Taiwan	Taps, cocks, valves, and similar appliances, for pipes, boiler shells, tanks, vats, and the like, including pressure-reducing valves and thermostatically controlled valves (84.61):		
	1. Small valves not for industrial use.	45% ad val.	3/ 4/
	2. Fire hydrants	5% ad val.	3/ 4/
	3. Wooden taps	45% ad val.	3/ 4/

See footnotes at end of table.

Table IX-2.--Cast-copper valves: Selected rates of duty, present and negotiated, in principal foreign markets for U.S. exports--Continued

Market	Description of commodity and foreign tariff item number	Present rate of duty 1/	Negotiated rate of duty 2/
Taiwan--Con.--	Taps, cocks, valves, and similar appliances, for pipes, boiler shells, tanks, vats, and the like, including pressure-reducing valves and thermostatically controlled valves (84.61)--Continued:		
	4. Valves in tubes		
	A. Bicycle	15% ad val.	3/ 4/
	B. Motorcycle	35% ad val.	3/ 4/
	C. Other motor vehicle	35% ad val.	3/ 4/
	5. Other	15% ad val.	3/ 4/

1/ Rates currently applicable to imports from the United States.
2/ Final rates negotiated under the Multilateral Trade Negotiations.
3/ Rate not negotiated in Tokyo round of the Multilateral Trade Negotiations.
4/ The United States has negotiated bilateral trade rate reductions with Taiwan on an ad hoc basis. No schedule applies to these rate reductions.

economies of scale, and output through technological transformation and automation (table IX-4). As a result of increasing production capacity coupled with declining domestic production, domestic capacity utilization has declined 20 percent during the 5-year period, dropping from 67.8 percent in 1979 to 54.3 percent in 1983 (table IX-3).

Table IX-3.--Cast-copper valves: U.S. production, capacity, and capacity utilization, 1979-83

Item	1979	1980	1981	1982	1983
Production------units--	21,305,313	21,222,277	23,173,218	17,977,574	19,809,809
Production capacity units--	31,431,000	31,360,000	32,604,000	34,044,000	36,502,000
Capacity utilization percent--	67.8	67.7	71.1	52.8	54.3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IX-4.--Cast-copper valves: Machinery and equipment in manufacturing facilities of reporting producers, by age of machine, as of Jan. 1, 1984

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	8	4	17	29	20
Molding lines:					
Automated	1	4	3	7	0
Manual	1	5	3	9	72
Total	10	13	23	45	92

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--Employment by domestic copper valve casters trended downward during 1979-83 (table IX-5), reaching its highest level in 1979 and its lowest level in 1983. The hours worked by these employees declined 33 percent in the period from 5.2 million in 1979 to 3.5 million in 1983.

Table IX-5.--Cast-copper valves: Number of employees and production and related workers in operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons	3,630	3,160	3,230	2,670	2,421
Production and related workers	2,935	2,511	2,604	2,128	1,889
Man-hours worked---1,000 hours	5,222	4,455	4,967	3,585	3,513
Wages paid-------1,000 dollars	35,128	32,954	37,670	29,905	29,592

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The hourly wages paid to production workers in foundries producing cast-copper valves rose 25 percent during 1979-83, rising annually from $6.73 in 1979 to $8.42 in 1983 (see following tabulation). Total wages paid to these employees, however, declined 16 percent overall, reflecting declining employment levels. Some of this decline is attributable to automation and improved manufacturing efficiency. A comparison of wages paid to production workers in foundries producing cast-copper valves and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S. foundry industry received wages below the average for U.S. manufacturing establishments during 1981-83, as shown in the following tabulation (per hour):

	Foundries producing cast-copper valves 1/	All operating U.S. manufacturing establishments 2/
1979-------	$6.73	$6.00
1980-------	7.40	7.27
1981-------	7.58	7.99
1982-------	8.34	8.49
1983-------	8.42	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--Domestic shipments of cast-copper valves declined 13 percent in quantity during 1979-83. Domestic shipments rose from 22.6 million valves ($79.3 million) in 1979 to a peak of 22.8 million valves ($91.6 million) in 1981. Shipments declined during 1982-83 to 19.6 million valves ($75.5 million) reflecting the depressed level of economic activity in the major end-use, construction industry (table IX-6). The unit value of domestically shipped cast-copper valves rose 10 percent during 1979-83, beginning the period at $3.03 each and ending at $3.34 each. The domestic unit value reached a high of $3.55 each in 1981 and 1982. 1/

Table IX-6.--Cast-copper valves: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	
1979-----------	22,563,310	79,335	$3.03
1980-----------	21,295,788	85,260	3.52
1981-----------	22,750,069	91,648	3.55
1982-----------	18,192,872	74,089	3.55
1983-----------	19,551,827	75,478	3.34

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ Valves reported include a small portion of shipments reported by weight; therefore, unit valves derived from such data are somewhat overstated.

In response to Commission questionnaires, domestic casting producers indicated that they exported an average of 3 percent by quantity and value of total U.S. exports of cast-copper valves during 1979-83. The reported cast-copper valve exports of producer respondents declined 30 percent by quantity (although rising 40 percent by value) during 1979-83, as shown in the following tabulation:

	Quantity (1,000 units)	Value (1,000 dollars)
1979-------	304	1,072
1980-------	277	1,253
1981-------	252	1,118
1982-------	259	1,390
1983-------	213	1,503

According to official U.S. statistics (table IX-7), exports of cast-copper valves were sporadic, rising and falling in alternate years. Exports declined overall however, dropping 33 percent from 8.2 million units ($29.4 million) in 1979 to 5.5 million units ($27.4 million) in 1983. U.S. exports of cast-copper valves peaked at 14.6 million units ($55.2 million) in 1980 and were at their lowest level in 1983. Most exports were believed to be finished copper valves made by valve manufacturers and/or various middlemen (such as distributors and wholesalers).

The major foreign markets for U.S. exports of cast-copper valves are Canada and Saudi Arabia (both accounting for a 19-percent market share of U.S. exports). Other foreign markets of significance include the United Kingdom and Taiwan.

Table IX-7.--Cast-copper valves: U.S. exports of domestic merchandise, by principal markets, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (1,000 units)				
Canada	3,076	1,841	1,871	1,708	1,072
Saudi Arabia	597	2,052	928	1,002	1,078
United Kingdom	374	358	260	315	264
Taiwan	147	251	108	169	327
All other	4,106	10,061	6,341	6,946	2,789
Total	8,200	14,563	9,508	10,140	5,530
	Value (1,000 dollars)				
Canada	5,303	6,540	7,804	6,963	5,002
Saudi Arabia	3,014	8,042	3,518	4,240	3,940
United Kingdom	2,328	2,491	1,780	2,316	1,890
Taiwan	518	1,397	1,013	1,691	1,838
All other	18,224	36,762	35,073	30,662	14,774
Total	29,387	55,232	49,188	45,872	27,444
	Unit value				
Canada	$1.72	$3.55	$4.17	$4.08	$4.67
Saudi Arabia	5.05	3.92	3.79	4.23	3.66
United Kingdom	6.22	6.96	6.85	7.36	7.15
Taiwan	3.54	5.56	9.58	10.02	5.62
All other	4.44	3.65	5.53	4.41	5.30
Total	3.58	3.79	5.17	4.52	4.96

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. producers' inventories.--The combined end-of-period inventories of producer respondents decreased during 1979-83, as shown in the following tabulation:

	Quantity (units)
1979	1,881,905
1980	1,637,370
1981	1,649,920
1982	1,209,108
1983	1,203,454

U.S. producers' inventories of cast-copper valves declined during 1979-83, dropping 36 percent from 1,881,905 units in 1979 to 1,203,454 units in 1983. This declining trend reflects producers' adjustments to long-term changes in the copper valve market on the basis of continuous changes in material specification from brass and bronze, even with continuing low copper prices. This forecast, coupled with the high-interest costs of maintaining inventories in recent years, has resulted in the following inventory adjustments by many small-to-medium-size foundries: (1) conformance to jobber-type production policies rather than production-type policies, (2) switching production away from valves that are highly affected by imports, and (3) switching from producing a single product (valves) to producing multiple products. Other foundries have ceased producing cast-copper valves altogether.

Financial experience of U.S. producers.--U.S. producers' net sales of cast-copper valves, as reported in response to Commission questionnaires, showed an upward trend during 1979-81, rising 12 percent from $149.0 million in 1979 to $167.3 million in 1981, before declining 15 percent to $142.3 million in 1983 (table IX-8). Profitability of U.S. producers rose 12 percent during 1979-83, rising from $17.1 million in 1979 to $19.1 million in 1983. Cast-copper valve producers' profitability peaked at $21.7 million in 1980. The ratio of profit to net sales rose from 11.5 percent in 1979 to 13.4 percent in 1983. The lower cost of scrap copper, the increased operating efficiency of reporting establishments, the various cost-reduction efforts undertaken within the industry, 1/ and the exit of many unprofitable foundries all contributed to profitability improvement of U.S. cast-copper valve producers in 1983.

Table IX-8.--Cast-copper valves: U.S. producers' net sales and net profit (loss) on operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Net sales----------1,000 dollars--	149,018	157,084	167,317	139,909	142,250
Net operating profit or (loss) 1,000 dollars--	17,099	21,689	21,002	16,310	19,067
Ratio of net profit to net sales percent--	11.5	13.8	12.6	11.7	13.4

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers' capital expenditures rose from $6.3 million in 1979 to $12.5 million in 1982, before declining to $4.7 million in 1983. U.S. producers' expenditures on new machinery, equipment, and fixtures accounted for the bulk (90 percent) of their domestic capital expenditures during 1979-83, except in 1980 when 62 percent of their capital expenditures went to new machinery, equipment, and fixtures, while 34 percent went to buildings and leasehold improvements (table IX-9). U.S. producers'

1/ Discussed in detail on page IX-23 under "capital expenditures."

Table IX-9.--Cast-copper valves: U.S. producers' capital expenditures on domestic facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	28	314	39	0	
Buildings, leasehold improvements	456	2,797	664	111	2[illegible]
Machinery, equipment, and fixtures:					
New	5,841	5,039	6,764	12,289	4,2[illegible]
Used	20	17	112	56	[illegible]
Total	6,345	8,167	7,579	12,456	4,6[illegible]

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

capital expenditures almost doubled during 1979-82 as producers began updating their facilities (both plant and equipment); but expenditures declined by almost two-thirds in 1983, as foundries began implementing the improved technology, automation, computerization, and other techniques aimed at increasing efficiency, economizing output, and improving quality. U.S. producers' made no capital expenditures on facilities in other countries during 1979-83.

Research and development expenditures.--U.S. producers' research and development expenditures declined 44 percent from $267,000 in 1979 to $160,000 in 1983 (table IX-10). Most producers, in response to Commission questionnaires, indicated that they lacked the ability to attract funds and the capital availability needed for adequate research and development in developing new alloys, markets, and improved technology.

Table IX-10.--Cast-copper valves: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

(In thousands of dollars)

Year	Value
1979	267
1980	244
1981	277
1982	186
1983	160

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Major foreign competitors

The major foreign competitors for U.S. producers of cast-copper valves, according to import statistics, are Taiwan, Japan, and Italy.

Taiwan.--Taiwan is the United States' leading foreign competitor. According to the American Embassy in Taipei, the number of foundries producing cast-copper valves is unknown; however, 14 firms are reported to supply cast-steel and cast-copper gate valves, stop cocks, swing check valves, and ball valves. No other product-specific data are available on the cast-copper-valve industry in Taiwan.

Japan.--Japan is the United States' second leading foreign competitor. According to the American Embassy in Tokyo, the number of foundries producing cast-copper valves is unknown; however, of 11 firms cited as major manufacturers of nonferrous castings, 7 firms are believed to be capable of supplying cast-copper valves for industrial and plumbing use. Japanese production of copper and copper-alloy castings for the use of valves and cocks has reportedly been relatively stable, as shown in the following tabulation:

Year	Quantity (short tons)	Value (million dollars)
1979	42,000	150
1980	44,000	165
1981	41,000	153
1982	42,000	144
1983	40,000	144

Korea.--Korea was cited in U.S. importers' responses to Commission questionnaires as being a major foreign competitor for cast-copper valves. According to the American Embassy in Seoul, of 73 foundries (both ferrous and nonferrous) listed as the largest companies in Korea, only 1 firm with an annual production capacity of 12,000 metric tons reportedly produces copper- and copper-alloy-cast valves.

Structural Factors of Competition Between U.S. and Foreign Industries

In comparing the U.S. cast-copper valve industry with competitors in China, Japan, Italy, Taiwan, and Korea, U.S. producers are considered to have the competitive advantage largely in terms of marketing structure (channels of distribution, responsiveness to orders, and after-sale service capabilities), whereas foreign producers generally have the competitive advantage in fuel cost, raw material availability and cost, capital formation, labor availability and cost, and government-related assistance (table IX-11).

Table IX-11.--Cast-copper valves: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

Item	Competitive advantage 1/				
	China	Japan	Italy	Taiwan	Korea
Fuel:					
Availability	F	S	S	S	S
Cost	F	F	S	F	F
Raw material:					
Availability	F	F	S	S	F
Cost	F	F	S	S	F
Capital:					
Availability	F	F	F	S	F
Cost	F	F	S	S	F
Ability of industry profits to attract funds	F	F	F	S	F
Labor:					
Availability	F	F	S	S	F
Cost	F	F	F	F	F
Production technology	D	S	S	S	2/
Marketing:					
Channels of distribution	D	D	D	S	S
Responsiveness to orders	D	D	D	S	S
After-sale service capabilities	D	D	D	D	D
Government involvement:					
Subsidies	F	F	F	F	F
Research and development assistance	D	S	F	S	S
Tariff levels on imports	F	F	S	F	F
Nontariff barriers to imports	F	F	S	F	F
U.S. Government regulations that increase costs	F	F	D	F	F
Foreign government regulations that increase costs	F	F	S	F	F

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

There is a consensus that U.S. and foreign producers have comparable fuel availability, and government research and development assistance and that the United States is equal to or better than its major competitors in its application of production technology.

Although many valves can be mass-produced, there are many that require production to customer specification or certain quality assurances that give domestic producers an edge in dealing with domestic customers. Also, the location of domestic producers in close proximity to the major consumers gives them a competitive edge in lower transportation costs and in adjusting production schedules, delivery time, and customer service to enable greater flexibilty in accepting orders. These market structure advantages are reflected, to some extent, in the lower and less costly inventory levels maintained by domestic producers relative to U.S. importers (table IX-12). U.S. producers tend to maintain inventory levels at approximately one-third of those maintained by U.S. importers.

Scrap copper is the essential raw material utilized in producing cast-copper valves. Scrap copper is priced by suppliers at a discount from the primary refined copper world price, with allowances for transportation and alloy composition. The supply of scrap copper is determined by the amount of primary copper production and is traded throughout the world. Those countries with large primary refined copper-producing industries, such as the United States and Japan, tend to maintain a relative competitive advantage in raw material availability. Raw material cost, the largest cost component in producing cast-copper valves, tends to be fairly uniform worldwide. Foreign producers have a raw material cost advantage because their copper purchases are made on the basis of London Metal Exchange prices, which tend to be lower than U.S. prices.

The current application of foundry technology (such as automation and computerization) by the domestic producers has resulted in foundry operations becoming less labor intensive and more capital intensive. Due to a 25 percent rise in hourly wages, labor costs in the United States have remained proportionally the same despite declining employment, and still rank second to raw material costs in the production process. Overall, the average cost of labor in the United States was about 35 percent higher than comparable labor costs in foreign countries during 1979-82. 1/ Casting technology is widespread in terms of production processes, machinery and equipment usage, and general product specifications. There are many proprietary applications of in-house mold designing, tooling, machinery and equipment application, and certain specialized product production techniques. However, all of the major castings processes are utilized with unique variations both domestically and abroad. China's foundry industry, however, remains primarily labor intensive and has not adopted automation in line with other countries.

1/ Bureau of Labor Statistics, Hourly Compensation Costs for Production Workers, unpublished data, 1982.

Table IX-12.--Cast-copper valves: Inventories held by producers and importers, as of Dec. 31, of 1979-83

(In units)

Year	Producers' inventories	Importers' inventories
1979	1,881,905	3,170,574
1980	1,637,370	3,382,376
1981	1,649,920	3,864,198
1982	1,209,108	3,967,528
1983	1,203,454	4,282,904

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The U.S. Market

Channels of distribution for cast-copper valves are varied. As most valve manufacturers and other valve purchasers meet their requirements primarily by buying valve castings in bulk (large orders, short-term delivery, various sizes and shapes), distributors usually are better able to carry large inventories and offer more flexible credit terms and servicing to better satisfy valve purchasers' needs than U.S. producers or importers. As a result, most U.S. producers' and U.S. importers' shipments (61 and 80 percent, respectively) are made to distributors as shown in table IX-13. About 33 percent of U.S. producer shipments, probably those from foundries with machining and assembling capabilities or those captive foundries of valve manufacturers, go directly to original equipment manufacturers.

Table IX-13.--Cast-copper valves: Percentage distribution of U.S. producers' and importers' shipments, by channels of distribution, average 1981-83

Channel of distribution	Share of shipment	
	Producers'	Importers'
Machine shops/other fabricators	3	-
Distributors	61	80
Original-equipment manufacturers	33	6
Other	3	14
Total	100	100

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As shown in table IX-14, domestically produced and foreign-made cast-copper valves compete heavily for market share in the valve and pipe fittings end-use market. This market accounts for the bulk (93 percent) of U.S. producers' shipments and the bulk (71 percent) of U.S. importers' shipments. Foreign cast-copper-valve producers have found an additional niche in the plumbing equipment market, which accounts for the second largest market share for U.S. importers' shipments (26 percent).

Table IX-14.--Cast-copper valves: Percentage distribution of U.S. producers' and importers' shipments, by types of markets, average 1981-83

Type of market	Share of shipment	
	Producers'	Importers'
Motor vehicles	-	1/
Farm machinery and equipment	-	-
Mining machinery and equipment	-	-
Construction machinery and equipment	-	-
Refrigeration and heating equipment (except pumps and compressors)	4	3
Plumbing equipment	2	26
Railway equipment	-	-
Industrial machinery	1/	-
Machine tools	-	-
Valves and pipe fittings	93	71
Pumps and compressors	1	-
Other	1/	-
Total	100	100

1/ Less than 0.5 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption

The estimated value 1/ of domestic consumption of copper-valve castings declined 22 percent from $385 million in 1979 to $302 million in 1983 (table IX-15). The trend in consumption was irregular, however, with consumption peaking in 1980 at $388 million and declining to its lowest level in 1983 at $302 million. The demand for cast-copper valves is dependent on and derived from the economic health of its end-use industries, primarily the building and construction industry. The downward trend in consumption reflects the lackluster demand for these products from the building and construction industry, together with long-term changes in material specifications resulting in the replacement of brass and bronze in valves by other metals and plastics. As a result of relatively high copper prices during 1979-80, some applications were engineered away from copper- alloy valves, causing additional long-term market losses.

1/ Data were not available on a quantity basis.

Table IX-15.--Cast-copper valves: Domestic shipments, exports, imports, and apparent consumption, 1979-83

Year	Producers' shipments	Exports	Imports	Apparent consumption	Ratio (percent) of imports to consumption
	Value (1,000 dollars)				
1979	355,400	10,700	40,465	385,165	10.5
1980	356,000	10,700	42,312	387,612	10.9
1981	344,000	10,300	52,995	386,695	13.7
1982	290,300	8,700	52,039	333,639	15.6
1983	251,400	7,500	58,193	302,093	19.3

Source: Estimated from data supplied by the Valve Manufacturer's Association, official statistics of the U.S. Department of Commerce, and industry sources.

According to responses to Commission questionnaires, imports have increased their market share in the declining U.S. cast-copper-valve market. The share of imports in domestic consumption rose steadily throughout the period, from 10.5 percent in 1979 to 19.3 percent in 1983.

U.S. imports

U.S. foundries producing cast-copper valve bodies and parts express increasing concern in Commission questionnaires that downstream importing (the practice of foreign competitors converting copper valve body and parts castings into the finished valve assemblies abroad and then shipping them to the U.S.) will continue to have a significant impact on the U.S. cast-copper-valve market.

Although U.S. producers of cast-copper valves largely reported no imports of like items during 1979-83, one U.S. producer indicated that it began importing cast-copper valves in 1984 in order to counter competition from abroad. This U.S. producer ranked lower (delivered) purchase price and the lower cost of tooling and patterns as its principal reasons for importing (table IX-16).

Table IX-16.--Cast-copper valves: U.S. producers' ranking of product-related factors that were the principal reasons for their imports, 1984

Reason for importing	Ranking 1/
Lower purchase price (delivered)	1
Cost of tooling and patterns	2
Shorter delivery time	-
Availability	3
Servicing	4
Favorable terms of sale	-
Favorable product guarantees	-
Favorable exchange rates	-
Historical supplier relationship	-
Product performance features:	
Superior design	-
Quality	5
More durable	-

1/ Ranking numbers range from numbers 1 to 5, number 1 indicating the most important reason for importing and number 5 indicating the least important reason for importing.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission (on the basis of only one response).

Note.--Respondent began importing in 1984.

The quantity of imported cast-copper valves shipped into the United States, as reported by respondents to the Commission's importer questionnaire, 1/ rose 64 percent during 1979-83, as shown in the following tabulation:

	Quantity (units)	Value (1,000 dollars)
1979	6,878,601	9,340
1980	7,073,232	14,232
1981	8,752,725	16,800
1982	8,779,742	14,947
1983	11,259,171	18,440

According to official U.S. statistics (table IX-17), imports of cast-copper valves were irregular, falling and rising in alternate years. Imports increased overall, however, rising 26 percent from 19.7 million units ($40.5 million) in 1979 to 24.9 million units ($58.2 million) in 1983. U.S. imports of cast-copper valves were at their lowest level of 18.2 million units ($42.3 million) in 1980, and peaked in 1983.

1/ Reported imports represent an average of 36 percent of total import value during 1979-83.

Table IX-17.--Cast-copper valves: U.S. imports for consumption, by principal sources, 1979-83

Source	1979	1980	1981	1982	1983
	Quantity (1,000 units)				
Taiwan	8,562	7,435	10,797	9,224	14,274
Japan	3,373	3,150	3,294	3,033	2,773
Italy	2,442	2,237	2,408	2,394	2,184
West Germany	484	475	308	588	949
All other	4,790	4,898	4,532	4,997	4,695
Total	19,651	18,195	21,339	20,236	24,875
	Value (1,000 dollars)				
Taiwan	12,472	12,555	19,221	17,774	24,729
Japan	8,756	9,088	9,819	9,116	8,209
Italy	5,427	5,210	6,794	6,082	5,924
West Germany	2,288	2,971	2,007	4,179	4,656
All other	11,522	12,488	15,154	14,888	14,675
Total	40,465	42,312	52,995	52,039	58,193
	Unit value				
Taiwan	$1.45	$1.69	$1.78	$1.93	$1.73
Japan	2.60	2.89	2.98	3.01	2.96
Italy	2.22	2.33	2.82	2.54	2.71
West Germany	4.73	6.26	6.51	7.11	4.91
All other	2.41	2.55	3.34	2.98	3.13
Total	2.06	2.33	2.48	2.57	2.34

Source: Compiled from official statistics of the U.S. Department of Commerce.

Competitive Assessment of Product-Related Factors in the U.S. Market

U.S. producers and importers rank foreign competitors as having the overall competitive advantage in the U.S. market, principally on the basis of lower (delivered) purchase prices and lower cost of tooling and patterns. However, U.S. producers also point out that favorable terms of sale and exchange rates provide an additional price-related advantage to foreign products (table IX-18). The principal advantage of domestic products was noted by producers and importers to be associated with market response factors, although importers believe that Korea is a reliable supplier in terms of product availability and delivery time. Importers also believe that foreign products are comparable to the U.S. product in the area of product performance features.

Table IX-18.--Cast-copper valves: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made castings in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/									
	Taiwan		Japan		Korea		China		Italy	
	P	I	P	I	P	I	P	I	P	I
Overall competitive advantage	F	F	F	2/	F	F	F	2/	F	F
Lower purchase price (delivered)	F	F	F	2/	F	F	F	2/	F	F
Cost of tooling and patterns	F	F	F	2/	F	F	F	2/	2/	S
Shorter delivery time	2/	D	2/	2/	2/	S	2/	2/	2/	D
Availability	F	D	2/	2/	2/	S	2/	2/	2/	D
Servicing	2/	D	2/	2/	2/	D	2/	2/	2/	D
Favorable terms of sale	F	S	F	2/	F	S	F	2/	2/	S
Favorable product guarantees	F	D	F	2/	F	S	2/	2/	2/	D
Favorable exchange rates	F	S	F	2/	F	S	F	2/	F	F
Historical supplier relationship	2/	D	2/	2/	2/	D	2/	2/	2/	D
Product performance features:										
Superior design	2/	S	2/	2/	2/	S	2/	2/	2/	S
Quality	F	D	2/	2/	2/	S	2/	2/	2/	S
More durable	2/	S	2/	2/	2/	S	2/	2/	2/	S

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. purchasers indicated that most of their cast-copper valve purchases were of domestically-produced products whereas foreign produced products were reported as less than 1 percent by value of total purchases (table IX-19). In providing their reasons for purchasing foreign-made cast-copper valves, purchasers also indicated that lower (delivered) purchase price was most important, and they noted the quality of imports as a consideration (table IX-20). Purchasers ranked the greater market response of U.S. producers in terms of servicing, shorter delivery time, historical supplier relationship, and availability as their most important reasons for purchasing U.S.-made cast copper valves.

Table IX-19.--Cast-copper valves: Purchases of domestically produced and foreign-produced castings by U.S. purchasers, 1979-83

Year	U.S.-produced	Foreign-produced
	Quantity (units)	
1979	5,856,399	23,100
1980	6,564,756	21,074
1981	6,697,570	24,409
1982	5,209,329	20,678
1983	5,874,243	49,471
	Value (1,000 dollars) 1/	
1979	215,959	142
1980	257,581	166
1981	300,557	68
1982	297,877	204
1983	379,043	322

1/ Values includes some purchases reported by weight; therefore unit values derived from such data may be overstated.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table IX-20.--Cast-copper valves: Ranking 1/ of U.S. purchasers' reasons for purchases of domestically produced and foreign-produced castings, 1981-84

Reason for purchase	U.S.-made copper valves	Foreign-made copper valves
Lower purchase price (delivered)	9	1
Cost of tooling and patterns	-	-
Shorter delivery time	2	-
Availability	4	-
Servicing	1	-
Favorable terms of sale	7	2
Favorable product guarantees	6	-
Favorable exchange rates	-	
Historical supplier relationship	3	-
Product performance features:		
Superior design	8	-
Quality	5	3
More durable	-	-

1/ Ranking numbers range from 1 to 9, number 1 indicating the most important reason for purchase and number 9 indicating the least important reason for purchase.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. purchasers reported, in response to Commission questionnaires, that the average lowest net delivered price for domestically produced cast copper gate valves (4-inch, 125 psi) was $2.26 per pound in 1981 $2.24 per pound in 1982 and $2.38 per pound in 1983 (table IX-21). These purchasers also reported that the average lowest net delivered price for foreign-made cast-copper gate valves (4-inch, 125 psi) was $1.82 per pound in 1981 and 1982, and $1.87 per pound in 1983. In comparison, there was a price difference of 44 cents per pound in 1981 42 cents per pound in 1982 and 51 cents per pound in 1983 between domestically produced and foreign-made cast-copper gate valves (4-inch, 125 psi) in the U.S. market. On a unit basis, the limited data provided indicates a price differential of 17 cents in 1983.

Table IX-21.--Average lowest net delivered prices for cast-copper gate values (4-inch, 125 psi) reported by purchasers, by quarters, 1981-83

(Price per pound)

Period	Domestic price	Import price
1981:		
January-March	$2.32	$1.82
April-June	2.24	1.82
July-September	2.24	1.82
October-December	2.24	1.82
1982:		
January-March	2.28	1.82
April-June	2.28	1.82
July-September	2.21	1.82
October-December	2.21	1.82
1983:		
January-March	2.21	1.82
April-June	2.21	1.82
July-September	2.56	1.82
October-December	2.56	2.02

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers and importers reported in response to Commission questionnaires, that their terms of sale for cast-copper valves were net due in 30 days or less, prepaid freight, with discounts for volume purchases and prompt payment.

The location of domestic cast-copper-valve producers in closer proximity to their major customers gives them a competitive edge over foreign producers in market response and transportation costs. Transportation costs and product standards have played a key role in defining the U.S. market. Domestic producers are able to compete more effectively in the bulky, heavy valves that require higher freight costs and a high degree of product performance requirements; foreign producers cannot readily produce and competitively bear the prepaid freight expenses of such valves in the U.S. market. Foreign producers, on the other hand, have concentrated their efforts on low-cost, lightweight, higher volume valves for which freight costs are of relatively limited consideration in retaining price competitiveness in the U.S. market.

U.S. producers' responses to import competition in the U.S. market

As can be seen from table IX-22, U.S. producers' responses to import competition included primarily cutting back production (20 percent), implementing cost-reduction efforts (16 percent), lowering prices or suppressing price increases to maintain market share (13 percent), and improving the quality of their products (13 percent). Thirteen percent of U.S. producer respondents indicated that they lacked the capital funds needed to counter foreign competition.

Table IX-22.---Cast-copper valves: U.S. producers' responses to import competition in the U.S. market, 1981-84

(In percent)

Nature of response	Share of responses
Took no or few actions because of the following:	
Had already shifted production to more advanced type of castings	-
Had already shifted production to other lines of castings	3
Lacked capital funds to counter foreign competition	13
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	13
Reduced or dropped plans to expand capacity	8
Cut back production	20
Closed production lines or manufacturing	3
Shifted to more advanced types of castings	8
Implemented cost-reduction efforts	16
Improved quality of the products	13
Imported	3
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

U.S. producers considered their major competitors in foreign markets to be China, Japan, Taiwan, and Korea (table IX-23). There are relatively limited exports of cast-copper valves, representing an average of 3 percent of total copper-valve exports during 1979-83, and most exports are believed to be of finished copper valve assemblies made by valve manufacturers. Nevertheless, U.S. producers ranked their major competitors as having the overall competitive advantage, primarily in the areas of pricing considerations and market response.

Table IX-23.--Cast-copper valves: U.S. producers' competitive assessment of product-related factors of competition for the U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-83

	Competitive advantage 1/			
	China	Japan	Taiwan	Korea
Overall competitive advantage	F	F	F	F
Lower purchase price (delivered)	F	F	F	F
Cost of tooling and patterns	F	F	F	F
Shorter delivery time	2/	F	F	F
Availability	2/	F	F	F
Servicing	2/	F	F	F
Favorable terms of sale	2/	F	F	F
Favorable product guarantees	2/	F	F	F
Favorable exchange rates	F	F	F	F
Historical supplier relationship	2/	F	F	F
Product performance features:				
Superior design	2/	2/	2/	2/
Quality	2/	2/	2/	2/
More durable	2/	2/	2/	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As shown in table IX-24, 27 percent of U.S. producer respondents indicated that they lacked the capital funds to counter foreign competition in foreign markets and therefore took no or few actions to improve their position. Actions taken by U.S. producers to counter increased competition in foreign markets centered on cutbacks in production (20 percent) and improving the quality of products (20 percent), whereas other producers either lowered prices or suppressed price increases to maintain market share or implemented cost-reduction efforts.

Table IX-24.--Cast-copper valves: U.S. producers' responses to increased competition in foreign markets, 1981-84

(In percent)

Nature of response	Share of responses
Took no or few actions because of the following:	
Had already shifted production to more advanced type of castings	-
Had already shifted production to other lines of castings	-
Lacked capital funds to counter foreign competition	27
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	13
Reduced or dropped plans to expand capacity	7
Cut back production	20
Closed production lines or manufacturing	-
Shifted to more advanced types of castings	-
Implemented cost-reduction efforts	13
Improved quality of the products	20
Imported	-
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

X. CAST ALUMINUM TRANSMISSION CASES

Description and Uses

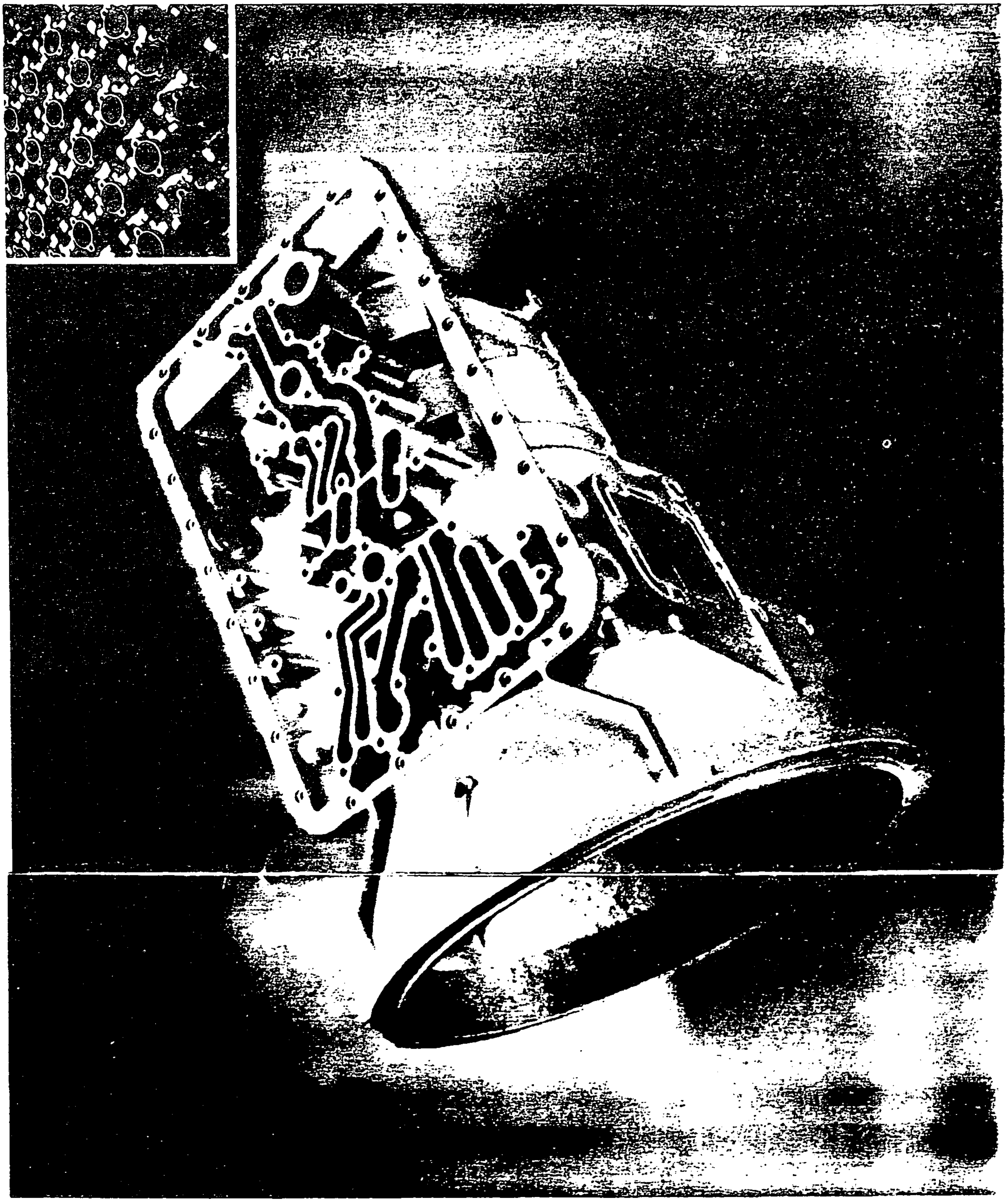
Cast-aluminum transmission cases are one-piece, 12-to-20-pound, die-cast units that house the complex transmission components for many front-wheel-drive, rear-wheel-drive automatic and automatic-overdrive motor-vehicle transmissions. Figures X-1 and X-2 show examples of some of the varieties of cast-aluminum transmission cases currently in production. There are no typical dimensions for cast-aluminum transmission cases as they are produced in various sizes and shapes as specified by the motor-vehicle manufacturers on the basis of their requirements for different vehicle models. Cast-aluminum transmission cases are usually composed of alloy 380 aluminum, an alloy containing 80.25 to 83.75 percent aluminum, 7.5 to 10 percent silicon, 3 to 4 percent copper, 3 percent zinc, 1.3 percent iron, .5 percent each manganese and nickel, 0.35 percent tin, and 0.1 percent magnesium. The properties of alloy 380 aluminum include tensile strength, yield strength, shear strength, and fatigue strength, providing a combination of utility and cost. There are no apparent physical differences between leading import and domestic transmission cases.

The aluminum transmission case was developed to house new transmissions developed to increase fuel efficiency of motor-vehicle engines and minimize transmission weight. By die casting as a single piece (unit), aluminum transmission cases combined with parts such as bell housings and extensions provide signficant manufacturing cost savings.

Aluminum is used for producing transmission cases because of its light weight, good corrosion resistance, ease of casting, good mechanical properties, and dimensional stability. Aluminum alloys made from primary or secondary metal serve as the raw material for melting. The dies used to cast transmission cases tend to be complex, having movable slides, cores, or other sections depending on customer requirements and weighing 40,000 to 200,000 pounds. In order to provide customers with quality prototype and experimental casting dies at the lowest cost and minimum lead time, many foundries will first make the specified transmission cases from wood pattern equipment to simulate die and mold partings of production die casting. Once the die has been made, the proper aluminum alloy is prepared and melted, and the transmission cases are cast in 1,200- to 3,000-ton cold-chamber die-cast machines. Figure X-3 is a diagram of a cold-chamber die-casting machine.

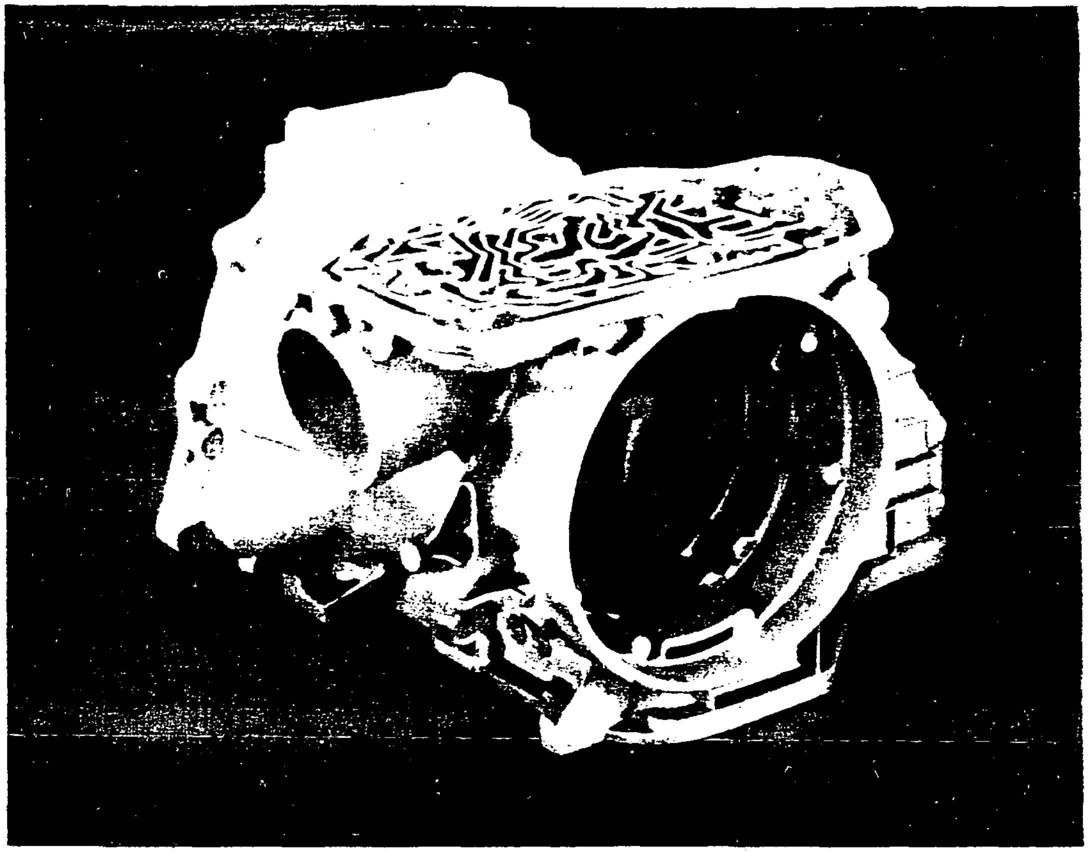
Most foundries ship the raw product, resulting from the operation described above, to the motor-vehicle manufacturers for machining, finishing, and assembly operations. There are a few large foundries, however, which have the inhouse capability to perform the machining and finishing operations. It is the motor-vehicle manufacturers that perform the assembly operations. Machining can involve drilling, topping, milling, grinding, boring, or reaming. Finishing can include chemical treatments for a wide variety of decorative or mechanical finishes. Assembling involves heat staking, adhesive bonding, and other conventional fastening methods necessary to produce either subassemblies (such as automotive transmissions with cast-aluminum cases) or entire systems assembly (complete automobiles).

Figure X-1.-Complex Automatic Transmittion Case
Of Cast Aluminum

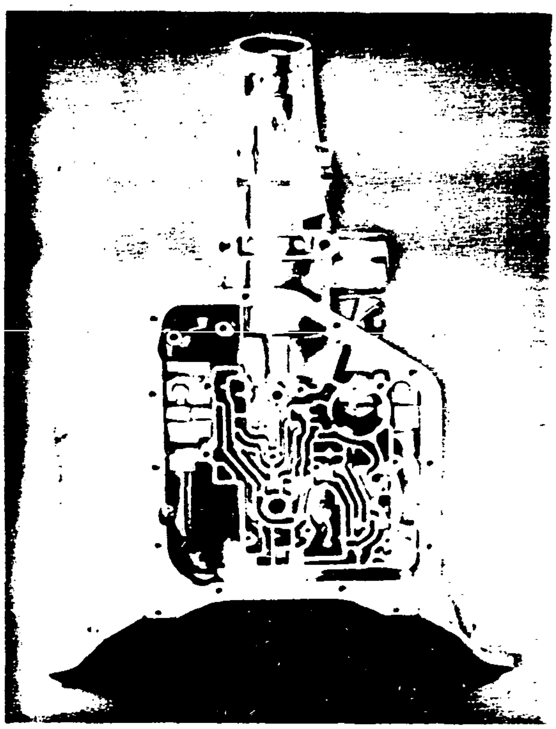


Source· Doehler Jarvis

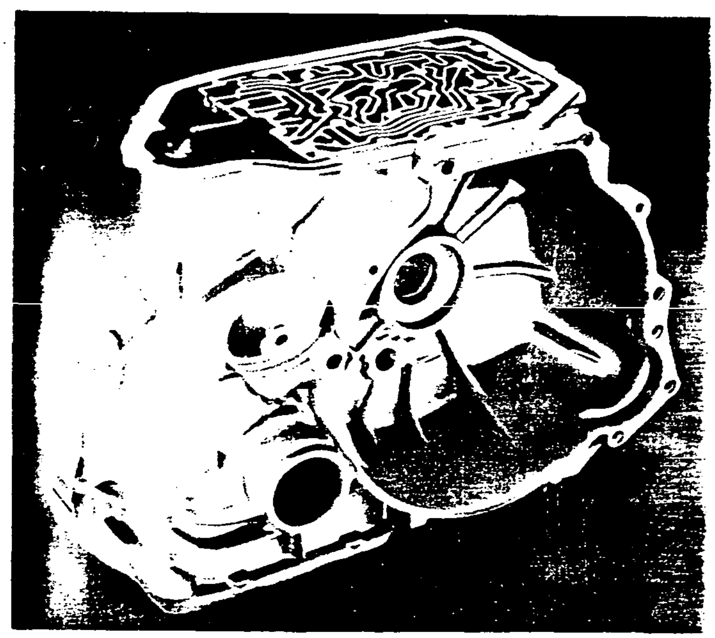
Figure X-2.-Other Varieties of Cast-Aluminum Transmission Cases



Front-wheel-drive transmission case.



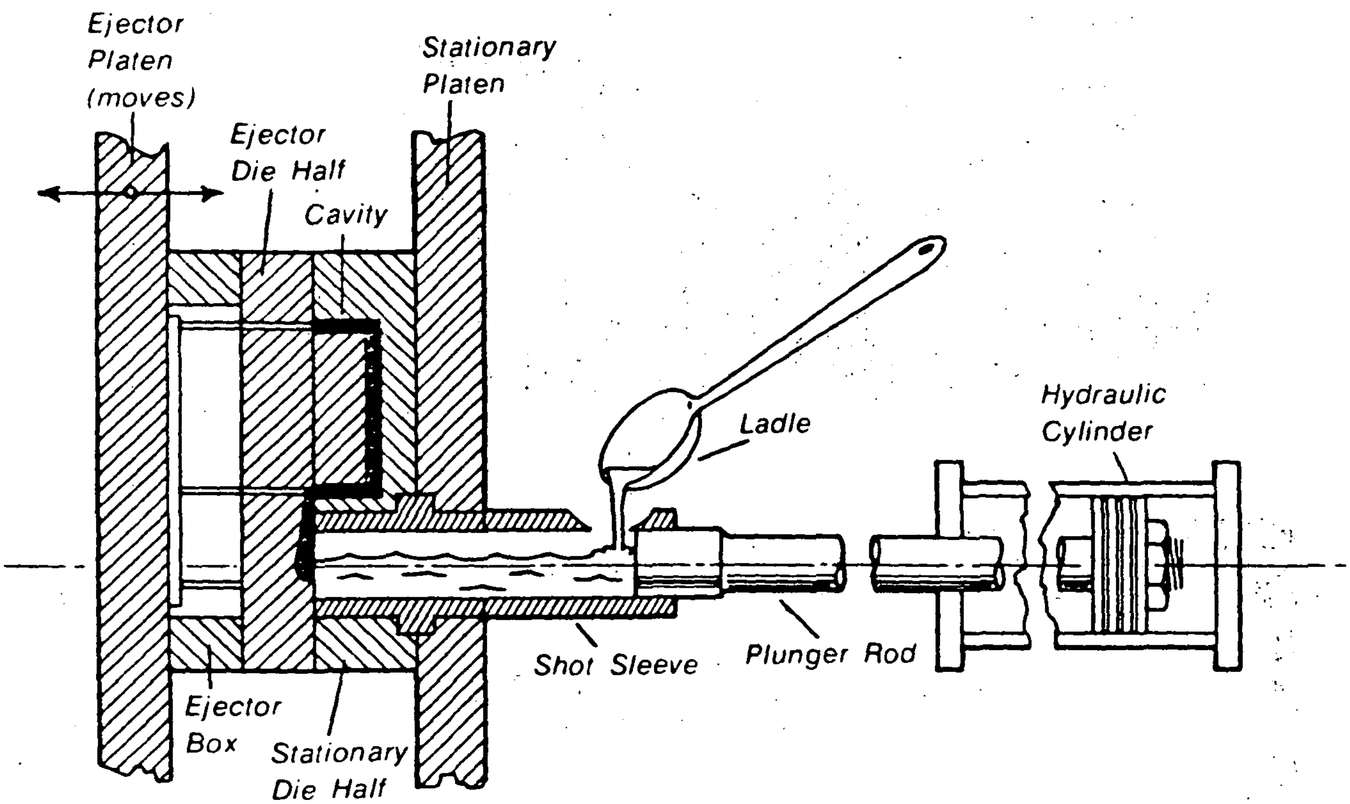
Diecast in a single piece this rear-wheel-drive automatic transmission case incorporates the bell housing and rear case extension In addition to a substantial weight reduction, this innovative combination of parts has provided significant manufacturing cost savings



This complex front-wheel-drive transmission case is die cast in one piece by Central Foundry for a major American automobile manufacturer

Source: Doehler-Jarvis and General Motors

Figure X-3.-Cold-Chamber Die-Casting Machine



Cold Chamber Machine. Diagram illustrates die. cold chamber and horizontal ram or plunger (in charging position)

Source: American Die Casting Institute, Inc.

Cast-aluminum transmission case producers, as well as other die casters and die-casting equipment makers, are making strides toward automated casting by adopting measures such as statistical process control, computerization, shot control, and robotics. Many cast-aluminum transmission case production facilities are highly automated, containing industrial robot controls, automated casting and trimming lines directed by microprocessors and programmable control circuitry, and automated machining centers with tape controlled equipment or programmable, multistation Computer Numerical Control (CNC) machining centers.

Customs Treatment

U.S. tariff treatment

Tariff provisions and duty rates applicable to cast-aluminum transmission cases are found in part 6, subpart B, of schedule 6, of the Tariff Schedules of the United States (TSUS). Detailed tariff descriptions are shown in appendix E. Table X-1 shows the pre-Multilateral Trade Negotiation (MTN) rates of duty which apply to imports of cast-aluminum transmission cases from those countries having most-favored-nation (MFN) status (col. 1), the negotiated column 1 rates of duty under the most recent MTN, and the rates of duty which apply to imports from countries designated in the TSUS as being under Communist domination or control (col. 2). The Generalized System of Preferences (GSP) provides for duty-free treatment of eligible articles imported directly from designated beneficiary developing countries. Eligible articles are identified in the column entitled "TSUS item No." by an "A" or "A*." Brazil, Mexico, and Taiwan are not entitled to duty-free treatment under the GSP for TSUS item 692.32, other parts of motor vehicles.

Automotive Products Trade Act of 1965 (APTA).--Most motor vehicles and bodies and chassis of Canadian origin intended for original-equipment use enter the United States duty free. Such duty-free treatment is authorized by the APTA of 1965, 1/ which implemented an agreement between the United States and Canada to accord duty-free treatment to specified motor vehicles and original motor-vehicle equipment shipped between the two countries. 2/ A special waiver under the General Agreement on Tariffs and Trade (GATT) was

---

1/ Public Law 80-283; 79 Stat. 1016 (1965).
2/ "Agreement Concerning Automotive Products Between the Government of the United States and the Government of Canada," signed Jan. 16, 1965.

Table X-1.--Cast-aluminum transmission cases: U.S. rates of duty, by TSUS items

(Cents per pound; percent ad valorem)

TSUS item No. 1/	Description	Pre-MTN col. 1 rate of duty 2/	Staged col. 1 rate of duty effective with respect to articles entered on or after Jan. 1--								Col. 2 rate of duty
			1980	1981	1982	1983	1984	1985	1986	1987	
692.32A*	Other parts of motor vehicles------	4%	3.9%	3.8%	3.7%	3.6%	3.4%	3.3%	3.2%	3.1%	25%
692.33	Other parts of motor vehicles if Canadian article and original motor-vehicle equipment.	Free	3/	3/	3/	3/	3/	3/	3/	3/	4/

1/ The designation "A" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP) and that all beneficiary developing countries are eligible for the GSP.

2/ Rate effective prior to Jan. 1, 1980.

3/ Rate not negotiated in the Tokyo round of the Multilateral Trade Negotiations.

4/ Not applicable.

sought and obtained by the United States in view of the preferential treatment to be accorded most Canadian motor vehicles and original-equipment parts. 1/

The U.S. obligation to accord duty-free treatment to imports from Canada applies in three situations. 2/ First, duty-free treatment applies to motor vehicles, with the exception of vehicles such as electric trolley buses, three-wheeled vehicles, trailers accompanying truck tractors, and motor vehicles specially constructed and equipped for special services and functions (e.g., fire engines). Second, duty-free treatment applies to fabricated components for use as original equipment in the manufacture of the specified motor vehicles, but does not apply to replacement parts or accessories; in addition, trailers, tires, and tubes are excluded. Third, the products of Canada specified in the agreement may not contain more than a certain percentage of "foreign content," that is, content of materials produced in countries other than the United States or Canada. For any article, the measure of such foreign content is the percentage of the appraised customs value of the article upon entry into the United States accounted by the aggregate value of such imported materials contained in the article. The maximum foreign content permitted is 50 percent for both motor vehicles and chassis and parts. This requirement provides that at least one-half the content of any article imported duty free under the agreement will be produced in either the United States or Canada. The rest of the content may come from third countries and the article will still be entitled to duty-free treatment when imported into the United States. Consequently, original-equipment parts manufactured in third countries may be assembled into completed vehicles in Canada and imported into the United States, and no duty will be payable on these components as long as the maximum permissible foreign content (50 percent) is not exceeded.

Foreign tariff treatment

Most of the major trading countries (the United States and Canada are exceptions) use the Customs Cooperation Council Nomenclature (CCCN) as the basis for their tariff classifications. Cast-aluminum transmission cases are classified in chapter 87 of the CCCN.

1/ At the time of the signing of the agreement and the enactment of the bill implementing it, it was generally understood that the duty-free treatment limited to automotive products from Canada was inconsistent with the obligation of the United States under art. I of the GATT, i.e., to accord unconditional most-favored-nation treatment with respect to customs duties on the products of contracting parties to the agreement. However, under art. XXV(5), the Contracting Parties of the GATT may grant a waiver of this principle if there are exceptional circumstances warranting such an action. Such a waiver was sought by the United States, and upon consideration of (1) the exceptionally high degree of integration of the two markets and (2) the opportunities of increased rationalization of production given the "close similarity of market conditions in the two countries and the close relationship which exists and could be further developed in their production facilities of automotive products," (Basic Instruments and Selected Documents, 14th supp., July 1966), p. 37, waiver was granted by the Contracting Parties on Dec. 20, 1965.

2/ See headnote 2, pt. 6B, schedule 6, of the TSUSA.

In the Canadian tariff schedules, cast-aluminum transmission cases are found in items 43819-1 (parts for the manufacture of motor trucks, motor buses, electric trackless trolley buses, firefighting vehicles, ambulances, hearses, and the chassis for same) and 43829-1 (parts, n.o.p., electro-plated or not, whether finished or not, for automobiles, motor vehicles, electric trackless trolley buses, firefighting vehicles, ambulances and hearses, or chassis, including engines. . .).

The present and negotiated rates of duty for Canada, the European Community (EC), Japan, Mexico, and Venezuela--major markets for U.S. exports of cast-aluminum transmission cases or finished assemblies of automotive transmissions with cast-aluminum cases--are shown in table X-2.

Table X-2.--Cast-aluminum transmission cases: Selected rates of duty, present and negotiated, in principal foreign markets for U.S. exports

Market	Description of commodity and foreign tariff item No.	Present rate of duty 1/	Negotiated rate of duty 2/
Canada	Parts for the manufacture of motor trucks, motor buses, electric trackless trolley buses, firefighting vehicles, ambulances, hearses, and the chassis, when of a class or kind not made in Canada (43819).	9.7% ad val.	8.0% ad val.
	Parts, n.o.p., electro-plated or not, whether finished or not, for automobiles, motor vehicles, electric trackless trolley buses, firefighting vehicles, ambulances, and hearses, or chassis, including engines, . . . (43829-1).	11.4% ad val. 3/	9.2% ad val.
EC	Parts and accessories of motor vehicles, for the industrial assembly of agricultural walking tractors, motor vehicles for the transport of persons, motor vehicles for the transport of goods or materials, and special-purpose motor lorries and vans (87.06).	5.7% ad val.	4.9% ad val.
Japan	Other parts and accessories of motor vehicles . . . (87.06).	7.5% ad val. 4/	3.0% ad val.

See footnotes at end of table.

Table X-2.--Cast-aluminum transmission cases: Selected rates of duty, present and negotiated, in principal foreign markets for U.S. exports--Continued

Market	Description of commodity and foreign tariff item number	Present rate of duty 1/	Negotiated rate of duty 2/
Mexico	Parts and accessories of motor vehicles for the transport of persons, goods, or materials, and special-purpose motor lorries and vans (87.06):		
	A018 Mechanical gear boxes, weighing less than 120kg.	40% ad val.	5/
	A045 Parts identifiable as solely for articles of mechanical gear boxes.	10% ad val.	5/
	A074 Automatic gear boxes	25% ad val.	5/
	A075 Parts identifiable as designed for automatic gear boxes.	10% ad val.	5/
	A087 Mechanical gear boxes weighing 120kg or more.	10% ad val.	5/
Venezuela	Parts, loose parts and accessories of automoblie vehicles (87.06):		
	03.00 Transmission organs and parts thereof:		
	01 Mechanical gear boxes and parts thereof.	1% ad val.	5/
	09 Other gear boxes and parts thereof.	1% ad val.	5/

1/ Rate currently applicable to imports from the United States.
2/ Final rates negotiated under the Multilateral Trade Negotiations.
3/ Duty-free under the Automotive Products Act of 1965 if intended for original-equipment use.
4/ Temporarily duty free as a result of bilateral trade negotiations.
5/ Rate not modified in the Tokyo round of the Multilateral Trade Negotiations.

Profile of the U.S. Industry and Major Foreign Competitors

United States

There are approximately 968 companies with 1,050 establishments producing aluminum castings in the United States, according to the latest Census of Manufactures. Of these, it is estimated that about 30 firms, or 3 percent, currently produce cast-aluminum transmission cases. The majority of these foundries were located in Michigan, Ohio, Illinois, Indiana, and Missouri. These aluminum foundries produce rough and semifinished die castings which are provided as raw materials to the motor-vehicle parts and accessories industry that provides original-equipment parts to motor-vehicle manufacturers or to the industry's secondary parts replacement market. A more detailed look at the industry producing cast-aluminum transmission cases, as provided in response to Commission questionnaires, follows.

U.S. production, capacity, and capacity utilization.--Domestic production of cast-aluminum transmission cases declined 36 percent during 1979-83. Production fluctuated throughout the 5-year period, beginning the period at 10.0 million units in 1979, reaching a low of 5.0 million units in 1982, and rebounding to 6.4 million units in 1983 (table X-3). Production of cast-aluminum transmission cases is directly correlated to the state of the motor vehicle and equipment industry. Consecutive years of declining sales for motor vehicles during 1979-82 resulted in depressed demand for cast-aluminum transmission cases. The motor vehicle market staged a recovery in 1983 which increased new car sales and demand for original-equipment parts.

Domestic production capacity for cast-aluminum transmission cases rose 7 percent during 1979-83, increasing from 12.6 million units in 1979 to 13.5 million units in 1983 (table X-3). In the early 1980's, a shift occurred in consumer demand toward small, fuel-efficient cars (the major application for cast-aluminum transmission cases) and away from larger cars. The bulk of the increase in domestic production capacity was attributable to domestic foundries' response to the automotive industry's modernization efforts. Capacity utilization increased to 47.5 percent in 1983, following a general downward trend from 79.5 percent in 1979 to 36.5 percent in 1982.

Table X-3.--Cast aluminum transmission cases: U.S. production, capacity, and capacity utilization, 1979-83

(In units)

Item	1979	1980	1981	1982	1983
Production	10,032,171	6,074,762	6,584,927	4,962,644	6,399,019
Production capacity	12,625,900	12,756,880	13,614,620	13,602,719	13,475,563
Capacity utilization percent	79.5	47.6	48.4	36.5	47.5

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The competitive developments in the automotive industry have resulted in a gradual transformation in the types and scope of machinery and equipment currently utilized in cast-aluminum transmission case manufacturing facilities. Die casters are under increasing pressure to meet automakers' demand for better quality products at lower prices. This demand has resulted in a trend toward increased automation and utilization of other forms of technology such as statistical process controls and robots. Table X-4 presents responses to Commission questionnaires regarding the ages and types of machinery and equipment in cast-aluminum transmission case manufacturing facilities.

Table X-4.--Cast-aluminum transmission cases: Machinery and equipment in manufacturing facilities of reporting producers, by age of the machine as of Jan. 1, 1984

Item	Age				
	0-2 years	3-4 years	5-9 years	10-19 years	20 years or older
Melting furnaces	11	24	24	13	4
Molding lines:					
Automated	2	5	7	11	29
Manual	3	15	17	59	85
Total	16	44	48	83	118

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. employment, hours worked, and wages.--Employment by domestic aluminum transmission case casters declined 34 percent during 1979-82, before rising 66 percent in 1983 (table X-5). Employment in the industry was at its highest level in 1983 and at its lowest level in 1982, reflecting economic developments during the period. The hours worked by these employees followed the employment trend, declining 36 percent during 1979-82, and then rising 79 percent in 1983. Hours worked declined from 31.8 million in 1979 to 20.2 million in 1982, before rising to 36.3 million in 1983. The loss of approximately 5,500 workers during 1979-82, as reported by domestic cast-aluminum transmission case producers, follows the employment trend of the motor vehicle and equipment industry, where unemployment was widespread during 1979-82, and improved (particularly for production workers) during 1983.

Table X-5.--Cast-aluminum transmission cases: Number of employees and production and related workers in operations producing foundry products, 1979-83

Item	1979	1980	1981	1982	1983
Number of employees and wages:					
All persons	18,342	16,599	15,777	12,156	19,829
Production and related workers	16,032	14,498	13,769	10,587	17,591
Man-hours worked---1,000 hours	31,771	27,549	25,965	20,229	36,288
Wages paid-------1,000 dollars	370,185	361,397	365,997	298,153	574,989

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The hourly wages paid to production workers in foundries producing cast-aluminum transmission cases rose 36 percent during 1979-83, rising annually from $11.65 in 1979 to $15.85 in 1983 (see following tabulation). Total wages paid to these employees, however, declined 19 percent during 1979-82, and then almost doubled in 1983, reflecting declining employment levels and hours worked up until 1983. Some of this decline was attributable to automation and improved manufacturing efficiency.

A comparison of wages paid to production workers in foundries producing cast-aluminum transmission cases and wages paid in all operating U.S. manufacturing establishments indicates that production workers in this segment of the U.S. foundry industry are receiving wages above the average for U.S. manufacturing establishments, as shown in the following tabulation (per hour):

	Foundries producing cast-aluminum transmission cases 1/	All operating U.S. manufacturing establishments 2/
1979----------	$11.65	$6.00
1980----------	13.12	7.27
1981----------	14.10	7.99
1982----------	14.74	8.49
1983----------	15.85	8.83

1/ Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.
2/ Compiled from official statistics of the U.S. Department of Labor.

U.S. producers' shipments and exports.--The Commission received usable data from producers representing over 90 percent of the domestic industry producing this product. Domestic shipments of cast-aluminum transmission cases, on the basis of quantity, declined 37 percent during 1979-83, following a general downward trend until 1983. Such shipments declined from 9.9 million units ($253 million) in 1979 to 5.0 million units ($180 million) in 1982, before turning upward to 6.2 million units ($247 million) in 1983 (table X-6). Domestic shipments reflect sales trends in the motor-vehicle market in the period. The unit value of domestically shipped cast-aluminum transmission cases rose 55 percent during 1979-83, from $25.67 per unit to $39.72 per unit.

Table X-6.--Cast-aluminum transmission cases: U.S. producers' domestic shipments of products produced in U.S. establishments, 1979-83

Year	Quantity	Value	Unit value
	Units	1,000 dollars	Per unit
1979-----------:	9,861,694	253,153	$25.67
1980-----------:	5,983,943	175,454	29.32
1981-----------:	6,498,140	232,022	35.71
1982-----------:	4,958,459	180,429	36.39
1983-----------:	6,211,789	246,734	39.72

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The major foreign market for U.S. exports of cast-aluminum transmission cases (either as individual parts or components of finished subassemblies) is Canada, accounting for a 67-percent market share of U.S. exports. Other foreign markets of significance include Mexico, Venezuela, West Germany, the United Kingdom, and Japan. In response to Commission questionnaires, domestic castings producers indicated that their unit exports of aluminum transmission cases rose steadily and increased almost tenfold from 1979 to 1983, as shown in the following tabulation:

	Quantity (units)	Value (1,000 dollars)
1979	5,300	130
1980	4,175	112
1981	18,000	372
1982	38,000	789
1983	51,600	1,000

According to official U.S. statistics (on the basis of value), exports of motor-vehicle parts (a category which includes cast-aluminum transmission cases) rose 22 percent overall during 1979-83, rising annually from $3.2 billion in 1979 to $4.2 billion in 1981, before declining to $3.9 billion in 1983 (table X-7). Likewise, the value of exports of motor-vehicle transmissions (a category which includes finished assemblies of automotive transmissions with cast-aluminum cases) rose 31 percent overall during 1979-83, rising irregularly from $639 million in 1979 to $786 million in 1982, and to $838 million in 1983, (table X-8). These exports declined slightly in 1980 and 1982 from the value of the previous years' export.

Table X-7.--Cast-aluminum transmission cases 1/: U.S. exports of domestic merchandise, by principal markets, 1979-83 2/

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
Canada	1,901,464	1,738,352	2,075,936	2,056,479	2,493,506
Mexico	486,006	661,040	965,784	600,756	368,426
Venezuela	108,615	124,257	266,228	254,303	208,685
West Germany	39,711	42,999	52,895	60,774	83,365
Other	645,915	819,104	877,235	927,560	715,315
Total	3,181,711	3,385,752	4,238,078	3,899,872	3,869,315

1/ Reported statistics are for exported parts of motor vehicles. The exportation of cast-aluminum transmission cases is not separately reported in official U.S. statistics. An estimated product breakout is unavailable.
2/ Official U.S. statistics report value only for this item.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table X-8.--Finished assemblies of automotive transmissions with cast aluminum cases 1/: U.S. exports of domestic merchandise, by principal markets, 1979-83 2/

(In thousands of dollars)

Market	1979	1980	1981	1982	1983
Canada	443,208	367,377	475,154	545,069	643,833
United Kingdom	25,960	31,184	25,186	32,525	34,004
West Germany	10,929	13,826	38,898	39,487	28,075
Japan	15,047	17,955	17,301	16,316	18,774
Other	143,512	205,555	240,018	152,169	113,110
Total	638,656	635,897	796,557	785,566	837,796

1/ Reported statistics are for exported motor-vehicle transmissions. The exportation of finished assemblies of automotive transmissions with cast-aluminum cases only is not separately reported in official U.S. statistics. An estimated product breakout is unavailable.
2/ Official U.S. statistics report value only for this item.

Source: Compiled from official statistics of the U.S. Department of Commerce.

U.S. producers' inventories.--The combined end-of-period inventories of producer respondents decreased during 1979-83, as shown in the following tabulation:

	Quantity (units)
1979	229,287
1980	135,745
1981	93,907
1982	56,693
1983	83,460

U.S. producers' inventories of cast-aluminum transmission cases were on a downward trend during 1979-83, declining 64 percent, from 229,287 units in 1979 to 83,460 units in 1983. U.S. producers' inventories were at their lowest level- 56,693 units- in 1982. The declining inventory trend for cast-aluminum cases reflects primarily two events. The first is the economic downturn in the motor-vehicle market which depressed demand for cast-aluminum transmission cases in 1979-82. Second, motor-vehicle manufacturers have attempted to reduce their inventory costs by implementing "just-in-time" policies (a manufacturing and inventory control system requiring precise coordination of assembly plant schedules and supplier deliveries). The concept requires that suppliers fit their production and delivery schedules to their customers' assembly schedule. In return, U.S. motor-vehicle manufacturers reduced the number of parts and component suppliers they dealt with and negotiated longer term, multiyear contracts with those remaining.

The increasing inventories in 1983 reflect the upturn in new car sales and demand for original-equipment parts for assembly in 1983. In addition, it is forecast that U.S. motor-vehicle manufacturers will source a greater share of their parts requirements to independent suppliers as they become less vertically integrated due to limited working capital and cost-reduction pressures. In order to prepare for the innovations in motor-vehicle parts and accessories market operations, domestic foundries producing cast-aluminum transmission cases are responding by substantially increasing their inventory levels, as evidenced by 1983 inventory levels.

Financial experience of U.S. producers.--U.S. producers' net sales of cast-aluminum transmission cases, as reported in response to Commission questionnaires, declined 33 percent during 1979-82, from $1.5 billion to $983 million, before rising 79 percent to $1.8 billion in 1983 (table X-9). Profitability of U.S. producers dropped 77 percent during 1979-82, declining from $125 million in 1979 to $28 million in 1982, before almost quadrupling to $111 million in 1983. The ratio of profit to net sales declined from 8.5 percent in 1979 to 6.3 percent in 1983. It is believed that the depressed state of the motor vehicle and parts industry and the rising production costs (such as raw material, labor, and energy) accounted for the profitability loss of domestic cast-aluminum transmission case producers during 1979-82; the market upturn for motor vehicles and parts accounted for the profitability gain in 1983.

Table X-9.--Cast-aluminum transmission cases: U.S. producers' net sales and net profit on operations producing foundry products, 1979-83

	1979	1980	1981	1982	1983
Net sales---1,000 dollars--	1,471,563	1,192,253	1,215,492	983,109	1,758,263
Net operating profit 1,000 dollars--	124,580	42,122	49,752	28,390	111,447
Ratio of net profit to net sales------------percent--	8.5	3.5	4.1	2.9	6.3

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Capital expenditures.--U.S. producers made no capital expenditures on facilities in other countries during 1979-83. U.S. producers' expenditures on new machinery, equipment, and fixtures accounted for the bulk (85 percent) of their domestic capital expenditures during 1979-83 (table X-10). U.S. producers' capital expenditures declined 58 percent during 1979-83, from $101.5 million in 1979 to $42.5 million in 1983. Since the application of aluminum as the metal used in producing one-piece transmission cases was not widely implemented until 1979-80, most capital expenditures for expanded plant space, new machinery and equipment, special tools, and other requirements for bringing its production on line were made then. Capital expenditures during 1981-83 are believed to have been primarily invested in new quality control and efficiency measures, such as statistical process controls, computers, robots, and other forms of automation and high technology.

Table X-10.--Cast-aluminum transmission cases: U.S. producers' capital expenditures on domestic facilities used in the production of foundry products, 1979-83

(In thousands of dollars)

Item	1979	1980	1981	1982	1983
Facilities in the United States:					
Land, land improvements	2,938	3,165	3,847	2,068	867
Buildings, leasehold improvements	15,419	17,272	4,873	2,188	1,106
Machinery, equipment, and fixtures:					
New	83,168	77,442	58,222	36,136	40,527
Used	15	27	472	45	16
Total	101,540	97,906	67,414	40,437	42,516

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Research and development expenditures.--U.S. producers' research and development expenditures declined 3 percent during 1979-83, although first rising steadily from $12.3 million in 1979 to $13.7 million in 1982, and then declining to $11.9 million in 1983 (table X-11). The foundries producing cast-aluminum transmission cases were faced with limited capital and cost-reduction pressures because of their declining profitability. It is believed that changes in the motor-vehicle and parts manufacturing industry which required that suppliers play increasing roles in production, design, planning, and research and development activities prevented U.S. producers' of cast-aluminum transmission cases from further reducing their research and development expenditures during 1979-83.

Table X-11.--Cast-aluminum transmission cases: U.S. producers' research and development expenditures incurred in the production of foundry products, 1979-83

(In thousands of dollars)

Year	Expenditures
1979	12,302
1980	12,670
1981	12,745
1982	13,675
1983	11,932

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Major foreign competitors

The major foreign competitors for U.S. producers of automotive components, according to official U.S. import statistics, are Canada and Japan.

Canada.--Canada is the major source of casting components for the automobile industry because all four major U.S. automotive producers, General Motors, Ford, Chrysler, and American Motors, maintain captive foundries in Ontario province in close proximity to their U.S. facilities in Michigan. The manufacture of castings, and subsequent sub-assembly of components and finished vehicles is the source of the high volume of two-way trade between the United States and Canada, and much of the imports of automotive components from Canada are accorded duty-free treatment by the Automotive Products Trade Act of 1965 (APTA). 1/ Industry sources indicate, however, that U.S. automakers do not manufacture substantial quantities of aluminum transmission cases in their Canadian foundries.

Japan.--Japan is the United States' second leading foreign competitor. Competition from Japan appears to be primarily of die-cast components in finished subassemblies (finished automotive transmissions with cast-aluminum cases), rather than in individual die-cast parts (individual cast-aluminum transmission cases). The number of foundries producing cast-aluminum transmission cases are unknown, however, of 11 major manufacturers of nonferrous castings, 4 were also motor-vehicle manufacturers and can be assumed to make cast aluminum motor-vehicle parts. 2/ Most motor-vehicle manufacturers also have private foundries which are comparatively larger in capacity than that of most "foundry companies" for production of a variety of castings mostly for their own consumption. No other product specific data are available on the cast-aluminum transmission case industry in Japan. Production of nonferrous metal die castings (believed to be primarily aluminum die castings) showed an upward trend during 1979-83, as noted in the following tabulation:

	Quantity (short tons)	Value (1,000 dollars)
1979	413,000	1,200,000
1980	478,000	1,500,000
1981	496,000	1,500,000
1982	472,000	1,200,000
1983	491,000	1,300,000

1/ See pp. X-5 to X-7 of this chapter.
2/ U.S. Department of State telegram, American Embassy Tokyo, July 10, 1984.

Structural Factors of Competition Between U.S. and Foreign Industries

U.S. producers of cast-aluminum transmission cases compared industries in the United States with foreign industries in Italy, Japan, West Germany, and Mexico. They determined that the U.S. industry has the competitive advantage in fuel cost (except Mexico), raw-material cost, and most facets of marketing structure, although Japan was ranked equal to domestic producers in this traditional area of U.S. advantage (table X-12). Foreign producers were largely given the competitive advantage in labor availability and cost, government involvement (subsidies, and nontariff barriers to imports), and cost of capital (except Mexico), although there was a consensus that U.S. producers maintained a comparable position with its foreign competitors' in terms of capital availability and the ability of industry profit to attract funds. Importantly, the U.S. industry is also considered to be equal to or better than its major competitors in the application of production technology.

Scrap aluminum is the essential raw material used in producing cast aluminum transmission cases. Scrap aluminum is priced by producers at a discount from the primary refined aluminum price (quoted primarily by producers), with allowances for transportation and alloy composition, as examples. Scrap aluminum supply is determined by the amount of primary aluminum production and is traded throughout the world. Those countries with large primary refined aluminum producing industries, such as the United States and Canada, tend to maintain a relative competitive advantage in raw-material availability. Since energy cost (primarily electricity) is the largest cost component in producing aluminum, and the United States has lower energy rates than Japan and Europe, U.S. casters of aluminum transmission cases have a competitive advantage in raw-material cost. Most fuel is consumed in the melting phase of cast aluminum transmission case production. The cost of fuel ranks behind raw-material and labor as a cost component in the production process, and U.S. producers generally have a competitive advantage in fuel costs as energy costs in the United States averaged nearly 50 percent less than foreign countries during 1979-82. 1/

Transmission cases are not mass-produced due to the requirement that they be made to customer specifications along with certain quality assurances and, therefore, domestic producers have an edge in dealing with domestic motor-vehicle manufacturers. In addition, the location of domestic producers in closer proximity to the motor vehicle manufacturers give them a competitive advantage in after-sale service capabilities. Japan, because of its continued efforts to locate motor-vehicle production facilities in the United States, was ranked as having after-sale service capabilities comparable with the United States.

1/ Energy Information Administration, International Energy Prices 1978-82, January, 1984.

Table X-12.--Cast-aluminum transmission cases: U.S. producers' competitive assessment of structural factors of competition for the U.S. industry and selected foreign industries, by major competing countries, 1981-84

Item	Competitive advantage 1/			
	Italy	Japan	West Germany	Mexico
Fuel:				
Availability	S	D	S	F
Cost	D	D	D	F
Raw material:				
Availability	S	D	S	D
Cost	D	D	D	D
Capital:				
Availability	S	S	S	D
Cost	F	F	F	D
Ability of industry profit to attract funds	S	S	F	S
Labor:				
Availability	F	S	F	F
Cost	F	F	F	F
Production technology	D	S	S	D
Marketing:				
Channels of distribution	D	S	D	D
Responsiveness to orders	F	S	S	D
After-sale service capabilities	D	S	D	D
Government involvement:				
Subsidies	F	F	F	2/
Research and development assistance	S	F	F	S
Tariff levels on imports	F	S	F	S
Nontariff barriers to imports	F	S	F	F
U.S. Government regulations that increase costs	2/	S	2/	S
Foreign government regulations that increase costs	2/	S	2/	F

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

As exhibited in table X-13, both U.S. producers and importers are increasing their on-hand inventories in 1983. Much of this inventory increase is probably the result of domestic motor-vehicle manufacturers' implementation of "just-in-time" policies previously discussed. Importers' inventories, however, are extremely small (averaging about 7 percent) in comparison with U.S. producers' inventories, and tends to suggest a marketing competitive advantage for U.S. producers in dealing with domestic motor-vehicle manufacturers.

The current application of foundry technology (e.g., automation and computerization) by domestic casters has resulted in foundry operations becoming less labor intensive and more capital intensive. Labor costs in the United States, however, have remained proportionally the same despite lower employment rates, due to a 36-percent rise in hourly wages. These costs rank second to raw-material cost in the production process. Overall, the average cost of labor in the United States is about 35 percent higher than comparable labor cost in foreign countries during 1979-82. 1/

Die-casting technology is widespread in terms of production process, machinery and equipment use, and general product specifications. However, since all cast-aluminum transmission cases are made to contracted or subcontracted motor-vehicle manufacturer specifications, many applications of inhouse mold designing, tooling, machinery and equipment application, and product production techniques are proprietary. U.S. producers are now more intimately involved in this process, and, as a result, they are able to maintain a competitive advantage or comparability with their major foreign competitors.

Table X-13.--Cast-aluminum transmission cases: Inventories held by producers and importers, as of Dec. 31, 1979-Dec. 31, 1983

(In units)

Year	Producers' inventories	Importers' inventories 1/
1979	229,287	8,074
1980	135,745	8,153
1981	93,907	5,384
1982	56,693	4,538
1983	83,460	10,604

1/ Importers' inventories of automotive transmissions with cast-aluminum cases included.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

1/ Bureau of Labor Statistics, Hourly Compensation Costs for Production Workers, unpublished data, 1982.

The U.S. Market

The fact that there are no standard shapes, sizes, and dimensions for cast-aluminum transmission cases, which must be produced to motor-vehicle manufacturer specifications, has effectively negated the mass production of these castings since information on vehicle model intricacies by manufacturer is highly proprietary and confidential. By limiting the dissemination of manufacturing specifications needed for cast-aluminum transmission case production, the channel of distribution is significantly restricted since production can only be effected by authority of a motor-vehicle manufacturer. This is evidenced in table X-14, which indicates that all U.S. producers' shipments and 70 percent of U.S. importers' shipments of cast-aluminum transmission cases were to original-equipment manufacturers. However, 92 percent of U.S. importers' shipments of finished assemblies of automotive transmissions with cast-aluminum cases were to distributors, primarily auto dealerships and repair/replacement parts outlets.

Table X-14.--Cast-aluminum transmission cases: U.S. producers' and importers' share of shipments, by channels of distribution, 1981-83

Channel of distribution	Share of shipments		
	Producers	Importers 1/	
Machine shops/other fabricators	-	-	-
Distributors	-	14	92
Original-equipment manufacturers	100	70	7
Other	-	16	1
Total	100	100	100

1/ Importers share of shipments of cast-aluminum transmission cases and finished assemblies of automotive transmissions with cast-aluminum cases, by channels of distribution.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The invention of cast-aluminum transmission cases in the late 1970's was the brainchild of motor-vehicle manufacturers working in conjunction with the metals industry. Since the product is in a relatively initial stage of market development, and because of its highly specialized applications to date, there is literally only one end-use market for cast-aluminum transmission cases. According to table X-15, all shipments of U.S. producers and U.S. importers went to the motor-vehicles market, where they competed against each other for market share.

Table X-15.--Cast-aluminum transmission cases: U.S. producers' and importers' shipments, by types of markets, during 1981-83

(In percent)

Type of market	Share of shipments	
	Producers	Importers 1/
Motor vehicles	100	100
Farm machinery and equipment	-	-
Mining machinery and equipment	-	-
Construction machinery and equipment	-	-
Refrigeration and heating equipment (except pumps and compressors)	-	-
Plumbing equipment	-	-
Railway equipment	-	-
Industrial machinery	-	-
Machine tools	-	-
Valves and pipe fittings	-	-
Pumps and compressors	-	-
Total	100	100

1/ Importers' share of shipments of finished assemblies of automotive transmissions with cast-aluminum cases, by type of market, is the same.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. consumption.--Domestic consumption of cast-aluminum transmission cases declined 37 percent during 1979-83, dropping from 10.0 million units ($305.8 million) in 1979 to 6.4 million units ($292.1 million) in 1983 (table X-16). As the demand for aluminum transmission cases cast by foundries is dependent upon the economic condition of the motor-vehicle parts industry, consumption trends mirrored the sales trend in the motor-vehicles market during 1979-83.

According to responses to Commission questionnaires, import share of the U.S. cast-aluminum transmission case market reflected a downward trend during 1979-83. Import market penetration rose from 1.8 percent in 1979 to 3.9 percent in 1980, in terms of quantity, and then steadily declined to 2.1 percent in 1982. Import penetration rose slightly in 1983 to 2.3 percent.

Table X-16.--Cast-aluminum transmission cases: Domestic shipments, exports, imports, and apparent consumption, 1979-83

(Quantity in thousands of units; value in thousands of dollars)

Year	Producers' shipments	Exports	Imports 1/	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1979	9,862	5	180	10,042	1.8
1980	5,984	4	243	6,227	3.9
1981	6,498	18	224	6,722	3.3
1982	4,958	38	107	5,065	2.1
1983	6,212	52	147	6,359	2.3
	Value				
1979	253,153	130	52,691	305,844	17.2
1980	175,454	112	82,381	257,835	32.0
1981	232,022	372	84,163	316,185	26.6
1982	180,429	789	32,335	212,764	15.2
1983	246,734	1,048	45,396	292,130	15.5

1/ Imports of automotive transmissions with cast-aluminum cases are included.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission and industry sources.

U.S. imports.--According to industry and trade sources, foreign sourcing of engines, transmissions, and transaxles by domestic motor-vehicle manufacturers has now reached a significant volume level. As a result, domestic foundries are experiencing increased imports not only of individual parts (such as cast-aluminum transmission cases) but more significantly of components in finished subassemblies (such as finished assemblies of automotive transmissions with cast-aluminum cases). This trend is borne out by importers' responses to Commission questionnaires.

The quantity of imported cast-aluminum transmission cases and finished assemblies shipped into the United States, as reported by respondents to the Commission's importer questionnaire, 1/ showed a general increase during 1979-83, as shown in the following tabulation:

1/ Reported imports represent an average of 2 percent of total import value during 1979-83.

Year	Importer respondents' imports			
	Quantity		Value	
	Cast-aluminum transmission cases	Finished transmissions with cases	Cast-aluminum transmission cases	Finished transmission with cases
	Units	Units	1,000 dollars	1,000 dollars
1979-------	2,059	177,738	112	52,579
1980-------	11,119	232,109	965	81,416
1981-------	8,726	215,728	584	83,579
1982-------	7,311	99,987	610	31,725
1983-------	9,139	138,203	623	44,773

A reflection of import patterns and trends for these items also can be obtained by looking at the official U.S. import statistics (on the basis of aggregated and value only) for motor-vehicle transmissions and motor-vehicle parts. U.S. imports of motor-vehicle parts (a category which includes cast-aluminum transmission cases) rose 43 percent overall during 1979-83, although declining 16 percent, from $2.1 billion in 1979 to $1.8 billion in 1980, and then rising annually, increasing 69 percent to $3.0 billion in 1983 (table X-17). The major sources for motor-vehicle parts were Canada (68 percent) and Japan (12 percent).

U.S. imports of motor-vehicle transmissions (a category which includes finished assemblies of automotive transmission with cast-aluminum cases) rose 57 percent overall during 1979-83, although declining by 30 percent, from $479 million in 1979 to $336 million in 1981, before more than doubling to $750 million in 1983 (table X-18). The major import sources for motor vehicle transmissions were Canada (65 percent), Japan (16 percent) and France (10 percent).

Table X-17.--Cast-aluminum transmission cases: 1/ U.S. imports for consumption, by principal sources, 1979-83 2/

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Canada	1,419,826	1,147,695	1,356,386	1,395,901	2,012,902
Japan	213,983	197,270	268,542	274,077	356,917
West Germany	135,435	122,877	116,595	136,165	143,930
Mexico	75,768	48,214	55,634	79,874	132,155
Other	231,201	236,033	269,510	238,038	319,128
Total	2,076,213	1,752,089	2,066,667	2,124,055	2,965,032

1/ Reported statistics are for exported parts of motor vehicles. The exportation of cast-aluminum transmission cases is not separately reported in official U.S. statistics. An estimated product breakout is unavailable.
2/ Official U.S. statistics report value only for this item.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Table X-18.--Finished assemblies of automotive transmission with cast aluminum cases: 1/ U.S. imports for consumption, by principal sources, 1979-83 2/

(In thousands of dollars)

Source	1979	1980	1981	1982	1983
Canada	110,335	60,937	91,675	281,151	484,763
Japan	29,313	36,405	44,513	81,672	122,961
France	177,550	134,469	104,982	79,039	77,666
United Kingdom	2,930	2,732	2,607	2,705	25,755
Other	158,446	166,743	92,523	70,035	38,448
Total	478,574	401,286	336,300	514,602	749,593

1/ Reported statistics are for exported parts of motor vehicles. The exportation of cast-aluminum transmission cases is not separately reported in official U.S. statistics. An estimated product breakout is unavailable.
2/ Official U.S. statistics report value only for this item.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Competitive Assessment of Product-Related Factors in the U.S. Market

U.S. producers considered their major foreign competitors to be France, Japan, and West Germany and ranked these foreign competitors (except Japan) as having the overall competitive advantage; however, their reasons for these rankings were diverse (table X-19). Price-related considerations and market response advantages were noted as contributing to the overall advantage of France whereas quality, product gurantees, and servicing provided the overall competitive advantage to West Germany. U.S. producers principally attribute their overall competitive advantage in the U.S. market with Japan to superior design and their reliability in servicing the market needs of traditional customers. U.S. importers, however, disagreed with this assessment and only gave U.S. products an advantage in one competitive factor in the U.S. market--shorter delivery time. U.S. importers rated Japan as having the overall competitive advantage. Competitive evaluations from importers concerning France and West Germany are believed to be largely from foreign motor-vehicle manufacturers that are importing parts for their U.S. dealerships and plants or under contract to certain domestic motor-vehicle manufacturers. Given the specialized nature of production requirements for cast-aluminum transmission cases, these importers rated the competitive advantage of these foreign-made castings as stemming from historical supplier relationships.

Table X-19.--Cast-aluminum transmission cases: U.S. producers' (P) and importers' (I) competitive assessment of product-related factors of competition for U.S.-produced and foreign-made castings in the U.S. market, by major supplying countries, 1981-84

Item	Competitive advantage 1/					
	France		Japan 2/		West Germany	
	P	I	P	I	P	I
Overall competitive advantage	F	3/	D	F	F	3/
Lower purchase price (delivered)	F	3/	F	F	3/	3/
Cost of tooling/patterns	F	3/	F	F	3/	3/
Shorter delivery time	F	3/	F	D	3/	3/
Availability	3/	3/	D	F	3/	3/
Servicing	F	3/	D	F	F	3/
Favorable terms of sale	3/	3/	S	F	3/	3/
Favorable product guarantees	3/	3/	F	F	F	3/
Favorable exchange rates	F	3/	S	F	3/	3/
Historical supplier relationship	3/	F	D	F	3/	F
Product performance features:						
Superior design	3/	3/	D	F	3/	3/
Quality	3/	3/	F	F	F	3/
More durable	3/	3/	S	F	3/	3/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.

2/ The assessment for the finished assemblies from Japan is substantially the same as the importers' assessment of the castings.

3/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. purchasers indicated that almost all of their cast-aluminum transmission case purchases were of domestically produced products (table X-20). Likewise, U.S. purchasers reported that their purchases of finished automotive transmissions with cast-aluminum cases were principally from domestic suppliers. In providing their reasons for purchasing domestically produced cast-aluminum transmission cases, U.S. purchasers ranked shorter delivery time, lower (delivered) purchase price, availability, and servicing as their most important considerations (table X-21). Lower (delivered) purchase price, cost of tooling/patterns, and product quality were the only reasons cited by U.S. purchasers for buying foreign-made cast-aluminum transmission cases.

Table X-20.--Cast-aluminum transmission cases: Purchases of U.S.-produced and foreign-produced foundry products, by U.S. purchasers, 1979-83

Year	Cast aluminum transmission cases		Finished automotive transmissions with cast aluminum cases	
	U.S.-produced	Foreign-produced	U.S.-produced	Foreign-produced
	Quantity (units)			
1979	204,821	0	182,656	7,681
1980	385,049	0	191,364	3,097
1981	142,394	0	169,603	14,597
1982	188,930	0	156,577	24,867
1983	344,774	31	128,685	81,145
	Value (1,000 dollars)			
1979	8,988	-	71,082	5,044
1980	8,603	-	72,307	2,732
1981	7,138	-	70,385	10,618
1982	5,117	-	68,940	15,156
1983	7,713	2	63,945	37,534

Table X-21.--Cast-aluminum transmission cases: Ranking 1/ of U.S. purchasers' reasons for purchases of U.S.-produced and foreign-produced castings, 1981-84 2/

Reason for purchase	U.S.-made transmission cases	Foreign-made transmission cases
Lower purchase price (delivered)	2	1
Cost of tooling/patterns	6	2
Shorter delivery time	1	-
Availability	3	-
Servicing	4	-
Favorable terms of sale	7	-
Favorable product guarantees	8	-
Favorable exchange rates	9	-
Historical supplier relationship	5	-
Product performance features:		
Superior design	-	-
Quality	-	3
More durable	-	-

1/ Ranking numbers range from 1 to 9, number 1 indicates the most importing reason for purchase and number 9 indicates the least important reason for purchase.

2/ U.S. purchasers did not rank their reasons for purchasing the finished assemblies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. purchasers reported that the average lowest net delivered price for a representative U.S.-produced cast-aluminum transmission case was $85.42 per unit in 1981, $88.67 per unit in 1982, and $90.63 per unit in 1983 (table X-22). Comparable data was not provided by U.S. purchasers on their purchasers of foreign-made transmission cases.

Both U.S. producers and U.S. importers reported similar terms of sale regarding cast-aluminum transmission cases (and finished assemblies in the case of imports) primarily net due in 30 days or less, although U.S. importers also indicated that they offered various discount opportunities and prepaid freight which becomes important when considering transportation costs. The added transportation cost to foreign producers for shipping bulky and heavy items such as cast-aluminum transmission cases, or finished assemblies with cast-aluminum transmission cases to the United States are an important factor in the international trade of these items. Transportation costs have played a key role in defining the market area of U.S. producers and limiting competition from foreign producers, which generally cannot bear these costs and effectively compete in an already intensely competitive U.S. market.

Table X-22.--Cast aluminum transmission cases: Average lowest net delivered price reported by purchasers, 1981-83

(Price per unit)

Period	Cast aluminum transmission cases used in passenger automobiles, with 4 cylinder gasoline powered, spark ignition, water cooled engines	
	Domestic	Foreign
1981:		
January-March	85.45	-
April-June	85.49	-
July-September	85.41	-
October-December	85.33	-
1982:		
January-March	85.05	-
April-June	89.92	-
July-September	89.94	-
October-December	89.78	-
1983:		
January-March	90.37	-
April-June	90.51	-
July-September	90.76	-
October-December	90.88	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to import competition in the U.S. market

As shown in table X-23, U.S. producers principally implemented cost-reduction efforts and improved the quality of cast-aluminum transmission cases in response to import competition in the domestic market. Some U.S. producers reduced or dropped plans to expand capacity, or closed production lines or manufacturing facilities due to import competition.

Table X-23.--Cast-aluminum transmission cases: U.S. producers' responses to import competition in the U.S. market, 1981-84

Nature of response	Share of responses
	Percent
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	0
Had already shifted production to other lines of castings	0
Lacked capital funds to counter foreign competition	0
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	0
Reduced or dropped plans to expand capacity	13
Cut back production	0
Closed production lines or manufacturing	13
Shifted to more advanced types of castings	0
Implemented cost-reduction efforts	38
Improved quality of the products	38
Imported	0
Opened a plant to manufacture abroad	0

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Competitive Assessment of Product-Related Factors in Foreign Markets

Foreign producers are major competitors to U.S. producers in foreign markets where transportation costs become a large limitation for market participation by U.S. producers. As a result, there are limited exports of cast-aluminum transmission cases by U.S. producers and their reported exports averaged 3 percent or less of total domestic shipments during 1981-83. Nevertheless, U.S. producers evaluated their competitive position in foreign markets and considered their major competitors to be France, Japan, and Italy (table X-24). They ranked their major competitors as having the overall competitive advantage, principally due to lower (delivered) purchase price, cost of tooling/patterns, favorable exchange rates, and shorter delivery time.

Table X-24.--Cast-aluminum transmission cases: U.S. producers' competitive assessment of product-related factors of competition for U.S.-produced and foreign-made castings in foreign markets, by major supplying countries, 1981-83

	Competitive advantage 1/		
	France	Japan	Italy
Overall competitive advantage	F	F	F
Lower purchase price (delivered)	F	F	F
Cost of tooling/patterns	F	F	F
Shorter delivery time	F	F	F
Availability	2/	2/	2/
Servicing	2/	2/	2/
Favorable terms of sale	2/	2/	2/
Favorable product guarantees	2/	2/	2/
Favorable exchange rates	F	F	F
Historical supplier relationship	2/	2/	2/
Product performance features:			
Superior design	2/	2/	2/
Quality	2/	2/	2/
More durable	2/	2/	2/

1/ D=Domestic advantage; F=Foreign advantage; and S=Competitive position the same.
2/ Insufficient data.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' responses to increased competition in foreign markets.--As shown in table X-25, U.S. producers took actions similar to their response in domestic markets in order to meet increased competition in their foreign markets. In addition to implementing cost-reduction efforts and improving product quality, producers shifted their production to more advanced types of castings.

Table X-25.--Cast-aluminum transmission cases: U.S. producers' responses to increased competition in their foreign markets, 1981-84

Nature of response	Share of responses
	Percent
Took no or few actions because your firm:	
Had already shifted production to more advanced type of castings	-
Had already shifted production to other lines of castings	12
Lacked capital funds to counter foreign competition	-
Took the following actions:	
Lowered prices or suppressed price increases to maintain market share	-
Reduced or dropped plans to expand capacity	-
Cut back production	-
Closed production lines or manufacturing	-
Shifted to more advanced types of castings	12
Implemented cost-reduction efforts	38
Improved quality of the products	38
Imported	-
Opened a plant to manufacture abroad	-

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

APPENDIX A

COPY OF LETTER TO CHAIRMAN ALFRED E. ECKES FROM AMBASSADOR WILLIAM E. BROCK, UNITED STATES TRADE REPRESENTATIVE, REQUESTING AN INVESTIGATION

THE UNITED STATES TRADE REPRESENTATIVE
WASHINGTON
20506

The Honorable Alfred Eckes
Chairman, United States International
Trade Commission
701 E Street, N.W.
Washington, D.C. 20436

Dear Mr. Chairman:

The U.S. foundry industry is one of our basic industries. Composed of some 3,400 units, it produces a large and diverse array of ferrous and nonferrous cast metal products which are used in 90 percent of all manufactured items, and in all machinery used in manufacturing. Although 80 percent of U.S. foundries employ less than 100 persons each, the number of production workers employed by the industry as a whole has totaled over 400,000.

Because of the pervasive use of its products, the health of the foundry industry historically has been closely aligned with the general state of the national economy. The recent performance of the industry, however, appears to be below that of the national economy. A number of factors may be contributing to this situation, including increased imports of foundry products and of manufactured items using foundry products.

It is difficult for the industry to analyze its problems because no good breakdown of data on this industry's production and trade composition exists. What data exists is fragmented and incomplete. As a result the industry does not have adequate information to evaluate its problems on a sound quantitative basis.

To provide the industry with this information, at the direction of the President, I am requesting the U.S. International Trade Commission, pursuant to section 332 (g) of the Tariff Act of 1930, to conduct an investigation and report to me on the competitive position of the U.S. foundry industry in domestic and world markets. The report should include an overview of the entire foundry industry together with a detailed analysis of selected key products which should be important to the U.S. foundry industry and to the extent possible representative of major segments of the entire foundry industry in terms of manufacturing process, import competition, marketing, and financial condition.

The product analysis should cover the following points: (1) current profile of the U.S. and foreign foundry industries; (2) conditions of competition between U.S. and foreign foundry producers; (3) factors affecting the future competitive posture of domestic and foreign foundry operations; and, (4) the implications of the U.S. competitive position on the foundry industry itself, related industries, and the U.S. economy as a whole.

The investigation should begin as soon as possible, with the final report to be submitted to the United States Trade Representative within eight months from the receipt of this request.

Very truly yours,

WILLIAM E. BROCK

WEB:mmb

APPENDIX B

NOTICE OF THE COMMISSION'S INVESTIGATION

Written Submission

Inasmuch as the Commission has found that a violation of section 337 has occurred, it may isue (1) an order which could result in the exclusion of the subject articles from entry into the United States and/or (2) cease and desist orders which could result in one or more respondents being required to cease and desist from engaging in unfair acts in the importation and sale of such articles. Accordingly, the Commission is interested in receiving written submissions which address the form of relief, if any, which should be ordered.

If the Commission contemplates some form of relief, it must consider the effect of that relief upon the public interest. The factors which the Commission will consider include the effect that an exclusion order and/or a cease and desist order would have upon (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) the U.S. production of articles which are like or directly competitive with those which are the subject of the investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions concerning the effect, if any, that granting relief would have on the public interest.

If the Commission orders some form of relief, the President has 60 days to approve or disapprove the Commission's action. During this period, the subject articles would be entitled to enter the United States under a bond in an amount determined by the Commission and prescribed by the Secretary of the Treasury. The Commission is therefore interested in receiving written submissions concerning the amount of the bond, if any, which should be imposed.

The parties to the investigation and interested Government agencies are requested to file written submissions on the issues of remedy, the public interest, and bonding. The complainant and the Commission investigative attorney are also requested to submit a proposed exclusion order and/or a proposed cease and desist order for the Commission's consideration. Persons other than the parties and Government agencies may file written submissions addressing the issues of remedy, the public interest, and bonding. Written submissions on remedy, the public interest, and bonding must be filed not later than the close of business on the day which is twenty-one (21) days from the date this notice appears in the Federal Register.

Commission Hearing

The Commission does not plan to hold a public hearing in connection with final disposition of this investigation.

Additional Information

Persons submitting written submissions must file the original document and 14 true copies thereof with the Office of the Secretary on or before the dealine stated above. Any person desiring to submit a document (or a portion thereof) to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment by the presiding oficer. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. Documents containing confidential information approved by the Commission for confidential treatment will be treated accordingly. All nonconfidential written submissions will be available for public inspection at the Secretary's Office.

Notice of this investigation was published in the Federal Register of June 8, 1983 (48 FR 26542).

Copies of the presiding officer's initial determination of January 4, 1984, and all other nonconfidential documents filed in connection with this investigation are available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 701 E Street NW., Washington, D.C. 20436, telephone 202-523-0161.

FOR FURTHER INFORMATION CONTACT: Judith M. Czako, Esq., Office of the General Counsel, U.S. International Trade Commission, telephone 202-523-0148.

By order of the Commission.

Issued: January 26, 1984.

Kenneth R. Mason,

Secretary.

[FR Doc. 84-2783 Filed 1-31-84; 8:45 am]

BILLING CODE 7020-02-M

[332-177]

Monthly Reports Providing Information on the U.S. Automobile Industry

AGENCY: International Trade Commission.

ACTION: Institution of an investigation under section 332(b) of the Tariff Act of 1930 (19 U.S.C. 1332 (b)) for the purpose of providing monthly report on the U.S. automobile industry.

BACKGROUND AND SCOPE OF INVESTIGATION: At the request of the Subcommittee on Trade, Committee on Ways and Means, U.S. House of Representatives, and in accordance with the provisions of section 332(b) of the Tariff Act of 1930 the Commission has instituted investigation No. 332-177, for the purpose of providing monthly data on the U.S. automobile industry through December 1984. The monthly reports will include data on automobile production, imports, exports, inventories, retail sales, price adjustments, and employment. The report will also include retail prices of selected comparable Japanese and U.S.-produced automobiles on a monthly basis.

The reports issued under this investigation will be similar in scope to those issued under recently completed investigation Nos. 332-121, 332-129, 332-136, and 332-152, of like title. Notice of the investigations were published in the Federal Register of January 7, 1981 (46 FR 1849), July 29, 1981 (46 FR 38779), February 10, 1982 (47 FR 6118), and February 15, 1983, (48 FR 6794), respectively.

EFFECTIVE DATE: January 24, 1984.

FOR FURTHER INFORMATION CONTACT: James McElroy or Georgia Jackson, Machinery and Equipment Division, Office of Industries, U.S. International Trade Commission, Washington, D.C. 20436 (telephone 202-523-0258 and 202-523-4604, respectively).

By order of the Commission.

Issued: January 25, 1984.

Kenneth R. Mason,

Secretary.

[FR Doc. 84-2705 Filed 1-31-84; 8:45 am]

BILLING CODE 7020-02-M

[332-176]

Competitive Assessment of the U.S. Foundry Industry

AGENCY: International Trade Commission.

ACTION: Institution of an investigation under section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)) concerning the competitive position of the U.S. foundry industry in domestic and world markets at the direction of the President, and the scheduling of a hearing in connection therewith.

EFFECTIVE DATE: January 19, 1984.

FOR FURTHER INFORMATION CONTACT: Mr. Peter Avery (202-523-0342) or Mr Patrick Magrath (202-523-0341).

Minerals and Metals Division, U.S. International Trade Commission, Washington, D.C. 20436.

SUMMARY:

Background and Scope of Investigation

The Commission instituted the investigation, No. 332–176, following receipt on December 29, 1983, of a request therefor from the United States Trade Representative (USTR), at the direction of the President. In accordance with the request, the Commission will examine the competitive position of the U.S. foundry industry in domestic and world markets. As requested by USTR, the study will include an overview of the U.S. foundry industry, together with a detailed analysis of selected key products which should be important to the U.S. foundry industry, and to the extent possible representative of major segments of the entire foundry industry in terms of manufacturing process, import competition, marketing, and financial condition.

In conducting its investigation, the Commission, at the request of USTR, will cover in its product analysis the following points: (1) Current profile of the U.S. and foreign foundry industries; (2) conditions of competition between U.S. and foreign foundry producers; (3) factors affecting the future competitive posture of domestic and foreign foundry operations; and, (4) the implications of the U.S. competitive position on the foundry industry itself, related industries, and the U.S. economy as a whole. The Commission expects to complete its study by August 31, 1984.

Public Hearing

A public hearing in connection with this investigation will be held in the Commission Hearing Room, 701 E Street, NW., Washington, D.C., 20436, beginning at 10:00 a.m. on July 18, 1984, to be continued on July 19, 1984, if required. All persons shall have the right to appear by counsel or in person, to present information and to be heard. Requests to appear at the public hearing should be filed with the Secretary, U.S. International Trade Commission, 701 E Street, NW., Washington, D.C. 20436, not later than noon, July 11, 1984.

Written Submissions

In lieu of or in addition to appearance at the public hearing, interested persons are invited to submit written statements concerning the investigation. Commercial or financial information which a submitting party desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with the requirements of § 201.6 of the Commission's *Rules of Practice and Procedure* (19 CFR 201.6). All written submissioins, except for confidential business information, will be available for inspection by interested persons. To be ensured of consideration by the Commission, written statements should be submitted at the earliest possible date, but no later than July 11, 1984. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

By order of the Commission.

Issued: January 23, 1984.

Kenneth R. Mason,

Secretary.

[FR Doc. 84–2770 Filed 1-31-84; 8:45 am]

BILLING CODE 7020-02-M

INTERSTATE COMMERCE COMMISSION

Agricultural Cooperative; To Perform Interstate Transportation for Certain Nonmembers

Date: January 27, 1984.

The following Notices were filed in accordance with section 10526(a)(5) of the Interstate Commerce Act. These rules provide that agricultural cooperatives intending to perform nonmember, nonexempt, interstate transportation must file the Notice, Form BOP 102, with the Commission within 30 days of its annual meetings each year. Any subsequent change concerning officers, directors, and location of transportation records shall require the filing of a supplemental Notice within 30 days of such change.

The name and address of the agricultural cooperative (1) and (2), the location of the records (3), and the name and address of the person to whom inquiries and correspondence should be addressed (4), are published here for interested persons. Submission of information which could have bearing upon the propriety of a filing should be directed to the Commission's Office of Compliance and Consumer Assistance, Washington, D.C. 20423. The Notices are in a central file, and can be examined at the Office of the Secretary, Interstate Commerce Commission, Washington, D.C.

(1) Agway Inc.
(2) Box 4933, Syracuse, NY 13221
(3) 333 Butternut Drive, Dewitt, NY 13214
(4) Ralph E. Hallock, Box 4933, Syracuse, NY 13221

(1) Buckskin Express, Ltd.
(2) 200 W. Marcy, Suite 129, Santa Fe, NM 87501
(3) 4000 S. 51st Ave., Laveen, AZ 85339
(4) Kimball Udall, 200 W. Marcy, Suite 129, Santa Fe, NM 87501

(1) Knouse Foods Cooperative, Inc.
(2) Peach Glen, PA 17306
(3) Peach Glen, PA 17306
(4) William H. Horner, Peach Glen, PA 17306

James H. Bayne,

Acting Secretary.

[FR Doc. 84-2722 Filed 1-31-84; 8:45 am]

BILLING CODE 7035-01-M

[Section 5a Application No. 23]

Middle Atlantic Conference; Assumption of Steel Carriers Tarif Association, Inc. Functions

AGENCY: Interstate Commerce Commission.

ACTION: Notice of filing of proposed amendments and request for comment.

SUMMARY: By petition filed March 1, 1983, the Middle Atlantic Conference (MAC), a motor carrier rate bureau, requests Commission approval of various amendments to its rate agreement. The proposed amendments would enable MAC to conduct consolidated rate bureau activities following a transfer to it of ratemaking, tariff publication, and other bureau activities presently performed by the Steel Carriers Tariff Association, Inc. (STA), another motor carrier rate bureau. The Commission seeks comments from interested parties as to whether this approval should be granted. Copies of the proposal are available for public inspection and copying at the Office of the Secretary, Interstate Commerce Commission, 12th St. and Constitution Avenue NW., Washington, DC, 20423, and from petitioner's representatives:

Bryce Rea, Jr., Patrick McEligot, Rea, Cross, & Auchincloss, 918 16th Street NW., Washington, DC 20006

J. Alan Royal, P.O. Box 397, 6410 Kenilworth Avenue, Riverdale, MD 20737.

DATES: Comments from interested parties are due March 2, 1984. We intend to issue a final decision in this proceeding no later than April 16, 1984.

ADDRESS: Send an original and 15 copies, if possible, of comments to: Section 5a Application No. 23, Office of the Secretary, Case Control Branch,

APPENDIX C

CALENDAR OF PUBLIC HEARING

TENTATIVE CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject : Competitive Assessment of the U.S. Foundry Industry

Inv. No. : 332-176

Date and time: July 18, 1984 - 10:00 a.m.

Sessions were held in connection with the investigation in the Hearing Room of the United States International Trade Commission, 701 E Street, N.W., in Washington.

WITNESS AND ORGANIZATION

DOMESTIC:

Thorp, Reed & Armstrong--Counsel
Washington, D.C.
on behalf of

The Cast Metals Federation ("CMF")

Herbert Roderick, Vice President - Marketing, Gartland Foundry, Terre Haute, Indiana

Robert Meier, President and Chief Executive Officer, Flynn & Emrich Company, Baltimore, Maryland

Carl A. Weigell, President, Motor Castings Company, Milwaukee, Wisconsin

Robert D. McIntire, Vice President and General Manager, National Castings, Sharon, Pennsylvania

Paul McCulloch, President, Metals Division, Evans Products Company, Rolling Meadows, Illinois

Peter Dudchenko, Director, Management Services, Iron Castings Society, Des Plaines, Illinois

Jack McNaughton, Executive Vice President, Steel Founders' Society of America, Des Plaines, Illinois

Roger M. Golden)
Preston T. Scott) --OF COUNSEL

- more -

Adduci, Dinan & Mastriani--Counsel
Washington, D.C.
<u>on behalf of</u>

The Municipal Castings Fair Trade Council (M.C.F.T.C.)

Alex DeBogory, President, U. S. Foundry and Manufacturing Company

John Campbell, President, Campbell Foundry Company

James Pinkerton, President, Pinkerton Foundry, Inc.

D. E. Shaw, Executive Vice President, Opelika Foundry Company, Inc.

Wallace Morgan, Executive Vice President, Vulcan Foundry, Inc.

F. Bruce Malpass, President, East Jordon Iron Works, Inc.

William C. Herrmann, Neenah Foundry Company

William E. Burke, Vulcan Foundry, Inc.

James Troup, LeBaron Foundry Company

Gerald Moore, Vice President, Bingham & Taylor

George Craig, President, Alhambra Foundry, Inc.

Lincoln Thompson, Jr., Chairman of the Board, Virginia Industries, Inc.

Steven Wolfberg, President, Allegheny Foundry Company

Donald R. Dinan)
Leslie A. Glick)--OF COUNSEL

Wells Manufacturing Company, Skokie, Illinois

Edward J. McMahon, Vice President-Sales

- more -

Bergen Point Brass Foundry, Inc., Bayonne, New Jersey

Ms. Rose Marine Lindberg, Corporate Secretary

James Ullman Hamersley--Counsel
Washington, D.C.
on behalf of

The American Die Casting Institute (ADCI), Des Plaines, Illinois

Walter Brown, Chairman of the Board, Kiowa Corporation, Marshalltown, Iowa

James U. Hamersley--OF COUNSEL

Rose, Schmidt, Dixon & Hasley--Counsel
Washington, D.C.
on behalf of

The American Pipe Fittings Association (APFA)

Paul H. Engle, Jr., Executive Director

Peter Buck Feller--OF COUNSEL

Kast Metals Corporation, Shreveport, Louisiana

R. A. McAllister, Human Resources Director

IMPORTERS:

O'Melveny & Myers--Counsel
Washington, D.C.
on behalf of

The Canadian Foundry Association

Richard W. LeVan, President, Western Foundry Company, Ltd.

Peter J. Kenny, President, Neelon Casting Ltd.

Gary N. Horlick
Ms. Judith Hippler Bello)

Southwestern Commercial Corporation, Houston, Texas

Timothy Gollin, Vice-President

APPENDIX D

A DISCUSSION OF THE EFFECTS OF EXCHANGE RATE CHANGES AMONG MAJOR U.S. TRADING PARTNERS ON THE COMPETITIVENESS OF U.S. PRODUCTS

EXCHANGE RATES

General

Unless offset by differences in relative inflation rates, changes in the value of the U.S. dollar vis-a-vis foreign currency can alter the competitiveness of imports in the United States. For example, a strong dollar and a relatively high rate of U.S. inflation can cause the dollar to become overvalued, increasing the competitiveness of imports in the United States.

To determine if changes in exchange rates have offset changes in inflation rates, real exchange rate indexes are often used. These indexes deflate changes in nominal exchange rates by changes in relative price levels. They show the change in competitiveness between the products of two countries since a base period. Real exchange rates for the U.S. dollar are determined by the following formula:

$$\text{Real exchange rate index} = \frac{\text{Nominal exchange rate index} \times \text{U.S. price index}}{\text{Foreign price index}}$$

If the real exchange rate index equals 100, the real value of the U.S. dollar has not changed since the base year. If the real exchange rate index is less than 100, the dollar is undervalued compared with the base year, and U.S. goods in general have become more competitive with foreign goods. The index would be less than 100 if either the U.S. price level has fallen relative to the foreign price level with no change in nominal exchange rates or the value of the dollar has risen in foreign exchange markets with no offsetting movement in relative price levels. If the real exchange rate index is greater than 100, the dollar is overvalued compared with the base year, and U.S. goods in general have become less competitive with foreign goods.

The following tabulation shows the real exchange rate indexes in 1983 for the U.S. dollar against the currencies of several countries for the base year 1979:

Country	Producer price index (1979=100)	Nominal exchange rate index (1979=100)	Real exchange rate index (1979=100)
United States	128.7	-	-
Brazil	2,215.9	2,183.4	126.8
Canada	137.2	105.2	98.7
China	121.1	127.1	135.1
India	149.2	124.3	107.3
Italy	176.2	171.4	125.2
Japan	118.8	109.5	118.6
Korea	175.4	161.6	118.6
Mexico	501.5	528.8	135.7
Spain	174.0	212.9	157.5
Taiwan	179.5	111.9	99.7
United Kingdom	142.0	139.9	126.8
West Germany	124.5	139.3	144.0

Source: Compiled from statistics of the International Monetary Fund.

As shown by the real exchange rate indexes in the tabulation, U.S. goods have become less competitive with goods from most foreign countries since 1979. The average real exchange rate index for the U.S. dollar against the foreign currencies is 124.5. This means that the price of imports has gone up by 24.5 percent less since 1979 than the price of U.S. goods. Goods from Spain, West Germany, Mexico, and China have enjoyed an especially sharp increase in competitiveness since 1979. Only goods from Canada have lost competitiveness to U.S. goods since 1979. 1/

1/ A study done by the U.S. International Trade Commission (The Effect of Changes in the Value of the U.S. Dollar on Trade in Selected Commodities, Investigation No. 332-150, USITC Pub. No. 1423 (August 1983)) found that although changes in exchange rates influence trade, other factors such as competitors' prices, product demand, and manufacturing costs are often equal or more important.

APPENDIX E

EXPLANATION OF THE RATES OF DUTY APPLICABLE TO CERTAIN FOUNDRY PRODUCTS AND SELECTED PORTIONS OF THE TARIFF SCHEDULES OF THE UNITED STATES ANNOTATED (1984)

Explanation of the rates of duty applicable to certain foundry products

The rates of duty in column 1 are most-favored-nation (MFN) rates, and are applicable to imported products from all countries except those Communist countries and areas enumerated in general headnote 3(f) of the TSUSA. 1/ However, such rates do not apply to products of developing countries which are granted preferential tariff treatment under the Generalized System of Preferences (GSP) or under the "LDDC" column.

The rates of duty in the "LDDC" column are preferential rates (reflecting the full U.S. MTN concession rate for a particular item without staging of duty reductions) and are applicable to products of the least developed developing countries designated in general headnote 3(d) of the TSUSA which are not granted duty-free treatment under the GSP. If no rate of duty is provided in the "LDDC" column for a particular item, the column 1 rate applies.

The rates of duty in column 2 apply to imported products from those Communist countries and areas enumerated in general headnote 3(f) of the TSUSA.

The GSP is a program of nonreciprocal tariff preferences granted by the United States to developing countries to aid their economic development by encouraging greater diversification and expansion of their production and exports. The GSP, implemented by Executive Order No. 11888, of November 24, 1975, applies to merchandise imported on or after January 1, 1976, and is scheduled to remain in effect until January 4, 1985. It provides for duty-free treatment of eligible articles imported directly from designated beneficiary developing countries. Eligible articles are identified in the column marked "GSP" with an "A" or "A*." The designation "A" means that all beneficiary developing countries are eligible for the GSP, and "A*" indicates that certain developing countries, specified in general headnote 3(c) of the TSUSA, are not eligible.

1/ The only Communist countries currently eligible for MFN treatment are the People's Republic of China, Hungary, Romania, and Yugoslavia.

GSP	Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty LDDC	Rates of Duty 2
			Cast-iron pipes and tubes:				
A	610.56		Other than alloy cast iron	....	7% ad val.	4% ad val.	25% ad val.
		20	Cast-iron soil pipe	Lb.			
		35	Cast-iron pressure pipe under 14 inches (inside diameter)	Lb.			
		45	Other	Lb.			
A	610.58	00	Alloy cast iron	Lb.	9.3% ad val. + additional duties (see headnote 4)	6.5% ad val. + additional duties (see headnote 4)	33% ad val. + additional duties (see headnote 4)
			Pipe and tube fittings of iron or steel:				
			Cast-iron fittings, not malleable:				
			For cast-iron pipe:				
A	610.62		Cast iron, other than alloy cast iron	....	7.9% ad val.	5.8% ad val.	25% ad val.
		20	For cast-iron soil pipe	Lb.			
		40	Other	Lb.			
A	610.63	00	Alloy cast iron	Lb.	9.3% ad val. + additional duties (see headnote 4)	6.5% ad val. + additional duties (see headnote 4)	33% ad val. + additional duties (see headnote 4)
			Not for cast-iron pipe:				
A	610.65	00	Cast iron, other than alloy cast iron	Lb.	2.8% ad val.	2.5% ad val.	20% ad val.
A	610.66	00	Alloy cast iron	Lb.	4.4% ad val. + additional duties (see headnote 4)	3.7% ad val. + additional duties (see headnote 4)	28% ad val. + additional duties (see headnote 4)
			Cast-iron fittings, malleable:				
			Not advanced in condition by operations or processes subsequent to the casting process:				
A	610.70	00	Cast iron, other than alloy cast iron	Lb.	6.6% ad val.	5.1% ad val.	20% ad val.
A	610.71	00	Alloy cast iron	Lb.	7.9% ad val. + additional duties (see headnote 4)	5.8% ad val. + additional duties (see headnote 4)	28% ad val. + additional duties (see headnote 4)
A	610.74	00	Advanced in condition by operations or processes subsequent to the casting process	Lb.	8.6% ad val.	6.2% ad val.	45% ad val.
A	610.80		Other fittings	....	8.6% ad val.	6.2% ad val.	45% ad val.
		08	Ductile fittings	Lb.			
			Other:				
			Flanges:				
			Under 14 inches (inside diameter):				
		13	Other than alloy iron or steel	Lb.			
			Alloy iron or steel:				
		15	Stainless steel	Lb.			
		18	Other	Lb.			
			14 inches and over (inside diameter):				
		21	Other than alloy iron or steel	Lb.			
			Alloy iron or steel:				
		24	Stainless steel	Lb.			
		28	Other	Lb.			

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

GSP	Item	Stat. Suffix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty LDDC	Rates of Duty 2
			Subpart G. - Metal Products Not Specially Provided For				
			Subpart G headnote:				
			1. This subpart covers only articles of metal which are not more specifically provided for elsewhere in the tariff schedules.				
			Articles of precious metal, including rolled precious metal:				
A	656.05	00	Of platinum, including rolled platinum............	X.......	12.5% ad val.	8% ad val.	65% ad val.
A	656.10	00	Of gold, including rolled gold.....................	X.......	12.6% ad val.	8.2% ad val.	65% ad val.
A	656.15	00	Of silver, including rolled silver................	X.......	7.7% ad val.	6% ad val.	65% ad val.
			Articles of base metal, coated or plated with precious metal:				
A	656.20	00	Coated or plated with platinum.....................	X.......	10.7% ad val.	7.5% ad val.	65% ad val.
A	656.25	00	Coated or plated with gold.........................	X.......	15.6% ad val. 1/❶	10% ad val. 1/❶	65% ad val.
			Coated or plated with silver:				
A	656.30	00	On copper or nickel silver.........................	X.......	10% ad val. 2/		65% ad val.
A	656.35	00	Other..	X.......	8.6% ad val. ❶	6.5% ad val.	65% ad val.
			Articles of iron or steel, not coated or plated with precious metal:				
			Cast-iron articles, not alloyed:				
	657.09		Not malleable......................................	....	Free		10% ad val.
		50	Manhole covers, rings, and frames........	Lb.			
		90	Other..	Lb.			
A	657.10	00	Malleable..	Lb......	3.4% ad val.	3.1% ad val.	20% ad val.
			Other articles:				
A	657.15	00	Of tin plate.......................................	X.......	3.8% ad val.	2.4% ad val.	45% ad val.
			Other:				
A*	657.24		Paper clips..	....	5.9% ad val.	3.8% ad val.	45% ad val.
		05	Wholly of wire.....................................	Lb.			
		10	Other..	Lb.			
A	657.25		Other..	....	7.1% ad val.	5.7% ad val.	45% ad val.
		05	Animal traps.......................................	No.			
			Articles wholly or in chief weight of wire:				
		20	Belts and belting..................................	Lb.			
		25	Other..	X			
			Cast articles:				
		40	With over 2.5% carbon by weight....................	Lb.			
		50	Other..	Lb.			
			Other:				
		62	Cable traction devices for tires...................	Lb.			
		63	Drum plugs...	Lb.			
		65	Ring binder mechanisms.............................	M.			
		90	Other..	X			

❶ 1/ Duty temporarily reduced. See item 947.34 in part 2, Appendix to the Tariff Schedules and general headnote 3(d)(ii).

❶ 2/ Duty temporarily reduced. See item 947.35 in part 2, Appendix to the Tariff Schedules.

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

G S P	Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	LDDC	2
			Internal combustion engines and parts thereof (con.):				
			Piston-type engines (con.):				
			Other (con.):				
			Engines other than compression-ignition engines:				
			Specially designed for:				
A*	660.48	❶	Automobiles (including trucks and buses).............	....	3.4% ad val.	3.1% ad val.	35% ad val.
		10	Used or rebuilt...........	No.			
		50	Other.....................	No.			
	660.49	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)......	No......	Free		
A	660.56		Other..........................	....	1.5% ad val.	Free	35% ad val.
		10	Specially designed for aircraft.................	No.			
			Outboard motors for marine craft:				
		22	Under 30 horsepower...............	No.			
		24	30 horsepower and over................	No.			
		30	Other.....................	No.			
	660.57	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)......	No......	Free		
	660.58	00	If certified for use in civil aircraft (see headnote 3, part 6C, schedule 6)..............	No......	Free		35% ad val.
			Non-piston type engines:				
A	660.59		Aircraft engines............................	....	5% ad val.		35% ad val.
		20	Turbo-jet and gas turbine, new...........	No.			
		40	Other..................................	No.			
	660.61	00	If certified for use in civil aircraft (see headnote 3, part 6C, schedule 6)....	No......	Free		35% ad val.
A	660.62		Other......................................	....	5% ad val.		35% ad val.
		10	Gas turbines............................	No.			
		80	Other..................................	No.			
	660.63	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)....................	No......	Free		
			Parts:				
	660.64	00	Cast-iron (except malleable cast-iron) parts, not alloyed and not advanced beyond cleaning, and machined only for the removal of fins, gates, sprues, and risers or to permit location in finishing machinery...........	Lb......	Free		10% ad val.

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

GSP	Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty LDDC	Rates of Duty 2
			Air pumps, vacuum pumps and air or gas compressors (including free-piston compressors for gas turbines); fans and blowers; all the foregoing, whether operated by hand or by any kind of power unit, and parts thereof (con.):				
			Fans and blowers, and parts thereof (con.):				
A*	661.06 (con.)		Other (con.):				
		30	Other fans and blowers	X			
		40	Parts	X			
	661.07	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)	X	Free		
	661.08	00	Fans and blowers, if certified for use in civil aircraft (see headnote 3, part 6C, schedule 6)	X	Free		35% ad val.
			Compressors, and parts thereof:				
A*	661.09	00	Refrigeration and air-conditioning compressors, 1/4 HP and under	No.	3.8% ad val.	3.4% ad val.	35% ad val.
A	661.10		Other compressors; parts of compressors		3.8% ad val.	3.4% ad val.	35% ad val.
			Refrigeration and air-conditioning:				
			Screw type:				
		01	200 HP and under	No.			
		02	Over 200 HP	No.			
			Other:				
			For all refrigerants except ammonia:				
		18	For motor vehicles	No.			
			Other:				
		20	Over 1/4 HP but not over 1 HP	No.			
		22	Over 1 HP but not over 3 HP	No.			
		24	Over 3 HP but not over 10 HP	No.			
		26	Over 10 HP	No.			
		30	For ammonia	No.			
			Other compressors:				
			Air compressors:				
			Stationary:				
		51	15 HP and under	No.			
		53	Over 15 HP but not over 100 HP	No.			
		55	Over 100 HP	No.			
		57	Portable	No.			
			Other compressors:				
		63	Centrifugal and axial	No.			
			Other, including reciprocating and rotary:				
		65	250 HP and under	No.			
		67	Over 250 HP but not over 1,000 HP	No.			
		69	Over 1,000 HP	No.			
		90	Parts	X			
	661.13	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)	X	Free		
	661.14	00	Compressors, if certified for use in civil aircraft (see headnote 3, part 6C, schedule 6)	X	Free		35% ad val.
A	661.15	00	Other	X	4.2% ad val.	3.7% ad val.	35% ad val.
	661.16	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)	X	Free		

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

GSP	Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	LDDC	2
			Subpart B. - Elevators, Winches, Cranes, and Related Machinery: Earth-Moving and Mining Machinery				
			Subpart B headnote:				
			1. This subpart does not cover -- (i) cranes or other machines mounted on vehicles, on vessels or other floating structures, or on other transport equipment (see part 6 of this schedule); or (ii) agricultural implements (see subpart C of this part).				
			Mechanical shovels, coal-cutters, excavators, scrapers, bulldozers, and other excavating, levelling, boring, and extracting machinery, all the foregoing, whether stationary or mobile, for earth, minerals, or ores; pile drivers; snow plows, not self-propelled; all the foregoing and parts thereof:				
A	664.06	00	Peat excavators	No.	1.9% ad val.	Free	35% ad val.
A	664.07		Backhoes, shovels, clamshells, draglines, and wheel-type front-end loaders		3.1% ad val.	2% ad val.	35% ad val.
		10	Backhoes, shovels, clamshells and draglines	No.			
		20	Wheel-type front-end loaders	No.			
A	664.08		Other		3.4% ad val.	2.5% ad val.	35% ad val.
		10	Drilling or boring machines	No.			
		20	Tracklaying-type front-end loaders	No.			
		30	Other machines	No.			
			Parts (including parts for articles provided for in items 664.06 and 664.07):				
		35	Track links	Lb.			
		42	Other	X			
A	664.10		Elevators, hoists, winches, cranes, jacks, pulley tackle, belt conveyors, and other lifting, handling, loading, or unloading machinery, and conveyors, all the foregoing and parts thereof not provided for in item 664.06, 664.07, or 664.08		3.1% ad val.	2% ad val.	35% ad val.
		05	Industrial robots	No.			
			Other:				
		15	Elevators, including freight, and moving stairways	No.			
			Conveyors:				
		25	Belt	No.			
		31	Other	No.			
		44	Hoists	No.			
		55	Overhead traveling cranes	No.			
			Jacks:				
		56	Hydraulic	No.			
		57	Other	No.			
		59	Winches	No.			
		60	Other, except parts	No.			

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

GSP	Item	Stat. Suffix	Articles	Units of Quantity	Rates of Duty 1	Rates of Duty LDDC	Rates of Duty 2
			Molds of types used for metal (except ingot molds), for metallic carbides, for glass, for mineral materials, or for rubber or plastics materials (con.):				
A	680.13		Other..	....	4.5% ad val.	3.9% ad val.	35% ad val.
		05	Injection, including die cast dies............	No.			
		10	Compression (compaction)......................	No.			
		15	Blow..	No.			
		20	Gravity pour (permanent)......................	No.			
		25	Other...	No.			
			Taps, cocks, valves, and similar devices, however operated, used to control the flow of liquids, gases, or solids, all the foregoing and parts thereof:				
			Hand-operated and check, and parts thereof:				
A	680.14		Of copper..................................	....	7% ad val.	5.6% ad val.	47% ad val.
		10	Under 125 pounds working pressure........	Lb.			
			125 pounds working pressure and over:				
		20	Check..................................	Lb.			
		30	Gate...................................	Lb.			
		40	Globe..................................	Lb.			
		50	Plug...................................	Lb.			
		60	Ball...................................	Lb.			
		70	Butterfly..............................	Lb.			
		80	Other..................................	Lb.			
	680.16	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)........	Lb......	Free		
A	680.17		Of iron or steel............................	....	9.5% ad val.	8% ad val.	45% ad val.
			Of iron or steel containing over 2.5 percent carbon by weight:				
		05	Check..................................	Lb.			
		10	Gate...................................	Lb.			
		15	Globe..................................	Lb.			
		18	Plug...................................	Lb.			
		25	Ball...................................	Lb.			
		30	Butterfly..............................	Lb.			
		35	Other..................................	Lb.			
			Other:				
		40	Check..................................	Lb.			
		45	Gate...................................	Lb.			
		50	Globe..................................	Lb.			
		55	Plug...................................	Lb.			
		60	Ball...................................	Lb.			
		65	Butterfly..............................	Lb.			
		68	Other..................................	Lb.			
	680.18	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)........................	Lb......	Free		
A	680.19	00	Other..	Lb......	6.9% ad val.	4.4% ad val.	45% ad val.
	680.24	00	If Canadian article and original motor-vehicle equipment (see headnote 2, part 6B, schedule 6)........................	Lb......	Free		

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

GSP	Item	Stat. Suffix	Articles	Units of Quantity	Rates of Duty 1	LDDC	2
			PART 6. - TRANSPORTATION EQUIPMENT				
			Part 6 headnote: 1. This part does not cover -- (i) bicycles (see part 5C of schedule 7); or (ii) sleds and toboggans (see part 5D of schedule 7).				
			Subpart A. - Rail Locomotives and Rolling Stock				
A	690.05	00	Rail locomotives and tenders	No.	4.5% ad val.	3.9% ad val.	35% ad val.
A	690.10	00	Self-propelled rail vehicles designed to carry passengers or articles	No.	8.3% ad val.	6.3% ad val.	35% ad val.
			Railroad and railway rolling stock:				
A	690.15	00	Passenger, baggage, mail, freight and other cars, not self-propelled	No.	18% ad val.		45% ad val.
A	690.20	00	Workshops, cranes, and other service vehicles	X	4.2% ad val.	3.7% ad val.	45% ad val.
			Parts of the foregoing articles:				
	690.25	00	Axles and parts thereof, and axle bars; all of the foregoing of iron or steel	Lb.	0.5% ad val.		3% ad val.
	690.30	00	Wheels and parts thereof, of iron or steel; and any of such wheels or parts imported with iron or steel axles fitted in them	Lb.	Free		1¢ per lb.
			Other:				
A	690.35		Parts of cars provided for in item 690.15, except brake regulators	-	6.8% ad val.	5.5% ad val.	45% ad val.
		10	Bolsters	Lb.			
		40	Side frames	Lb.			
		60	Other	X			
A	690.40	00	Other	X	4.5% ad val.	3.9% ad val.	35% ad val.

Subpart B. - Motor Vehicles

Subpart B headnotes:

1. For the purposes of this subpart --
   (a) the term "motor vehicles" includes amphibious motor vehicles;
   (b) automobile truck tractors imported with their trailers are, together with their trailers, classifiable in item 692.02, but, if such tractors and trailers are separately imported, they are classifiable in items 692.29 and 692.32, respectively.

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

SCHEDULE 6. - METALS AND METAL PRODUCTS
Part 6. - Transportation Equipment

6 - 6 - E
692.24 - 692.33

GSP	Item	Stat. Suffix	Articles	Units of Quantity	Rates of Duty 1	LDDC	2
			Chassis, bodies (including cabs), and parts of the foregoing motor vehicles (con.):				
			Other:				
	692.24	00	Cast-iron (except malleable cast-iron) parts, not alloyed and not advanced beyond cleaning, and machined only for the removal of fins, gates, sprues, and risers or to permit location in finishing machinery..........	Lb.	Free		10% ad val.
			Other:				
A	692.29	00	Automobile truck tractors, if imported without their trailers..................	No.	4% ad val.		25% ad val.
	692.31		If Canadian article (see headnote 2 of this subpart)...................		Free		
		20	Gasoline fueled...............	No.			
		40	Other.........................	No.			
A*	692.32		Other..................................		3.4% ad val. 1/	3.1% ad val. 1/	25% ad val.
		07	Axle spindles.......................	No. Lb.			
		15	Body stampings.....................	X			
		20	Bumpers............................	X			
		30	Wheels designed to be mounted with pneumatic tires...............	X			
		40	Hubcaps and wheel covers............	X			
			Radiators and parts thereof:				
		42	Complete radiators...........	X			
		44	Radiator cores................	X			
		46	Parts of radiators (other than cores)................	X			
		60	Mufflers and tailpipes.............	X			
		72	Brakes and parts thereof...........	X			
			Transmissions:				
		74	For automobile trucks and motor buses..................	X			
		76	For passenger automobiles......	X			
		78	Other.........................	X			
		82	Shock absorbers....................	X			
		88	Other..............................	X			
	692.33		If Canadian article and original motor-vehicle equipment (see headnote 2 of this subpart)............		Free		
		10	Body stampings................	X			
		20	Bumpers.......................	X			
		30	Wheels designed to be mounted with pneumatic tires..........	X			
		40	Hubcaps and wheel covers.......	X			
		50	Radiators.....................	X			
		60	Mufflers and tailpipes.........	X			
		72	Brakes and parts thereof.......	X			
			Transmissions:				
		74	For automobile trucks and motor buses...........	X			
		76	For passenger automobiles..............	X			
		78	Other.....................	X			
		80	Shock absorbers...............	X			
		90	Other.........................	X			

1/ Duty on axle spindles and shock absorbers temporarily reduced. See item 947.36 in part 2, Appendix to the Tariff Schedules and general headnote 3(d)(ii).

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).

GSP	Item	Stat. Suf-fix	Articles	Units of Quantity	Rates of Duty 1	LDDC	2
			Tractors (except tractors in item 692.40 and except automobile truck tractors), whether or not equipped with power take-offs, winches, or pulleys, and parts of such tractors:				
	692.34		Tractors suitable for agricultural use, and parts thereof	....	Free		Free
			New tractors:				
			Wheel type except garden tractors:				
			Power take-off horsepower type:				
		02	Under 20-PTO horsepower	No.			
		04	20-PTO horsepower or more, but less than 30-PTO horsepower	No.			
		05	30-PTO horsepower or more, but less than 40-PTO horsepower	No.			
		06	40-PTO horsepower or more, but less than 80-PTO horsepower	No.			
		09	80-PTO horsepower or more, but less than 100-PTO horsepower	No.			
		11	100-PTO horsepower or more	No.			
			Other:				
		15	Riding	No.			
			Other:				
		20	Rotary	No.			
		25	Other	No.			
		30	Track-laying type (including half-track)	No.			
		40	Other	No.			
		50	Used tractors	No.			
		60	Parts of tractors	X			
A	692.35		Other	....	3.4% ad val.	2.2% ad val.	27.5% ad val.
		10	Track-laying tractors (including half-track)	No.			
			Other tractors:				
		22	Off-the-highway type	No.			
		26	Other	No.			
			Parts of the foregoing:				
		32	Tracklinks for track-laying tractors	No. v Lb.			
		34	Other	X			
A	692.40		Fork-lift trucks, platform trucks and other self-propelled work trucks, and platform tractors; all of the foregoing of off-the-highway types used in factories, warehouses, or transportation terminals for short-distance transport, towing, or handling of articles; and parts of the foregoing trucks and tractors	....	1.7% ad val.	Free	35% ad val.
			Vehicles:				
		05	Operator walking	No.			
			Operating riding:				
		15	Electric powered	No.			
		25	Gasoline powered	No.			
		30	Other	No.			
		50	Other	No.			
		70	Parts thereof	X			
A	692.45		Tanks and other self-propelled armored military vehicles, whether or not fitted with weapons, and parts thereof	....	1.9% ad val.	Free	35% ad val.
		10	Vehicles	No.			
		20	Other	X			

Note: For explanation of the symbol "A" or "A*" in the column entitled "GSP", see general headnote 3(c).