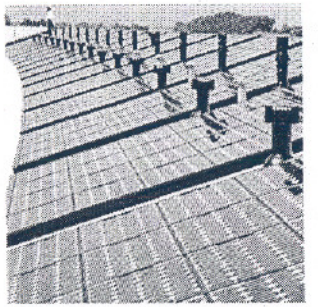
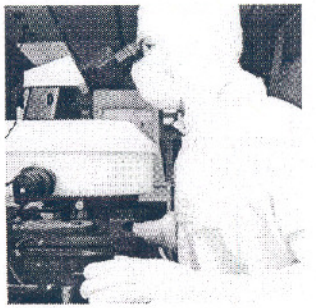
Renewable Energy Technology



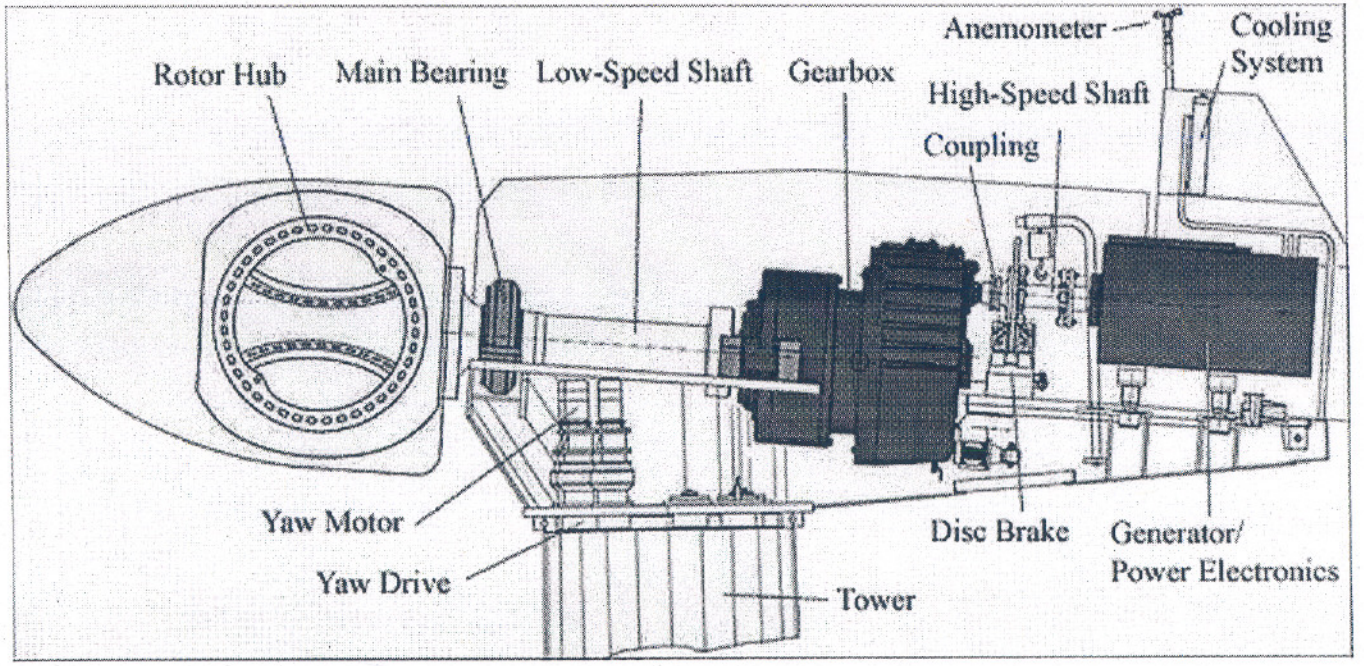


Component Parts and the Location of Manufacturing Activity

REPP

— 1: Identify Parts and NAICS codes

Component	*Specific NAICS*	*NAICS Industry*
Main Bearing	3329913032 - Tapered roller bearings	332991 - Ball and Roller Bearings



2: Using the NAICS Data

NAICS code	Code Description	Total Employees	Annual Payroll ($1000s)	Number of Establisments
326199	All other Plastics Products	501,009	15,219,355	8,174
331511	Iron Foundries	75,053	3,099,509	747
332312	Fabricated Structural Metal	106,161	3,975,751	3,033
332991	Ball and Roller Bearings	33,416	1,353,832	198
333412	Industrial and Commercial fans and blowers	11,854	411,979	177
333611	Turbines, and Turb. Generators, and Turb. Gen. Sets	17,721	1,080,891	110
333612	Speed Changer, Industrial	13,991	539,514	248
333613	Power Transmission Equip.	21,103	779,730	292
334418	Printed circuits and electronics assemblies	105,810	4,005,786	716
334519	Measuring and Controlling Devices	34,499	1,638,072	830
335312	Motors and Generators	62,164	2,005,414	659
335999	Electronic Equipment and Components, NEC	42,546	1,780,246	979
Total		1,025,327	35,890,079	16,163

20 Components fall into 12 different NAICS codes

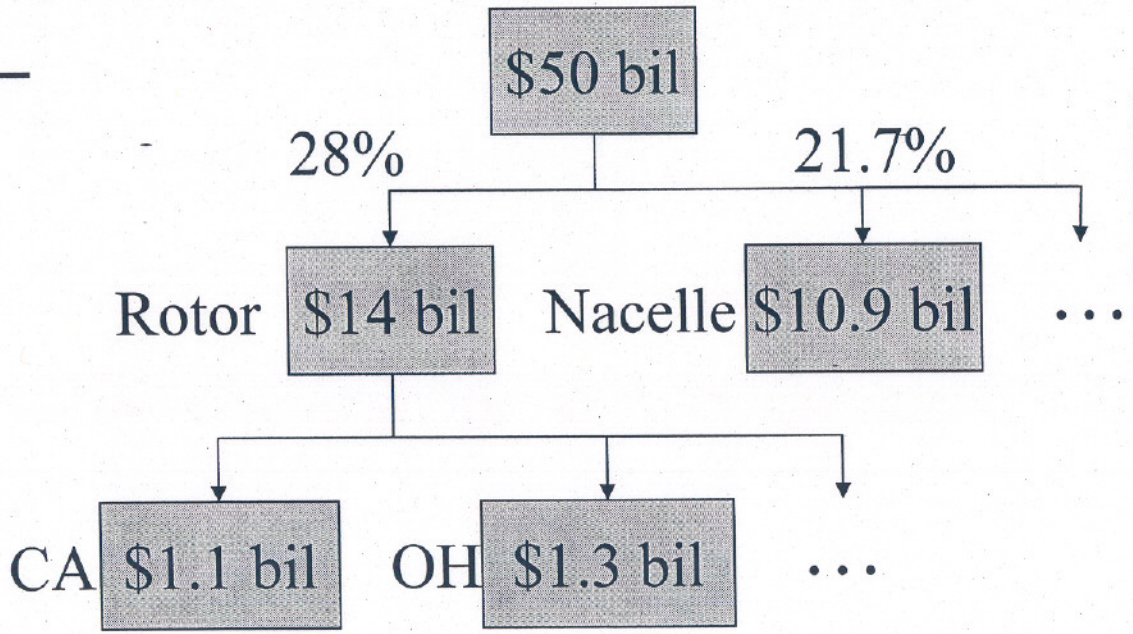
The 16,163 firms in these codes are distributed throughout U.S.

— 3:Allocate $ based on component cost

— Based on NREL's WindPACT study, components grouped into five groups and assigned relative cost:

Component Group	% of Total Turbine manufacturing Cost	Portion of Investment Allocated (billions)
Rotor	**28.0%**	**$ 14.0**
Nacelle and Controls	**21.7%**	**$ 10.9**
Gearbox and Drive Train	**17.3%**	**$ 8.7**
Generator and Power Electronics	**7.0%**	**$ 3.5**
Tower and Foundation	**26.0%**	**$ 13.0**
Total	**100.0%**	**$ 50.0**

— 4:Allocate geographically



$$\frac{25{,}226}{322{,}382} \quad \frac{\text{\# Employees in Rotors in State}}{\text{Total \# Employees in Rotors}}$$

Within each component group, funds are allocated to geographic divisions (such as states), based on the NAICS census data fraction of employees in that area.

Employees are used rather than firms to account for variation in the size of firms.

— Basic Result

— Looked at firms with the technical potential to enter the market

- 16,163 firms in all 50 states
- 20 states that receive the most investment and jobs (80% of the total) account for 75% of U.S. population, and 76% of the manufacturing jobs lost in the last 3.5 years

States Ranked by Investment

3 FTE manufacturing jobs per MW

Portion of $50B – Sum of component groups

State	Employees at Potential Companies	Rotor	Nacelle and Controls	Gearbox & Drive Train	Generator & Power Electronics	Tower	Number of New FTE Jobs	Average Investment ($ Billions)
California	**102,255**	25226	52490	1380	14889	8270	**12,717**	**4.24**
Ohio	**80,511**	30578	33367	6360	3372	6834	**11,688**	**3.90**
Texas	**60,229**	15191	28339	1678	3006	12015	**8,943**	**2.98**
Michigan	**66,550**	27719	30241	2466	926	5198	**8,549**	**2.85**
Illinois	**57,304**	20001	24193	5520	3143	4447	**8,530**	**2.84**
Indiana	**53,064**	18962	20359	4783	2633	6326	**8,317**	**2.77**
Pennsylvania	**50,304**	16647	20844	2565	1997	8251	**7,622**	**2.54**
Wisconsin	**48,164**	17795	21317	3796	567	4689	**6,956**	**2.32**
New York	**47,375**	10855	24188	4020	5966	2347	**6,549**	**2.18**
South Carolina	**20,532**	4398	4510	6780	1765	3079	**4,964**	**1.65**

Top 20 States – with Demographics

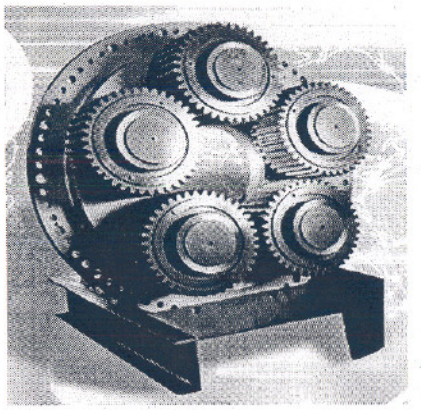
State	Potential Number of Jobs	Average Investment ($ Billions)	2001 Population	Rank in U.S.	Manufacturing Jobs Lost, Jan. 2001 - May 2004*	Rank in U.S.
California	12,717	4.24	34,501,130	1	318,000	1
Ohio	11,688	3.90	11,373,541	7	165,500	3
Texas	8,943	2.98	21,325,018	2	169,600	2
Michigan	8,549	2.85	9,990,817	8	129,300	8
Illinois	8,530	2.84	12,482,301	5	131,500	6
Indiana	8,317	2.77	6,114,745	14	63,500	13
Pennsylvania	7,622	2.54	12,287,150	6	155,200	5
Wisconsin	6,956	2.32	5,401,906	18	68,300	10
New York	6,549	2.18	19,011,378	3	130,500	7
South Carolina	4,964	1.65	4,063,011	26	56,800	17
...						
20 State Total	120,017	40	212,375,542		2,055,600	
% U.S. Total	80%	80%	75%		76%	

County Data

- County level data is available, by the same method used for state level data

County	Employees at Potential Companies	Rotor	Nacelle and Controls	Gearbox & Drive Train	Generator & Power Electronics	Tower	Number of Jobs	Average Investment ($ Millions)
Carroll, OH	**78**	39	39	-	-	-	**8**	**2.6**
Champaign, OH	**410**	205	205	-	-	-	**41**	**13.7**
Clark, OH	**410**	191	205	-	7	7	**43**	**14.2**
Clermont, OH	**426**	118	133	-	-	175	**79**	**26.4**
Clinton, OH	**360**	159	151	7	-	43	**48**	**15.9**
Columbiana, OH	**1,084**	514	457	-	-	113	**134**	**44.8**
Coshocton, OH	**377**	187	94	-	-	96	**61**	**20.3**
Crawford, OH	**1,127**	187	187	750	-	3	**349**	**116.2**
Cuyahoga, OH	**5,864**	1,809	2,542	779	216	518	**936**	**312.2**

Sample HS Results



- **Gear Box**

NAICS

6-digit: 333612 Speed Changer, Industrial

10-digit: 3336127438 Enclosed concentric and parallel (Planetary) center distance 6 in. or more

HS

6-digit: 848340 Gears and gearing, … gear boxes and other speed changers, including torque converters

10-digit: 8483405010 Fixed ratio speed changers

Exports of HS 848340 - Gearboxes

88 Countries Export products in 848340

For example, exports from Latin America to the world:

Country	Trade Value		Country	Trade Value	
Argentina	$	4,143,659	El Salvador	$	15,830
Bolivia	$	7,429	Guatemala	$	27,195
Brazil	$	25,241,184	Honduras	$	1,710
Chile	$	1,782,594	Mexico	$	60,504,264
Colombia	$	412,291	Nicaragua	$	5,229
Costa Rica	$	145,668	Uruguay	$	5,789
Ecuador	$	80,927			