THE MACHINERY INDUSTRY OF JAPAN 2003

MARCH 2004

THE JAPAN MACHINERY FEDERATION（JMF）

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Note Data sources shown with abbreviations in this booklet are as follows:

METI	:	Ministry of Economy, Trade and Industry
MHLW	:	Ministry of Health, Labor and Welfare
MPHPT	:	Ministry of Public Management, Home Affairs, Posts and Telecommunications
MOF	:	Ministry of Finance
JETRO	:	Japan External Trade Organization

1 Recent Trends in the Machinery Industry

1-1. Production Trends

According to "Current Production Statistics Survey" of METI, in 2002, the index of industrial production of Japan in each quarter increased from the previous quarter, while at yearly base it showed a decrease of 1.4% from the previous year, a decline of 2 consecutive years. The index was 91.9 in 2002 (2000 = 100), weakening from gradually increasing trend in a previous year. As revised index taking 2000 as 100, it was the lowest since 1998.

Looking at the machinery industry, while the index for transportation equipment increased 6.5% from the previous year, those for other 3 categories declined. General machinery, electrical machinery and precision instruments decreased 8.0%, 4.2% and 10.6% each from the previous year. In general machinery, semiconductor manufacturing equipment seriously dropt according to the weak demands of semiconductor products.

In electrical machinery, the production of electrical measuring & controlling instruments declined seriously because of decreased orders, and in the precision instruments the influence of reduced output of optical instruments was great.

According to "Machinery Statistics" compiled by METI, production for the machinery industry in 2002 showed a 0.1% increase from the year earlier and totaled ¥62,003.0 billion.

1-2. Foreign Trade

Looking at export trends in the machinery industry, total machinery exports in 2002 grew 5.7% from the previous year to ¥37,542.0 billion, because of great increase of car export and increase of export of IT related products. Good progress of car sales in the U.S. by putting new models on the market and by special sales promotion activities, and removal of extra custom duty for imported cars in China as it became a member of WTO were the background for healthy increase of car exports.

Looking at imports in the machinery industry in 2002, it showed an increase of 1.6% from the previous year and totaled to ¥13,434.0 billion, marking the third consecutive year of increase. However, in spite of great increase of imports of IT related products, the level of growth rate was as very small as the previous year (2.3%). As a result, the trade surplus in 2002 registered the first increase during resent 3 years.

Table 1-1. Production Index in the Machinery Industry

(2000 = 100, %)

	Production Index	Change (from previous year)			
	2002	2000	2001	2002	2003.1～6
Mining and manufacturing	91.9	5.7	△6.8	△1.4	4.1 (△1.6)
General machinery	81.9	9.2	△11.1	△8.0	6.3 (4.6)
Electrical machinery	87.3	6.2	△8.9	△4.2	5.5 (5.0)
Transportation equipment	106.4	4.0	△0.1	6.5	1.2 (△4.7)
Precision instruments	80.1	△4.0	△10.4	△10.6	3.6 (△4.1)

(Note) ( ) Change from previous half year
(Source) METI [Current Production Statistics Survey]

Table 1-2. Production in the Machinery Industry

(billion yen, %)

	Production	Change (from previous year)			
	2002	2000	2001	2002	2003.1～6
General machinery	10,182	8.6	△12.7	△9.4	5.8 (5.2)
Electrical machinery	22,705	8.9	△16.0	△11.1	4.0 (0.5)
Transportation equipment	28,497	5.7	2.7	16.5	4.3 (0.3)
Precision instruments	619	△4.7	△11.2	△12.6	6.7 (△0.9)
Total	62,003	7.5	△8.8	0.1	4.4 (1.2)

(Note) ( ) Change from previous half year
(Source) METI [Current Production Statistics Survey]

Table 1-3. Exports in the Machinery Industry

(billion yen, %)

	Exports	Change (from previous year)			
	2002	2000	2001	2002	2003.1～6
General machinery	10,599	9.3	△7.8	3.6	3.4 (△1.2)
Electrical machinery	11,924	18.2	△15.6	3.4	6.2 (△4.4)
Transportation equipment	13,000	0.3	2.8	16.8	3.7 (0.0)
Precision instruments	2,019	15.3	△5.2	△23.2	0.5 (△5.1)
Total	37,542	9.9	△7.4	5.7	4.2 (△2.1)

(Note) ( ) Change from previous half year
(Source) [Trade Statistics]

Table 1-4. Imports in the Machinery Industry

(billion yen, %)

	Import	Change (from previous year)			
	2002	2000	2001	2002	2003.1～6
Total	13,434	17.0	2.3	1.6	0.9 (0.0)

(Note) ( ) Change from previous half year
(Source) [Trade Statistics]

2 The Importance of the Machinery Sector in Japanese Industry

2-1. Scale of the Machinery Industry

(1) Number of Operations

According to METI's industrial statistics, at the end of 2001, manufacturing operations with four or more employees numbered 316,267, representing a decrease of 7.4% or 25,154 plants since the end of 2000. Of these, the number of operations belonging to the machinery industry was 79,024, representing a decrease of 8.2% or 7,024 plants since 2000. Machinery industry plants made up 25.0% of all manufacturing operations, decreasing 0.2 points from the end of 2000.

Breaking down the machinery industry plants by sector, general machinery, with its large number of small and medium-sized enterprises, accounted for the most plants with 36,907 (46.7% of all plants in the machinery industry), followed by electric machinery sector with 24,396 plants (30.9%), transportation machinery with 12,684 (16.1%), and precision machinery plants with 5,037 (6.4%).

(2) Employment

At the end of 2001, there were 8,866,220 people employed in manufacturing operations with four or more employees. This represented a 3.5% reduction (317,613 jobs) from the year earlier, and a decrease for 10 consecutive years. Employment in the machinery industry was 3,464,523 people, or a 4.8% decrease (174,633 jobs) from the previous year. The machinery industry accounted for 39.1% of all manufacturing employment, decreasing 0.5 points from the previous year.

By sector, electric machinery employed the most people with 1,451,804 (41.9% of total machinery industry employment), followed by general machinery with 1,001,192 (28.9%), transportation with 846,331 (24.4%), and precision machinery with 165,196 (4.8%).

(3) Shipments

In 2001, shipments for all manufacturing operations with four or more employees amounted to ¥286,667,406 million, a decrease of 4.6% or ¥13,810,198 million from the previous year. Machinery industry shipments were ¥130,075,316 million, down 8.7% or ¥12,469,896 million from the previous year. Machinery industry shipments accounted for 45.4% of overall manufacturing shipments, down 2.0 points from the year earlier.

By sector, electric machinery shipments led the way with ¥52,465,722 million (40.3% of the machinery industry shipments), followed by transportation machinery shipments with ¥45,152,216 million (34.7%), general machinery with ¥28,457,479 million (21.9%), and precision machinery with ¥3,999,899 million (3.1%).

Table 2-1. Number of Operations

	Industries	1999	2000			2001		
		Number of operations	Number of operations	Change (%)	Weight (%)	Number of operations	Change (%)	Weight (%)
	Total (Manufacturing)	345,457	341,421	98.8	100.0	316,267	92.6	100.0
12	Food manufacturing	39,659	39,395	99.3	11.5	37,491	95.2	11.9
13	Manufacture of beverage, food and tobacco	5,211	5,376	103.2	1.6	5,061	94.1	1.6
14	Manufacture of textile mill products	12,304	11,384	92.5	3.3	10,456	91.8	3.3
15	Manufacture of apparel and other finished product made fabrics	25,820	23,735	91.9	6.9	20,750	87.4	6.6
16	Manufacture of lumber and wood products except furniture	13,400	12,984	96.9	3.8	11,746	90.5	3.7
17	Manufacture of furniture and fixtures	13,003	12,417	95.5	3.6	11,772	94.8	3.7
18	Manufacture of pulp, paper and paper products	9,717	9,589	98.7	2.8	9,014	94.0	2.9
19	Publishing, printing and allied products	25,275	24,876	98.4	7.3	23,095	92.8	7.3
20	Manufacture of chemical and allied products	5,280	5,263	99.7	1.5	5,152	97.9	1.6
21	Manufacture of petroleum and coal products	1,156	1,137	98.3	0.3	1,084	95.3	0.3
22	Manufacture of plastic products	18,582	18,875	101.6	5.5	17,767	94.1	5.6
23	Manufacture of rubber products	4,357	4,277	98.2	1.2	4,048	94.6	1.3
24	Leather tanning and manufacture of leather products, and fur skins	3,932	3,594	91.4	0.8	3,397	94.5	1.1
25	Manufacture of ceramic, stone and clay products	17,704	17,388	98.2	5.1	16,420	94.4	5.2
26	Iron and steel industry	5,223	5,154	98.7	1.5	4,922	95.5	1.6
27	Manufacture of non-ferrous metals and products	3,573	3,575	100.0	1.0	3,342	93.5	1.1
28	Manufacture of fabricated metals and products	42,385	42,807	101.0	12.5	39,626	92.6	12.5
29	Manufacture of general machinery (included 33 manufacture of ordnance)	38,991	39,943	102.4	11.7	36,907	92.4	11.7
30	Manufacture of electrical machinery	27,522	27,282	99.1	8.0	24,396	89.4	7.7
31	Manufacture of transportation equipment	13,327	13,342	100.1	3.9	12,684	95.1	4.0
32	Manufacture of precision instruments	5,469	5,481	100.2	1.6	5,037	91.9	1.6
	Total of machinery industry (29～32)	85,309	86,048	100.9	25.2	79,024	91.8	25.0
34	Miscellaneous manufacturing industries	13,570	13,547	99.8	4.0	12,100	89.3	3.8

(Notes) Operations with 4 or more employees
(Source) METI [Census of Manufactures 2001]

Table 2-2. Number of Employees

	Industries	1999	2000			2001		
		Number of employees	Number of employees	Change (%)	Weight (%)	Number of employees	Change (%)	Weight (%)
	Total (Manufacturing)	9,377,750	9,183,833	97.9	100.0	8,866,220	96.5	100.0
12	Food manufacturing	1,133,749	1,127,177	99.4	12.3	1,155,025	102.5	13.0
13	Manufacture of beverage, food and tobacco	115,190	112,658	97.8	1.2	111,530	99.0	1.3
14	Manufacture of textile mill products	201,232	184,004	91.4	2.0	170,812	92.8	1.9
15	Manufacture of apparel and other finished product made fabrics	439,651	386,727	88.0	4.2	344,453	89.1	3.9
16	Manufacture of lumber and wood products except furniture	171,048	162,905	95.2	1.8	151,788	93.2	1.7
17	Manufacture of furniture and fixtures	172,213	163,838	95.1	1.8	155,763	95.1	1.8
18	Manufacture of pulp, paper and paper products	250,257	242,969	97.1	2.6	235,944	97.1	2.7
19	Publishing, printing and allied products	516,554	502,184	97.2	5.5	496,653	98.9	5.6
20	Manufacture of chemical and allied products	370,694	365,953	98.7	4.0	364,068	99.5	4.1
21	Manufacture of petroleum and coal products	28,904	27,145	93.9	0.3	26,245	96.7	0.3
22	Manufacture of plastic products	430,349	433,177	100.7	4.7	428,645	99.0	4.8
23	Manufacture of rubber products	134,737	131,532	97.6	1.4	127,331	96.8	1.4
24	Leather tanning and manufacture of leather products, and fur skins	48,024	44,233	92.1	0.5	41,488	93.8	0.5
25	Manufacture of ceramic, stone and clay products	373,225	363,997	97.5	4.0	348,286	95.7	3.9
26	Iron and steel industry	242,616	236,525	97.5	2.6	223,817	94.6	2.5
27	Manufacture of non-ferrous metals and products	140,814	141,872	100.7	1.5	134,145	94.6	1.5
28	Manufacture of fabricated metals and products	728,199	722,425	99.2	7.9	699,422	96.8	7.9
29	Manufacture of general machinery (included 33 manufacture of ordnance)	1,041,627	1,043,890	100.2	11.4	1,001,192	95.9	11.3
30	Manufacture of electrical machinery	1,604,147	1,573,683	98.1	17.1	1,451,804	92.3	16.4
31	Manufacture of transportation equipment	857,039	849,517	99.1	9.2	846,331	99.6	9.5
32	Manufacture of precision instruments	178,251	172,066	96.5	1.9	165,196	96.0	1.9
	Total of machinery industry (29～32)	3,681,064	3,639,156	98.9	39.6	3,464,523	95.2	39.1
34	Miscellaneous manufacturing industries	199,230	195,356	98.0	0.2	186,282	95.4	2.1

(Notes) Operations with 4 or more employees
(Source) METI [Census of Manufactures 2001]

Table 2-3. Shipments

(million yen)

	Industries	1999	2000			2001		
		Shipments	Shipments	Change (%)	Weight (%)	Shipments	Change (%)	Weight (%)
	Total (Manufacturing)	291,449,554	300,477,604	103.1	100.0	286,667,406	95.4	100.0
12	Food manufacturing	24,333,842	23,888,077	98.2	7.9	23,454,150	98.2	8.2
13	Manufacture of beverage, food and tobacco	10,726,179	10,932,925	101.9	3.6	10,914,272	99.8	3.8
14	Manufacture of textile mill products	3,236,081	3,008,080	93.0	1.0	2,736,822	91.0	1.0
15	Manufacture of apparel and other finished product made fabrics	3,900,874	3,478,958	89.2	1.2	3,008,227	86.5	1.0
16	Manufacture of lumber and wood products except furniture	3,311,504	3,194,109	96.5	1.1	2,905,932	91.0	1.0
17	Manufacture of furniture and fixtures	2,804,890	2,703,260	94.4	0.9	2,531,517	93.6	0.9
18	Manufacture of pulp, paper and paper products	7,862,925	7,933,875	100.9	2.6	7,582,775	95.6	2.6
19	Publishing, printing and allied products	12,877,333	12,778,464	99.2	4.3	12,525,367	98.0	4.4
20	Manufacture of chemical and allied products	23,077,855	23,762,228	103.0	7.9	23,228,380	97.8	8.1
21	Manufacture of petroleum and coal products	8,059,712	9,433,625	117.0	3.1	9,612,923	101.9	3.4
22	Manufacture of plastic products	10,243,490	10,486,448	102.4	3.5	9,995,163	95.3	3.5
23	Manufacture of rubber products	3,117,165	3,107,318	99.7	1.0	2,896,780	93.2	1.0
24	Leather tanning and manufacture of leather products, and fur skins	732,309	678,098	92.6	0.2	624,632	92.1	0.2
25	Manufacture of ceramic, stone and clay products	8,817,915	8,859,642	101.6	2.9	8,397,364	94.8	2.9
26	Iron and steel industry	11,321,665	11,927,293	105.3	4.0	11,201,829	93.9	3.9
27	Manufacture of non-ferrous metals and products	5,788,960	6,190,520	106.9	2.1	5,849,213	94.5	2.0
28	Manufacture of fabricated metals and products	15,238,215	15,142,541	99.4	5.0	14,545,010	96.1	5.1
29	Manufacture of general machinery (included 33 manufacture of ordnance)	28,260,834	34,658,588	122.6	11.5	28,457,479	82.1	9.9
30	Manufacture of electrical machinery	54,905,121	59,448,600	108.3	19.8	52,465,722	88.3	18.3
31	Manufacture of transportation equipment	43,877,373	44,366,979	101.1	14.8	45,152,216	101.8	15.8
32	Manufacture of precision instruments	4,169,343	4,071,045	97.6	1.4	3,999,899	98.3	1.4
	Total of machinery industry (29～32)	131,212,671	142,545,212	108.6	47.4	130,075,316	91.3	45.4
34	Miscellaneous manufacturing industries	4,785,971	4,686,887	97.9	1.6	4,581,735	97.8	1.6

(Notes) Operations with 4 or more employees
(Source) METI [Census of Manufactures 2001]

Table 2-4. Value Added

(million yen)

	Industries	1999 Value added	2000 Value added	2000 Change (%)	2000 Weight (%)	2001 Value added	2001 Change (%)	2001 Weight (%)
	Total (Manufacturing)	107,859,559	110,242,635	102.2	100.0	103,305,132	93.7	100.0
12	Food manufacturing	9,251,769	9,130,254	98.7	8.3	8,991,978	98.5	8.7
13	Manufacture of beverage, food and tobacco	3,341,064	3,442,677	103.0	3.1	3,388,142	98.4	3.3
14	Manufacture of textile mill products	1,370,594	1,301,245	94.9	1.2	1,192,205	91.6	1.2
15	Manufacture of apparel and other finished product made fabrics	1,847,233	1,648,594	89.2	1.5	1,428,017	86.6	1.4
16	Manufacture of lumber and wood products except furniture	1,220,958	1,190,750	97.5	1.1	1,095,450	92.0	1.1
17	Manufacture of furniture and fixtures	1,226,019	1,194,357	97.4	1.1	1,122,832	94.0	1.1
18	Manufacture of pulp, paper and paper products	2,910,194	2,978,056	102.3	2.7	2,882,271	96.8	2.8
19	Publishing, printing and allied products	6,699,752	6,622,782	98.8	6.0	6,515,047	98.4	6.3
20	Manufacture of chemical and allied products	11,475,838	11,496,608	100.2	10.4	11,248,504	97.8	10.9
21	Manufacture of petroleum and coal products	959,540	705,680	73.5	0.6	553,658	78.5	0.5
22	Manufacture of plastic products	4,137,262	4,250,034	102.7	3.8	4,056,316	95.4	3.9
23	Manufacture of rubber products	1,444,492	1,444,447	100.0	1.3	1,356,308	93.9	1.3
24	Leather tanning and manufacture of leather products, and fur skins	284,598	261,708	91.9	0.2	251,515	96.1	0.2
25	Manufacture of ceramic, stone and clay products	4,187,149	4,296,050	102.6	3.9	4,105,201	95.6	4.0
26	Iron and steel industry	3,823,875	4,228,818	110.6	3.8	3,955,742	93.5	3.8
27	Manufacture of non-ferrous metals and products	1,647,177	1,869,225	113.5	1.7	1,665,992	89.1	1.6
28	Manufacture of fabricated metals and products	6,775,007	6,770,255	100.2	6.1	6,492,607	95.9	6.3
29	Manufacture of general machinery (included 33 manufacture of ordnance)	11,229,637	13,509,910	120.3	12.2	11,020,189	81.6	10.7
30	Manufacture of electrical machinery	17,800,094	20,144,294	113.2	18.3	16,094,604	79.9	15.6
31	Manufacture of transportation equipment	12,493,696	11,815,575	94.6	10.7	12,469,847	105.5	12.1
32	Manufacture of precision instruments	1,750,515	1,770,370	101.1	1.6	1,742,318	98.4	1.7
	Total of machinery industry (29 〜 32)	43,273,942	47,240,149	109.2	42.8	41,326,958	87.5	40.0
34	Miscellaneous manufacturing industries	1,983,095	1,937,289	97.7	1.8	1,676,388	86.5	1.6

(Notes) Operations with 4 or more employees
(Source) METI [Census of Manufactures 2001]

(4) Value Added

2001 value added for all manufacturing operations with four or more employees amounted to ¥103,305,132 million, down 6.3% or ¥6,937,503 million from 2000. Machinery industry value added came to ¥41,326,958 million, down 12.5% or ¥5,913,191 million from the previous year. Value added for the machinery industry accounted for 40.0% of value added for all manufacturing operations, down 2.8 points from the previous year.

By sector, electric machinery led the way with ¥16,094,604 million in value added (38.9% of the value added for the machinery industry), followed by transportation machinery with ¥12,469,847 million (30.2%), general machinery with ¥11,020,189 million (26.7%), and precision machinery with ¥1,742,318 million (4.2%).

(5) Exports and Imports

According to MOT's foreign trade statistics, Japanese exports (yen- based) for 2002 amounted to ¥52,109.0 billion, representing a 6.4% increase from the previous year. Machinery equipment exports were ¥37,542.1 billion, a 6.4% increase. Machinery equipment made up 72.0% of all exports by value (general machinery claimed 20.3%, electric machinery 22.9%, transportation machinery 24.9%, and precision machinery 3.9%), decreasing 0.5 points from the previous year.

Japanese imports (yen-based) for 2002 amounted to ¥42,227.6 billion, a 0.4% decrease from the previous year. Machinery equipment imports were ¥13,434.3 billion, an 1.6% increase from the previous year. Machinery equipment made up 31.8% of all imports by value, an increase of 0.4 points from 2000.

As a result, the trade surplus for 2002 amounted to ¥9,881.5 billion, representing a 50.5% increase from the previous year.

- 2002 dollar-based Japanese exports came to $417,014,716 thousand, a 3.4% increase from the previous year. Of this amount, machinery equipment exports were $300,448,961 thousand, an increase of 2.7% from 2001.
- 2002 dollar-based Japanese imports were $336,984,327 thousand, a decrease of 3.5% from the previous year. Of this amount, machinery equipment imports were $107,438,866 thousand, a decrease of 1.3% from 2001.

Table 2-5. Machinery & Equipment Exports (yen base)

(million yen)

	2000	2001	2002	02/01 (%)	Weight (%)
Total	51,654,198	48,979,244	52,108,956	106.4	100.0
Foodstuffs	226,764	363,993	269,117	73.9	0.5
Raw materials & fuels	399,000	468,304	503,467	107.5	1.0
Machinery & equipment	38,367,511	35,525,071	37,542,130	105.7	72.0
General machinery	11,101,517	10,232,855	10,598,833	103.6	20.3
Electrical machinery	13,670,794	11,534,475	11,924,196	103.4	22.9
Transportation equipment	10,823,169	11,129,051	12,999,722	116.8	24.9
Motor vehicles (excluding parts)	6,930,054	7,210,812	8,774,645	121.7	16.8
Vessels	1,106,695	1,026,134	1,123,645	109.5	2.2
Precision instruments	2,772,031	2,628,691	2,019,379	76.8	3.9
Metals	2,849,176	2,885,931	3,227,445	111.8	6.2
Iron & steel products	1,599,514	1,649,038	1,939,592	117.6	3.7
Chemicals	3,808,729	3,743,718	4,173,674	111.5	8.0
Textiles	920,322	921,111	917,979	99.7	1.8
Non-metallic manufactures	596,395	564,887	566,069	100.2	1.1
Re-export goods, commodities and transactions not classified according to kind	1,901,629	2,896,527	2,229,726	77.0	4.3

(Source) METI [White Paper on International Trade 2003]

Table 2-6. The weight of the machinery equipment in exports (2002)

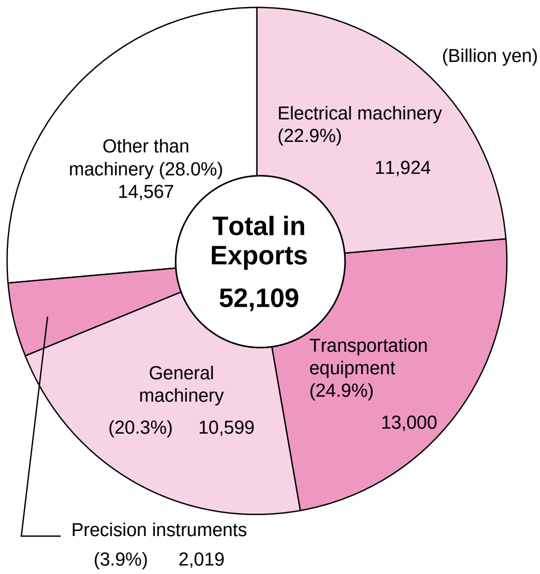


Table 2-7. Machinery & Equipment Imports (yen base)

(million yen)

Commodity	2000	2001	2002	02/01 (%)	Weight (%)
Total	40,938,423	42,415,533	42,227,506	99.6	100.0
Foodstuffs	4,963,098	5,247,596	5,282,336	100.7	12.5
Raw materials	2,626,650	2,586,073	2,521,804	97.5	6.0
Textile fibers	103,460	100,671	92,837	92.2	0.2
Metal ore	932,296	937,114	950,377	101.4	2.3
Wood	644,491	599,980	548,077	91.3	1.3
Mineral fuels	8,316,638	8,523,657	8,173,925	95.9	19.4
Coal	583,263	752,692	785,982	104.4	1.9
Petroleum, crude and partly refined	4,818,853	4,718,360	4,573,106	96.9	10.8
Petroleum products	953,190	903,102	822,654	91.1	1.9
Machinery & equipment	12,928,049	13,218,798	13,434,300	101.6	31.8
Chemicals	2,869,498	3,113,939	3,239,486	104.0	7.7
Metals	1,949,094	1,814,057	1,702,577	93.9	4.0
Textiles	2,643,347	2,891,057	2,752,090	95.2	6.5
Re-import goods, commodities and transactions not classified according to kind	690,699	786,389	881,394	112.1	2.1

(Source) METI [White Paper on International Trade 2003]

Table 2-8. The weight of the machinery equipment imports (2002)

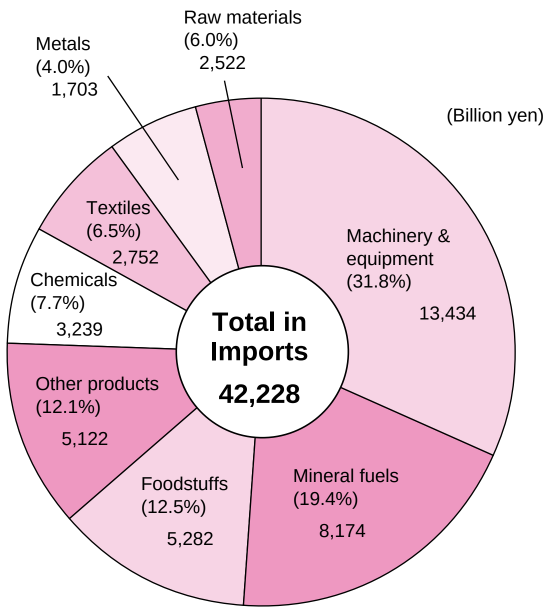


Table 2-9. Machinery & Equipment Exports (dollar base)

(thousand dollar)

Commodity	2000	2001	2002	02/01 (%)	Weight (%)
Total	479,283,559	403,230,427	417,014,716	103.4	100.0
Foodstuffs	2,102,780	2,991,219	2,149,772	71.9	0.5
Raw materials & fuels	3,699,167	3,852,093	4,022,553	104.4	1.0
Machinery & equipment	356,033,759	292,550,544	300,448,961	102.7	72.0
General machinery	102,987,608	84,268,724	84,799,288	100.6	20.3
Electrical machinery	126,826,795	95,020,872	95,549,948	100.6	22.9
Transportation equipment	100,493,494	91,605,420	103,935,906	113.4	24.9
Motor vehicles (excluding parts)	64,327,014	59,333,193	70,227,813	118.4	16.8
Vessels	10,319,286	8,460,411	9,174,159	108.4	2.2
Precision instruments	25,725,863	21,655,528	16,163,819	74.6	3.9
Metals	26,427,846	23,732,927	25,838,720	108.9	6.2
Iron & steel products	14,836,707	13,556,524	15,537,048	114.6	3.7
Chemicals	35,335,669	30,815,598	33,385,143	108.3	8.0
Textiles	8,533,281	7,571,129	7,355,877	97.2	1.8
Non-metallic manufactures	5,531,931	4,650,693	4,525,939	97.3	1.1
Re-export goods, commodities and transactions not classified according to kind	17,637,455	23,819,891	17,852,619	74.9	4.3

(Source) METI [White Paper on International Trade 2003]

Table 2-10. Machinery & Equipment Imports (dollar base)

(thousand dollar)

Commodity	2000	2001	2002	02/01 (%)	Weight (%)
Total	379,718,204	349,191,516	336,984,327	96.5	100.0
Foodstuffs	46,050,781	43,131,490	42,154,146	97.7	12.5
Raw materials	24,380,239	21,404,414	20,124,523	94.0	6.0
Textile fibers	960,884	829,290	740,859	89.3	0.2
Metal ore	8,652,722	7,716,265	7,584,207	98.3	2.3
Wood	5,983,861	4,941,879	4,373,769	88.5	1.3
Mineral fuels	77,088,471	70,202,685	65,229,631	92.9	19.4
Coal	5,410,888	6,190,145	6,272,301	101.3	1.9
Petroleum, crude and partly refined	44,660,369	38,863,915	36,494,342	93.9	10.8
Petroleum products	8,837,551	7,451,020	6,564,951	88.1	1.9
Machinery & equipment	119,892,725	108,864,436	107,438,866	98.7	31.9
Chemicals	26,614,500	25,638,203	25,851,776	100.8	7.7
Metals	18,084,912	14,951,524	13,586,920	90.9	4.0
Textiles	24,533,601	23,803,166	22,703,112	95.4	6.7
Re-import goods, commodities and transactions not classified according to kind	6,403,425	6,468,306	7,033,708	108.7	2.1

(Source) METI [White Paper on International Trade 2003]

(6) Investment in Plants and Equipment

According to figures compiled by the Development Bank of Japan, investment in plants and equipment (construction-base) in F.Y.2002 amounted to ¥18,713.8 billion, a 10.3% decrease from the previous year. Of this figure, manufacturing accounted for ¥5,586.1 billion, a 16.2% decrease, and non-manufacturing sectors invested ¥13,127.7 billion, a 7.5% decrease. Manufacturing investment represented 29.9% of the total, and non-manufacturing 70.1%.

Looking at investment by sector, the electrical machinery sector decreased investment by 20.9% from the previous year, and general machinery (-18.7%), precision machinery (-20.2%), chemical (-19.1%), steel (-20.9%), electric power (-19.7%), communication/information (-14.2%), and leasing (-4.4%) declined from the previous year. On the other hand, investments in the transportation equipment sector (1.5%), oil (32.3%), construction (6.0%), and wholesale/retail (2.8%) increased from the previous year.

Table 2-11. Investment in Plants and Equipment by Sector

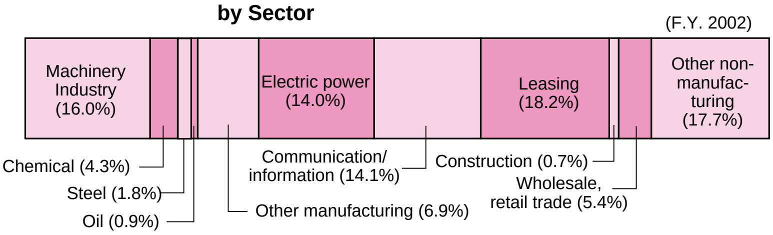
(100 million yen, %)

Sector	Investment				Change	Weight
	F.Y. 00/99	F.Y. 01/00	F.Y. 2001	F.Y. 2002	02/01	F.Y. 2002
Total	4.1	▲9.3	208,512	187,138	▲10.3	100.0
Manufacturing	12.5	▲9.7	66,623	55,861	▲16.2	29.9
Machinery industry	19.1	▲19.5	34,099	29,882	▲12.4	16.0
General machinery	0.6	▲3.3	4,312	3,506	▲18.7	1.9
Electrical machinery	38.7	▲34.4	15,940	12,606	▲20.9	6.7
Transportation equipment	▲3.7	2.0	12,512	12,705	1.5	6.8
Precision instruments	34.2	▲5.7	1,335	1,065	▲20.2	0.6
Chemical industry	10.1	8.1	10,039	8,121	▲19.1	4.3
Oil industry	▲36.8	34.7	1,200	1,588	32.3	0.9
Steel industry	▲21.1	7.5	4,183	3,309	▲20.9	1.8
Other industries	6.9	▲1.4	17,102	12,961	▲24.2	6.9
Non-Manufacturing	0.4	▲9.2	141,889	131,277	▲7.5	70.1
Electric power	▲9.5	▲9.8	32,642	26,197	▲19.7	14.0
Communication/information	2.1	▲10.8	30,770	26,405	▲14.2	14.1
Leasing industry	5.4	2.8	35,673	34,091	▲4.4	18.2
Construction	▲5.4	▲0.1	1,308	1,387	6.0	0.7
Wholesale, retail trade	6.6	▲19.6	9,870	10,151	2.8	5.4
Other industries	2.3	▲15.3	31,626	33,046	4.5	17.7

(Source) The Development Bank of Japan
[Investment in Plants and Equipment Research Report, 2003. 8]

Table 2-12. Weight of Investment in Plants and Equipment by Sector

(F.Y. 2002)



(Source) The Development Bank of Japan
[Investment in Plants and Equipment Research Report, 2003. 8]

As a result, the share of F.Y.2002 total investment in plants and equipment held by the various sectors is as follows: leasing 18.2%, communication/information 14.1%, electric power 14.0%, transportation equipment 6.8%, electrical machinery 6.7%, general machinery 1.9%, and precision instruments 0.6%.

In the machinery industry, the total investment in plants and equipment registered a 12.4% decrease, and the total share decreased 0.4 points from the previous year to 16.0%.

(7) Research and Development

According to the survey on scientific and technological research conducted by MPHPT, research expenditures by Japanese industry for 2002 grew 1.1% from the year earlier to a total of ¥11,573.4 billion. After increasing for 4 consecutive years beginning in 1995, these expenditures decreased 1.6% from the previous year in 1999, but turned positive again in 2000, and in 2002 registered an increase for the third consecutive year.

The manufacturing sector invested 87.1% of the total or ¥10,081.3 billion. The machinery industry spent ¥6,939.1 billion on research, which is 59.9% of the total amount spent by Japanese industry.

The number of researchers in 2002 was 555,576, 89.3% of whom were employed in the manufacturing sector. The machinery industry accounted for 59.8% of the total for Japanese industry.

Table 2-13. Research and Development in Machinery Industry (F.Y.2002)

Sector	Companies performing		Expenditure on R & D			Researchers	
	Number of companies	Weight in total companies (%)	Total (100 million yen)	Weight (%)	Weight in sales (%)	Total (%)	Weight (%)
Total	14,226	2.6	115,734	100.0	3.04	555,576	100.0
Manufacturing	11,004	7.0	100,813	87.1	3.99	496,343	89.3
Machinery industry	4,404	13.1	69,391	59.9	5.44	332,165	59.8
General machinery	1,914	8.7	9,392	8.1	4.43	49,961	9.0
Electrical machinery	1,656	11.2	38,091	32.9	6.29	187,965	33.8
Transportation equipment	356	5.3	17,379	15.0	4.35	70,852	12.8
Precision instruments	478	13.7	4,529	3.9	7.77	23,387	4.2
Other manufacturing	6,600	6.0	31,422	27.2	2.51	164,178	29.5
Other industries	3,222	0.8	14,921	12.9	1.17	59,233	10.7

(Source) Statistics Bureau of MPHPT
[Report on Survey of Research and Development 2003]
(Note) 2003.3.31.

2-2. The Machinery Industry's Share of Net Domestic Product

In 2001, the machinery industry's net domestic product amounted to ¥32,357.1 billion or 7.6% of the NDP for all of Japanese industry. This figure also amounted to 37.0% of the total for manufacturing.

The share in NDP had been rising each year, 9.0% in 1995, 9.2% in 1996, and 9.3% in 1997. However, in 1998 it decreased 1.1 points to 8.2%, in 1999 it decreased 0.1 points to 8.1%, and in 2000 it decreased 0.1 points to 8.0%. This trend continued in 2001 and it declined to 7.6% falling 0.4 points from the previous year .

The share in the total of manufacturing also declined by 1.2 points to 37.0% in 2001, after rising to 38.7% in 1995, 39.8% in 1996, remaining at the same level in 1997, declining to 38.3% with a fall of 1.5 points in 1998, and remaining at the same level in 1999, and declining to 38.2% with a fall of 0.1 points in 2000.

Table 2-14. The Machinery Industry's Share of Net Domestic Product

(Nominal, billion yen, %)

	1999	2000	2001		
				Share of total	Share of manufacturing
1. Industries	393,551.6	393,112.2	383,951.8	90.3	–
(1) Agriculture forestry and fisheries	5,619.6	5,091.5	4,836.5	1.1	–
(2) Mining	469.2	441.1	462.9	0.1	–
(3) Manufacturing	92,282.3	91,257.7	87,481.3	20.6	100.0
① Food	11,432.0	12,151.1	11,051.4	2.6	12.6
② Textiles	1,016.5	958.4	885.0	0.2	1.0
③ Pulp & paper	2,421.4	2,549.5	2,451.2	0.6	2.8
④ Chemicals	7,620.0	6,817.3	7,100.7	1.7	8.1
⑤ Petroleum	5,686.6	5,664.1	6,590.3	1.5	7.5
⑥ Ceramics, stone & clay products	3,092.6	3,154.9	2,980.9	0.7	3.4
⑦ Iron & steel, non-ferrous metals	5,137.1	5,485.0	5,100.6	1.2	5.8
⑧ Fabricated metals	5,035.8	4,889.8	4,697.1	1.1	5.4
[⑨〜⑫ Machinery industry]	35,339.8	34,896.2	32,357.1	7.6	37.0
⑨ General machinery	8,432.0	8,452.6	8,225.9	1.9	9.4
⑩ Electrical machinery	15,685.0	16,024.2	12,983.3	3.1	14.8
⑪ Transportation equipment	9,717.5	8,922.9	9,657.7	2.3	11.0
⑫ Precision instruments	1,505.3	1,496.5	1,490.2	0.4	1.7
⑬ Other manufacturing	15,500.6	14,691.4	14,266.8	3.4	16.3
(4) Construction	33,770.3	33,356.3	32,088.2	7.5	–
(5) Electric power, gas, water	9,162.0	9,075.4	9,141.8	2.1	–
(6) Wholesale, retail trade	67,771.0	66,578.2	64,337.1	15.1	–
(7) Finance & insurance	29,485.2	29,018.2	30,199.5	7.1	–
(8) Real estate	45,377.1	46,056.8	45,907.6	10.8	–
(9) Transport & communications	26,240.7	27,285.1	26,645.3	6.3	–
(10) Services	83,374.1	84,952.0	82,851.7	19.5	–
2. Government services	34,487.2	34,413.4	32,757.2	7.7	–
(1) Electricity, gas, water	974.9	944.3	885.4	0.2	–
(2) Services	12,073.7	11,800.3	11,268.0	2.6	–
(3) Public administration	21,438.7	21,668.9	20,603.8	4.8	–
3. Private non-profit services to households	9,179.5	8,475.9	8,509.2	2.0	–
(1) Services	9,179.5	8,475.9	8,509.2	2.0	–
Total	437,218.3	436,001.6	425,218.2	100.0	–
Import tax	2,940.9	3,165.0	3,242.9	–	–
Other	-3,328.6	-3,511.5	-3,430.3	–	–
Imputed interest	-24,806.6	-23,738.2	-25,777.8	–	–
Grand total	412,024.0	411,916.8	399,253.0	–	–

(Source) Cabinet Office

2-3. Recent Trends in the Establishment of New Factories and Plants

In 2002, the number of new locations for factories and plants was 844, decreasing 24.8% or 279 locations from 1,123 locations in the previous year. The total area of new locations was 872 hectares (1 hectare = 10,000 m^2), decreasing 36.8% or 507 hectares from 1,379 hectares in 2001. Both showed drastic decreases.

The decline of the number of new location was caused by the declining motivation of investment for new plants due to long slump of the economy, greater disadvantage of domestic locations compared to overseas locations such as in China, and due to the accelerating trend to consolidate the production bases.

The average area per location also great decreased to 1.03 hectares, from 1.23 hectares in the previous year. The continuing trend of slimming down of the new locations was one of the reasons for the decline of total area of new locations.

Table 2-15. Trends in the Establishment of New Factories and Plants

	1999	2000	2001	2002	Change (%) 2001 – 2002
Number	974	1,126	1,123	844	▲24.8
Area (ha)	1,125	1,473	1,379	872	▲36.8

(Note) 1. Lands of 1,000m^2 or over, newly acquired or leased, for the purpose of constructing factories, plants or business sites for manufacturing, electricity (excluding hydroelectric or geothermal power plants), gas or heat supply business.

2. 1 ha = 10,000m^2

(Source) METI [2002 Survey of New Locations for Factories and Plants]

3 Detailed Trends in the Machinery Industry

3-1. Production in the Machinery Industry

(1) Production Index

According to “Current Production Statistics Survey” of METI, the index of industrial production of Japan in 2002 decreased 1.4% from the previous year to 91.9 (2000 = 100).

① General Machinery

In 2002, the production index in general machinery decreased 8.0% from the previous year to 81.9.

Looking at the types of machinery, the production index for special industrial machinery drastically decreased 24.4% from the previous year, and marked second consecutive year of decline. The decrease was due to a decrease, especially in

Table 3-1. Production Index In the Machinery Industry

(2000 = 100, %)

Average	Mining and manufacturing	General machinery	Electrical machinery	Transportation equipment	Precision instruments
2000	100.0	100.0	100.0	100.0	100.0
2001	93.2	89.0	91.1	99.9	89.6
2002	91.9	81.9	87.3	106.4	80.1
Change 2002/2001	98.6	92.0	95.8	106.5	89.4

(Source) METI [Curreent Production Statistics Survey]

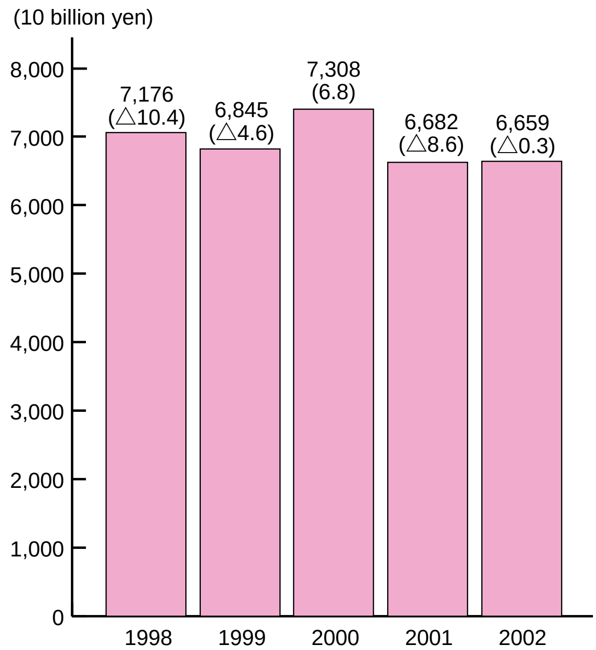
Table 3-2. Production in the Machinery Industry

(million yen, %)

	Machinery industry	General machinery	Electrical machinery	Transportation equipment	Precision instruments	Metal products	Castings/ forgings	Hunting rifles/ ordnance
1998	71,758,552	12,826,656	28,121,603	23,465,257	955,875	3,579,421	2,372,728	437,013
1999	8,445,433	11,849,120	27,925,519	22,523,865	836,025	2,571,461	2,300,850	438,594
2000	73,075,401	12,870,634	30,413,944	23,809,390	797,351	2,356,499	2,421,320	406,262
2001	66,815,381	11,241,693	25,534,386	24,456,193	707,523	2,275,298	2,195,872	404,416
2002	66,592,245	10,181,523	22,704,765	28,497,379	619,283	1,984,595	2,159,097	445,603
Weight	100.0	15.3	34.1	42.8	0.9	3.0	3.2	0.7
02/01	99.7	90.6	88.9	116.5	87.5	87.2	98.3	110.2

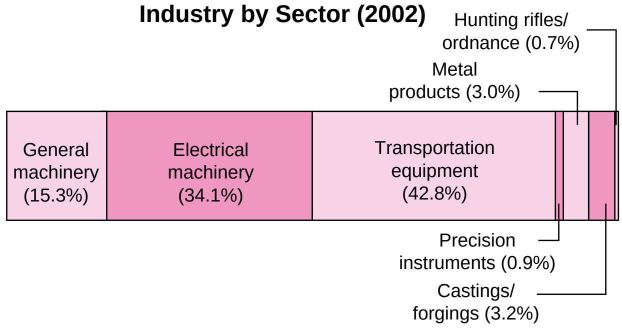
(Note 1) Beginning in 1997, the general machinery category included production of semiconductor and flat panel display manufacturing equipment.
(Note 2) In 2002, the past data from 1998 to 2001 revised due to the error correction.
(Source) METI [Machinery Statistics 2002]

Table 3-3. Production in the Machinery Industry



(Note) ( ) change, %
(Source) METI [Machinery Statistics 2001]

Table 3-4. Weight of production in the Machinery Industry by Sector (2002)



and after autumn, in the production of semiconductor manufacturing equipment reflecting the weak demand for semiconductors.

The production index for metal cutting machine tools decreased 22.4% from the previous year, marking two consecutive years, due to a decrease in machining centers, numerically controlled turning machines and grinding machines. The production index for fans, pumps, and hydraulic, air & oil pressure machinery also decreased 7.7% from the previous year. The decrease was the result of the decrease in air compressors due to continuing restraint of investment in semiconductor related industries, and decrease of pump and oil hydraulic machineries. The production index for parts of industrial machinery fell 4.0% and marked the second year of consecutive year of decline, due to the decrease of production in fixed ratio speed changers, general valves & cocks and faucets. The production index for conveying machinery decreased 8.4% from the previous year due to the decline in automatic high-rise warehouses, cranes, conveyors and others.

On the other hand, the production textile machinery increased 2.4% from the previous year due to a sharp increase in looms, as the export of looms for china was steady good condition for the year.

② Electrical Machinery

In 2002, the production index for electrical machinery decreased 4.2% from the previous year to 87.3.

Looking at the type of machinery, the production index for communication equipment showed a 21.7% decrease from the previous year, the second consecutive year of decline , due to the decrease in PHS, cellular telephones, electric switching systems, digital transmission equipments and fixed communication equipments, in spite of the increase in basic exchange for mobile customer premises equipments.

Electric computers decreased 11.9% from the previous year, due to the dull demands for both individual and company use, and due to the transfer of production to overseas by leading makers.

The production index for household electrical machinery decreased 13.1% from the previous year, marking the sixth year of decline, due to the decrease in all items except ventilating fans. The index for integrated circuits showed a 4.0% decrease from the previous year, the second consecutive year of decline, due to the declined demands for mobile phones, PCs including related equipments and game machines. The index for electrical measuring instruments showed a 29.3% decrease, marking second consecutive year of decline, due to the decline in all items.

Table 3-5. Production in General Machinery

(million yen, %)

	General machinery	Boilers, engines and turbines	Mining and construction equipment	Chemical machinery and strage tanks	Pulp & paper-making machinery, plastic processing machinery	Printing & related machines	Pumps, compressors & fans
2000	12,870,634	1,431,236	988,748	362,657	259,663	312,329	442,362
2001	11,241,693	1,193,447	846,945	272,378	194,747	259,302	411,277
2002	10,181,523	1,284,934	799,012	231,822	195,520	247,862	368,178
Share	100.0	12.6	7.8	2.3	1.9	2.4	3.6
02/01	90.6	107.7	94.3	85.1	100.4	95.6	89.5

	Oil-hydraulic and pneumatic equipment	Conveyance machines and industrial robots	Power transmissions	Agricultural machinery	Metal cutting machine tools	Metal forming machinery & foundry equipment	Textile machinery
2000	507,012	1,002,234	330,584	488,817	814,636	286,898	167,774
2001	419,774	863,608	308,577	424,038	776,453	254,960	165,483
2002	384,659	814,556	289,110	423,744	585,098	175,369	178,641
Share	3.8	8.0	2.8	4.2	5.8	1.7	1.8
02/01	91.6	94.3	93.7	99.9	75.4	68.8	108.0

	Food products machinery, wrapping & packing machinery	Wood working machinery	Office machinery	Sewing machines & hand knitting machines	Refrigerating machines, appliances and equipment	Vending and service machines, & business washing machines	Bearings
2000	246,416	46,656	642,588	110,516	2,087,859	245,172	595,282
2001	280,757	32,055	493,162	86,665	2,006,814	216,447	541,581
2002	239,727	24,691	425,369	74,392	1,871,912	179,099	539,182
Share	2.4	0.2	4.2	0.7	18.4	1.8	5.3
02/01	85.4	77.0	86.3	85.8	93.3	82.7	99.6

	Semiconductor and flat panel display manufacturing system
2000	1,501,195
2001	1,501,195
2002	848,646
Share	8.3
02/01	71.1

(Source) METI [Machinery Statistics 2002]

On the other hand, the production index for electronic parts turned to increase from the fall in the previous year, showing a 13.9% increase, as the production of active matrix LCD increased, due to increased demand for digital cameras and digital video-cameras for domestic market and increased export for mobile phones. The index for batteries increased 19.1% from the previous year due to the steady export of Lithium ion storage batteries for PCs and mobile phones.

Table 3-6. Production in Electrical Machinery

(million yen, %)

	Electrical machinery	Rotating electrical machinery	Electrical stationary machines	Switchgears and controlling equipment	Consumer electric appliances	Electric lamps, wiring equipment and luminaries	Communication and related equipment
2000	30,413,944	974,103	577,998	1,467,052	1,428,773	1,070,957	4,155,626
2001	25,534,386	860,619	566,211	1,299,002	1,384,558	1,004,304	3,955,300
2002	22,704,765	825,019	485,296	1,199,929	1,205,513	974,222	2,967,937
Share	100.0	3.6	2.1	5.3	5.3	4.3	13.1
02/01	88.9	95.9	85.7	92.4	87.1	97.0	75.0

	Consumer electronic appliances	Parts for electronic equipment	Electronic tubes, semiconductor devices and integrated circuits	Electronic applications equipment (Electronic computer etc.)	Electrical measuring & controlling instruments	Batteries
2000	2,191,166	3,635,390	7,512,104	5,778,130	773,436	849,209
2001	1,876,418	2,754,282	5,680,001	4,871,681	572,044	709,966
2002	1,978,080	2,677,144	5,630,132	3,673,675	410,179	677,639
Share	8.7	11.8	24.8	16.2	1.8	3.0
02/01	105.4	97.2	99.1	75.4	71.7	95.4

(Source) METI [Machinery Statistics 2002]

③ Transportation Equipment

The production index for transportation equipment in 2002 increased 6.5% from the previous year to 106.4.

Looking at the type of machinery, the index increased 6.3% for passenger cars after two consecutive years of increase, due to the increase in domestic market, in addition to the increase of exports mainly to North America, Asia and Europe. On the other hand, the index for motor vehicle parts showed a 8.3% increase, an increase for four consecutive years, due to increased production for both domestic use and exports. The index for trucks increased 4.1% from the previous year, due to the increase of production of large trucks.

④ Precision Instruments

The production index of this sector in 2002 showed a 10.6% drop from the previous year to 80.1.

Table 3-7. Production in Transportation Equipment

(million yen, %)

	Transportation equipment	Motor vehicles	Parts for motor vehicles and electric equipment for internal combustion engines	Motorcycles and parts	Bicycles (incl. wheelchair)	Industrial vehicles	Aircraft (incl. repairing)
2000	23,809,390	16,327,414	5,323,244	765,910	123,093	319,705	950,024
2001	24,456,193	17,143,179	5,177,289	733,724	105,951	304,953	991,097
2002	28,497,379	18,481,808	7,720,264	943,483	88,329	297,357	966,138
Share	100.0	64.9	27.1	3.3	0.3	1.0	3.4
02/01	116.5	107.8	149.1	128.6	83.4	97.5	97.5

(Source) METI [Machinery Statistics 2002]

Looking at the type of machinery, the index for measuring machines and instruments decreased 7.1 % due to the drop in industrial measures, analytical instruments, precision measuring machines and instruments, in spite of increase in measuring instruments as result of new models in the market. Optical apparatus and parts dropped 14.9%, the fourth consecutive year of decline, due to the decline of 24mm and 35mm cameras and interchangeable lenses. Watches and clocks decreased for the fourth consecutive year by 5.3%, due to the decline in movements and battery driven type watches and clocks (completed), in spite of the increase in battery driven type watches (movements).

Table 3-8. Production in Precision Instruments

(million yen, %)

	Precision instruments	Measuring equipment and instruments	Optical appliances and instruments	Watches & clocks
2000	797,351	413,668	227,388	156,295
2001	707,523	403,460	173,875	130,189
2002	619,283	359,414	146,359	113,510
Share	100.0	58.1	23.6	18.3
02/01	87.5	89.1	84.2	87.2

(Source) METI [Machinery Statistics 2002]

(2) Production Value

According to “Machinery Statistics” of METI, production for the machinery industry in 2002 showed a 0.3% decrease from the previous year to ¥66,592.2 billion. The sectors of general machinery, electrical machinery, precision instruments, metal products, castings/forgings registered decreases, while transportation equipment and hunting rifles/ordnance increased.

Slowing world economy as a result of a series of terrorist attacks in U.S.A. , worsening environment for investment caused by illegal accounting in some of big US companies, a decline of investment in plants and equipment in Japan and progress of shifting to oversea production for cost competition with China were background factors for week production activities in Japan.

The individual sectors accounted for the following shares of machinery industry production: general machinery 15.3%, electrical machinery 34.1%, transportation equipment 42.8%, precision instruments 0.9%, metal products 3.0%, casting/ forging 3.2%, and hunting rifles/ordnance 0.7%.

Compared to the previous year, the share of transportation equipment rose 6.6 points, and hunting rifles/ordnance slightly increased their shares. But general machinery, electrical machinery, precision instruments, metal products and others decreased or kept flat their shares.

① General Machinery

The production in the general machinery category in 2002 decreased 9.4% from the previous year to ¥10,181.5 billion.

Looking at the types of machinery, boilers, engines and turbines increased 7.7% from the previous year due to increased orders of boilers and turbines from electricity sector. Engineering, construction and mining machinery, and tractors declined 5.7% from the previous year due to week export.

Chemical machinery and storage tanks dropped 16.9% from the previous year due to depressed orders for machineries and equipment relating to the environment.

Pulp & papermaking machinery and plastic processing machinery increased 0.4% from the previous year due to increased export to Asia, North America and others. Printing & related machines dropt 4.4% from the previous year due to the depressed domestic demands and decreased export to Europe and U.S.A.

Conveyance machines and industrial robots decreased 5.7% as the production of conveying machines dropt due to the decrease of orders in the previous year, and as the production of industrial robots turned downward for domestic car industry and continued decreasing trend for electronics and electric industries, in spite of the increase in the export.

Oil-hydraulic and pneumatic equipment decreased 8.4% from the previous year due to depressed export of both of oil-hydraulic equipment and pneumatic equipment. Agricultural machinery dropt 0.1%, as each type machinery was in the trend of sifting to low price machines in the market under deflation, in the progress of agricultural structure improvement, and under the difficult problems of sharp increase of vegetable import and BSE.

Metal cutting machine tools decreased 24.6% from the previous year due to depressed domestic and foreign demand. Metal forming machinery & foundry equipment decreased 31.2% as the production rapidly shifted to overseas. Textile Machinery increased 8.0% due to the increase of export to China the biggest market.

Food products machinery, wrapping & packing machinery decreased 14.6% due to depressed economy and decline in stock price in Japan, and deflation pressure to the machinery price, in spite of increased demands for the machineries responding to safety and sanitation. Wood working machinery dropt 23.0% due to depressed housing industry as seen in the decreased number of new housing constructions. Office machinery decreased 13.7% from the previous year, due to the sharp drop of export from Japan as direct export of coping machines from oversea production sites increased. Sewing machines & hand knitting machines decreased 14.2% due to the drop of export of industrial sewing machines. Refrigerating machines, appliances and equipment due the progressed oversea production of air conditioners and dull demand in domestic market. Semiconductor and flat panel display manufacturing system decreased 28.9% from the previous year, due to decreased production of wafer processing equipment, one of semiconductor manufacturing systems.

② Electrical Machinery

2001 production of electrical machinery decreased 11.1% from the previous year to ¥22,704.7 billion.

Looking at the types of machinery, each of rotating electrical machinery (4.1% decrease), electrical stationary machines (4.3% decrease), and switchgears and controlling equipment (7.6% decrease) showed a decrease from the previous year, due to the dull investment for plants and equipment in private sector, ending of special procurement demand for power generating and transforming plants in U.S.A. caused by depressed economy, and steady trend of declining domestic production affected by sifting to oversea production. Consumer electric appliances decreased 2.9% from the previous year, due to the sluggish demand in domestic market, the increase of import caused by the shift of production to overseas, and the drop of price in domestic market.

Table 3-9. Production in Metal Products

(million yen, %)

	Metal products	Steel structures	Springs	Valves and pipe fittings	Air tools & hand tools	Metal gas & oil equipment, solor heated equipment
2000	2,356,499	966,700	282,611	423,669	133,169	550,350
2001	2,275,298	924,504	252,417	416,827	128,464	553,086
2002	1,984,595	748,047	257,152	373,931	118,503	486,962
Share	100.0	37.7	13.0	18.8	6.0	24.5
02/01	87.2	80.9	101.9	89.7	92.2	88.0

(Source) METI [Machinery Statistics 2002]

Production of communication and related equipment declined 25.0% from the previous year, due to prolonged slump in the consumer spending and in the company's investment in plants and equipment, restrained investment for the infrastructure by communication carriers and SP, cooling down of export demand caused by the burst of IT bubble in U.S.A., and the shift of production to Asia. Consumer electronic appliances increased 5.4% from the previous year, due to the great increase of digital video equipment of high technology such as PDP TV, liquid crystal color TV, digital camera, DVD recorder, car navigation system and others, in spite of the decline of audio equipment such as stereo components caused by the sift to overseas production. Electronic appliances equipment decreased 24.6%, due to the drastic decline of electronic computer and its related equipment, and as the replacement of mobile phone to the third generation failed to go smoothly. Parts for electronic equipment decreased 2.8%, and electronic tubes, semiconductor devices and integrated circuits decreased 0.9% from the previous year, keeping almost same level of production in the year earlier. The production of the electrical measuring & controlling instruments decreased 28.3% from the previous year, due to the decrease of general measuring equipment caused by the dull demand for the industries related with communication and network, and the decline of production in the industrial measuring equipment and instruments caused by the shift to overseas production and the decline of domestic investment in plants and equipment, in spite of the growth in the export of semiconductor characteristic measuring.

③ Transportation Equipment

2002 production of transportation equipment came to ¥28,497.3 billion or a 16.5% increase from the previous year, the third consecutive year of increase.

Looking at the individual categories, in the motor vehicles sector, in the domestic market, the production of small passenger cars was in excellent condition under the trend of down sizing of passenger cars, and also the production of large passenger cars enjoyed the effects of new models mainly in the minivan type and sedan type, and for the foreign market, the export of high-value added passenger cars mainly to U.S.A. was healthy due to the effect of new model cars. The production of buses increased due to substitute demand responding to the Nox and PM regulation for the cars and the Tokyo metropolitan area regulation, and by the newly created demand of barrier free, low-floor buses for regular routes. As a result, as total production in the motor vehicle sector increased 7.8% from the previous year.

Parts for motor vehicles and electric equipment for internal combustion engines increased 49.1% from the previous year, due to the increased production of cars in Japan and the great increase of export.

On the other hand, the production of industrial vehicles decreased 2.5% from the previous year, due to the decreased export of forklift trucks to Asia ,the main market, in spite of the graduate rise of demand for replacement in the domestic market. And the production of air craft dropt 2.5% from the previous year, due to the decline of received orders caused by the decreased level of production in the foreign major aircraft makers.

Table 3-10. Production in Castings / Forgings

(million yen, %)

	Castings / forgings	Powder metallurgy	Forged products	Iron castings	Malleable iron	Precision castings	Copper & cooper-base alloy castings
2000	2,421,320	303,769	491,443	718,030	37,654	47,093	70,078
2001	2,195,872	244,243	462,315	636,217	36,312	49,305	69,471
2002	2,159,097	228,780	429,640	617,617	30,031	44,930	67,342
Share	100.0	10.6	19.9	28.6	1.4	2.1	3.1
02/01	98.3	93.7	92.9	97.1	82.7	91.1	96.9

	Light alloy castings	Die-casting
2000	287,797	465,456
2001	264,325	433,684
2002	275,823	464,934
Share	12.8	21.5
02/01	104.3	107.2

(Source) METI [Machinery Statistics 2002]

④ Precision Instruments

2002 production of precision instruments declined to ¥619.2 billion, a 12.5% decrease from the previous year, the sixth consecutive year of decline.

Looking at the individual categories, the production of measuring equipment and instruments decreased 10.9% due to the declined of measuring instruments. Optical appliances and instruments decreased a total of 15.8% from the previous year, as cameras decreased affected by digital cameras (included in the classification of consumer electronic appliances). Watches and clocks also decreased 12.8% under the acceleration of offshore production of complete watches and clocks and drop of unit price for movements.

⑤ Metal Products

2002 production of metal products fell by 12.8% from the year before to ¥1,984.5 billion, the sixth consecutive year of decline.

By category, steel structures decreased 19.1% from previous year, due to the decline of order of architectural structures under the depressed economy. And springs, valves / pipe fittings, air tools / hand tools, and metal gas & oil equipment / solar heated equipment decreased 1.9%, 10.3%, 7.8% and 12.0% each.

⑥ Castings / Forgings

2002 production of castings and forgings decreased 1.7% from the previous year to ¥2,159.0 billion.

By category, powder metallurgy decreased 6.3%, and forged products decreased 7.1% from the year earlier due to the severe request of cost reduction from user industries under deflationary economy. And iron castings, malleable iron, precision castings, and copper & copper-base alloy castings decreased 2.9%, 17.3%, 8.9% and 3.1% decreased each. On the other hand, light alloy castings and die-castings increased 4.3% and 7.2% each from the previous year.

⑦ Hunting Rifles / Ordnance

2002 production of hunting rifles and ordnance increased 10.2% from the previous year to ¥445.6 billion.

Table 3-11. Production in Hunting Rifles/ Ordnance

(million yen, %)

	Ordnance	Hunting rifles
2000	397,503	8,759
2001	396,415	8,001
2002	438,213	7,390
Share	100.0	100.0
02/01	110.5	92.4

(Source) METI [Machinery Statistics 2002]

3-2. Labor Indices for the Machinery Industry

(1) Regular Employment Index

According to MPHPT's "Monthly Statistics of Japan", the regular employment index (2000=100) in Japanese industry (enterprises with 30 or more regular employees) in 2002 decreased 1.4 points from the year earlier to 97.1.

The regular employment index in manufacturing fell 4.7 points from the previous year to 92.8, the tenth year of consecutive decline since 1993.

Looking at each sector in the machinery industry, the employment index in the general machinery sector decreased 4.4 points to 93.6, the index in the electrical machinery sector declined 8.7 points to 88.1, the transportation equipment employment index fell 2.7 points to 94.6, and the employment index in the precision instruments sector fell 4.6 points to 95.1. All sectors continued their decline.

Table 3-12. Regular Employees in Machinery Industry

(2000 = 100, %)

Average during year	Total	Manufacturing	Machinery industry			
			General machinery	Electrical machinery	Transportation equipment	Precision instruments
1998	102.4	105.2	105.4	105.4	105.9	104.5
1999	101.2	102.5	102.1	102.2	103.2	101.6
2000	100.0	100.0	100.0	100.0	100.0	100.0
2001	98.5	97.4	97.9	96.5	97.2	99.7
2002	97.1	92.8	93.6	88.1	94.6	95.1
02/01(%)	98.6	95.3	95.6	91.3	97.3	95.4

(Note) Coverage: Establishments with 30 or more regular employees
(Source) Statistics Bureau of MPHPT [Monthly Statistics of Japan]

(2) Wages and Salary

In 2002, average monthly wages and salary for all industry for regular employees decreased 2.5% from the previous year to ¥387,600.

For all manufacturing, wages and salaries decreased 1.1% to ¥401,500 per month. Looking at wages in the machinery industry, wages in the general machinery sector decreased 4.7% to ¥438,000 (109% of the average for manufacturing), electrical machinery wages decreased 2.4% to ¥435,100 (108% of the rate for manufacturing), transportation equipment wages increased 3.4% to ¥485,800 (121% of manufacturing), and wages in the precision instruments sector decreased 3.7% to ¥400,800 (100% of the manufacturing average).

Table 3-13. Average Monthly Cash Earnings per Regular Employee in Machinery Industry

(Thousand yen, %)

Average during year	Total	Manufacturing	Machinery industry			
			General machinery	Electrical machinery	Transportation equipment	Precision instruments
1998	415.7	407.8	446.1	424.1	469.8	402.0
1999	396.3	399.1	445.4	433.3	462.1	412.5
2000	398.1	406.7	461.5	446.9	465.4	423.9
2001	397.4	406.1	459.4	445.6	469.9	416.0
2002	387.6	401.5	438.0	435.1	485.8	400.8
02/01(%)	97.5	98.9	95.3	97.6	103.4	96.3

(Note) Coverage: Establishments with 30 or more regular employees
(Source) Statistics Bureau of MPHPT [Monthly Statistics of Japan]

(3) Hours Worked

In 2002, the monthly hours actually worked by the average regular employee for all industry decreased 0.6% from the previous year to 153.1 hours per month. Monthly hours worked in manufacturing increased 0.6% from the year earlier to 163.8 hours per month.

Looking at the machinery industry, hours worked in the general machinery sector increased 0.7% to 167.4 hours (102% of the average for all manufacturing), hours worked in electrical machinery increased 1.3% to 160.7 hours (98% of manufacturing), hours worked in the transportation equipment sector increased 1.9% to 171.7 hours (105% of manufacturing), and precision instruments hours worked increased 0.1% to 161.6 hours (99% of manufacturing).

Table 3-14. Average Monthly Hours Worked per Regular Employee in Machinery Industry

(hour, %)

Average during year	Total	Manufacturing	Machinery industry			
			General machinery	Electrical machinery	Transportation equipment	Precision instruments
1998	156.6	162.7	166.9	160.3	168.3	159.2
1999	153.5	161.9	163.8	159.9	166.5	161.5
2000	154.9	164.7	169.0	163.6	169.8	165.0
2001	154.0	162.9	166.3	158.7	168.5	161.4
2002	153.1	163.8	167.4	160.7	171.7	161.6
02/01 (%)	99.4	100.6	100.7	101.3	101.9	100.1

(Note) Coverage: Establishments with 30 or more regular employees
(Source) Statistics Bureau of MPHPT [Monthly Statistics of Japan]

(4) Productivity Index

According to MPHPT's "Monthly Statistics of Japan", the labor productivity index (2000=100) for all manufacturing in 2002 increased 2.8 points or 2.9% from the previous year to 98.8.

Looking at the labor productivity index in the machinery industry, the general machinery sector fell 2.8 points or a 3.0% decrease to 89.1, the electrical machinery sector increased 8.1 points or 9.0% to 98.4, transportation equipment rose 7.9 points or 7.6% to 111.4, and the precision instruments sector fell 5.0 points or 5.5% in productivity to 86.2.

Table 3-15. Index of Labor Productivity in Machinery Industry

(2000 = 100, %)

Average during year	Manufacturing	Machinery industry			
		General machinery	Electrical machinery	Transportation equipment	Precision instruments
1998	92.2	95.0	78.1	93.2	114.5
1999	94.6	93.3	85.9	95.8	104.5
2000	100.0	100.0	100.0	100.0	100.0
2001	96.0	91.9	90.3	103.5	91.2
2002	98.8	89.1	98.4	111.4	86.2
02/01(%)	102.9	97.0	109.0	107.6	94.5

(Source) Statistics Bureau of MPHPT [Monthly Statistics of Japan]

3-3. Plants and Equipment Investment in the Machinery Industry

(1) Investment Trends

① 2002 Actual Investment

According to the survey of planned investment in plants and equipment conducted by the Development Bank of Japan, in F.Y. 2002 actual investment in plants and equipment (construction base) fell 16.2% for manufacturing industry, and fell 7.5% for non-manufacturing industry. As the result, actual investment in plants and equipment for all industry fell 10.3% from the previous year, registering the second consecutive year of decline, and marked double-digit percentage of decline, first time in 9 years.

In manufacturing, the automotive sector where the investment for production of new models and sales promotions were seen, and the chemicals sector where investment for environmental measures and for increasing self-service gas stations were seen, marked the second consecutive year of increase. On the other hand, in the electrical machinery sector and its relating industrial sectors, such as non-ferrous metal sector, ceramic, stone & clay sector and precision instruments sector), the investment was controlled continuously under the dull demands. The actual investment in plants and equipment in the each sector of chemicals, iron & steel, general machinery, food products and others sharply declined, due to the completion of planned investments and others.

In non-manufacturing, the investment turned to increase in the transportation sector for the extension of rail lines and the new line constructions, and in the whole sale, retail trade sector due to increasing new brunch shops of supermarkets and others. While the investment sharply declined in each of the electric power sector due to the restrained investment for thermal power plants, the communication/information sector due to restrained investment for existing mobile communication systems and fixed line telecommunication systems, and the service sector due to completion of the construction of large theme parks.

Table 3-16. Plants and Equipment Investment in the Main Sectors

(100 million yen, %)

Sector	Plants and equipment investment				Change	Weight	Plan (Change)	
	2000/99	2001/2000	F.Y. 2001	F.Y. 2002	2002/2001	F.Y. 2002	2003/2002	2004/2003
All industry	4.1	▲9.3	208,512	187,138	▲10.3	100	4.9	▲6.1
(excluding electricity)	▲6.8	(▲9.3)	(175,870)	(160,941)	(▲8.5)	(86.0)	(6.3)	(▲6.6)
Manufacturing	12.5	▲9.7	66,623	55,861	▲16.2	29.9	16.2	▲11.0
Food products	▲3.2	▲6.5	4,262	3,639	▲14.6	1.9	4.2	▲5.0
Textiles	▲19.8	3.3	713	617	▲13.4	0.3	▲1.3	▲25.7
Pulp, paper	24.2	15.1	2,272	1,825	▲19.7	1.0	▲11.7	▲26.8
Chemicals	10.1	8.1	10,039	8,121	▲19.1	4.3	11.2	▲7.3
Oil industry	▲36.8	34.7	1,200	1,588	32.3	0.8	9.8	16.1
Ceramic, stone & clay products	37.1	▲7.4	2,368	1,618	▲31.7	0.9	18.4	▲0.2
Iron & steel	▲21.1	7.5	4,183	3,309	▲20.9	1.8	22.3	▲24.2
Non-ferrous metals	64.3	10.2	3,358	1,861	▲44.6	1.0	23.7	▲9.0
General machinery	0.6	▲3.3	4,312	3,506	▲18.7	1.9	13.8	▲3.9
(Boiler, engines & turbines)	(▲22.8)	(12.9)	(399)	(474)	(18.7)	(0.2)	(▲2.1)	(▲3.4)
(Metal working machinery)	(▲5.8)	(12.2)	(282)	(236)	(▲16.4)	(0.1)	(13.7)	(▲5.9)
(Office machines)	▲5.0	(1.8)	(1,518)	(1,320)	(▲13.1)	(0.7)	(18.0)	(▲1.9)
(Industrial machinery)	(▲3.3)	(▲3.8)	(1,417)	(1,082)	(▲23.7)	(0.6)	(4.6)	(3.6)
(Machinery parts)	(18.6)	(▲25.2)	(695)	(394)	(▲43.3)	(0.3)	(43.9)	(▲50.4)
Electrical machinery	38.7	▲34.4	15,940	12,606	▲20.9	6.7	22.3	▲12.6
(Electric appliances)	(▲2.5)	(▲18.4)	(4,511)	(3,640)	(▲19.3)	(2.0)	(13.8)	(▲7.5)
(Electric machinery)	(▲11.6)	(▲7.3)	(941)	(670)	(▲28.8)	(0.4)	(7.2)	(3.8)
(Parts of electronic apparatus)	(60.5)	(▲40.5)	(10,488)	(8,296)	(▲20.9)	(4.4)	(27.2)	(▲15.0)
Precision instruments	34.2	▲5.7	1,335	1,065	▲20.2	0.6	30.4	▲27.2
Transportation equipment	▲3.7	2.0	12,512	12,705	1.5	6.8	16.7	▲2.3
(Automotive)	(▲3.2)	(1.1)	(11,978)	(12,116)	(1.2)	(6.5)	(16.5)	(▲0.6)
(Shipbuilding)	(31.3)	(33.0)	(125)	(120)	(▲4.4)	(0.2)	(31.6)	(▲30.4)
(Aircraft)	(▲34.8)	(10.2)	(288)	(316)	(9.8)	(0.1)	(13.5)	(1.4)
Other manufacturing	5.3	▲8.6	4,130	3,401	▲17.7	1.8	24.9	▲18.8
Non-manufacturing	0.4	▲9.2	141,889	131,277	▲7.5	70.1	0.2	▲5.1
(excluding electricity)	(3.5)	(▲9.0)	(109,247)	(105,080)	▲3.8	(56.2)	(1.2)	(▲5.3)
Construction	▲5.4	▲0.1	1,308	1,387	6.0	0.7	▲21.8	▲21.5
Wholesale, retail trade	6.6	▲19.6	9,870	10,151	2.8	5.4	1.8	▲3.1
Real estate	17.7	▲20.5	8,165	8,113	▲0.6	4.3	▲12.6	▲39.2
Transportation	▲5.0	▲7.1	17,052	19,743	15.8	10.5	2.3	▲13.0
Electricity	▲9.5	▲9.8	32,642	26,197	▲19.7	14.0	▲4.1	▲4.8
Gas	▲2.1	▲15.3	2,684	2,427	▲9.6	1.3	9.1	▲7.7
Communication / information	2.1	▲10.8	30,770	26,405	▲14.2	14.1	2.1	▲6.5
Leasing	5.4	2.8	35,673	34,091	▲4.4	18.2	3.4	3.9
Service	3.7	▲35.5	3,312	2,264	▲31.6	1.2	1.8	7.7
Other non-maufac-turing	▲13.7	▲11.6	414	499	20.5	0.3	▲17.8	9.3

(Source) The Development Bank of Japan [Investment in Plants and Equipment Research Report, 2003.8]

② F.Y. 2003 Planned Investment

F.Y.2003 planned investment in plants and equipment for all industries will increase 4.9% from the previous year, as the investment in manufacturing industries will act as a driving engine for other industries. For manufacturing industries, total planned investment in plants and equipment will turn upward after three consecutive years of decline, because in more than half of manufacturing industries including automotive industry and electric machinery industry will drastically increase their investments, but as a total of the manufacturing it will be still in low level. In the electrical machinery industry the manufacturers of end products such as audio-video equipments will aggressively invest for plants and equipment of devices and others such as flat-screen display equipments, pushed by sharply increasing demands for digital consumer- electronics. In addition to the above, The investment in plants will sharply increase in the precision instruments industry for the equipments related to semiconductor manufacturing equipments, in the non-ferrous metals industry for preparation for 300 mm silicon wafers, and in ceramics, stone and clay products industry for glass-substrates for liquid crystal display equipments, as the driving engines in the sectors related to the electric parts and devices industry. And in the chemicals industry, the investment for electronics materials for information equipments in addition to the investment for medical products will pull up the level of total investments. And the automotive industry (for preparation for new model cars) and the iron and steel industry (for renewal or repairing of blast furnaces) will make it active to invest for renewal of facilities on the ground of healthy sales and revenues.

In non-manufacturing industries, total planned investment in plants and equipment will increase 0.2% in 2003 from the previous year. In the real estate sector where big renewal projects will be completed, and the electric power industry were the restrain of investment will continue for improving their balance sheets, the investment in plants and equipment will drop. On the other hand, plants and equipment investment in the leasing industry in there the increase of demands is expected, in the communication/information industry where the investment for next-generation mobile-phone, fiber optic network and terrestrial digital broadcasting systems will be expected, and in the wholesale, retail trade industry where new location of branch shop of supermarket is active, will increase. As the result the total investment in plants and equipment in the non-manufacturing industries in 2003 will remain almost in the same level with the year earlier.

(2) Machinery Orders

According to the survey of actual orders for machinery conducted by the Cabinet Office (280 companies surveyed), total machinery orders for F.Y.2002 decreased 1.9% from the year earlier to ¥22,834.3 billion, after it declined in 1999 0.3% from the previous year, increased 12.3% in 2000, and decreased 12.3% in 2001.

Looking at machinery orders from the private sector in F.Y.2002, the orders from the manufacturing sector decreased 1.9%, and orders from the non-manufacturing sector decreased 9.3% from the previous year. As a result, machinery orders from the private sector registered a 7.0% decrease from the previous year, the second consecutive year of decline.

Table 3-17. Orders Received for Machinery (by source)

(million yen, %)

	F.Y.1999	F.Y. 2000	F.Y. 2001	F.Y. 2002
Total	23,631,055 (△0.3)	26,548,850 (12.3)	23,280,779 (△12.3)	22,834,318 (△1.9)
Total (excluding vessels)	22,511,361 (△1.5)	25,119,319” (11.6)	22,036,282 (△12.3)	21,556,530 (△2.2)
Foreign	6,318,442 (10.2)	7,463,097 (18.1)	5,791,558 (△22.4)	6,586,057(△13.7)
Domestic	15,856,766” (△3.3)	17,559,465 (10.7)	16,188,606 (△7.8)	15,040,981 (△7.1)
Domestic (excluding vessels)	15,541,704 (△3.8)	17,251,186 (11.0)	16,052,499 (△6.9)	14,894,098 (△7.2)
Public sector	3,902,059 (△5.8)	4,155,073 (6.5)	3,774,844 (△9.2)	3,490,117 (△7.5)
Private sector	11,954,707 (△2.4)	13,404,392 (12.1)	12,413,762 (△7.4)	11,550,864 (△7.0)
Private sector (excluding vessels)	11,856,903 (△2.7)	13,302,864 (12.2)	12,277,746 (△7.7)	11,404,398 (△7.1)
Private sector (excluding vessels and electric power)	10,469,293 (0.6)	12,202,782 (16.6)	10,662,171 (△12.6)	10,266,435 (△3.7)
Manufacturing	4,359,620 (0.7)	5,190,531 (19.1)	3,957,545 (△23.8)	3,880,681 (△1.9)
Non-Manufacturing	7,595,087 (△4.2)	8,213,861 (8.1)	8,456,217 (3.0)	7,670,183 (△9.3)
Non-Manufacturing (excluding vessels)	7,519,928 (△4.5)	8,125,531 (8.1)	8,351,750 (2.3)	7,552,214 (△9.6)
Non-Manufacturing (excluding vessels and electric power)	6,132,318 (0.6)	7,025,449 (14.6)	6,736,175 (△4.1)	6,414,251 (△4.8)
Agencies	1,455,847 (△7.1)	1,526,288 (4.8)	1,300,615 (△14.8)	1,207,280 (△7.2)
Sales amounts	25,268,740 (△2.0)	26,824,470 (6.2)	23,631,439 (△11.9)	23,166,847 (△2.0)
Sales amounts (excluding vessels)	24,151,827 (△1.1)	25,678,462 (6.3)	22,466,905 (△12.5)	21,884,730 (△2.6)
Order outstanding	18,445,079 (△5.0)	18,276,954 (△0.9)	17,747,158 (△2.3)	17,102,140 (△3.6)
Order outstanding (excluding vessels)	16,454,924 (△5.4)	16,010,368 (△2.7)	15,185,133 (△5.2)	14,709,971 (△3.1)

(Note)　Coverage 280 major companies
(Source)　Cabinet Office

Private sector demand (excluding vessels and electric power), which is considered to be a leading indicator of private investment in plants and equipment, registered a 3.7% decrease from the previous year in F.Y. 2002, after an increase of 0.6% in F.Y.1999, a sharp increase of 16.6% in F.Y.2000, and marked a decrease of 12.6% in F.Y.2001.

Orders from the public sector registered a 7.5% decrease, the second year of consecutive decline, as orders from 4 categories including the transportation services operated by the public sector, Defense Agency, and local governments declined, in spite of increased orders from the National government and the telecommunication services industry.

In F.Y.2002, overseas demand for machinery decreased 13.7% from the previous year, due to declined demand for power generating machinery, electric power machinery and railway vehicles, while the demand for electronic/communication equipment, industrial machineries, machine tools and ships increased.

Table 3-18. Orders Received for Machinery (by machinery items)

(million yen, %)

	F.Y. 1999		2000		2001		2002	
Power generating machinery	1,758,867	(△14.2)	1,811,811	(3.0)	2,102,607	(16.1)	1,592,178	(△24.3)
Electric power machinery	1,801,906	(△7.6)	1,809,558	(0.4)	1,657,741	(△8.4)	1,552,782	(△6.3)
Electric equipment, Telecommunications apparatus	10,068,394	(5.4)	11,442,583	(13.6)	9,719,885	(△15.1)	9,717,035	(0.0)
Industrial machinery	6,623,971	(△2.3)	7,358,320	(11.1)	6,227,180	(△15.4)	6,346,907	(1.9)
Metal cutting machinery	683,957	(△17.2)	886,566	(29.6)	609,411	(△31.3)	618,110	(1.4)
Railway vehicles	304,742	(△22.2)	476,752	(56.4)	374,827	(△21.4)	365,878	(△2.4)
Road motor vehicles	402,247	(8.0)	458,716	(14.0)	453,877	(1.1)	516,579	(13.8)
Aircraft	867,277	(△6.1)	875,013	(0.9)	890,754	(1.8)	847,061	(△4.9)
Ships	1,119,694	(31.4)	1,429,531	(27.7)	1,244,497	(△12.9)	1,277,788	(2.7)
Steel structures	661,335	(△11.4)	590,543	(△10.7)	522,626	(△11.5)	463,570	(△11.3)
Bearings	569,421	(3.2)	593,760	(4.3)	521,959	(△12.1)	580,331	(11.2)
Electrical wires & cables	1,028,200	(△3.5)	1,081,332	(5.2)	988,325	(△8.6)	936,351	(△5.3)

(Source) Cabinet Office

Table 3-19. Orders Received for Machinery (by business sector of source)

(million yen, %)

	F.Y. 1999		2000		2001		2002	
Public sector	3,902,059	(△5.8)	4,155,073	(6.5)	3,774,844	(△9.2)	3,490,117	(△9.2)
Private sector	11,954,707	(△2.4)	13,404,392	(12.1)	10,605,780	(△20.9)	9,679,869	(△20.9)
(Manufacturing)	4,359,620	(0.7)	5,190,531	(19.1)	3,814,242	(△26.5)	3,744,276	(△26.5)
Foods	155,755	(△3.2)	153,094	(△1.7)	138,973	(△9.2)	119,738	(△9.2)
Textiles	60,930	(△4.1)	56,200	(△7.8)	50,230	(△10.6)	42,677	(△10.6)
Paper & pulp	93,090	(9.8)	114,867	(23.4)	68,066	(△40.7)	73,438	(△40.7)
Chemicals	300,781	(△16.5)	429,373	(42.8)	326,189	(△24.0)	276,161	(△24.0)
Petroleum & coal products	57,804	(△29.1)	68,357	(18.3)	75,809	(10.9)	71,268	(10.9)
Ceramics	48,064	(△22.9)	58,706	(22.1)	47,514	(△19.1)	42,261	(△19.1)
Iron & steel	151,280	(△24.4)	205,701	(36.0)	147,889	(△28.1)	127,849	(△28.1)
Machinery	2,116,487	(17.6)	2,578,430	(21.8)	1,729,585	(△32.9)	1,777,398	(△32.9)
Motor vehicles	290,440	(△20.2)	388,878	(33.9)	409,165	(5.2)	442,989	(5.2)
Shipbuilding	140,512	(△11.8)	168,209	(19.7)	179,513	(6.7)	192,926	(6.7)
Other manufacturing	944,477	(12.4)	1,051,641	(11.3)	641,309	(△39.0)	577,571	(△39.0)
(Non-Manufacturing)	7,595,087	(△4.2)	8,213,861	(8.1)	6,791,538	(△17.3)	5,935,593	(△17.3)
Transport	617,624	(△1.4)	677,187	(9.6)	699,056	(3.2)	704,195	(3.2)
Construction	581,272	(5.1)	556,520	(△4.3)	470,422	(△15.5)	420,231	(△15.5)
Electric power	1,387,698	(△22.0)	1,100,778	(△20.7)	1,615,879	(46.8)	1,138,008	(46.8)
Mining	54,573	(20.6)	48,291	(△11.5)	37,146	(△23.1)	29,256	(△23.1)
Agriculture, forestry & fisheries	565,929	(4.0)	539,340	(△4.7)	522,668	(△3.1)	505,741	(△3.1)
Communication	1,950,842	(5.2)	2,516,784	(29.0)	2,300,358	(△8.6)	2,050,349	(△8.6)
Other non-manufacturing	2,437,149	(△3.4)	2,774,961	(13.9)	1,146,009	(△58.7)	1,087,813	(△58.7)

(Note) – Machinery includes general machinery, electrical machinery, transportation quipment (excluding motor vehicles) and precision instruments.
– Other manufacturing includes rubber products & leather products, non-ferrous metals, fabricated metals and others.
– Other non-manufacturing includes wholesale & retail trade, financial services & insurance, real estate, information services and others.

(Source) Cabinet Office

3-4. Research and Development in the Machinery Industry

According to the 2002 survey of scientific and technological research conducted by the statistics bureau of the Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT), research expenditures by Japanese industry for F.Y.2001 rose 5.4% from the previous year to a total of ¥11,451.0 billion. Of this amount, the machinery industry spent ¥6,833.8 billion, an increase of 1.3% from the previous fiscal year, and its share of the total amount spent by Japanese industry was 59.7%.

By sector, the general machinery sector spent ¥815.3 billion on R&D (7.1% of all R&D expenditures), electrical machinery spent ¥3,852.4 billion (33.6%), transportation equipment spent ¥1,675.5 billion (14.6%), and the precision instruments sector spent ¥490.6 billion (4.3%).

Table 3-20. Expenditures on R&D in the Machinery Industry

(100 million yen, %)

Sector	F.Y.	1998	1999	2000	2001	01 / 00	Weight
All industry	106,584	108,001	106,302	108,602	114,510	105.4	100.0
Manufacturing	98,164	98,071	95,216	98,160	98,849	100.7	86.3
Machinery industry	65,897	66,302	64,484	67,431	68,338	101.3	59.7
General machinery	7,901	8,117	8,114	8,836	8,153	92.3	7.1
Electrical machinery	37,194	37,128	36,159	38,200	38,524	100.8	33.6
Transportation equipment	16,540	16,320	15,296	15,526	16,755	107.9	14.6
Precision instruments	4,262	4,737	4,915	4,869	4,906	100.8	4.3
Other manufacturing	32,267	31,769	30,732	30,729	30,511	99.3	26.6
Other industries	8,420	9,930	11,086	10,442	15,661	150.0	13.7

(Note) Including software industry after 1996
(Source) Statistics Bureau of MPHPT
[Report on the Survey of Research and Development 2002]

Table 3-21. Expenditures on R&D by Type of Activity in the Machinery Industry (F.Y. 2001)

(%)

Sector	Weight of expenditure on R & D by type of activity		
	Basic research	Applied research	Development research
All industry	5.8	20.4	73.9
Manufacturing	5.7	20.0	74.3
General machinery	3.6	19.1	77.3
Electrical machinery	3.8	19.2	77.0
Transportation equipment	2.4	14.3	83.2
Precision instruments	1.8	24.6	73.6

(Note 1) 2002.3.31.
(Note 2) All Industry includes special public corporations.
(Source) Statistics Bureau of MPHPT
[Report on the Survey of Research and Development 2002]

3-5. Exports in the Machinery Industry

2002 exports of machinery and equipment (yen base) increased 5.7% from the previous year to ¥37,542.1 billion, and the share of exports of machinery and equipment in the total exports declined by 0.5 points from the previous year to 72.0%.

Looking at the exports of machinery and equipment by sector, the transportation equipment sector increased its share from 31.3% to 34.6%, due to a 21.7% increase from the previous year in the exports of passenger cars (excluding parts), the main product of the sector. The electrical machinery sector decreased its share in all exports of machinery and equipment to 31.8% from 32.5% in the previous year, in spite of 18.5% increase in exports of visual apparatus, the main product of the sector. The share for the general machinery

Table 3-22. Exports in the Machinery Industry (yen base)

[by sector] [million yen]

Sector	2000	2001	2002	02/01 (%)	Weight (%)
Total	38,367,511	35,525,071	37,542,130	105.7	100.0
General machinery	11,101,517	10,232,855	10,598,833	103.6	28.2
Power generating machinery	1,635,451	1,720,184	1,748,263	101.6	4.7
Agricultural machinery	127,986	119,652	139,429	116.5	0.4
Office machines	3,094,226	2,820,710	3,005,311	106.5	8.0
Metalworking machinery	756,105	678,868	705,926	103.9	1.9
Textile machines	222,231	225,722	247,561	109.7	0.7
Machinery for the mfrs.of paper or pulp articles	28,461	20,926	22,513	107.6	0.1
Printing and bookbinding machines	193,189	175,431	167,122	95.3	0.4
Construction and mining machinery	354,946	378,406	492,407	130.1	1.3
Heating and cooling equipment	420,118	354,775	360,162	101.5	1.0
Pumps and centrifuges	685,018	690,650	769,153	111.4	2.0
Mechanical handling equipment	390,852	378,478	402,532	106.4	1.1
Bearings	270,766	248,722	246,998	99.3	0.7
Electrical machinery	13,670,794	11,534,475	11,924,196	103.4	31.8
Electric power machinery	633,459	587,093	566,759	96.5	1.5
Apparatus for making, breaking,electronic circuits	1,436,405	1,202,356	1,252,835	104.2	3.3
Visual apparatus	1,502,439	1,358,205	1,609,474	118.5	4.3
Audio apparatus	350,715	252,066	243,129	96.5	0.6
Telecommunications apparatus	920,282	766,820	577,331	75.3	1.5
Domestic electrical equipment	73,451	65,550	60,837	92.8	0.2
Transportation equipment	10,823,169	11,129,051	12,999,722	116.8	34.6
Railway vehicles	40,187	62,207	52,051	83.7	0.1
Road motor vehicles excl.parts	6,930,054	7,210,812	8,774,645	121.7	23.4
Parts of road motor vehicles	1,864,212	1,880,380	2,117,162	112.6	5.6
Cycles with engines mounted	562,495	573,926	560,628	97.7	1.5
Parts for cycles with engines mounted	97,786	115,128	115,056	99.9	0.3
Bicycles	971	793	828	104.4	0.0
Parts for bicycles	56,120	46,295	52,647	113.7	0.1
Aircraft	160,823	209,994	161,877	77.1	0.4
Ships	1,106,695	1,026,134	1,152,209	112.3	3.1
Precision instruments	2,772,031	2,628,691	2,019,379	76.8	5.4
Camera and parts thereof	112,139	82,481	57,566	69.8	0.2
Copying apparatus	333,409	273,958	32,632	11.9	0.1
Watches, clocks and parts	146,924	124,621	121,988	97.9	0.3

(Source) METI [White Paper on International Trade 2003]

Table 3-23. Exports in the Machinery Industry (dollar base)

[by sector] [thousand dollar]

Sector	2000	2001	2002	02/01 (%)	Weight (%)
Total	356,033,759	292,550,544	300,448,961	102.7	100.0
General machinery	102,987,608	84,268,724	84,799,288	100.6	28.2
Power generating machinery	15,173,821	14,151,136	13,959,321	98.6	4.6
Agricultural machinery	1,187,232	987,956	1,107,883	112.1	0.4
Office machines	28,697,826	23,239,707	24,045,387	103.5	8.0
Metalworking machinery	7,012,859	5,593,927	5,647,273	100.9	1.9
Textile machines	2,060,241	1,860,034	1,988,132	106.9	0.7
Machinery for the mfrs.of paper or pulp articles	263,876	172,582	180,109	104.4	0.1
Printing and bookbinding machines	1,792,752	1,444,005	1,337,589	92.6	0.4
Construction and mining machinery	3,295,989	3,112,574	3,936,266	126.5	1.3
Heating and cooling equipment	3,900,202	2,921,697	2,880,924	98.6	1.0
Pumps and centrifuges	6,353,967	5,682,718	6,159,665	108.4	2.1
Mechanical handling equipment	3,627,468	3,116,033	3,223,446	103.4	1.1
Bearings	2,511,629	2,048,794	1,978,265	96.6	0.7
Electrical machinery	126,826,795	95,020,872	95,549,948	100.6	31.8
Electric power machinery	5,875,544	4,832,431	4,527,890	93.7	1.5
Apparatus for making, breaking,electronic circuits	13,324,059	9,902,775	10,034,008	101.3	3.3
Visual apparatus	13,911,105	11,170,618	12,924,406	115.7	4.3
Audio apparatus	3,257,630	2,077,214	1,948,018	93.8	0.6
Telecommunications apparatus	8,540,683	6,321,743	4,623,263	73.1	1.5
Domestic electrical equipment	681,567	539,988	487,100	90.2	0.2
Transportation equipment	100,493,494	91,605,420	103,935,906	113.4	34.6
Railway vehicles	373,453	511,786	413,268	80.8	0.1
Road motor vehicles excl.parts	64,327,014	59,333,193	70,227,813	118.4	23.4
Parts of road motor vehicles	17,295,134	15,474,809	16,937,525	109.5	5.6
Cycles with engines mounted	5,214,908	4,736,384	4,447,490	93.9	1.5
Parts for cycles with engines mounted	907,054	947,527	918,254	96.9	0.3
Bicycles	9,011	6,520	6,629	101.7	0.0
Parts for bicycles	520,439	380,948	421,510	110.6	0.1
Aircraft	1,491,705	1,726,051	1,288,194	74.6	0.4
Ships	10,319,286	8,460,411	9,174,159	108.4	3.1
Precision instruments	25,725,863	21,655,528	16,163,819	74.6	5.4
Camera and parts thereof	1,041,835	679,627	460,694	67.8	0.2
Copying apparatus	3,096,670	2,261,165	260,094	11.5	0.1
Watches, clocks and parts	1,363,622	1,025,096	977,492		0.3

(Source) METI [White Paper on International Trade 2003]

sector fell by 0.6 points from 28.8% to 28.2% in spite of an increase of 6.5% and 1.6% in exports of office machinery, the main product of the sector, and power generating machinery. The precision instruments sector decreased its share by 2.0 points to 5.4% from 7.4% in the year earlier, due to a 2.1% decrease in exports of watches, clocks and parts, and a drastic decrease of 88.1% in exports of copying apparatus.

Looking at the exports of machinery and equipment by destination, exports to the United States, the destination of the largest amount of exports, showed a increase of 0.9% from the previous year. On the other hand, the U.S. share in all exports of machinery and equipment dropt from 33.5% in the previous year to 32.0%, due to the increased exports to almost all other countries. China, the number 2 destination, increased its share from 5.8% to 7.7%, and the share of number 3 Hong Kong also rose from 5.3% to 5.7%.

By region, North America decreased its share 1.3 points to 34.1% from 35.4% in the year earlier. On the other hand, Asia increased its share to 37.1% from 34.4% in the previous year, and overtook the top share from North America.

Table 3-24. Exports in the Machinery Industry (yen base)

[by area] [million yen]

Area	2000	2001	2002	02/01 (%)	Weight (%)
Total	38,367,511	35,525,071	37,542,130	105.7	100.0
U.S.A.	12,528,269	11,910,294	12,020,703	100.9	32.0
Taiwan	2,566,276	1,811,083	2,000,836	110.5	5.3
R.Korea	2,012,000	1,706,693	1,989,561	116.6	5.3
Hong Kong	1,944,116	1,870,674	2,126,212	113.7	5.7
China	1,797,842	2,066,495	2,880,153	139.4	7.7
Germany	1,721,963	1,462,322	1,318,697	90.2	3.5
Singapore	1,683,642	1,267,752	1,215,220	95.9	3.2
U.Kingdom	1,297,255	1,144,707	1,172,245	102.4	3.1
Netherlands	1,105,667	1,133,952	1,051,808	92.8	2.8
Malaysia	1,071,050	941,016	944,512	100.4	2.5
Asia	13,817,708	12,232,051	13,930,575	113.9	37.1
ASEAN	5,197,555	4,535,911	4,663,736	102.8	12.4
Middle East	909,661	1,029,031	1,196,188	116.2	3.2
Western Europe	7,003,543	6,325,918	6,122,057	96.8	16.3
EU	6,719,235	6,031,810	5,837,863	96.8	15.6
CIS • Central/Eastern Europe	217,740	242,902	300,064	123.5	0.8
North America	13,208,514	12,587,511	12,799,086	101.7	34.1
Central and South America	1,895,030	1,786,735	1,669,703	93.4	4.4
Africa	435,645	423,578	491,761	116.1	1.3
Oceania	879,670	897,345	1,032,693	115.1	2.8

(Source) METI [White Paper on International Trade 2003]

Table 3-25. Exports in the Machinery Industry (dollar base)

[by area] [thousand dollar]

Area	2000	2001	2002	02/01 (%)	Weight (%)
Total	356,033,759	292,550,544	300,448,961	102.7	100.0
U.S.A.	116,242,382	98,099,144	96,067,790	97.9	32.0
Taiwan	23,821,280	14,909,145	16,031,773	107.5	5.3
R.Korea	18,671,449	14,059,316	15,966,838	113.6	5.3
Hong Kong	18,035,048	15,388,481	17,037,791	110.7	5.7
China	16,657,085	16,994,000	23,155,996	136.3	7.7
Germany	15,975,955	12,060,427	10,557,147	87.5	3.5
Singapore	15,626,705	10,448,728	9,718,634	93.0	3.2
U.Kingdom	12,042,815	9,429,440	9,365,727	99.3	3.1
Netherlands	10,250,525	9,348,667	8,418,759	90.1	2.8
Malaysia	9,936,143	7,751,227	7,558,688	97.5	2.5
Asia	128,199,022	100,687,397	111,699,952	110.9	37.2
ASEAN	48,227,870	37,351,486	37,342,505	100.0	12.4
Middle East	8,435,817	8,459,547	9,590,157	113.4	3.2
Western Europe	64,996,973	52,138,884	48,955,782	93.9	16.3
EU	62,357,447	49,716,267	46,681,613	93.9	15.5
CIS • Central/Eastern Europe	2,019,401	1,997,860	2,400,271	120.1	0.8
North America	122,555,899	103,676,666	102,282,157	98.7	34.0
Central and South America	17,610,475	14,714,802	13,308,681	90.4	4.4
Africa	4,046,444	3,487,934	3,940,476	113.0	1.3
Oceania	8,169,728	7,387,454	8,271,461	112.0	2.8

(Source) METI [White Paper on International Trade 2003]

3-6. Imports in the Machinery Industry

In 2002, imports of machinery and equipment (yen base) increased 1.2% from the previous year to ¥13,434.3 billion, and the share of imports in the machinery industry in the total imports increased by 0.6 points to 31.8% from the previous year.

Looking at the type of machinery imported, we see that imports of transportation equipment increased 22.3% and precision instruments increased 0.6% from the previous year. On the other hand, imports of general machinery fell 0.9% and electrical machinery fell 1.3% from the previous year. According to the increase of imports of transportation equipment, its share in the total imports of machinery and equipment increased 2.2 points from 11.0% in the year earlier to 13.2%.

Table 3-26. Imports in the Machinery Industry (yen base)

[by sector] [million yen]

Sector	2000	2001	2002	02/01 (%)	Weight (%)
Total	12,928,049	13,218,798	13,434,300	101.6	100.0
General machinery	4,514,934	4,622,477	4,582,626	99.1	34.1
Power generating machinery	426,672	510,294	562,036	110.1	4.2
Agricultural machinery	29,988	37,100	39,145	105.5	0.3
Office machines	2,904,233	2,764,027	2,697,546	97.6	20.1
Metalworking machinery	88,970	76,815	88,770	115.6	0.7
Textile machines	22,831	26,837	30,302	112.9	0.2
Machinery for the mfrs. of paper of pulp articles	14,319	25,142	15,440	61.4	0.1
Printing and bookbinding machines	42,276	54,447	50,263	92.3	0.4
Construction and mining machinery	30,595	32,013	40,397	126.2	0.3
Heating or cooling equipment	118,353	177,549	198,856	112.0	1.5
Pumps and centrifuges	176,238	199,306	209,830	105.3	1.6
Mechanical handling equipment	38,903	50,272	46,918	93.3	0.3
Plastic processing machinery	19,860	25,776	34,862	135.2	0.3
Bearings	46,613	46,251	44,158	95.5	0.3
Power transmissions, gears	52,056	60,295	67,686	112.3	0.5
Vending machines	8,455	6,251	8,539	136.6	0.1
Electrical machinery	5,813,327	5,877,964	5,802,241	98.7	43.2
Electric power machinery	419,398	438,737	428,969	97.8	3.2
Apparatus for making, breaking electric circuits	235,020	241,131	245,954	102.0	1.8
Visual apparatus	330,324	420,173	372,694	88.7	2.8
Audio apparatus	279,324	305,737	303,059	99.1	2.3
Parts of audio and visual apparatus	288,836	366,777	413,129	112.6	3.1
Telecommunications apparatus	571,673	531,330	411,505	77.4	3.1
Domestic electrical apparatus	158,858	202,884	258,446	127.4	1.9
Other	3,456,551	3,277,731	3,212,642	98.0	23.9
Transportation equipment	1,456,921	1,449,253	1,772,642	122.3	13.2
Road motor vehicles excl.pars	767,904	781,392	803,760	102.9	6.0
Parts of road motor vehicles	220,049	257,646	319,640	124.1	2.4
Trailer, semitrailer	10,393	13,289	12,707	95.6	0.1
Cycles with engines mounted	26,133	32,460	38,809	119.6	0.3
Parts of cycles with engines mounted	10,949	14,039	14,300	101.9	0.1
Bicycles	44,240	51,023	57,030	111.8	0.4
Parts of bicycles	13,463	14,094	12,275	87.1	0.1
Airclaft	323,258	239,253	461,175	192.8	3.4
Ships	21,723	27,013	33,512	124.1	0.2
Precision instruments	1,142,867	1,269,104	1,276,790	100.6	9.5
Cameras	58,523	51,265	37,444	73.0	0.3
Meter,measuring and scientific instruments	136,735	135,368	130,766	96.6	1.0
Copying apparatus	66,513	87,145	63,989	73.4	0.5
Medical instruments	328,002	404,100	413,830	102.4	3.1
Optical fiber cables	24,900	33,023	22,567	68.3	0.2
Contact lenses	38,776	54,617	54,799	100.3	0.4
Laser	21,600	32,788	37,552	114.5	0.3
Watches, clocks and parts	185,260	200,326	210,354	105.0	1.6

(Source) METI [White Paper on International Trade 2003]

Table 3-27. Imports in the Machinery Industry (dollar base)

[by sector] [thousand dollar]

Sector	2000	2001	2002	02/01 (%)	Weight (%)
Total	119,892,725	108,864,436	107,438,866	98.7	100.0
General machinery	41,873,612	38,072,694	36,569,543	96.1	34.0
Power generating machinery	3,958,247	4,199,514	4,499,571	107.1	4.2
Agricultural machinery	278,702	304,917	312,048	111.5	0.3
Office machines	26,934,030	22,769,810	21,488,312	94.4	20.0
Metalworking machinery	822,387	634,956	707,731	111.5	0.7
Textile machines	211,546	221,282	242,806	109.7	0.2
Machinery for the mfrs. of paper of pulp articles	132,801	207,195	122,734	59.2	0.1
Printing and bookbinding machines	392,118	448,263	402,758	89.8	0.4
Construction and mining machinery	283,805	263,437	323,204	122.7	0.3
Heating or cooling equipment	1,098,650	1,459,991	1,585,273	108.6	1.5
Pumps and centrifuges	1,634,874	1,640,466	1,678,891	102.3	1.6
Mechanical handling equipment	361,038	413,564	375,027	90.7	0.3
Plastic processing machinery	184,492	212,192	276,986	130.5	0.3
Bearings	432,632	380,995	353,523	92.8	0.3
Power transmissions, gears	483,012	496,025	542,402	109.3	0.5
Vending machines	78,581	51,430	68,039	132.3	0.1
Electrical machinery	53,900,999	48,423,208	46,421,675	95.9	43.2
Electric power machinery	3,891,228	3,612,589	3,430,998	95.0	3.2
Apparatus for making, breaking electric circuits	2,179,770	1,985,771	1,969,885	99.2	1.8
Visual apparatus	3,060,797	3,455,640	2,982,218	86.3	2.8
Audio apparatus	2,587,293	2,513,033	2,420,180	96.3	2.3
Parts of audio and visual apparatus	2,676,176	3,021,067	3,313,557	109.7	3.1
Telecommunications apparatus	5,307,169	4,370,463	3,278,461	75.0	3.1
Domestic electrical apparatus	1,473,618	1,667,219	2,069,043	124.1	1.9
Other	32,045,406	27,030,588	25,712,154	95.1	23.9
Transportation equipment	13,521,217	11,924,463	14,231,025	119.3	13.2
Road motor vehicles excl. pars	7,128,747	6,429,284	6,439,736	100.2	6.0
Parts of road motor vehicles	2,040,125	2,121,081	2,563,976	120.9	2.4
Trailer, semitrailer	96,420	109,146	101,825	93.3	0.1
Cycles with engines mounted	242,716	266,596	311,429	116.8	0.3
Parts of cycles with engines mounted	101,529	115,527	114,365	99.0	0.1
Bicycles	410,982	419,427	452,879	108.0	0.4
Parts of bicycles	124,958	116,235	97,639	84.0	0.1
AircLaft	2,999,018	1,969,468	3,728,460	189.3	3.5
Ships	202,324	220,644	266,507	120.8	0.2
Precision instruments	10,596,896	10,444,071	10,216,622	97.8	9.5
Cameras	542,372	422,606	298,366	70.6	0.3
Meter,measuring and scientific instruments	1,270,765	1117,003	1,046,632	93.7	1.0
Copying apparatus	616,927	718,083	510,707	71.1	0.5
Medical instruments	3,042,121	3,322,605	3,308,653	99.6	3.1
Optical fiber cables	230,504	271,948	179,553	66.0	0.2
Contact lenses	359,491	448,709	437,901	97.6	0.4
Laser	200,276	270,166	300,554	111.2	0.3
Watches,clocks and parts	1,717,290	1,645,956	1,686,399	102.5	1.6

(Source) METI [White Paper on International Trade 2003]

Table 3-28. Imports in the Machinery Industry (yen base)

[by area] [million yen]

Area	2000	2001	2002	02/01 (%)	Weight (%)
Total	12,928,049	13,218,798	13,434,300	101.6	100.0
U.S.A.	3,816,777	3,661,134	3,459,206	94.5	25.7
Taiwan	1,553,818	1,093,787	1,065,127	97.4	7.9
R.Korea	1,281,532	872,613	882,717	101.2	6.6
Hong Kong	933,814	87,847	80,077	91.2	0.6
China	846,690	2,000,524	2,592,038	129.6	19.3
Germany	817,562	937,983	969,388	103.3	7.2
Singapore	539,662	439,402	381,538	86.8	2.8
U.Kingdom	484,474	333,822	277,759	83.2	2.1
Netherlands	476,948	82,019	80,024	97.6	0.6
Malaysia	321,583	773,857	626,094	80.9	4.7
Asia	6,423,078	6,655,033	7,068,183	106.2	52.6
ASEAN	2,545,975	2,581,040	2,426,252	94.0	18.1
Middle East	33,787	44,344	33,763	76.1	0.3
Western Europe	2,300,144	2,456,911	2,458,461	100.1	18.3
EU	2,081,031	2,207,137	2,202,415	99.8	16.4
CIS • Central/Eastern Europe	50,441	61,878	56,512	91.3	0.4
North America	3,924,355	3,782,872	3,571,483	94.4	26.6
Central and South America	142,554	146,749	152,961	104.2	1.1
Africa	12,906	37,734	62,632	166.0	0.5
Oceania	40,784	33,277	29,530	88.7	0.2

(Source) METI [White Paper on International Trade 2003]

Table 3-29. Imports in the Machinery Industry (dollar base)

[by area] [thousand dollar]

Area	2000	2001	2002	02/01 (%)	Weight (%)
Total	119,892,725	108,864,436	107,438,866	98.7	100.0
U.S.A.	35,396,471	30,167,724	27,659,799	91.7	25.7
Taiwan	14,407,728	9,014,976	8,502,344	94.3	7.9
R.Korea	11,888,637	7,191,231	7,068,769	98.3	6.6
Hong Kong	8,663,183	723,215	639,163	88.4	0.6
China	7,856,835	16,446,785	20,760,150	126.2	19.3
Germany	7,582,228	7,718,919	7,765,486	100.6	7.2
Singapore	5,000,018	3,622,745	3,045,018	84.1	2.8
U.Kingdom	4,493,171	2,754,664	2,219,217	80.6	2.1
Netherlands	4,423,107	675,258	638,012	94.5	0.6
Malaysia	2,982,490	6,373,384	4,993,189	78.3	4.6
Asia	59,565,993	54,797,404	56,525,643	103.2	52.6
ASEAN	23,604,939	21,262,798	19,379,112	91.1	18.0
Middle East	313,647	365,906	270,405	73.9	0.3
Western Europe	21,336,371	20,227,227	19,671,249	97.3	18.3
EU	19,306,415	18,172,856	17,620,045	97.0	16.4
CIS • Central/Eastern Europe	467,076	509,340	456,036	89.5	0.4
North America	36,364,975	31,170,814	28,553,462	91.6	26.6
Central and South America	1,321,057	1,208,482	1,215,689	100.6	1.1
Africa	145,474	311,101	503,207	161.8	0.5
Oceania	378,132	274,162	236,777	86.4	0.2

(Source) METI [White Paper on International Trade 2003]

Looking at total imports of machinery and equipment by region, the United State, from which the most machinery is imported, had seen its share of total imports exhibit a growing trend from 1996 to 1998. But since 1999 when U.S. share fell sharply to 33.9%, U.S. share continuously fell to 29.5% in 2000, to 27.7% in 2001, and to 25.7% in 2002.

Looking at the ratio of 2002 imports from the year earlier for 5 main countries, it was 94.5% for U.S.A., 129.6% for China, 97.4% for Taiwan, 101.2% for R. Korea, and 103.3% for Germany.

3-7. Foreign Direct Investment by the Machinery Industry

(1) Foreign Investment by Sector

According to the statistics of MOF's "Foreign Direct Investment (export facto report or prior notice basis)", F.Y.2001 Japanese foreign direct investment (dollar base) consecutively decreased 34.9% from the year earlier to $31,660 million, the lowest level after F.Y.1986, due to the decline of investment in the non-manufacturing sector. On the other hand, Japanese direct investment in the manufacturing sector kept its growing trend, and its share from 24.0% in the year earlier to 44.1%.

Foreign direct investment in F.Y.2001 in the manufacturing industries increased 19.4% from the previous fiscal year to $13,945 million.

The transportation machinery sector increased 38.2% from the year earlier to $4,335 million, the second highest record, mainly due to aggressive investment in the car industry. The electrical machinery sector increased 20.1% to $3,660 million. On the other hand, machinery (general machinery) sector decreased 13.6% from the previous fiscal year to $1,219 million. In other sectors, the foreign direct investment increased from the previous fiscal year in the food sector to $819 million and in the wood & pulp sector to $732 million, each due to the acquisition of Celulose Nipo-Brasileira S.A. (CENIBURA) in Brazil by Japan Brazil Paper and Pulp Resources Development Co. Ltd. (JBP) and the investment to San Miguel Corp. in the Philippines by Kirin Brewery Co., Ltd.

(2) Foreign Direct Investment by Country and Region

In F.Y.2001 Japanese direct investment (dollar base) in England, the top nation in the year earlier for the first time, decreased 79.3% from the previous fiscal year to $3,960 million. As a result, U.S.A. again took the top position of the countries for Japanese direct investment. And Cayman ($4.996 million), Netherlands ($4.560 million) and England followed.

Japanese direct investment in East Asia slightly increased 3.8% to $5,929 million, and the direct investment in ASEAN4 increased 15.7% from the previous fiscal year to $2,353 million, the first increase after 1998 when it turned downwards affected by Asian currency crisis. In ASEAN4, Philippines marked the record of $756 million, an increase of 65.2% from the previous fiscal year, due to the investment to San Miguel by Kirin Brewery.

Table 3-30. Foreign Direct Investment by Sector

(million dollar, %)

	F.Y. 1999	2000			2001			2002 (The first half)			Total (1951 〜 2001)	
	Volume	Volume	Weight	Change	Volume	Weight	Change	Volume	Weight	Change	Volume	Weight
Food	14,908	257	0.5	△98.3	819	2.6	218.6	108	0.6	33.3	26,777	3.3
Textiles	260	222	0.5	△14.5	203	0.6	△8.7	118	0.7	48.4	9,817	1.2
Wood & pulp	115	147	0.3	27.5	732	2.3	397.6	36	0.2	△95.0	7,206	0.9
Chemicals	1,694	1,916	3.9	13.1	1,492	4.7	△22.1	679	4.0	1.6	33,477	4.2
Ferrous / non-ferrous metal	1,458	706	1.5	△51.5	635	2.0	△10.1	273	1.6	△20.8	23,269	2.9
Machinery	995	1,411	2.9	41.8	1,219	3.9	△13.6	523	3.1	△16.8	22,132	2.8
Electrical machinery	16,350	3,047	6.3	△81.4	3,660	11.6	20.1	910	5.4	△47.5	74,928	9.3
Transportation machinery	4,781	3,138	6.5	△34.4	4,335	13.7	38.2	3,452	20.4	20.6	39,680	4.9
Other	1,749	837	1.7	△52.1	849	2.7	1.4	783	4.6	182.2	30,303	3.8
Manufacturing	42,310	11,682	24.0	△72.4	13,945	44.1	19.4	6,882	40.7	△6.9	267,589	33.3
Agriculture, forestry	80	27	0.1	△65.9	34	0.1	24.1	2	0.0	△75.2	2,509	0.3
Fisheries	26	132	0.3	406.8	27	0.1	△79.3	35	0.2	4,167.9	1,638	0.2
Mining	921	641	1.3	△30.5	479	1.5	△25.2	260	1.5	△25.3	28,473	3.5
Construction	182	91	0.2	△50.1	65	0.2	△28.4	30	0.2	93.3	5,789	0.7
Retail	3,876	3,344	6.9	△13.7	2,577	8.2	△22.9	1,020	6.0	△15.7	77,825	9.7
Finance, insurance	9,885	8,405	17.3	△15.0	10,752	34.0	27.9	5,845	34.6	118.4	158,400	19.7
Services	4,314	1,760	3.6	△59.2	1,550	4.9	△11.9	652	3.9	△1.5	87,549	10.9
Transportation	2,772	21,880	45.0	689.5	1,340	4.2	△93.9	644	3.8	△27.7	60,728	7.5
Real estate	2,114	364	0.8	△82.8	525	1.7	44.2	1,252	7.4	460.3	94,671	11.8
Other	8	2	0.0	△75.4	26	0.1	1,224.5	25	0.1	–	8,237	1
Non-manufacturing	24,178	36,647	75.4	51.6	17,377	55.0	△52.6	9,765	57.8	61.8	525,819	65.4
Branches	206	251	0.5	22.0	283	0.9	13.1	253	1.5	△5.6	10,242	1.3
Total	66,694	48,580	100.0	△27.2	31,606	100.0	△34.9	16,901	100.0	23.4	804,614	100.0

(Notes) 1. Original data were reported in yen by MOF, and the above figures were converted on the basis of the Bank of Japan's inter-bank rate.
2. Growth rate is in comparison to the same period a year earlier.

(Source) JETRO [White Paper on Trade and Foreign Direct Investment 2003]
(Original source data : MOF [Foreign Direct Investment])

Malaysia and Indonesia also marked an increase due to the increase of Japanese direct investment in non-manufacturing sectors. In Asean4, only Thailand decreased 5.7% from the year earlier, but it was becoming to the center of production for cars and white goods, and Japanese direct investment in manufacturing sector was steady.

Japanese investment in China registered a 44.8% increase from the previous year to $1,440 million, keeping healthy trend of the investment, and the investment in manufacturing sector in China drastically increased 67.1% to $1,271 million. However Japanese investment in China was less than the total in ASEAN4. And because it remained still so far from $4,473 million recorded in 1995, it couldn't be said that Japanese direct investment in East Asia was over-concentrated in China.

Table 3-31. Foreign Direct Investment by Area

(million dollar, %)

	F.Y.1999		2000		2001		2002 (the first half)	
	Volume	Change	Volume	Change	Volume	Change	Volume	Change
World	66,694	63.7	48,580	△27.2	31,606	△34.9	16,901	23.4
North America	24,770	126.3	12,271	△50.5	6,458	△47.4	3,108	△3.6
U.S.A.	22,296	116.1	12,136	△45.6	6,370	△47.5	3,090	△1.6
Europe	25,804	84.2	24,406	△5.4	10,571	△56.7	7,743	55.9
EU	25,191	81.9	23,909	△5.1	10,226	△57.2	7,546	–
Asia	7,162	9.7	5,931	△17.2	6,178	4.2	2,576	△6.7
East Asia	6,825	10.6	5,711	△16.3	5,929	3.8	2,359	△11.4
Asia NIES	3,198	81.2	2,682	△16.1	2,135	△20.4	876	△13.4
Korea	980	223.7	813	△17.0	543	△33.2	318	△10.4
Taiwan	285	27.4	510	78.6	319	△37.4	145	△0.2
Hong Kong	971	61.3	936	△3.6	296	△68.4	123	33.5
Singapore	962	51.2	424	△56.0	977	130.7	288	△31.0
ASEAN4	2,876	△13.9	2,035	△29.3	2,353	15.7	564	△37.3
Malaysia	526	2.2	232	△55.9	256	10.3	46	△55.5
Thailand	816	△40.5	931	14.2	881	△5.4	283	△44.8
Indonesia	918	△14.7	414	△54.9	461	11.3	130	△32.1
Philippines	617	62.8	458	△25.8	756	65.2	106	13.2
China	751	△29.5	995	32.4	1,440	44.8	919	22.3
Central and South America	7,437	15.1	5,232	△29.6	7,658	46.4	2,345	4.5
Middle East	113	△22.7	19	△83.4	20	7.5	14	1,587.3
Africa	515	15.8	53	△89.6	193	260.6	41	△66.9
Oceania	893	△59.6	667	△25.4	527	△20.9	1,074	182.8

(Notes) 1. Original data were reported in yen by MOF, and the above figures were converted on the basis of the Bank of Japan's inter-bank rate.
2. Growth rate is in comparison to the same period a year earlier.

(Source) JETRO [White Paper on Trade and Foreign Direct Investment 2003]
(Original source data : MOF [Foreign Direct Investment])

3-8. Plant Exports

According to METI survey, actual contracts for overseas plants for F.Y.2002 are as follows.

(1) General Conditions

In F.Y.2002, the contract amount of the construction of foreign plants and engineering by Japanese corporations increased 12.3% from the previous fiscal year to $13.97 billion.

Looking at plant exports by region, the top market was Asia (the share was 45.3% for the total contract amount), and Middle East (17.6%), Africa (12.0%) followed. The contract amount for Asia and Middle East marked about 50% of the total. Taiwan ($2.15 billion), China ($1.85 billion) and Indonesia ($0.52 billion) were top 3 nations or territory for plant exports in Asia. UAE ($0.93 billion) and Saudi Arabia ($0.48 billion) were top two nations in Middle East.

By sector, the general plants, energy plants, transportation infrastructure, plants connected with life and environment, information/communication plants, general plants sectors increased their contract amounts from the previous fiscal year, while the sectors of generating plants and chemical plants decreased their contracts. Looking at the sectors where contracts increased, in the sector of transportation infrastructure the contract for super project (a project exceeding $100 million) of high speed railway project) pushed up the total amount, and in the sector of the plant connected with life and environment, where the super projects of desalination were contracted, medium and small size projects (projects less than $100 million) were also increased and led to an increase of total amount of the contracts.

In generating plant sector and chemical plant sector the contract amounts decreased as a backlash to the steady activities since 2000.

In "other" sector, the amount of contracts for big projects exceeding $100 million increased only 0.2% from the previous fiscal year, on the other hand, the amount of contracts of medium and small size projects (projects less than $100 million) increased 36.4% from the previous fiscal year, and as result they contributed to the increase of the total amount of the contracts.

The main driving factors for healthy plants export in 2002 were ① steady demands for plants in the oil producing nations in Middle East and increasing contracts for energy plants due to growing demands for LNG in the world, ② the contracts of high speed railway project and big projects connected with life and environment in Taiwan, and ③ increasing contracts due to the successful repeat orders as the result of concentration of sales activities for selected targets.

Table 3-32. Plant Exports (by Destination)

(100 million dollar)

Area	F.Y. 2000		F.Y. 2001		F.Y. 2002	
	Number of plants	Volume	Number of plants	Volume	Number of plants	Volume
Asia	289	77.9 (50.7)	290	55.1 (44.3)	498	63.2 (45.3)
Middle and Near East	42	9.1 (5.9)	40	20.5 (16.4)	75	24.5 (17.6)
Africa	20	11.3 (7.3)	19	18.7 (15.0)	45	16.7 (12.0)
Central and South America	79	16.8 (11.0)	55	4.9 (3.9)	63	7.7 (5.5)
Oceania	9	3.2 (2.1)	8	5.0 (4.0)	4	0.2 (0.2)
Western Europe	65	10.8 (7.0)	103	4.9 (4.0)	108	5.9 (4.3)
North America	109	10.9 (7.1)	78	10.5 (8.5)	68	12.2 (8.8)
Other	21	13.8 (8.9)	50	4.8 (3.9)	52	9.0 (6.5)
Total	634	153.7 (100.0)	643	124.4 (100.0)	913	139.7 (100.0)

(Note 1) The survey basis was modified to include the service contracts unaccompanied with machineries or equipment exports such as by general constructers. And the past data were also revised by this new basis.

(Note 2) Each case is a contract for heavy machinery and related service valued at more than $500,000 excluding transportation equipment. The number in parentheses represents the share of the total.

(Source) METI

(2) Plant Exports by Destination

Looking at the actual contracts for overseas plants by destination in F.Y.2002, for Asia, Middle East, Central and South America, North America, Western Europe, and "Other" (former Soviet Union, such as Russia), the amount of contracts increased, and for Africa and Oceania it decreased. The contract amount of plants export for Middle East, one of the main markets as well as Asia for Japanese enterprises, recorded the increase of four consecutive years, and marked the highest since1997.

Looking at the share of each region in the total amount of the contracts by Japanese companies, in 2002 fiscal year, Asia was 45.3% in share, and kept continuously the position of the most important market for Japanese companies. Middle East region once decreased its share during 1998 and 2000 to 5 or 6% level, and thereafter had increased to the level of late-teen percents by recovered demands in the oil producing countries in the region.

Looking at the actual contracts amount for export plants by region, total contracts amount in Asia was $6.32 billion, in Middle East $2.45 billion, in Africa $1.67 billion and in North America $1.22 billion. The amount in those four regions shared about 80% of all plants export. By the number of contracts, the number was 498 in Asia, 108 in Western Europe 108 and 75 in Middle East, and total number of contracts in those 3 regions shared about 70% in the total contracts of plants export. The fact that plants export for Asia stood out from all others by both of the amount and the number of contracts, shows the strategic significance of the region of Asia for Japanese plants export.

Table 3-33. Plant Exports (by Sector)

(million dollar)

Sector	F.Y. 2000		F.Y. 2001		F.Y. 2002	
	Number of plants	Volume	Number of plants	Volume	Number of plants	Volume
Plant connected with life and environment	24	1.9 (1.2)	14	1.6 (1.3)	64	14.4 (10.3)
Information/communication	290	27.5 (17.9)	242	8.8 (7.1)	283	9.3 (6.6)
Transportation infrastructure	9	36.6 (23.8)	18	6.8 (5.5)	32	26.8 (19.2)
Energy	19	37.7 (24.5)	28	30.8 (24.7)	48	31.3 (22.4)
Generating	133	29.0 (18.9)	142	45.4 (36.5)	174	25.4 (18.2)
Chemical	35	11.2 (7.3)	62	22.8 (18.3)	84	18.5 (13.3)
Steel	42	4.7 (3.1)	41	3.3 (2.6)	67	6.2 (4.4)
Other	82	5.1 (3.3)	96	4.9 (4.0)	161	7.8 (5.6)
Total	634	153.7 (100.0)	643	124.4 (100.0)	913	139.7 (100.0)

(Note 1) The survey basis was modified to include the service contracts unaccompanied with machineries or equipment exports such as by general constructers. And the past data were also revised by this new basis.
(Note 2) Each case is a contract for heavy machinery and related service valued at more than $500,000 excluding transportation equipment. The number in parentheses represents the share of the total.
(Note 3) The grouping of sectors was revised from 5 to 8.
(Source) METI

Table 3-34. Top 10 in Plant Exports by Volume

(million dollar)

	F.Y.1999	F.Y. 2000	F.Y. 2001	Volume
1	Taiwan	Taiwan	Taiwan	21.5
2	Russia	China	China	18.5
3	U.S.A.	Algeria	U.S.A.	12.2
4	Mexico	Qatar	United Arab Emirates	9.3
5	Algeria	U.S.A.	Algeria	7.3
6	Malaysia	Libya	Brazil	5.3
7	Turkey	Saudi Arabia	Indonesia	5.2
8	Saudi Arabia	Singapore	Saudi Arabia	4.8
9	China	Iran	Nigeria	4.3
10	Brazil	Australia	Thailand	4.2

(Note) By the revised basis, the data include railway vehicles but exclude ships and railway vehicles
(Source) METI

(3) Plant Exports by Sector

Looking at the foreign plant contracts by Japanese corporations in F.Y.2002 by sector, in the sector of the plants connected with life and environment, both the amount and the share of contracts registered great increase due to the contracts of big projects in UAE and Algeria. the number of contracts also marked a big increase due to the increased number of contracts in Asia.

In the information/communication plants sector, the total contracts amount increased in 2002, due to the increased contracts of mid-scale and small projects in Asia, Middle East, Africa and "other" regions, in spite of nothing of big project contract. The total number of contracts also increased due to the increase in Asia, Middle East, Africa and Central and South America, in spite of the decrease in North America, Western Europe and "Other" region.

In the transportation infrastructure sector, the contracts amount in 2002 marked a great increase due to the contracts of 2 super projects of high-speed railway constructions in Taiwan and the super project of subway construction in Singapore.

In the energy plant sector, in spite of the increased number of contracted big projects, such as LNG plants in Nigeria, Qatar, Oman, gas-field development project in Algeria and pipe line project in Russia, the total contracts amount for big projects decreased from the previous year. On the other hand mid-size and small projects increased, and as the result, the total amount of the contracts in the sector increased from the previous fiscal year.

In the generating plant sector, there were the export contracts of big projects for U.S.A., Rumania and Vietnam, while in China, Taiwan in Asia and in others the contracts of big projects drastically dropped. As the result the total amount of the contracts decreased in spite of increased number of contracts of mid-size and small projects. the number of contracts increased in Oceania, unchanged in Western Europe, and increased in other regions.

In the chemical plants sector, the amount of contracts decreased from the previous fiscal year due to the decrease of the contracts of projects of all sizes, in spite of increased amount of contracts in Asia with contracts of big projects in China and Indonesia. The number of contracts in the sector increased due to the large increase in Asia, in spite of the decrease in Middle East, North America and "Other" regions.

In the steel plant sector, the contracts of mid-size and small projects increased in Asia, Middle East, Africa, North America and "Other" regions, while the big project was not contracted. As the result, the total contracts amount showed a large increase. And increased large number of contracts in Asia pushed up the total number of contracts in the sector.

In the general plant sector, both of the amount and the number of contracts drastically increased, due to the big contracts of nickel smelter plant in Philippines and cement plant in Yemen, and increased contracts of mid-size and small plant projects.

3-9. Recent Trends in the Establishment of New Factories and Plants

(1) By Sector

According to "2002 Survey of New Locations for Factories and Plants" conducted by METI, the number of new locations drastically decreased by 24.8% (279) from the previous year to 844.

Looking at new locations in 2002 by sector, the sector of food manufacturing built 161 new plants (169 in 2001), the sector of manufacture of general machinery built 80 new plants (134 in 2002), the sector of manufacture of electrical machinery built 64 new plants (133 in 2001), the sector of manufacture of fabricated metals and products built 62 new plants (98 in 2001), and the sector of plastic products built 56 new plants (84 in 2001). And these top 5 sectors shared 50.1% of the total number (844) of new plants by all sectors (55.0% in 2001).

(2) By Region

Looking at the number of new locations in 2002 by region, in all regions the number of new locations decreased from the previous year, especially in 10 regions except Coastal Kinki, Sanyo and Shikoku the number drastically decreased. The

Table 3-35. New Locations for Factories and Plants by Sector

	2000		2001		2002		Change (%) 2002 / 2001	
	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)
Total	1,126	1,473	1,123	1,379	844	872	▲24.8	▲36.8
Domestic resource type	336	358	332	383	318	320	▲4.2	▲16.4
General merchandise type	176	181	186	165	137	139	▲26.3	▲15.8
Basic material type	120	156	141	232	103	131	▲27.0	▲43.5
Manufacturing/assembling	478	716	447	556	272	263	▲39.1	▲52.7
Manufacturing industry	1,110	1,411	1,106	1,336	830	853	▲25.0	▲36.2
Food manufacturing	172	128	169	153	161	122	▲4.7	▲20.3
Manufacture of beverage, food and tobacco	39	90	35	53	49	69	40.0	30.2
Manufacture of textile mill products	5	1	5	3	3	4	▲40.0	33.3
Manufacture of apparel and other finished product made fabrics	14	9	17	7	10	5	▲41.2	▲28.6
Manufacture of lumber and wood products except furniture	38	29	41	62	40	52	▲2.4	▲16.1
Manufacture of furniture and fixtures	8	2	11	5	11	8	0.0	60.0
Manufacture of pulp, paper and paper products	27	25	32	30	20	20	▲37.5	▲33.3
Printing industry	20	14	35	30	26	13	▲25.7	▲56.7
Manufacture of chemical and allied products	60	101	75	160	47	80	▲37.3	▲50.0
Manufacture of petroleum and coal products	13	12	8	5	10	8	25.0	60.0
Manufacture of plastic products	105	123	84	82	56	55	▲33.3	▲32.9
Manufacture of rubber products	9	10	16	17	11	23	▲31.3	▲35.3
Leather tanning and Manufacture of leather products, and fur skins	1	0	2	1	-	-	-	-
Manufacture of ceramic, stone and clay products	55	85	50	82	45	52	▲10.0	▲36.6
Iron and steel industry	28	27	36	42	34	30	▲5.6	▲28.6
Manufacture of non-ferrous metals and products	19	16	22	24	12	12	▲45.5	▲50.0
Manufacture of fabricated metals and products	115	102	98	106	62	74	▲36.7	▲69.8
Manufacture of general machinery	114	207	134	89	80	65	▲40.3	▲27.0
Manufacture of electrical machinery	176	283	133	241	64	55	▲51.9	▲77.2
Manufacture of transportation equipment	53	115	62	109	51	62	▲17.7	▲43.1
Manufacture of precision instruments	20	9	20	12	16	9	▲20.0	▲25.0
Miscellaneous manufacturing industries	19	23	21	23	22	35	4.8	52.2
Electricity industry	10	48	13	29	11	13	▲15.4	▲55.2
Gas supply industry	5	12	4	14	3	6	▲25.0	▲57.1
Heat supply industry	1	2	–	–	–	–	–	–

(Note) As the Classification was revised, publishing and allied products sector moved to information/communication (non-manufacturing industry) and excruded from the table. Manufacture of ordnance sector was moved to miscellaneous mznufacturing industries. The past deta were also revised.

(Source) METI [2002 Survey on New Locations for Factories and Plants] number of new locations decreased 67 or 36.0% from the previous year to 119 in Inland Kanto, 63 or 35.6% to 114 in Southern Tohoku, 45 or 29.2% to 109 in Tokai, 28 or 43.8% to 36 in Southern Kyusyu, 24 or 40.7% to 35 in Hokkaido.

(3) Reasons for Selection of Location Site

Among the reasons for selecting a new location site in 2002, the top was "ease of acquiring enough area," the same as in the previous year, with a 19.1% share. Next was "Short access to the market" (12.6%) and "proximity to head office" (12.2%), "short access to related companies" (10.4%), and "subsidy and cooperation from the local government" (8.8%) followed. Compared to the previous year, "Short access to the market" increased its share and jumped to the second in rank from the fourth in the previous year.

(4) New Locations for Research Laboratories

In 2002, total new locations for research laboratories independent from other facilities were 15, a decrease of 4 from 19 in the year before.

By prefecture, 2 new laboratories were built in Kanagawa and in Hyogo, and12 each in Hokkaido, Aomori, Miyagi, Tochigi, Niigata, Ishikawa, Yamanashi, Osaka, Shimane, Miyazaki and Okinawa

Among new locations for laboratories in 2002, it was a notable event that a very large technical R&D center over 20 ha was located in a vacant lot of a university in Kanagawa by a major transportation equipment manufacturer, foreign affiliated laboratory (43 hectare) was newly located in a vacant airport in Hokkaido, and the R&D facility for the manufacturing technology of low power consumption type next generation display equipment, one of national projects, was newly located in Miyagi.

Table 3-36. New Locations for Factories and Plants by Region

Region	2000		2001		2002		Change (%) 2002 / 2001	
	Case	Area (ha)	Case	Area (ha)	Case	Area (ha)	Case	Area (ha)
Total	1,126	1,473	1,123	1,379	844	872	▲24.8	▲36.8
Hokkaido	66	103	59	84	35	47	▲40.7	▲44.0
Northern Tohoku	52	87	42	52	32	35	▲23.8	▲32.7
Southern Tohoku	175	244	177	190	114	120	▲35.6	▲36.8
Kanto, inland	195	329	186	350	119	132	▲36.0	▲62.3
Kanto, coastal	78	78	97	106	78	87	▲19.6	▲17.9
Tokai	135	176	154	213	109	110	▲29.2	▲48.4
Hokuriku	60	45	53	49	40	37	▲24.5	▲24.5
Kinki, inland	37	54	35	34	27	29	▲22.9	▲14.7
Kinki, coastal	76	48	73	62	78	56	▲6.8	▲9.7
San-in	14	11	10	8	9	11	▲10.0	37.5
Sanyo	52	92	44	49	45	50	▲2.3	2.0
Shikoku	31	28	38	55	37	25	▲2.6	▲54.5
Northern Kyushu	89	103	91	83	85	109	▲6.6	31.3
Southern Kyushu	66	75	64	44	36	24	▲43.8	▲45.5

(Note) Prefectures in each region

Hokkaido : Hokkaido
Northern Tohoku : Aomori, Iwate, Akita
Southern Tohoku : Miyagi, Yamagata, Fukushima, Niigata
Kanto, inland : Ibaraki, Tochigi, Gunma, Yamanashi, Nagano
Kanto, coastal : Saitama, Chiba, Tokyo, Kanagawa
Tokai : Shizuoka, Aichi, Gifu
Hokuriku : Toyama, Ishikawa, Fukui
Kinki, inland : Shiga, Kyoto, Nara
Kinki, coastal : Osaka, Hyogo, Wakayama, Mie
San-in : Tottori, Shimane
Sanyo : Okayama, Hiroshima, Yamaguchi
Shikoku : Tokushima, Kagawa, Ehime, Kochi
Northern Kyusyu : Fukuoka, Saga, Nagasaki, Oita
Southern Kyushu : Kumamoto, Miyazaki, Kagoshima, Okinawa

(Source) METI [2002 Survey on New Locations for Factories and Plants]

4 Outline of JMF

4-1. Organization and Activities

(1) Overview

The Japan Machinery Federation (Nihon Kikai Kougyou Rengokai, or NIKKIREN) is a nationwide organization of the Japanese machinery and engineering industry. Its membership consists of 101 regular members (50 company members of the leading companies in the fields of engineering and machinery manufacturing, and 51 association members of industry-specific trade associations), and 11 supporting members.

The trade associations represent manufacturers from the following industrial areas: general machinery (machine tools, industrial machinery, etc.); electrical machinery (electrical equipment, electronics, etc.); transport equipment (automobiles, rail cars, shipbuilding, etc.); precision machinery (cameras, measuring equipment, etc.); machinery parts and components (gears, screws, bearings, etc.); and tool and die.

The JMF was established April 2, 1952, as a voluntary organization called the Japan Machinery Association. Its purpose was to contribute to the overall advancement of the Japanese engineering industry and, by extension, the general economy of the Japan. The association's name was changed to the Japan Machinery Federation in 1954 and the organization became a non-profit, public-service corporation in 1958.

The JMF continues to fulfill its original purpose through the following activities:

- Establish and implement policies to promote the development of the engineering industry
- Represent the desires and general views of the engineering industry to the Diet, government officials and other authorities
- Undertake studies and surveys of the engineering industry
- Collect and disseminate information of importance to the engineering industry
- Coordinate activities with similar and related organizations, both domestic and international

(2) Management

President

Kentaro Aikawa
(Counselor, Mitsubishi Heavy Industries, Ltd.)

Vice-President

Kosaku Inaba
(Counselor and Director, Ishikawajima-Harima Heavy Industries Co., Ltd.)
Tsutomu Kanai
(Chairman and Representative Director, Hitachi Ltd.)
Fumio Sato
(Counselor, Toshiba Corporation)
Kikuo Fujiwara
(Counselor, Shimadzu Corporation)
Eiichi Tamori
(The Japan Machinery Federation)

Executive Director

Masaaki Hirano
Kazuyoshi Hara

(3) Organization

Executive
Vice-President
Executive Director

General Management Division	Secretariat for Council and Board, secretariat for the standing committees, supporting research, etc.
Accounting Division	Accounting, etc.
Management Division	Secretariat for the standing and special committees, statistics, survey, public relations, publishing, etc.
Office of Standards Development	Secretariat for a special committee, Japanese mirror committees of ISO/TC199 and IEC/TC44, research, etc.
Osaka Office	Secretariat for the standing committees, survey, etc.
Chicago Office	Overseas reports, liaison, etc.
Bruxelles Office	Overseas reports, liaison, etc.

(4) Standing Committees

Steering Committee
(Planning, budget, and accounting)

International Trade and Economic Cooperation Committee
(Trade policies and promotion of economic cooperation)

Materials Committee
(Supply and demand of materials and longterm stabilization of prices)

Industrial Technology Committee
(Promotion of industrial technology)

Labor Committee
(Labor management and employment)

Marine Equipment Development Committee
(Development of machinery for maritime resources)

Environment Committee
(Environment protection)

Special Committee on Planning
(Forecasting and policies for the engineering industry)

Special Committee on Finance and Taxation
(Reforms in finance and the tax system)

Special Committee on Public Relations
(Promotion of public understanding of the engineering industry)

Special Committee on Advanced Industrialization
(Promotion of international competitiveness of the engineering industry)

Kansai Committee
(Matters concerning the Kansai district and the management of the Osaka Office)

Ad Hoc Screening Committee for Energy Conserving Machinery Award

Ad Hoc Committee on Standards Development & Promotion

Ad Hoc Executive Committee on 50th Anniversary Commemorative Project

(5) Activities and Services

Lectures

The JMF holds lecture meetings, inviting experts from a variety of fields to share their knowledge of recent developments both home and abroad.

Periodicals

① Weekly Report

The JMF issues a Weekly Report containing articles concerning issues of importance to the engineering industry. Leading executives in the engineering industry express their views on a variety of subjects. Developments in government policy vis-a-vis the engineering industry, current challenges, and future trends are covered, and information on JMF activities is supplied. Important developments in Europe and North America are monitored through the JMF's overseas offices in Bruxelles and Chicago. The weekly Report is distributed by e-mail to JMF members and others.

② Handbook on Machinery Statistics

The handbook is an annual compilation of the basic statistics of the engineering industry, foreign and domestic. Important reference material is also included.

③ English pamphlet on Engineering Industry

This English pamphlet presents basic statistics of the engineering industry.

Regular Surveys

① Economic Trend

The JMF conducts a quarterly survey on economic trends among 181 companies in the engineering field. The information is valuable to those making administrative and managerial decisions.

② Production Forecasts

Twice a year, the JMF collects the production forecasts of its association members (the industry-specific trade associations) and compiles a forecast for the entire engineering industry.

③ Labor Survey

The JMF publishes a survey on labor conditions in the engineering industry including figures on wage increases, bonus levels, etc.

Media Activities

In an effort to inform the public of the important role played by the engineering industry in everyday life and to introduce new technologies, the JMF contributes a column twice each month to the Nihon Keizai Shinbun (Japan Economic Journal) entitled, “Machine and Living.”

Resource Library

In 1987, the JMF established its Resource Library on the 4th floor of the Kikai Shinko Kaikan building. The library contains the research and studies carried out by the JMF as well as other associations and organizations related to the engineering industry. Other materials on hand include policy papers issued by various government agencies, council and committee reports, forecasts and surveys, publications and catalogs issued by JMF company members and association members and historiographies. The Resource Library also lends out the films and video-tapes produced by the JMF.

Support for Third-Party Research

The JMF, as a nationwide organization dedicated to the overall advancement of the engineering and information industry, supports the research and study conducted by a variety of associations and thinktanks concerning fields such as advanced technology, engineering, industrial development, standardization and safety, energy development, and international cooperation. The JMF is proud to have supported a wide range of important research in these areas.

JMF Award for Energy-Conserving Machinery

Every year the JMF presents awards to companies or groups of companies judged to have contributed to the promotion of efficient use of energy by developing and commercializing superior energy-saving machines. Eligible machinery should be developed and commercialized within the previous three years and should fall into one of the following categories: (1)general machinery as well as installations, facilities, and systems; (2) gauges and various measuring instruments; (3)machinery utilizing non-recycled resources such as industrial wastes, garbage, methane gas, and agricultural wastes. (Automobiles and air conditioners are not eligible.)

Shared Office Facilities

In March, 1972, the JMF began to offer shared office space and support services to members at its Chicago office. The facilities can accommodate the representatives of up to four companies. Companies have utilized the Chicago facilities for varying lengths of time and for a variety of purposes: overseas training for key personnel, market research and industry data collection, technical support, liaison functions, etc. Chicago tenures have often resulted in the establishment of U.S. subsidiaries or joint ventures with U.S. companies.

4-2. Members

(1) Regular Members

① Company Members

Chiyoda Corporation
Daihen Corporation
Daikin Industries, Ltd.
Ebara Corporation
Fuji Electric Holding Co., Ltd.
Glory Ltd.
Hirata Valve Industry Co., Ltd.
Hitachi, Ltd.
Hitachi Zosen Corporation
Ishii Iron Works Co., Ltd.
Ishikawajima-Harima Heavy Industries Co., Ltd.
The Japan Steel Works, Ltd.
JFE Engineering Corporation.
Kawasaki Heavy Industries, Ltd.
Kobe Steel, Ltd.
Komatsu, Ltd.
Koyo Seiko Co., Ltd.
Kubota Corporation
Kurimoto, Ltd.
Makino Milling Machine Co., Ltd.
Matsushita Electric Industrial Co., Ltd.
Meidensha Corporation
Mitsubishi Electric Corporation
Mitsubishi Heavy Industries, Ltd.
Mitsubishi Kakoki Kaisha, Ltd.
Mitsui Engineering & Shipbuilding Co., Ltd.
Nachi-Fujikoshi Corp.
NEC Corporation
NGK Insulators, Ltd.
Nippon Steel Corporation
NSK Ltd.
NTN Corporation
Nunome Electric Co., Ltd.
OKK Corporation
Okuma Corporation
OMRON Corporation
Sanki Engineering Co., Ltd.
Sanyo Electric Co., Ltd.
Shimadzu Corporation
Sumitomo Heavy Industries, Ltd.
SUNX Limited
Takuma Co., Ltd.
Tokyo Kikai Seisakusho, Ltd.
Torishima Pump Mfg. Co., Ltd.
Toshiba Corporation
Toyo Engineering Corporation
Tsubakimoto Chain Co.
Tsukishima Kikai Co., Ltd.
Yanmar Co., Ltd.
Yaskawa Electric Corporation

② Association Members

All Japan Machinist Hand Tools Manufacturers Association
Communications and Information network Association of Japan
The Fasteners Institute of Japan
Hydraulic Gate & Penstock Association
Industrial Diamond Association of Japan
Japan Analytical Instruments Manufacturers' Association
Japan Association of Defense Industry
Japan Association of Rolling Stock Industries
Japan Auto Parts Industries Association
Japan Automobile Manufacturers Association, Inc.
The Japan Bearing Industrial Association
Japan Business Machine and Information System Industries Association
Camera & Imaging Products Association
Japan Cast Iron Foundry Association
Japan Cemented Carbide Tool Manufacturers Association
Japan Chain Association
Japan Clock & Watch Association
Japan Construction Equipment Manufacturers Association
Japan Electric Measuring Instruments Manufacturer's Association
The Japan Electrical Manufacturers' Association
Japan Electronics and Information Technology Industries Association
Japan Elevator Association
Japan Farm Machinery Manufacturer's Association
The Japan Food Machinery Manufacturers Association
Japan Forming Machinery Association
Japan Gear Manufacturers Association
Japan Industrial Saw and Knife Association
Japan Industrial Vehicles Association
Japan Land Engine Manufacturers Association
Japan Machine Tool Builders' Association
Japan Machine Accessory Association
Japan Measuring Instruments Federation
Japan Fluid Power Association
Japan Packaging Machinery Manufacturers Association
Japan Precision Measuring Instruments Association
Japan Printing Machinery Manufacturers Association
The Japan Refrigeration and Air Conditioning Industry Association
Japan Robot Association
Japan Sewing Machinery Manufacturers Association
The Japan Small Cutting Tools' Association
The Japan Society of Industrial Machinery Manufacturers
Japan Spring Manufacturers Association
Japan Steel Constructors Association
Japan Testing Machinery Association
Japan Textile Machinery Association
The Japan Valve Manufacturers' Association
The Japan Wood Working Machinery Association
Japanese Marine Equipment Association
Nippon Electric Control Equipment Industries Association
The Society of Japanese Aerospace Companies
The Shipbuilder's Association of Japan

(2) Supporting Members

EMS Japan
Fuji Research Institute Corporation
Hitachi Business International, Ltd.
Japan Information Technology Services Industry Association
Mitsubishi Research Institute, Inc.
Resona Research Institute, Inc.
Shinkawa Electric Co., Ltd.
Shinko research Co., Ltd.
SICK K.K.
Toray Corporate Business Research, Inc.
TUV Rheinland Japan

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KEIRIN

This work was subsidized by the Japan Keirin Association through its promotion funds from KEIRIN RACE.