THE MACHINERY INDUSTRY OF JAPAN 2004

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THE JAPAN MACHINERY FEDERATION (JMF)

THE MACHINERY INDUSTRY OF JAPAN 2004

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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
MIC	:	Ministry of Internal Affairs and Communications (The English name of the ministry was changed from "Public Management, Home Affairs, Post and Telecommunications (MPHPT)" to the name above mentioned.)
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 2003, the index of industrial production of Japan was on a weak note in the first half year, and was seen to be turned upward in the second half. As a result, at yearly base the index was 95.0 (2000 = 100) showing an increase of 3.3% from the previous year, the first increase in the recent three years.

Looking at the machinery industry , the index for general machinery industry increased 7.2% from the previous year, and the index for electrical machinery industry, information and communication electronics equipment industry, electronic parts and devices industry, transport equipments (excl. ships and rolling stocks) industry, and precision instruments industry increased 6.0%, 4.3% 17.8%, 3.1% and 2.5% each from the previous year.

According to "Machinery Statistics" of METI, due to the increased production of special industry machinery such as semiconductor manufacturing equipment in the general machinery industry, lithium ion rechargeable batteries and others in the electrical machinery industry, and cellular phone, digital still camera and etc in the information and communication electronic equipment industry, each of these industries registered first growth of production after two consecutive years of decline. Electric parts and devices industry and transport equipment industry marked the increase of production for two consecutive years, each due to the healthy demands for devices from information / communication electronic equipment industry and the increased production of tracks.

And precision instruments industry turned its production upward after four consecutive years of decline due to the increased production of measuring equipment and instruments.

As a result, the total production for the machinery industry in 2003 showed a 3.7% increase from the year earlier and totaled ¥65,105.0 billion.

Table 1-1. Production Index in the Machinery Industry

(2000 = 100, %)

Industries	Production Index	Change (from previous year)			
	2003	2001	2002	2003	2004.1 ~ 6
Mining and manufacturing	95.0	△6.8	△1.3	3.3	7.1 (2.8)
General machinery	87.8	△11.0	△8.0	7.2	18.8 (14.4)
Electrical machinery	92.5	△8.9	△4.2	6.0	11.7 (10.4)
Information and communication electronics equipment	84.4	△6.2	△13.8	4.3	1.3 (△0.8)
Electronic parts and devices	103.2	△21.3	11.3	17.8	23.6 (6.7)
Transport equipment (excl. ships and rolling stocks)	108.5	△0.7	5.9	3.1	8.7 (3.8)
Precision instruments	82.1	△10.4	△10.6	2.5	16.9 (9.4)

(Note 1) ( ) Change from previous half year
(Note 2) The Japan Standard Industrial Classification (JSIC) was revised, and the old category of "electrical machinery" was devided to 3 categories of "electrical machinery", "information communication electronics equipment" and "electronic parts and devices".
(Source) METI [Current Production Statistics Survey]

Table 1-3. Exports in the Machinery Industry

(billion yen, %)

Industries	Exports	Change (from previous year)			
	2003	2001	2002	2003	2004.1 ~ 6
General machinery	11,025	△7.8	3.6	4.0	13.9 (7.5)
Electrical machinery	12,857	△15.6	3.4	7.8	16.5 (1.7)
Transport equipment (incl. ships and rolling stocks)	3,261	2.8	16.8	2.0	4.7 (4.3)
Precision instruments	2,154	△5.2	△23.2	6.7	26.6 (6.7)
Total	39,297	△7.4	5.7	4.7	12.2 (4.5)

(Note 1) ( ) Change from previous half year
(Note 2) The classification of goods and industris is in accordance with the classification for "The Basic" Classification Index for The Survey Report on Trade of Japan"
(Source) MOF [Trade Statistics]

1-2. Foreign Trade

Looking at export and import trends in the machinery industry, total machinery exports in 2003 registered a 4.7% growth from the previous year to ¥39,297.0 billion, the increase for two consecutive years. Export in the general machinery industry and in the electrical machinery industry increased 4.0% and 7.8% each from the previous year, showing the growth of two consecutive years.

Electrical machinery industry registered a 7.8% growth of export from the previous year, the growth in two consecutive years, and transportation equipment industry increased its export 2.0% from the year earlier, the increase for four consecutive years. And the export in the precision instruments industry turned upward after the decline of two years and registered a 6.7% growth of export from the previous year. In the general machinery industry, the export of metalworking machinery, construction and mining machinery, heating or cooling equipments and mechanical handling equipment drastically increased in 2003. In the electrical machinery industry, the export of telecommunications apparatus and electronic parts and devices also increased in large scale in addition to the other items. And the increased export of passenger motor cars and parts of road motor vehicles in the transportation equipment industry, and scientific, medical, optical instruments (such as copying apparatus, liquid crystal devices, meters, measuring and scientific instruments, and others) in the precision instruments industry was seen, and such increase of export contributed for the growth of total export in the machinery industry.

Looking at imports in the machinery industry in 2003, it showed an increase of 4.0% from the previous year and totaled to ¥13,974.0 billion, marking the fourth consecutive year of increase.

The import of many categories of machinery and equipment except telecommunications apparatus registered great increases of 2-digits, and it leaded to the growth of total imports in the machinery industry.

As a result, the trade surplus in 2003 registered the second consecutive year of increase.

Table 1-2. Production in the Machinery Industry

(billion yen, %)

Industries	Production	Change (from previous year)			
	2003	2001	2002	2003	2004.1 ~ 6
General machinery	11,436	△12.2	△9.3	5.0	15.2 (15.8)
Electrical machinery	6,546	△10.3	△9.5	1.1	10.1 (6.9)
Information and communication electronics equipment	8,434	△11.7	△20.3	5.8	0.4 (△2.4)
Electronic parts and devices	8,910	△24.3	△.5	7.3	14.8 (3.2)
Transport equipment (excl. ships and rolling stocks)	29,130	2.7	16.5	2.2	4.2 (4.3)
Precision instruments	649	△11.2	△12.6	4.8	7.2 (3.0)
Total	65,105	△8.7	-	3.7	7.7 (5.5)

(Note 1) ( ) Change from previous half year
(Note 2) The old category of "electrical machinery" was devided to 3 categories as mentioned in Table 1-1
(Source) METI [Current Production Statistics Survey]

Table 1-4. Imports in the Machinery Industry

(billion yen, %)

Industries	Import	Change (from previous year)			
	2003	2001	2002	2003	2004.1 ~ 6
Total	13,974	2.3	1.6	4.0	11.7 (4.7)

(Note 1) ( ) Change from previous half year
(Note 2) The classification of goods and industris is in accordance with the same classification as in Table 1-3
(Source) MOF [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 2002, manufacturing operations with four or more employees numbered 290,848, representing a decrease of 8.0% or 25,419 plants since the end of 2001. Of these, the number of operations belonging to the machinery industry was 73,730, representing a decrease of 6.7% or 5,249 plants since 2001. Machinery industry plants made up 25.4% of all manufacturing operations, increasing 0.4 points from the end of 2001.

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 34,432, (46.7% of all plants in the machinery industry), followed by electrical machinery sector with 22,380 plants (30.4%), transportation equipment with 12,266 (16.6%), and precision instruments and machinery plants with 4,622 (6.3%).

Table 2-1. Number of Operations

JSIC code no.	Industries	2000	2001			2002		
		Number of operations	Number of operations	Change (%)	Weight (%)	Number of operations	Change (%)	Weight (%)
	Total (Manufacturing)	341,421	316,267	92.6	100.0	290,848	92.0	100.0
9	Manufacture of food	39,395	37,491	95.2	11.9	35,739	95.3	12.3
10	Manufacture of beverages, tobacco and feed	5,376	5,061	94.1	1.6	4,866	96.1	1.7
11	Manufacture of textile mill products, except apparel and other finished products made from fablics and similar materials	11,384	10,456	91.8	3.3	9,260	88.6	3.2
12	Manufacture of apparel and other finished product made from fabrics and similar materials	23,735	20,750	87.4	6.6	18,011	86.8	6.2
13	Manufacture of lumber and wood products except furniture	12,984	11,746	90.5	3.7	10,651	90.7	3.7
14	Manufacture of furniture and fixtures	12,417	11,772	94.8	3.7	10,359	88.0	3.6
15	Manufacture of pulp, paper and paper products	9,589	9,014	94.0	2.9	8,439	93.6	2.9
16	Printing and allied industries	24,876	23,095	92.8	7.3	19,493	84.4	6.7
17	Manufacture of chemical and allied products	5,263	5,152	97.9	1.6	5,045	97.9	1.7
18	Manufacture of petroleum and coal products	1,137	1,084	95.3	0.3	1,048	96.7	0.4
19	Manufacture of plastic products	18,875	17,767	94.1	5.6	16,809	94.6	5.8
20	Manufacture of rubber products	4,277	4,048	94.6	1.3	3,673	90.7	1.3
21	Manufacture of leather tanning, and leather products, and fur skins	3,594	3,397	94.5	1.1	2,882	84.8	1.0
22	Manufacture of ceramic, stone and clay products	17,388	16,420	94.4	5.2	15,285	93.1	5.3
23	Manufacture of iron and steel	5,154	4,922	95.5	1.6	4,589	93.2	1.6
24	Manufacture of non-ferrous metals and products	3,575	3,342	93.5	1.1	3,171	94.9	1.1
25	Manufacture of fabricated metal	42,807	39,626	92.6	12.5	36,667	92.5	12.6
26	Manufacture of general machinery (incl. 328 manufacture of ordnance and accessories)	39,943	36,907	92.4	11.7 -	34,462	93.4	11.8 -
27～29	Manufacture of electrical machinery	27,282	24,396	89.4	7.7	22,380	91.7	7.7
30	Manufacture of transportation equipment (incl. 302 manufacture of railroad equipment and parts, and 303 shipbuildind and repairing, and marine engines.)	13,342	12,684	95.1	4.0	12,266	96.7	4.2
31	Manufacture of precision instruments and machinery	5,481	5,037	91.9	1.6	4,622	91.8	1.6
	Total of machinery industry (26,27,30,31)	86,048	79,024	91.8	25.0	73,730	93.3	25.4
34	Miscellaneous manufacturing industries	13,547	12,100	89.3	3.8	11,131	92.0	3.8

(Note 1) Operations with 4 or more employees
(Note 2) JSIC means the Japan Standard Industrial Classification
(Note 3) In 2002, JSIC was revised and the old category of "Manufacturer of electrical machinery" was devided to 3 categories of "Manufacture of electrical machinery, equipment and supplies", "Manufacture of information and communication electronics equipment" and "Manu facture of electronic parts and devices". However, for the covenience of comparison with data of the past years, "Manufacture of electrical machinery" shows the total of these 3 categories in the table."
(Source) METI [Census of Manufactures 2002]

(2) Employment

At the end of 2002, there were 8,323,589 people employed in manufacturing operations with four or more employees. This represented a 6.1% reduction (542,631 jobs) from the year earlier, and a decrease for 11 consecutive years. Employment in the machinery industry was 3,283,691 people, or a 5.2% decrease (180,832 jobs) from the previous year. The machinery industry accounted for 39.5% of all manufacturing employment, increasing 0.4 points from the previous year.

By sector, electrical machinery sector employed the most people with 1,326,340 (40.4% of total machinery industry employment), followed by general machinery with 949,166 (28.9%), transport equipment with 853,472 (26.0%), and precision instruments and machinery with 154,713 (4.7%).

(3) Shipments

In 2002, shipments for all manufacturing operations with four or more employees amounted to ¥269,361,805 million, a decrease of 6.0% or ¥17,305,601 million from the previous year. Machinery industry shipments were ¥123,524,429 million, down 5.0% or ¥6,550,887 million from the previous year. Machinery industry shipments accounted for 45.9% of overall manufacturing shipments, increasing 2.0 points from the year earlier.

By sector, shipments for transport equipment sector led the way with ¥47,997,396 million (38.9% of the machinery industry shipments), followed by electrical machinery shipments with ¥46,041,088 million (37.3%), general machinery with ¥25,935,783 million (21.0%), and precision instruments and machinery with ¥3,550,162 million (2.9%).

Table 2-2. Number of Employees

JSIC code no.	Industries	2000	2001			2002		
		Number of employees	Number of employees	Change (%)	Weight (%)	Number of employees	Change (%)	Weight (%)
	Total (Manufacturing)	9,183,833	8,866,220	96.5	100.0	8,323,589	93.9	100.0
9	Manufacture of food	1,127,177	1,155,025	102.5	13.0	1,137,521	98.5	13.7
10	Manufacture of beverages, tobacco and feed	112,658	111,530	99.0	1.3	109,170	97.9	1.3
11	Manufacture of textile mill products, except apparel and other finished products made from fablics and similar materials	184,004	344,453	92.8	1.9	155,071	90.8	1.9
12	Manufacture of apparel and other finished product made from fabrics and similar materials	386,727	344,453	89.1	3.9	305,373	88.7	3.7
13	Manufacture of lumber and wood products except furniture	162,905	151,788	93.2	1.7	139,334	91.8	1.7
14	Manufacture of furniture and fixtures	163,838	155,763	95.1	1.8	141,297	90.7	1.7
15	Manufacture of pulp, paper and paper products	242,969	235,944	97.1	2.7	224,874	95.3	2.7
16	Printing and allied industries	502,184	496,653	98.9	5.6	367,037	73.9	4.4
17	Manufacture of chemical and allied products	365,953	364,068	99.5	4.1	353,980	97.2	4.3
18	Manufacture of petroleum and coal products	27,145	26,245	96.7	0.3	25,135	95.8	0.3
19	Manufacture of plastic products	433,177	428,645	99.0	4.8	417,945	97.5	5.0
20	Manufacture of rubber products	131,532	127,331	96.8	1.4	122,183	96.0	1.5
21	Manufacture of leather tanning, and leather products, and fur skins	44,233	41,488	93.8	0.5	36,729	88.5	0.4
22	Manufacture of ceramic, stone and clay products	363,997	348,286	95.7	3.9	321,735	92.4	3.9
23	Manufacture of iron and steel	236,525	223,817	94.6	2.5	209,087	93.4	2.5
24	Manufacture of non-ferrous metals and products	141,872	134,145	94.6	1.5	134,423	100.2	1.6
25	Manufacture of fabricated metal	722,425	699,422	96.8	7.9	667,367	95.4	8.0
26	Manufacture of general machinery (incl. 328 manufacture of ordnance and accessories)	1,043,890	1,001,192	95.9	11.3 -	949,166	94.8	11.4 -
27～29	Manufacture of electrical machinery	1,573,683	1,451,804	92.3	16.4	1,326,340	91.4	15.9
30	Manufacture of transport equipment (incl. 302 manufacture of railroad equipment and parts, and 303 shipbuildind and repairing, and marine engines.)	849,517	846,331	99.6	9.5	853,472	100.8	10.3
31	Manufacture of precision instruments and machinery	172,066	165,196	96.0	1.9	154,713	93.7	1.9
	Total of machinery industry (26,27,30,31)	3,639,156	3,464,523	95.2	39.1	3,283,691	94.8	39.5
34	Miscellaneous manufacturing industries	195,356	186,282	95.4	2.1	171,637	92.1	2.1

(Note 1) Operations with 4 or more employees
(Note 2) "Manufacture of electrical machinery" shows the total of 3 categories as same as in Table2-1.
(Source) METI [Census of Manufactures 2002]

Table 2-3. Shipments

(million yen)

JSIC code no.	Industries	2000 Shipments	2001 Shipments	2001 Change (%)	2001 Weight (%)	2002 Shipments	2002 Change (%)	2002 Weight (%)
	Total (Manufacturing)	300,477,604	286,667,406	95.4	100.0	269,361,805	94.0	100.0
9	Manufacture of food	23,888,077	23,454,150	98.2	8.2	22,984,018	98.0	8.5
10	Manufacture of beverages, tobacco and feed	10,932,925	10,914,272	99.8	3.8	10,626,600	97.4	3.9
11	Manufacture of textile mill products, except apparel and other finished products made from fablics and similar materials	3,008,080	2,736,822	92.8	1.9	2,478,223	90.8	0.9
12	Manufacture of apparel and other finished product made from fabrics and similar materials	3,478,958	3,008,227	86.5	1.0	2,651,314	88.1	1.0
13	Manufacture of lumber and wood products except furniture	3,194,109	2,905,932	91.0	1.0	2,645,715	91.0	1.0
14	Manufacture of furniture and fixtures	2,703,260	2,531,517	93.6	0.9	2,253,507	89.0	0.8
15	Manufacture of pulp, paper and paper products	7,933,875	7,582,775	95.6	2.6	7,152,012	94.3	2.7
16	Printing and allied industries	12,778,464	12,525,367	98.0	4.4	7,411,140	59.2	2.8
17	Manufacture of chemical and allied products	23,762,228	23,228,380	97.8	8.1	22,748,344	97.9	8.4
18	Manufacture of petroleum and coal products	9,433,625	9,612,923	101.9	3.4	9,576,151	99.6	3.6
19	Manufacture of plastic products	10,486,448	9,995,163	95.3	3.5	9,627,805	96.3	3.6
20	Manufacture of rubber products	3,107,318	2,896,780	93.2	1.0	2,890,342	99.8	1.1
21	Manufacture of leather tanning, and leather products, and fur skins	678,098	624,631	92.1	0.2	548,371	87.8	0.2
22	Manufacture of ceramic, stone and clay products	8,859,642	8,397,364	94.8	2.9	7,678,365	91.4	2.9
23	Manufacture of iron and steel	11,927,293	11,201,829	93.9	3.9	10,962,676	97.9	4.1
24	Manufacture of non-ferrous metals and products	6,190,520	5,849,213	94.5	2.0	5,668,471	96.9	2.1
25	Manufacture of fabricated metal	15,142,541	14,545,010	96.1	5.1	13,736,524	94.4	5.1
26	Manufacture of general machinery (incl. 328 manufacture of ordnance and accessories)	30,398,632	28,457,479	93.6	9.9 -	25,935,783	91.1	9.6 -
27~29	Manufacture of electrical machinery	59,448,600	52,465,722	88.3	18.3	46,041,088	87.8	17.1
30	Manufacture of transport equipment (incl. 302 manufacture of railroad equipment and parts, and 303 shipbuildind and repairing, and marine engines.)	44,366,979	45,152,216	101.8	15.8	47,997,396	106.3	17.8
31	Manufacture of precision instruments and machinery	4,071,045	3,999,899	98.3	1.4	3,550,162	88.8	1.3
	Total of machinery industry (26,27,30,31)	138,285,256	130,075,316	94.1	45.4	123,524,429	95.0	45.9
34	Miscellaneous manufacturing industries	4,686,887	4,581,735	97.8	1.6	4,197,798	91.6	1.6

(Note 1) Operations with 4 or more employees
(Note 2) "Manufacture of electrical machinery" shows the total of 3 categories as same as in Table2-1.
(Source) METI [Census of Manufactures 2002]

(4) Value Added

In 2002, value added for all manufacturing operations with four or more employees amounted to ¥97,458,726 million, down 5.7% or ¥5,846,406 million from 2001. Machinery industry value added came to ¥40,580,169 million, down 1.8% or ¥746,789 million from the previous year. Value added for the machinery industry accounted for 41.6% of value added for all manufacturing operations, increased 1.6 points from the previous year.

By sector, electrical machinery led the way with ¥14,578,321 million in value added (35.9% of the value added for the machinery industry), followed by transport equipment with ¥14,233,034 million (35.1%), general machinery with ¥10,223,622 million (25.2%), and precision instrument and machinery with ¥1,545,192 million (3.8%).

Table 2-4. Value Added

(million yen)

JSIC code no.	Industries	2000	2001			2002		
		Value added	Value added	Change (%)	Weight (%)	Value added	Change (%)	Weight (%)
	Total (Manufacturing)	110,242,635	103,305,132	93.7	100.0	97,458,726	94.3	100.0
9	Manufacture of food	9,130,254	8,991,978	98.5	8.7	8,793,806	97.8	9.0
10	Manufacture of beverages, tobacco and feed	3,442,677	3,388,142	98.4	3.3	3,353,202	99.0	3.4
11	Manufacture of textile mill products, except apparel and other finished products made from fablics and similar materials	1,301,245	1,192,205	92.8	1.9	1,079,580	90.8	1.1
12	Manufacture of apparel and other finished product made from fabrics and similar materials	1,648,594	1,428,017	86.6	1.4	1,259,540	88.2	1.3
13	Manufacture of lumber and wood products except furniture	1,190,750	1,095,450	92.0	1.1	1,014,632	92.6	1.0
14	Manufacture of furniture and fixtures	1,194,357	1,122,832	94.0	1.1	990,595	88.2	1.0
15	Manufacture of pulp, paper and paper products	2,978,056	2,882,271	96.8	2.8	2,655,179	92.1	2.7
16	Printing and allied industries	6,622,782	6,515,047	98.4	6.3	3,462,763	53.2	3.6
17	Manufacture of chemical and allied products	11,496,608	11,248,504	97.8	10.9	11,024,106	98.0	11.3
18	Manufacture of petroleum and coal products	705,680	553,658	78.5	0.5	921,083	166.4	0.9
19	Manufacture of plastic products	4,250,034	4,056,316	95.4	3.9	3,909,582	96.4	4.0
20	Manufacture of rubber products	1,444,446	1,356,308	93.9	1.3	1,368,904	100.9	1.4
21	Manufacture of leather tanning, and leather products, and fur skins	261,707	251,516	96.1	0.2	217,188	86.4	0.2
22	Manufacture of ceramic, stone and clay products	4,296,050	4,105,201	95.6	4.0	3,779,256	92.1	3.9
23	Manufacture of iron and steel	4,228,818	3,955,742	93.5	3.8	3,779,548	95.5	3.9
24	Manufacture of non-ferrous metals and products	1,869,225	1,665,992	89.1	1.6	1,475,350	88.6	1.5
25	Manufacture of fabricated metal	6,770,255	6,492,607	95.9	6.3	6,166,669	95.0	6.3
26	Manufacture of general machinery (incl. 328 manufacture of ordnance and accessories)	11,743,569	11,020,189	93.8	10.7 -	10,223,622	92.8	10.5 -
27～29	Manufacture of electrical machinery	20,144,294	16,094,604	79.9	15.6	14,578,321	90.6	15.0
30	Manufacture of transport equipment (incl. 302 manufacture of railroad equipment and parts, and 303 shipbuildind and repairing, and marine engines.)	11,815,575	12,469,847	105.5	12.1	14,233,034	114.1	14.6
31	Manufacture of precision instruments and machinery	1,770,370	1,742,318	98.4	1.7	1,545,192	88.7	1.6
	Total of machinery industry (26,27,30,31)	45,473,808	41,326,958	90.9	40.0	40,580,169	98.2	41.6
34	Miscellaneous manufacturing industries	1,937,289	1,676,388	86.5	1.6	1,627,574	97.1	1.7

(Note 1) Operations with 4 or more employees
(Note 2) "Manufacture of electrical machinery" shows the total of 3 categories as same as in Table2-1.
(Note 3) For establishments with 9 or fewer employees gross value added was used.
(Source) METI [Census of Manufactures 2002]

(5) Exports and Imports

According to METI's "White Paper on International Trade 2004", Japanese exports (yen- based) for 2003 amounted to ¥54,548.4 billion, representing a 4.7% increase from the previous year. Machinery and equipment exports were ¥39,296.8 billion, a 4.7% increase. Machinery and equipment made up 72.0% of all exports by value (general machinery claimed 20.2%, electrical machinery 23.6%, transport equipment 24.3%, and precision instruments and machinery 3.9%), keeping same level as in the previous year.

Japanese imports (yen-based) for 2003 amounted to ¥44,362.0 billion, a 5.1% increase from the previous year. Machinery and equipment imports were ¥13,973.6 billion, a 4.0% increase from the previous year. Machinery and equipment made up 31.5% of all imports by value, a decrease of 0.3 points from 2002.

As a result, the trade surplus for 2003 amounted to ¥10,186.3 billion, representing a 3.1% increase from the previous year.

- 2003 dollar-based Japanese exports came to $471,822,448 thousand, a 13.1% increase from the previous year. Of this amount, machinery and equipment exports were $339,936,913 thousand, an increase of 13.1% from 2002.
- 2003 dollar-based Japanese imports were $383,303,922 thousand, an increase of 13.5% from the previous year. Of this amount, machinery and equipment imports were

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

(million yen)

Commodity	2001	2002	2003	03/02 (%)	Weight (%)
Grand total	48,979,244	52,108,956	54,548,350	104.7	100.0
Foodstuff	363,993	269,117	266,625	99.1	0.5
Raw materials & fuels	468,304	503,467	555,384	110.3	1.0
Machinery & equipment	35,525,071	37,542,130	39,296,844	104.7	72.0
Machinery other than electric	10,232,855	10,598,833	11,024,774	104.0	20.2
Electrical machinery	11,534,475	11,924,196	12,857,185	107.8	23.6
Transport equipment	11,129,051	12,999,722	13,260,757	102.0	24.3
Motor vehicles (excluding parts)	7,210,812	8,774,645	8,895,012	101.4	16.3
Vessels	1,026,134	1,123,645	1,133,514	100.9	2.1
Precision instruments	2,628,691	2,019,379	2,154,128	106.7	3.9
Metals	2,885,931	3,227,445	3,388,475	105.0	6.2
Iron & steel products	1,649,038	1,939,592	2,066,009	106.5	3.8
Chemicals	3,743,718	4,173,674	4,525,005	108.4	8.3
Textiles	921,111	917,979	900,239	98.1	1.7
Non-metallic manufactures	564,887	566,069	591,987	104.6	1.1
Re-export goods. Commodities and transactions not classified according to kind	2,896,527	2,229,726	2,361,299	105.9	4.3

(Source) METI [White Paper on International Trade 2004]

Table 2-6. The weight of the machinery equipment in exports (2003)

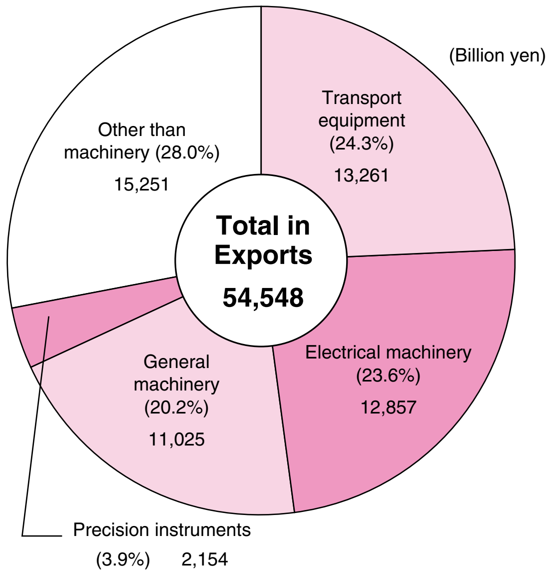


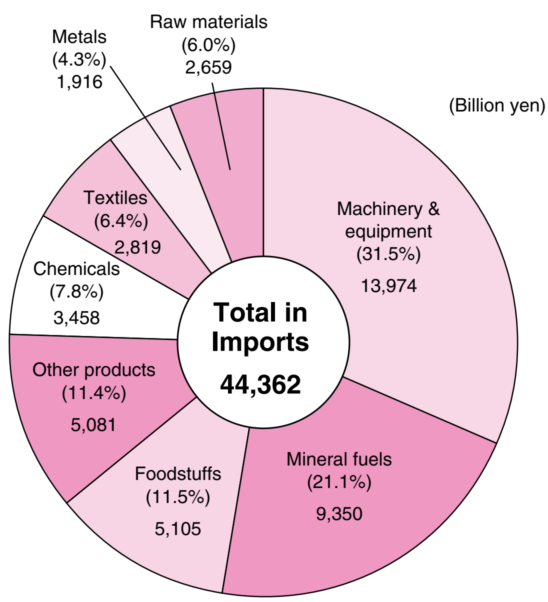
Table 2-7. Machinery & Equipment Imports (yen base)

(million yen)

Commodity	2001	2002	2003	03/02 (%)	Weight (%)
Grand total	42,415,533	42,227,506	44,362,023	105.1	100.0
Foodstuffs	5,247,596	5,282,336	5,104,575	96.6	11.5
Raw materials	2,586,073	2,521,804	2,658,512	105.4	6.0
Textile fibers	100,671	92,837	88,705	95.5	0.2
Metal ore	937,114	950,377	1,030,832	108.5	2.3
Wood	599,980	548,077	549,095	100.2	1.2
Mineral fuels	8,523,657	8,173,925	9,349,924	114.4	21.1
Coal	752,692	785,982	743,902	94.6	1.7
Petroleum, crude and partly refined	4,718,360	4,573,106	5,328,392	116.5	12.0
Petroleum products	903,102	822,654	995,833	121.1	2.2
Machinery & equipment	13,218,798	13,434,300	13,973,582	104.0	31.5
Chemicals	3,113,939	3,239,486	3,458,279	106.8	7.8
Metals	1,814,057	1,702,577	1,915,869	112.5	4.3
Textiles	2,891,057	2,752,090	2,818,870	102.4	6.4
Re-import goods. Commodities and transactions not classified according to kind	786,389	881,394	759,627	86.2	1.7

(Source) METI [White Paper on International Trade 2004]

Table 2-8. The weight of the machinery equipment imports (2003)



(6) Investment in Plants and Equipment

According to the survey on planned capital spending compiled by the Development Bank of Japan to catch the trend of investment, 2,605 enterprises commonly replied for both surveys in F.Y.2002 and F.Y,2003 invested in plants and equipment ¥18,713.8 billion (construction-base) as total in F.Y.2003, an 1.1% decrease from the previous fiscal year. Among these enterprises, manufacturing sector spent ¥5,967.6 billion in total, a 11.3% increase, and non-manufacturing sector spent ¥12,657.1 billion in F.Y.2003, a 6.0% decrease from the previous fiscal year.

Looking at the weight in the total investment in plants and equipment by sector, the investment in manufacturing accounted 32.0% of the total in 2003, and it in non-manufacturing represented 68.0%.

Looking at the trend of main industrial sectors in F.Y.2003, the electrical machinery sector increased its investment by 34.8% from the previous fiscal year, and general machinery sector (4.6%), transport equipment sector (2.5%), precision instruments sector (29.4%), chemical sector (5.3%), steel sector (20.2%), and wholesale, retail trade sector (9.8%) increased. On the other hand, the investments in the oil sector (11.1%), electric power sector (18.7%), construction sector (7.1%) decreased from the previous fiscal year. As the result, total investment in plants and equipment in the machinery industry (as total of main 4 sectors) increased 17.3% in F.Y.2003.

And the share of F.Y.2003 total investment in plants and equipment held by the various sectors is as follows: leasing 20.1%, communication/information 13.8%, electric power 11.4%, electrical machinery 8.7%, transport equipment 6.5%, chemical 4.5%, general machinery 2.0%, and precision instruments 0.7%. And total share of the machinery industry (as total of main 4 sectors) increased 1.8 points from the previous fiscal year to 17.8%.

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

(thousand dollar)

Commodity	2001	2002	2003	03/02 (%)	Weight (%)
Grand total	403,230,427	417,014,716	471,822,448	113.1	100.0
Foodstuff	2,991,219	2,149,772	2,313,677	107.6	0.5
Raw materials & fuels	3,852,093	4,022,553	4,803,309	119.4	1.0
Machinery & equipment	292,550,544	300,448,961	339,936,913	113.1	72.0
Machinery other than electric	84,268,724	84,799,288	95,347,273	112.4	20.2
Electrical machinery	95,020,872	95,549,948	111,313,799	116.5	23.6
Transport equipment	91,605,420	103,935,906	114,608,944	110.3	24.3
Motor vehicles (excluding parts)	59,333,193	70,227,813	76,920,821	109.5	16.3
Vessels	8,460,411	9,174,159	9,748,767	106.3	2.1
Precision instruments	21,655,528	16,163,819	18,666,898	115.5	4.0
Metals	23,732,927	25,838,720	29,295,539	113.4	6.2
Iron & steel products	13,556,524	15,537,048	17,861,613	115.0	3.8
Chemicals	30,815,598	33,385,143	39,103,820	117.1	8.3
Textiles	7,571,129	7,355,877	7,784,932	105.8	1.6
Non-metallic manufactures	4,650,693	4,525,939	5,123,554	113.2	1.1
Re-export goods. Commodities and transactions not classified according to kind	23,819,891	17,852,619	20,427,922	114.4	4.3

(Source) METI [White Paper on International Trade 2004]

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

(thousand dollar)

Commodity	2001	2002	2003	03/02 (%)	Weight (%)
Grand total	349,191,516	337,833,289	383,303,922	113.5	100.0
Foodstuffs	43,131,490	42,244,237	44,119,224	104.4	11.5
Raw materials	21,404,414	20,163,650	22,940,237	113.8	6.0
Textile fibers	829,290	739,748	764,861	103.4	0.2
Metal ore	7,716,265	7,599,682	8,898,922	117.1	2.3
Wood	4,941,879	4,383,866	4,729,595	107.9	1.2
Mineral fuels	70,202,685	65,467,992	80,619,750	123.1	21.0
Coal	6,190,145	6,274,240	6,413,659	102.2	1.7
Petroleum, crude and partly refined	38,863,915	36,670,606	45,948,535	125.3	12.0
Petroleum products	7,451,020	6,588,801	8,603,078	130.6	2.2
Machinery & equipment	108,864,436	107,438,866	120,889,272	112.5	31.5
Chemicals	25,638,203	25,932,067	29,878,095	115.2	7.8
Metals	14,951,524	13,626,181	16,558,032	121.5	4.3
Textiles	23,803,166	22,031,031	24,369,514	110.6	6.4
Re-import goods. Commodities and transactions not classified according to kind	6,468,306	7,034,686	6,573,909	93.4	1.7

(Source) METI [White Paper on International Trade 2004]

(7) Research and Development

According to the survey on scientific and technological research conducted by MIC, research expenditures by Japanese industry for 2003 grew 1.6% from the year earlier to a total of ¥11,755.5 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 since then this increasing trend was continuing.

The manufacturing sector invested 85.3% of the total or ¥10,032.0 billion. The machinery industry spent ¥6,870.3 billion on research, which is 58.4% of the total amount spent by Japanese industry.

The number of researchers in 2003 was 580,359 in all industries, and 87.3% of whom were employed in the manufacturing sector. The machinery industry accounted for 51.7% of the total for Japanese industry.

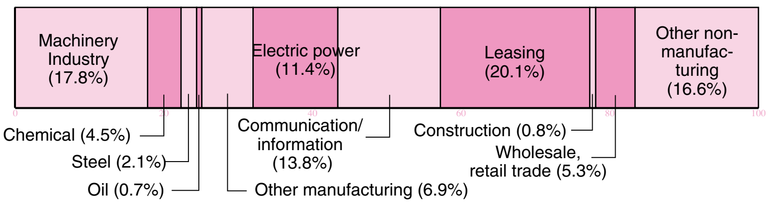
Table 2-11. Investment in Plants and Equipment by Sector

(100 million yen, %)

Sector	Investment 2,605 enterprises (Note 1)				Change	Weight
	F.Y. 01/00	F.Y. 02 / 01	F.Y. 2002	F.Y. 2003	03 / 02	F.Y. 2003
Total	▲9.3	▲10.3	188,290	186,247	▲1.1	100.0
Manufacturing	▲9.7	▲16.2	53,598	59,676	11.3	32.0
Machinery industry	▲19.5	▲12.4	8,293	33,195	17.3	17.8
General machinery	▲3.3	▲18.7	3,476	3,635	4.6	2.0
Electrical machinery	▲34.4	▲20.9	11,968	16,133	34.8	8.7
Transport equipment	2.0	1.5	11,874	12,165	2.5	6.5
Precision instruments	▲5.7	▲20.2	975	1,262	29.4	0.7
Chemical industry	8.1	▲19.1	8,005	8,431	5.3	4.5
Oil industry	34.7	32.3	1,553	1,380	▲11.1	0.7
Steel industry	7.5	▲20.9	3,214	3,862	20.2	2.1
Other industries (Note 2)	▲1.4	▲24.2	12,533	12,808	2.2	6.9
Non-Manufacturing	▲9.2	▲7.5	134,692	126,571	▲6.0	68.0
Electric power	▲9.8	▲19.7	26,023	21,166	▲18.7	11.4
Communication/information	▲10.8	▲14.2	26,691	25,673	▲3.8	13.8
Leasing industry	2.8	▲4.4	38,250	37,366	▲2.3	20.1
Construction	▲0.1	6.0	1,513	1,405	▲7.1	0.8
Wholesale, retail trade	▲19.6	2.8	9,077	9,969	9.8	5.3
Other industries (Note 3)	▲15.3	4.5	33,138	30,992	▲6.5	16.6

(Note 1) The investment amount shows the total investment of 2,605 common enterorises responced for both surveys in 2002 and 2003, and not shows the total investment of all enterprises.
(Note 2) Other industries (manufacturing) includes foods and beverages, textiles, pulp and paper, printing, rubber, ceramic, stone and clay, non-ferrous metals, fablicated metals, and other manufacturing industries.
(Note 3) Other industries (non-manufacturing) includes fishing, mining, real estate, transport, gas supply, services and other non-manufacturing industries.
(Source) The Development Bank of Japan [Survey on Planned Capital Spending, June 2004]

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



(Source) The Development Bank of Japan
[Investment in Plants and Equipment Research Report, June 2004]

Table 2-13. Research and Development in Machinery Industry (F.Y.2003)

Sector	Companies performing		Expenditure on R & D			Researchers	
	Number of companies	Weight in total com-panies (%)	Total (100 million yen)	Weight (%)	Weight in sales (%)	Total (%)	Weight (%)
Total	25,421	4.6	117,555	100.0	2.78	580,359	100.0
Manufacturing industry	20,686	13.0	100,320	85.3	3.71	506,497	87.3
Machinery industry	7,571	16.2	68,703	58.4	5.02	331,520	57.1
General machinery	2,464	11.4	9,174	7.8	4.12	48,192	8.3
Electrical machinery	1,553	19.9	9,888	8.4	5.05	55,014	9.5
Information and communication electronics equipment	848	40.8	20,408	17.4	6.75	92,588	16.0
Electronic parts and devices	540	11.4	5,747	4.9	3.88	37,391	6.4
Transport equipment (incl. ships and rolling stocks)	583	8.8	18,460	15.7	4.40	74,095	12.8
Precision instruments	1,583	42.3	5,026	4.3	6.26	24,240	4.2
Other manufacturing industries	13,115	11.7	31,617	26.9	2.37	174,977	30.1
Non-manufacturing industry	4,735	1.2	17,235	14.7	1.13	73,862	12.7

(Note 1) 2004.3.31.
(Note 2) The old category of "electrical machinery" was devided to 3 categories of "electrical machinery", "information and communication electronics equipment" and "electronic parts and devices", according to the revision of Japan Standard Industrial Classification (JSIC).
(Source) Statistics Bureau of MIC [Report on Survey of Research and Development 2004]

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

In 2002, the machinery industry's net domestic product amounted to ¥32,060.8 billion or 7.6% of the NDP for all of Japanese industry. This figure also amounted to 37.4% 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 to 7.6% falling 0.4 points from the previous year, but in 2002 .the share was 7.6%, keeping same share in 2001.

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 in1998, and remaining at the same level in 1999, and declining to 38.2% with a fall of 0.1 points in 2000 and to 37.0% with a fall of 1.2 point. However in 2002 the share rose to 37.4% increasing 0.4 point.

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

(Nominal, billion yen, %)

Classification of economic activities	2000 Amount	2001 Amount	2002 Amount	2002 Share of total	2002 Share of manufacturing
1. Industries	393,112.2	383,951.8	379,621.6	90.1	–
(1) Agriculture forestry and fisheries	5,091.5	4,836.5	4,747.0	1.1	–
(2) Mining	441.1	462.9	410.2	0.1	–
(3) Manufacturing	91,257.7	87,481.3	85,837.3	20.4	100.0
① Food products and beverages	12,151.1	11,051.4	10,830.2	2.6	12.6
② Textiles	958.4	885.0	812.1	0.2	0.9
③ Pulp, paper and paper products	2,549.5	2,451.2	2,304.6	0.5	2.7
④ Chemicals	6,817.3	7,100.7	7,141.3	1.7	8.3
⑤ Petroleum and coal products	5,664.1	6,590.3	7,120.4	1.7	8.3
⑥ Non-metallic mineral products	3,154.9	2,980.9	2,701.0	0.6	3.1
⑦ Basic metal	5,485.0	5,100.6	4,768.1	1.1	5.6
⑧ Fabricated metal products	4,889.8	4,697.1	4,257.8	1.0	5.0
[⑨〜⑫ Machinery industry]	34,896.2	32357.1	32,060.8	7.6	37.4
⑨ Machinery	8,452.6	8,225.9	7,318.4	1.7	8.5
⑩ Electrical machinery, equipment and supplies	16,024.2	12,983.3	11,831.0	2.8	13.8
⑪ Transport equipment	8,922.9	9,657.7	11,561.4	2.7	13.5
⑫ Precision instruments	1,496.5	1,490.2	1,350.0	0.3	1.6
⑬ Others	14,691.4	14,266.8	13,841.0	3.3	16.1
(4) Construction	33,356.3	32,088.2	30,383.6	7.2	–
(5) Electricity ,gas and water supply	9,075.4	9,141.8	9,278.0	2.2	–
(6) Wholesale and retail trade	66,578.2	64,337.1	63,653.8	15.1	–
(7) Finance and insurance	29,018.2	30,199.5	30,936.9	7.3	–
(8) Real estate	46,056.8	45,907.6	46,726.8	11.1	–
(9) Transport and communications	27,285.1	26,645.3	25,615.0	6.1	–
(10) Service activities	84,952.0	82,851.7	82,032.9	19.5	–
2. Producers of government services	34,413.4	32,757.2	32,898.3	7.8	–
(1) Electricity, gas and water supply	944.3	885.4	874.2	0.2	–
(2) Service activities	11,800.3	11,268.0	11,302.9	2.7	–
(3) Public administration	21,668.9	20,603.8	20,721.2	4.9	–
3. Producers of private non-profit services to households	8,475.9	8,509.2	8,672.7	2.1	–
(1) Service activities	8,475.9	8,509.2	8,672.0	2.1	–
Sub-total	436,001.5	425,218.2	421,192.6	100.0	–
Taxes and duties on imports	3,165.0	3,242.9	3,157.3	–	–
Other	▲3,511.5	▲3,430.3	▲3,022.9	–	–
Imputed bank service charge	▲23,738.2	▲25,777.8	▲26,815.1	–	–
Grand total	411,916.8	399,253.0	394,511.9	–	–

(Source) Economic and Social Research Institute, Cabinet Office [National Accounts]

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

In 2003, the number of new locations for factories and plants was 1,052 increasing 24.6% or 208 locations from 844 locations in the previous year. The total area of new locations was 1,330 hectares (1 hectare = 10,000m^2), increasing 52.5% or 458 hectares from 872 hectares in 2002. Both showed drastic increases.

The increase of number of new locations was believed to be caused by the increasing enterprises who adopted domestic locations after reviewing overseas locations such as in China, in addition to the growing new locations for factories and plants in the industries in good conditions such as transport equipment and information/telecommunications sectors.

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

	2000	2001	2002	2003	Change (%) 03 / 02
Number	1,126	1,123	844	1,052	24.6
Area (ha)	1,473	1,379	872	1,330	52.5

(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 [2003 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 2003 increased 3.3% from the previous year to 95.0 (2000 = 100).

① General Machinery

In 2003, the production index in general machinery increased 7.2% from the previous year to 87.8.

Looking at the types of machinery, the production index for special industry machinery showed a 16.1% increase from the previous year, a first increase after three years of decline. The increase was due to increased demand of semiconductor manufacturing equipment for domestic and overseas semiconductor makers such as in Korea, Taiwan and U.S.A. as a result of good condition of mobile phones and digital household appliances, and also due to a increase of production of injection molding machines and printing machines.

The production index for construction machinery increased 28.9% from the previous year, due to increased production of all types of machinery including bulldozers, earth finishing machinery and construction cranes, in addition to the increase of shovel type excavators enjoyed increased exports mainly to North America and China and healthy demands from domestic lease and rental sector.

The production index for fans, pumps and oil hydraulic equipment increased 11.5% from the previous year turning upward after three years of decline, due to the increased demand of pneumatic equipment for plant investments in semiconductor, motor vehicle and their related industries, and due to the increased demand of oil hydraulic equipment mainly for construction equipment and plastic processing machineries.

The production index for metal cutting machine tools showed an 18.7% increase, the first increase in recent three years, due to increased production in the all categories of machining centers, special purpose machines and numerically controlled electrical discharge machines, as the exports to Asia and United States mainly for motor vehicle industry increased.

The production index for industrial robots showed a 27.0% growth from the previous year, the first growth in 3 years, as numerically controlled robots and playback robots increased.

The production index for mold and die decreased 5.9% from the previous year, a decline of two consecutive years, as both of stamping dies and plastic molds decreased, and the production index for chemical machinery also showed a 5.3% decrease, a decline of three consecutive years, due to decrease of production of dust collectors, filters and heat exchangers.

② Electrical Machinery

In 2003, the production index for electrical machinery increased 6.0% from the previous year to 92.5.

Looking at the type of machinery, the production index for batteries showed a 22.4% increase from the previous year, the second consecutive year of increase, due to the increase in small sized sealed lithium ion rechargeable batteries by increased productions for the demands from personal computer and mobile phone sectors, and due to the increase in lead acid batteries and alkaline manganese dioxide batteries.

The production index for electrical measuring instrument showed a 19.4% increase, the first increase in three years, due to the increase of production of semiconductor characteristic measuring equipments for semiconductor manufacturers.

The production index for rotating electrical machinery increased 5.2% from the year earlier, after 5 years of decline, due to increased production of servo motors for industrial machineries and small capacity motors for motor vehicles. On the other hand, production index for consumer electric appliances dropt 9.9% from the previous year, registering the fifth consecutive year of decline, due to the decrease of electric refrigerators, split type air conditioners, electric washing machines and others.

③ Information and communication electronics equipment

In 2003, the production index for information and communication electronics equipment increased 4.3% from the previous year to 84.4.

Looking at the type of equipment, the production index for consumer electronic appliances showed an increase of 17.7% from the year earlier, registering the second consecutive year of increase, due to the increase of digital still camera where many new models of smaller size and higher image quality got in, and the increase of car navigation system for the market where both of DVD type and HDD type had strong demands, and due to the increase of video cameras in high demands for smaller and high quality of image.

The index for communication equipment increased 6.1%, turning upward after three consecutive year of decline, due to the increase of cellular phones in where new models with mega-pixel camera or other high performances released, and due to the increase of basic exchange systems for basic station of PHS and cellular phones, in spite of the decrease of production of digital transmission equipment, electronic switching system and others.

The production index for electronic computers decreased 6.3% from the year earlier, marked the third consecutive year of decline, due to the decrease of domestic production of personal computers and display units caused by the transfer of production mainly for notebook style computers to overseas, and decrease of input-output units where the transfer of production to overseas of printers, the main item, progressed, in spite of the increase of terminal equipments and general purpose computers.

④ Electronic parts and devices

In 2003, the production index for electronic parts and devices increased 17.8% from the previous year to 103.2.

. Looking at the type of equipment, the production index for integrated circuits increased 21.2% from the year earlier, marking the second consecutive year of increase, due to the increase of production of metal oxide semiconductor ICs (CCD) for cellular telephone and digital still cameras, in spite of slight decline of linear ICs.

The index for parts for electronic equipment increased 16.0%, also marking two consecutive years of increase, due to the increased production of middle and small active matrix LCDs , fixed capacitors and electronic circuit boards for cellular telephone and digital still cameras, in spite of the

Table 3-1. Production Index In the Machinery Industry

(2000 = 100, %)

Average	Mining and manufacturing	General machinery	Electrical machinery	Information and communication electronics equipment	Electronic parts and devices	Transport equipment(1)	Precision instruments
2001	93.2	89.0	91.1	93.8	78.7	99.3	89.6
2002	92.0	81.9	87.3	80.9	87.6	105.2	80.1
2003	95.0	87.8	92.5	84.4	103.2	108.5	82.1
2003/2002	103.3	107.2	106.0	104.3	117.8	103.1	102.5

(Note 1) Excluding ships and rolling stocks.
(Source) METI [Current Production Statistics Survey]

decrease of production in switching power supply units and others.

⑤ Transport Equipment

The production index for transport equipment in 2003 increased 3.1% from the previous year to 108.5.

Looking at the type of machinery, the index decreased 0.4% for passenger cars after the increase in the previous year due to the decrease in domestic market. By vehicle classification, the index for small passenger cars and midget passenger cars decreased 5.6% and 1.5% each after two years of increase, due to decline of production of small cars for both of domestic and overseas markets and of midget cars for domestic. The index for large passenger cars increased 2.2% from the previous year, marking the first increase after five consecutive years of decline, due to the production both for domestic and overseas increased. The index for parts for motor vehicle marked a 6.5% increase, the fifth consecutive year of increase, due to the increased exports in addition to the increase for domestic market.

The production index for trucks showed a 12.7% increase from the year earlier, the large increase of two consecutive years. By classification, the index for large truck registered a 13.0% increase, drastic increase of two consecutive years, due to the increased exports, in addition to increased domestic demands for replacements caused by NOx and PM regulation for vehicles and the regulation of restriction for diesel-powered vehicles driving. The index for small truck increased 2.3%, turning upward after four years of decline, due to the increase of domestic and overseas demands.

⑥ Precision Instruments

The production index of this sector in 2003 showed a 2.5% increase from the previous year to 82.1.

Looking at the type of machinery, the index for measuring equipment and instruments increased 9.3%, the first increase in recent three years, due to the increase in analytical instruments where the demands of optical and spectrophtometric analyzers were healthy, precision measuring machines and instruments, industrial measures and others, in spite of decrease in gas-meters.

The index for optical apparatus and parts dropped 11.4%, the fifth consecutive year of decline, due to the decline of 35mm cameras and interchangeable lenses caused by transferring to digital still cameras. Watches and clocks decreased for the fifth consecutive year by 3.5%, due to the decline in battery driven type watches (completed), battery driven type clocks and movements for battery driven type watches as the exports declined.

(2) Production Value

According to "Machinery Statistics" of METI, production for the machinery industry in 2003 showed a 3.5% increase from the previous year to ¥69,843.6 billion. In the trend of decreasing domestic production caused by the progressed overseas transfer of production, the sectors that are manufacturing high-value added or sophisticated products and taking advantage for exporting them are acting as engines for the Japanese machinery industry.

Looking at the production value in 2003 by sector, the sectors of general machinery, electrical machinery, information and telecommunication electronics equipment, electronic parts and devices, transport equipment, precision instruments steel casting and forgings registered increase, while fabricated metal and weapons and hunting guns increased.

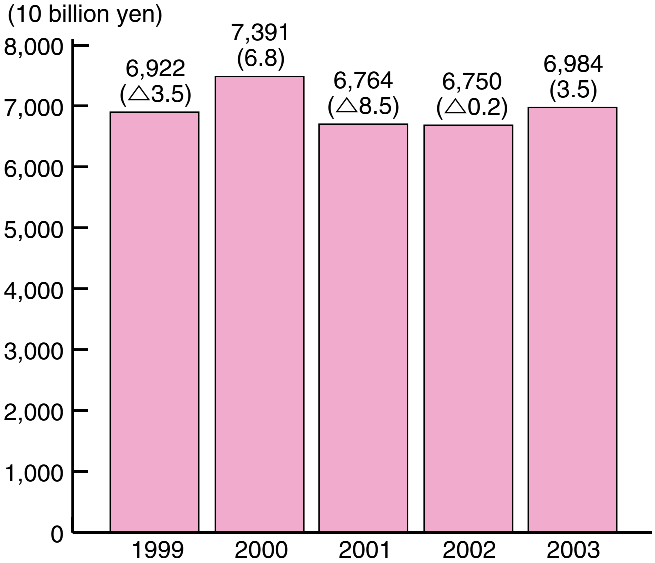
Table 3-2. Production in the Machinery Industry

(million yen, %)

	Machinery industry	General machinery	Electrical machinery	Information and communication electronics equipment	Electronic parts and devices	Transport equipment	Precision instruments	Fabicated metal	Steel Casting and forgings	Weapons and Hunting guns
1999	69,223,201	12,626,886	7,571,466	10,787,947	9,566,106	22,523,865	836,025	2,571,461	2,300,850	438,595
2000	73,909,058	13,672,370	7,981,950	11,316,422	11,147,494	23,809,390	797,351	2,356,499	2,421,320	406,262
2001	67,635,824	12,010,143	7,157,144	9,994,952	8,434,283	24,456,193	707,523	2,275,298	2,195,872	404,416
2002	67,496,077	10,892,833	6,473,823	7,969,672	8,307,276	28,497,379	619,283	2,137,881	2,152,327	445,603
2003	69,843,619	11,435,649	6,545,973	8,433,866	8,910,374	29,130,131	649,295	2,064,879	2,246,956	426,496
Weight	100.0	16.4	9.4	12.1	12.8	41.7	0.9	3.0	3.2	0.6
03/02	103.5	105.0	101.1	105.8	107.3	102.2	104.8	96.6	104.4	95.7

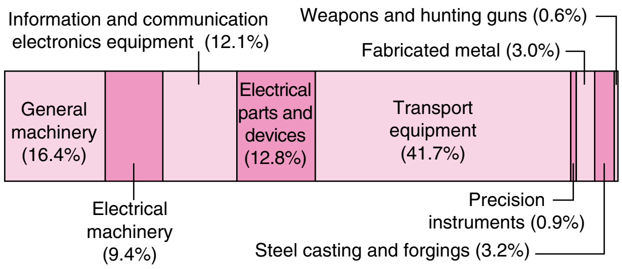
(Note 1) The Japan Standard Industrial Classification (JSIC) was revised, and the old category of "electrical machinery" was devided to 3 categories of "electrical machinery", "information and communication electronics equipment" and "electronic parts and devices". And in this table, ships and rolling stocks are excluded from transportation equipment.
(Note 2) Different from "Yearbook of Machinery Statistics", the total of "machinery industry" includes "fabricated metal" and "steel casting and forgings".
(Note 3) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

Table 3-3. Production in the Machinery Industry



(Note) ( ) means the change(%) from the previous year and △ shows minus.
(Source) METI [Yearbook of Machinery Statistics 2003]

Table 3-4. Weight of production in the Machinery Industry by Sector (2003)



① General Machinery

The production in the general machinery in 2003 increased 5.0% from the previous year to ¥11,435.6 billion.

Looking at the type of machinery, boilers, engines and turbines decreased 10.7% from the previous year due to decreased orders of boilers and turbines in spite of increase in internal combustion engines. mining and construction equipment increased 23.4% due to special demands caused by emission regulations and domestic demands for replacement combined with export of used ones, in addition to the large increase of exports. Chemical machinery and storage tanks increased 11.2% reflecting increased orders. Pulp and paper making machines, plastic processing machinery, printing, plate making, bookbinding and paper converting machines increased 13.4% from the previous year, as plastic processing machinery orders from the sectors of electrical machinery, motor vehicles and others increased, and as the exports of the printing, plate making, bookbinding and paper converting machines for South-eastern Asia, especially for China and Taiwan, covered their depressed domestic demands. The production of conveyance machines and industrial robots increased 7.0%, due to the increase of industrial robots vitalized with active demands from the electronic equipment and electric machinery industries, in spite of decrease in conveyance machines mainly caused by depressed demands of multilevel car parking towers from construction and real estate industries. The production of agricultural machineries, which was worried about the affection of unusual cold summer in Japan, could mark an increase, as tractors and rice planting machines increased over the previous year, and as the export of tractors for North America increased. And wood working machineries increased as the mind of investment for equipment recovered in the lumber and wood industry due to favorable turn in small steps of circumstances such as an increase of new house constructions. As the result, the production of agricultural machinery and wood working machinery grew 4.4% from the previous year. Metal cutting machine tools grew 18.0% from the year earlier, due to the active demands from motor vehicles industry and semiconductor manufacturing equipment industry. The production of metal forming machinery and foundry equipment increased 18.1%, due to the drastic increase of orders for foundry equipment from both of domestic and overseas motor vehicle industry. The production of office machinery decreased 11.6% due to progress of overseas production and continuing severe domestic market. Sewing machines and textile machinery increased 12.9%, due to the increase of textile machinery supported by active demands in China market, in spite of decline of both of industrial and household sewing machines as the result of progressed overseas production. The production of refrigerating machines, appliances and equipment decreased 0.8% from the year earlier, affected by cold summer in Japan in spite of recovering trend supported by demands for plant investments and plant renewals. The production of semiconductor・flat-panel display manufacturing system grew 15.1% from the previous year, as semiconductor manufacturers started to invest for full-scale production lines to response for the active demands from digital consumer electrics sector, and due to the vitalization of investments for the fifth-generation type substrates providing for large size TVs.

Table 3-5. Production in General Machinery

(million yen, %)

	General machinery	Boilers, engines and turbines	Mining and construction equipment,crushers,grinding mills and separators	Chemical machinery and strage tanks	Pulp & paper making machines,plastic processing machinery, printing,plate making, bookbinding and paper converting machines	Pumps, compressors, fans blowers	Oil-hydraulic and pneumatic equipment
2001	12,010,143	1,193,447	846,945	272,378	454,049	411,277	419,774
2002	10,892,833	1,284,934	799,012	231,822	443,382	368,178	384,659
2003	11,435,649	1,147,969	986,196	257,784	502,894	369,715	451,197
Share	100.0	10.0	8.6	2.3	4.4	3.2	3.9
03 / 02	105.0	89.3	123.4	111.2	113.4	100.4	117.3

	Conveyance machines and industrial robots	Power transmission equipment	Agricultural machinery and wood working machinery	Metal cutting machine tools	Metal forming machinery and foundry equipment	Food products machinery, wrapping and packing machinery	Office machinery
2001	863,608	308,577	456,093	776,453	254,960	280,757	493,162
2002	814,556	289,110	448,435	585,098	175,369	239,727	425,369
2003	871,234	292,065	468,061	690,205	207,072	227,569	376,191
Share	7.6	2.6	4.1	6.0	1.8	2.0	3.3
03 / 02	107.0	101.0	104.4	118.0	118.1	94.9	88.4

	Sewing machinery and textile machinery	Refrigerating machines, appliances and equipment	Vending machines, automatic ticket wicket system, and commercial type washing machines	Bearings	Molds and dies	Tools for machines	Semiconductor, flat-panel display manufacturing system
2001	252,148	2,006,814	216,447	541,581	413,085	355,365	1,193,223
2002	253,033	1,871,912	179,099	539,182	391,619	319,692	848,646
2003	285,725	1,856,319	174,940	562,554	384,088	346,844	977,026
Share	2.5	16.2	1.5	4.9	3.4	3.0	8.5
03 / 02	112.9	99.2	97.7	104.3	98.1	108.5	115.1

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

② Electrical Machinery

2003 production of electric machinery increased 1.1% from the previous year to ¥6,546.0 billion.

Looking at the type of machinery, electrical stationary machines showed a 4.2% increase, while rotating electrical machinery decreased 0.3% under continuing restraint of investments in electricity industry, and switchgears and controlling equipment decreased 1.5%, due to the recovering trend of private investment in plants and equipment showed after three years of decrease in addition to active exports of production plants and equipment to China market. The production of consumer electric appliances decreased 7.5% from the previous year, due to decreased domestic demands under declined consumer confidence, depressed domestic demand for household refrigerators affected with cold summer, and progress of overseas production.

Electric lamps, wiring equipment and luminaries kept same level in the year earlier as each of demands for IT related sector, replacement in household and exports were remained at same level in the previous year. The production of electric measuring instrument and associated electronic equipment increased 12.9%, as the production of semiconductor characteristic measuring equipment increased drastically supported with strong sector of digital consumer electronics.

③ Information and Communication Electronics Equipment

2003 production of information and communication electronics equipment increased 5.8% from the previous year to ¥8,433.9 billion.

Looking at the type of machinery, the production of communication and related equipment marked a 15.2% increase, due to recovery trend in domestic market and two digits recovery of wireless communication equipment such as cellular telephone and associated electronic equipment, in spite of the progress of production shift to China and increased overseas procurements. Household electronic machinery increased 14.2%, as DVD recorders, digital still cameras, car navigation system, visual equipment such as flat-screen TV

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	Electric measuring instrument and associated electronic	Cells and batteries
2001	7,157,144	860,619	566,211	1,299,002	1,384,558	983,244	1,353,544	709,966
2002	6,473,823	825,019	485,296	1,199,929	1,205,513	947,176	1,133,251	677,639
2003	6,545,973	822,742	505,806	1,181,422	1,114,681	947,196	1,279,914	694,212
Share	100.0	12.6	7.7	18.0	17.0	14.5	19.6	10.6
03 / 02	101.1	99.7	104.2	98.5	92.5	100.0	112.9	102.4

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

Table 3-7. Production in Information and Communication Electronics Equipment

(million yen, %)

	Information and communication electronics equipment	Communication equipment	Household electronic machinery	Electronic computers
2001	9,994,952	3,955,300	1,912,574	4,127,078
2002	7,969,672	2,967,937	2,025,820	2,975,915
2003	8,433,866	3,418,016	2,313,751	2,702,099
Share	100.0	40.5	27.4	32.0
03 / 02	105.8	115.2	114.2	90.8

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

Table 3-8. Production in Electronic Parts and Devices

(million yen, %)

	Electronic parts and devices	Parts for electronic equipment	Electronic tubes, semiconductor devices and integrated circuits
2001	8,434,283	2,754,282	5,680,001
2002	8,307,276	2,677,144	5,630,132
2003	8,910,374	2,654,242	6,256,132
Share	100.0	29.8	70.2
03 / 02	107.3	99.1	111.1

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

and others marked substantial increase, in spite of decline of audio equipment due to lacking new models to activate the market.

The production of electronic computers declined 9.2% from the previous year due to continuing weak demand.

④ Electronic Parts and Devices

In 2003, the production of electronic parts and devices increased 7.3% from the previous year to ¥8,910.4 billion, due to growing market for digital AV equipment, recovery of investment related with IT, recovery of cellular telephone market, expanding usage for cars and others, and growing exports led by semiconductors.

⑤ Transport Equipment

2003 production of transport equipment came to ¥29,130.1 billion or a 2.2% increase from the previous year.

Looking at the type of machinery, the production of motor vehicles increased 3.1%, as the production of trucks increased due to recovered profits and business confidence in user enterprises and healthy demands in domestic market affected by the regulation in metropolitan area and NOx・PM regulation, and as the production of buses increased due to domestic demand for replacement and affected by the regulation in metropolitan area and NOx・PM regulation, while the production of passenger cars declined due to weakened effect of new models, progress of offshore production and affection of strong yen, in spite of effect of new models of large passenger cars.

Parts for motor vehicles and electric equipment for internal combustion engines increased 2.1%, due to increased export of parts corresponding to expanding offshore production by Japanese auto manufacturers. Industrial vehicles slightly increased 0.2%, due to emerging demands for replacements affected by recovery of domestic economy and revival in user enterprises, in addition to steady export. The production of aircraft (total) declined 5.3% from the previous year, due to decrease in aircraft, aircraft engines and airframe parts, in spite of increase in aircraft engine parts.

⑥ Precision Instruments

2003 production of precision instruments increased to ¥649.3 billion, a 4.8% increase from the previous year, the first year of increase in seven consecutive years.

Looking at the type of machinery, the production of measuring equipment and instruments increased 10.4% due to the increase in all of measuring instruments, testing machines and measuring instruments affected by healthy condition of user industries. Total production of optical appliances and instruments, watches and clocks decreased 2.8% from the previous year,

as still cameras decreased affected by digital still cameras (included in the classification of consumer electronic appliances) and as binocular type microscopes decreased, in spite of increase of metallurgical microscopes supported by recovered market for semiconductors.

⑦ Fabricated Metal

2003 production of fabricated metal fell by 3.4% from the year before to ¥2,064.8 billion.

By type of product, iron and steel parts for structures decreased 12.8% and from previous year. Springs increased 9.5%, and valves and pipe fittings decreased 0.8%. Pneumatic tools, machinist hand tools, knives for machines and machine tools for automobiles increased 2.4% from the year earlier as all of high speed steel cutting tools, cemented carbide tools and diamond cutting tools increased. Gas and oil equipment for cooking, boiling and heating, and solar water heater increased 1.2%.

Table 3-9. Production in Transport Equipment

(million yen, %)

	Transport equipment	Motor vehicles	Parts for motor vehicles and electric equipment for internal combustion engines	Motor cycles and parts	Bycycles and wheelchairs	Industrial vehicles	Aircraft
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
2003	29,130,131	19,053,153	7,884,598	898,007	81,400	297,923	915,050
Share	100.0	65.4	27.1	3.1	0.3	1.0	3.1
03 / 02	102.2	103.1	102.1	95.2	92.2	100.2	94.7

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

Table 3-10. Production in Precision Instruments

(million yen, %)

	Precision instrument	Measuring equipment and instruments	Optical appliances and instruments, watches and clocks
2001	707,523	403,460	304,063
2002	619,283	359,414	259,869
2003	649,295	396,727	252,568
Share	100.0	61.1	38.9
03/02	104.8	110.4	97.2

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

⑧ Steel Casting and Forgings

2003 production of steel casting and forgings increased 4.4% from the previous year to ¥2,247.0 billion.

By type of product, Forgings from billets and bars increased 5.4% from the year earlier due to increased orders from sectors of automotives, construction equipment and industrial machineries. Sintered products, iron castings, malleable cast iron, copper/alloy castings, die castings increased 4.1%, 5.2%, 0.1%, 10.7% and 8.9% each from the previous year, while precision castings and aluminum castings decreased 11.5% and 5.0% each.

⑨ Weapons and Hunting Guns

2003 production of weapons and hunting guns decreased 4.3% from the previous year to ¥426.5 billion.

Table 3-11. Production in Fabicated Metal

(million yen, %)

	Fabricated metal	Iron and steel parts for structures	Springs	Valves and pipe fittings	Pneumatic tools, machinist hand tools, knives for machines and machine tools for automobiles	Gas and oil equipment for cooking, boiling and heating, and solar water heater
2001	2,275,298	924,504	252,417	416,827	128,464	553,086
2002	2,137,881	801,748	257,152	465,728	126,291	486,962
2003	2,064,879	699,360	281,626	461,782	129,361	492,750
Share	100.0	33.9	13.6	22.4	6.3	23.9
03 / 02	96.6	87.2	109.5	99.2	102.4	101.2

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Report on Iron and Steel, Non-ferrous Metal and Fabricated Metals Statistics 2003]

Table 3-12. Production in Steel Casting and Forgings

(million yen, %)

	Steel casting and forgings	sintered products	Forgings from billets and bars	Iron castings	Malleable cast iron	Precision castings	Copper/alloy castings
2001	2,195,872	244,243	462,315	636,217	36,312	49,305	69,471
2002	2,152,327	228,780	429,640	617,617	30,031	44,930	67,342
2003	2,246,956	238,081	452,659	650,003	30,056	39,742	74,531
Sgare	100.0	10.6	20.1	28.9	1.3	1.8	3.3
03 / 02	104.4	104.1	105.4	105.2	100.1	88.5	110.7

	Aluminum castings	Die castings
2001	264,325	433,684
2002	269,053	464,934
2003	255,680	506,204
Sgare	11.4	22.5
03 / 02	95.0	108.9

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Report on Iron and Steel, Non-ferrous Metal and Fabricated Metals Statistics 2003]

Table 3-13. Production in Weapons and Hunting Guns

(million yen, %)

	Weapons and hunting guns
2001	404,416
2002	445,603
2003	426,496
Share	100.0
03 / 02	95.7

(Note) Some of the names of categories and historical data were adjusted according to the revised classification.
(Source) METI [Yearbook of Machinery Statistics 2003]

3-2. Labor Indices for the Machinery Industry

(1) Regular Employment Index

According to "Monthly Statistics of Japan" published by Statistics Bureau of MIC, the regular employment index (2000=100) in Japanese industry (enterprises with 30 or more regular employees) in 2003 decreased 1.3 points from the year earlier to 96.4.

The regular employment index in manufacturing fell 3.0 points or 3.2% from the previous year to 89.4, the eleventh year of consecutive decline since 1993.

Looking at each sector in the machinery industry, the employment index in the general machinery sector decreased 3.1 points or 3.3% to 90.3, the index in the electrical machinery sector declined 4.9 points or 5.5% to 83.4, the transport equipment employment index fell 0.6 points or 0.6% to 94.2, and the employment index in the precision instruments sector fell 1.3 points or 1.4% to 91.3. All sectors continued their decline.

Table 3-14. Regular Employment Index in Machinery Industry

(2000=100, %)

Average during year	Total	Manufacturing	Machinery industry			
			General machinery	Electrical machinery, equipment & supplies	Transport equipment	Precision instruments & machinery
1999	100.8	102.8	102.3	101.9	103.0	103.8
2000	100.0	100.0	100.0	100.0	100.0	100.0
2001	99.0	97.1	97.6	96.7	97.4	97.6
2002	97.7	92.4	93.4	88.3	94.8	92.6
2003	96.4	89.4	90.3	83.4	94.2	91.3
03/02 (%)	98.7	96.8	96.7	94.5	99.4	98.6

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

(2) Wages and Salary

In 2003, average monthly wages and salary for all industry for regular employees increased 0.5% from the previous year to ¥389,700.

For all manufacturing, wages and salaries increased 2.2% to ¥410,800 per month. Looking at wages in the machinery industry, wages in the general machinery sector increased 4.2% to ¥456,400 (111% of the average for manufacturing), electrical machinery wages increased 3.4% to ¥449,700 (109% of the rate for manufacturing), transport equipment wages increased 1.7% to ¥494,200 (120% of manufacturing), and wages in the precision instruments sector increased 4.0% to ¥416,900 (100% of the manufacturing average).

Table 3-15. Average Monthly Cash Earnings per Regular Employee in Machinery Industry

(Thousand yen, %)

Average during year	Total	Manufacturing	Machinery industry			
			General machinery	Electrical machinery, equipment & supplies	Transport equipment	Precision instruments & machinery
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
2003	389.7	410.8	456.4	449.7	494.2	416.9
03/02 (%)	100.5	102.3	104.2	103.4	101.7	104.0

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

(3) Hours Worked

In 2003, the monthly hours actually worked by the average regular employee for all industry increased 0.5% from the previous year to 153.8 hours per month. Monthly hours worked in manufacturing increased 1.1% from the year earlier to 165.6 hours per month.

Looking at the machinery industry, hours worked in the general machinery sector increased 1.6% to 170.1 hours (103% of the average for all manufacturing), hours worked in electrical machinery increased 2.1% to 164.0 hours (99% of manufacturing), hours worked in the transport equipment sector increased 0.8% to 173.0 hours (104% of manufacturing), and precision instruments hours worked increased 1.2% to 163.6 hours (99% of manufacturing).

Table 3-16. Average Monthly Hours Worked per Regular Employee in Machinery Industry

(hour, %)

Average during year	Total	Manufacturing	Machinery industry			
			General machinery	Electrical machinery, equipment & supplies	Transport equipment	Precision instruments & machinery
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
2003	153.8	165.6	170.1	164.0	173.0	163.6
03/02 (%)	100.5	101.1	101.6	102.1	100.8	101.2

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

(4) Productivity Index

According to MIC's "Monthly Statistics of Japan", the labor productivity index (2000=100) for all manufacturing in 2003 increased 4.7 points or 4.8% from the previous year to 103.5.

Looking at the labor productivity index in the machinery industry, the general machinery sector increased 7.1 points or 8.0% to 96.2, the electrical machinery sector rose 14.6 points or 14.8% to 98.4, transport equipment increased 0.1 points or 0.1% to 111.5, and the precision instruments sector increased 2.1 points or 2.5% in productivity to88.3.

Table 3-17. Index of Labor Productivity in Machinery Industry

(hour, %)

Average during year	Manufacturing	Machinery industry			
		General machinery	Electrical machinery	Transport machinery	Precision machinery
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
2003	103.5	96.2	113.0	111.5	88.3
03/02 (%)	104.8	108.0	114.8	100.1	102.4

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

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

(1) Investment Trends

① 2003 Actual Investment

According to "The Survey of Planned Investment in Plants and Equipment" conducted by the Development Bank of Japan, in F.Y. 2003 actual investment in plants and equipment (construction base) showed an 11.3% increase, the first increase in three years, for manufacturing industry, while it for non-manufacturing industry marked a 6.0% decrease, the third consecutive year of decline. As the result, actual investment in plants and equipment for all industry fell 1.1% from the previous year, recovering near to the flat level.

In manufacturing, leaded by electrical machinery sector where the actual investment in plants and equipment grew 34.8% from the previous year, in many sectors it increased, on the other hand, in non-manufacturing, in many sectors the investment decreased except in services, wholesale and retail, and city gas sectors.

Table 3-18. Plants and Equipment Investment in the Main Sectors

(100 million yen, %)

Industry	Change		Investment(2,605 firms)		Change	Weight	Plan (Change)	
	2001/2000	2002/2001	F.Y.2002	F.Y.2003	2003/2002	F.Y.2003	2004/2003	2005/2004
All industry	▲9.3	▲10.3	188,290	186,247	▲1.1	100.0	6.9	▲7.6
(Excl. electric power)	(▲9.3)	(▲8.5)	(162,267)	(165,081)	(1.7)	(88.6)	(8.3)	(▲8.2)
Manufacturing	▲9.7	▲16.2	53,598	59,676	11.3	32.0	18.8	▲7.9
Food and beverages	▲6.5	▲14.6	3,484	3,092	▲11.3	1.7	24.3	▲20.2
Textiles	3.3	▲13.4	483	474	▲1.9	0.3	▲9.5	▲24.4
Pulp and paper	15.1	▲19.7	1,872	1,701	▲9.1	0.9	1.6	▲7.3
Chemicals	8.1	▲19.1	8,005	8,431	5.3	4.5	14.3	▲3.0
Petroleum	34.7	32.3	1,553	1,380	▲11.1	0.7	64.5	▲33.8
Cement, ceramics and glass	▲7.4	▲31.7	1,514	1,640	8.3	0.9	33.6	▲34.9
Iron and steel	7.5	▲20.9	3,214	3,862	20.2	2.1	▲2.4	▲6.3
Non-ferrous metals	10.2	▲44.6	1,807	2,041	12.9	1.1	15.2	14.2
General machinery	▲3.3	▲18.7	3,476	3,635	4.6	2.0	23.4	▲10.7
Electric machinery	▲34.4	▲20.9	11,968	16,133	34.8	8.7	18.6	3.2
(Electric devices, etc.)	(▲40.5)	(▲20.9)	(8,017)	(11,699)	(45.9)	(6.3)	(▲18.7)	(4.5)
Precision machinery	▲5.7	▲20.2	975	1,262	29.4	0.7	70.1	▲18.7
Transport equipment	2.0	1.5	11,874	12,165	2.5	6.5	20.1	▲12.3
(Automobiles)	(1.1)	(1.2)	11,228	11,366	1.2	6.1	(20.7)	▲10.0
Other manufacturing	▲8.6	▲17.7	3,374	3,860	14.4	2.1	12.4	▲14.7
Non-manufacturing	▲9.2	▲7.5	134,692	126,571	▲6.0	68.0	1.3	▲7.5
(Excl. electric power)	(▲9.0)	(▲3.8)	(108,669)	(105,405)	(▲97.0)	(56.6)	(2.3)	(▲8.4)
Construction	▲0.1	6.0	1,513	1,405	▲7.1	0.8	▲7.6	▲29.1
Wholesale and retail	▲19.6	2.8	9,077	9,969	9.8	5.4	4.1	▲11.4
Real estate	▲20.5	▲0.6	8,206	7,484	▲8.8	4.0	▲5.5	▲16.7
Transport	▲7.1	15.8	19,716	17,888	▲9.3	9.6	2.3	▲31.2
Electric power	▲9.8	▲19.7	26,023	21,166	▲18.7	11.4	▲4.3	▲5.4
City gas	▲15.3	▲9.6	2,463	2,586	5.0	1.4	0.1	▲1.0
Telecom. and information	▲10.8	▲14.2	26,691	25,673	▲3.8	13.8	▲2.2	▲3.8
Leasing	2.8	▲4.4	38,250	37,366	▲2.3	20.1	6.8	2.8
Services	▲35.5	▲31.6	2,273	2,635	15.9	1.4	1.3	▲41.2
Other non-manufacturing	▲11.6	20.5	480	401	▲16.5	0.2	27.0	17.2

(Note 1) The investment amount shows the total investment of 2,605 common enterprises responced for both surveys in 2002 and 2003, and not shows the total investment of all enterprises.
(Note 2) "Transport equipment" includes ships and rolling stocks.
(Note 3) "Other manufacturing" includes publishing and printing, rubber, metal products and others.
(Note 4) "Other non-manufacturing" includes fishing, mining and others.
(Source) The Development Bank of Japan [Survey on Planned Capital Spending, June 2004]

② F.Y.2004 Planned Investment

F.Y.2004 planned investment in plants and equipment for all industries will increase 6.9% from the previous year, as the investment in manufacturing industries which will mark the first case of two consecutive years of two-digit increase after bursting the babble economy, will act as a driving engine for other industries, and in non-manufacturing it will turn upward to a little increase. For manufacturing industries, total planned investment in plants and equipment will increase 18.8%, due to the increase in most sectors including electrical machinery and automobile sectors, which have a big weight. In electrical machinery industry, the investment in plants for electronic devices such as semiconductors and flat panel displays will become active, because those are expanding their applications to digital household electronics and automobiles. Automobile industry also will mark two-digit increase of investment preparing for new model cars, environmental protections, new technologies and equipment for safety. The increasing trend in some sectors as mentioned above will make ripple effects to the sectors related, and the investment in precision machinery, non-ferrous metals, cement, ceramics and glass, chemicals and general machinery will increase. Among those sectors, in non-ferrous metals and cement, ceramics and glass sectors the investment for plants related to recycling will contribute for increase, in chemicals sector, investments for diversification of raw materials or formation of in-process materials supply chain in petrochemical industry will contribute for increase, and in general machinery sector the investment for expansion of production capacity for handling increased demands from China and others will also contribute. In petroleum, pulp and paper, and food and beverage sectors the investment for plants and equipment will turn upward due to increasing green actions.

(2) Machinery Orders

According to the survey of "Orders Received for Machinery" (the survey covering 280 companies in the major machinery sectors) conducted by Economic and Social Research Institute of the Cabinet Office (280 companies surveyed), total machinery orders for F.Y.2003 showed an 11.5% increase from the year earlier, the first increase in three years, to ¥25,463.6 billion, after it increased 12.3% in 2000 from the previous year, and decreased 12.3% and 1.9% in 2001and 2002 each.

Looking at machinery orders by source, overseas orders increased 31.3% from the previous year, as it increased for power generating machinery, electric power machinery, electronic equipment and telecommunication apparatus, industrial machinery, metal cutting machinery, road motor vehicles and ships, while decreased for railway vehicles and aircraft.

Domestic orders increased 2.9% from the year earlier, and among them the orders from private sector increased 4.2%, due to a 17.2% increase of orders from manufacturing sectors, in spite of a 2.4% decrease of orders from non-manufacturing sectors.

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 8.2% increase from the previous year in F.Y. 2003, the first increase in three years after a sharp increase of 16.6% in F.Y.2000, and marked a 12.6% decrease in F.Y.2001 and a 3.7% decrease in F.Y.2002.

Domestic orders from the public sector registered an 1.3% decrease, the third year of consecutive decline, as orders from 4 categories including the transportation services operated by the public sector, telecommunication services industry, National government and others declined, while orders from the Defense Agency and local governments increased.

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

(million yen, %)

Source	F.Y.2000	Change 2000/1999	F.Y.2001	Change 2001/2000	F.Y.2002	Change 2002/2001	F.Y.2003	Change 2003/2002
Total orders received	26,548,850	12.3	23,280,779	△ 12.3	22,834,318	△ 1.9	25,463,584	11.5
(Excl. vessels)	25,119,319	11.6	22,036,282	△ 12.3	21,556,530	△ 2.2	23,615,428	9.6
Overseas orders	7,463,097	18.1	5,791,558	△ 22.4	6,586,057	13.7	8,647,583	31.3
Domestic orders	17,559,465	10.7	16,188,606	△ 7.8	15,040,981	△ 7.1	15,484,142	2.9
(Excl. vessels)	17,251,186	11.0	16,052,499	△ 6.9	14,894,098	△ 7.2	15,446,997	3.7
Domestic orders from public sector	4,155,073	6.5	3,774,844	△ 9.2	3,490,117	△ 7.5	3,444,822	△ 1.3
Domestic orders from private sector	13,404,392	12.1	12,413,762	△ 7.4	11,550,864	△ 7.0	12,039,320	4.2
(Excl. vessels)	13,302,864	12.2	12,277,746	△ 7.7	11,404,398	△ 7.1	12,002,500	5.2
(Excl. vessels & electricity)	12,202,782	16.6	10,662,171	△ 12.6	10,266,435	△ 3.7	11,107,807	8.2
Manufacturing	5,190,531	19.1	3,957,545	△ 23.8	3,880,681	△ 1.9	4,550,043	17.2
Non-manufacturing	8,213,861	8.1	8,456,217	3.0	7,670,183	△ 9.3	7,489,277	△ 2.4
(Excl. vessels)	8,125,531	8.1	8,351,750	2.8	7,552,214	△ 9.6	7,471,067	△ 1.1
(Excl. vessels & electricity)	7,025,449	14.6	6,736,175	△ 4.1	6,414,251	△ 4.8	6,576,374	2.5
Orders through agencies	1,526,288	4.8	1,300,615	△ 14.8	1,207,280	△ 7.2	1,331,859	10.3
Sales	26,824,470	6.2	23,631,439	△ 11.9	23,166,847	△ 2.0	24,005,976	3.6
(Excl. vessels)	25,678,462	6.3	22,466,905	△ 12.5	21,884,730	△ 2.6	22,721,376	3.8
Orders outstanding	18,276,954	△ 0.9	17,747,158	△ 2.9	17,102,140	△ 3.6	18,320,053	7.1
(Excl. vessels)	16,010,368	△ 2.7	15,185,133	△ 5.2	14,709,971	△ 3.1	15,318,776	4.1

(Note) Coverage : 280 major companies.

(Source) Economic and Social Research Institute, Cabinet Office

Table 3-20. Orders Received for Machinery (by machinery items)

(million yen, %)

Machinery	F.Y.2000	Change 2000/1999	F.Y.2001	Change 2001/2000	F.Y.2002	Change 2002/2001	F.Y.2003	Change 2003/2002
Power generating machinery	1,811,811	3.0	2,102,607	16.1	1,592,178	△ 24.3	1,735,910	9.0
Electric power machinery	1,809,558	0.4	1,657,741	△ 8.4	1,552,782	△ 6.3	1,549,898	△ 0.2
Electronic equipment, Telecommunication apparatus	11,442,583	13.6	9,719,885	△ 15.1	9,717,035	△ 0.0	10,634,573	9.4
Industrial machinery	7,358,320	11.1	6,227,180	△ 15.4	6,346,907	1.9	6,959,287	9.6
Metal cutting machinery	886,566	29.6	609,411	△ 31.3	618,110	1.4	757,796	22.6
Railway vehicles	476,752	56.4	374,827	△ 21.4	365,878	△ 2.4	348,652	△ 4.7
Road motor vehicles	458,716	14	453,877	△ 1.1	516,579	13.8	764,352	48.0
Aircraft	875,013	0.9	890,754	1.8	847,061	△ 4.9	864,960	2.1
Ships	1,429,531	27.7	1,244,497	△ 12.9	1,277,788	2.7	1,848,156	44.6
Steel structures	590,543	△ 10.7	522,626	△ 11.5	463,570	△ 11.3	406,015	△ 12.4
Bearings	593,760	4.3	521,959	△ 12.1	580,331	11.2	601,945	3.7
Electrical wires & cables	1,081,332	5.2	988,325	△ 8.6	936,351	△ 5.3	894,728	△ 4.4

(Source) Economic and Social Research Institute, Cabinet Office

Table 3-21. Orders Received for Machinery (by business sector of source)

(million yen, %)

Business sector	F.Y.2000		F.Y.2001		F.Y.2002		F.Y.2003	
Public sector	4,155,073	6.5	3,774,844	△ 9.2	3,490,117	△ 7.5	3,444,822	△ 1.3
Private sector	13,487,317	12.1	12,413,763	△ 8.0	11,550,864	△ 7.0	12,039,320	4.2
(Manufacturing)	5,273,456	19.1	3,957,546	△ 25.0	3,880,681	△ 1.9	4,550,043	17.2
Food	153,094	△ 1.7	138,973	△ 9.2	119,738	△ 13.8	140,337	17.2
Textiles	56,200	△ 7.8	50,230	△ 10.6	42,677	△ 15.0	43,204	1.2
Paper & pulp	114,867	23.4	68,066	△ 40.7	73,438	7.9	69,308	△ 5.6
Chemicals	429,373	42.8	326,189	△ 24.0	276,161	△ 15.3	322,036	16.6
Petroleum & coal products	68,357	18.3	75,809	10.9	71,268	△ 6.0	96,758	35.8
Ceramics	58,706	22.1	47,514	△ 19.1	42,261	△ 11.1	46,651	10.4
Iron & steel	205,701	36.0	147,889	△ 28.1	127,849	△ 13.6	140,202	9.7
Machinery	2,578,430	21.8	1,729,585	△ 32.9	1,777,398	2.8	2,305,110	29.7
Motor vehicles	388,878	33.9	409,165	5.2	442,989	8.3	467,154	5.5
Shipbuilding	168,209	19.7	179,513	6.7	192,926	7.5	182,442	△ 5.4
Other manufacturing	1,051,641	11.3	784,613	△ 25.4	713,976	△ 9.0	736,841	3.2
(Non-manufacturing)	8,213,861	8.1	8,456,217	3.0	7,670,183	△ 9.3	7,489,277	△ 2.4
Transport	677,187	9.6	699,056	3.2	704,195	0.7	664,887	△ 5.6
Construction	556,520	△ 4.3	470,422	△ 15.5	420,231	△ 10.7	441,396	5.0
Electric power	1,100,778	△ 20.7	1,615,879	46.8	1,138,008	△ 29.6	894,797	△ 21.4
Mining	48,291	△ 11.5	37,146	△ 23.1	29,256	△ 21.2	34,419	17.6
Agriculture, forestry & fisheries	539,340	△ 4.7	522,668	△ 3.1	505,741	△ 3.2	465,394	△ 8.0
Communication	2,516,784	29.0	2,300,358	△ 8.6	2,050,349	△ 10.9	2,249,034	9.7
Other non-manufacturing	2,774,961	13.9	2,810,688	1.3	2,822,403	0.4	2,739,350	△ 2.9

(Note)
- "Machinery" includes general machinery, electrical machinery, transport equipment (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) Economic and Social Research Institute, Cabinet Office.

3-4. Research and Development in the Machinery Industry

According to MIC's "Survey of Research and Development, 2004", research expenditures by Japanese industry for F.Y.2003 declined 0.5% from the previous year to a total of ¥11,755.5 billion. Of this amount, the machinery industry spent ¥6,870.3 billion, a decrease of 1.0% from the previous fiscal year, and its share of the total amount spent by Japanese industry was 58.4%.

By sector, the general machinery sector spent ¥917.4 billion on R&D (7.8% of all R&D expenditures), electrical machinery, equipment and supplies spent ¥988.8 billion (8.4%), information and communication electronics equipment spent ¥2,040.8 billion (17.4%), electronic parts and devices spent ¥574.7 billion (4.9%), transport equipment spent ¥1,846.0 billion (15.7%), and the precision instruments sector spent ¥502.6 billion (4.3%).

Table 3-22. Expenditures on R & D in the Machinery Industry

(100 million yen, %)

Sector	F.Y.1999	F.Y.2000	F.Y.2001	F.Y.2002	F.Y.2003	03 / 02	Weight
All industry	106,302	108,602	114,490	115,734	117,555	101.6	100.0
Manufacturing	95,216	98,160	98,362	100,813	100,320	99.5	85.3
Machinery industry	64,484	67,431	68,748	69,391	68,703	99.0	58.4
General machinery	8,114	8,836	9,571	9,392	9,174	97.7	7.8
Electrical machinery,	36,159	38,200					
Electrical machinery, equipment and supplies			9,965	9,400	9,888	105.2	8.4
Information and communication electronics equipment			22,743	22,331	20,408	91.4	17.4
Electronic parts and devices			6,467	6,360	5,747	90.4	4.9
Transport equipment (excl. shipbuilding and rolling stocks)	15,296	15,526	15,881	17,379	18,460	106.2	15.7
Precision instruments	4,915	4,869	4,121	4,529	5,026	111.0	4.3
Other manufacturing	30,732	30,729	29,614	31,422	31,617	100.6	26.9
Other industries	11,086	10,442	16,128	14,921	17,235	115.5	14.7

(Note 1) Data for 2001 or later were adjusted according to the revision of Japan Standard Industrial Classification(JSIC) in 2002,March.
(Note 2) According to the revision of JISC, the old category of "electrical machinery" was devided to 3 categories of "electrical machinery", "information and communication electronics equipment" and "electronic parts and devices".
(Source) MIC [Survey of Reesearch and Development, 2004]

Table 3-23. Expenditures on R & D by Type of Activity in the Machinery Industry (F.Y.2003)

(%)

Sector	Weight of expenditure on R & D by type of activity		
	Basic research	Applied research	Development research
All industry	6.0	19.4	74.7
Manufacturing	6.0	19.6	74.4
General machinery	4.4	19.8	75.8
Electrical machinery	5.2	25.3	69.5
Information and communication electronics equipment	3.7	18.7	77.7
Electronic parts and devices	2.8	21.9	75.2
Transport equipment (incl. ships and rolling stocks)	2.1	11.0	86.9
Precision instruments	3.6	26.2	70.2

(Note 1) As of 2004.3.31.
(Note 2) "All industry" includes "public corpotations".
(Note 3) The classification of indutry is same as in Table 3-22.
(Source) MIC [Survey of Reesearch and Development, 2004]

3-5. Exports of Machinery and Equipment

2003 exports of machinery and equipment (yen base) increased 4.7% from the previous year to ¥39,296.8 billion, and the share of exports of machinery and equipment in the total exports was 72.0% the same level in the previous year.

Looking at the exports of machinery and equipment by machinery, the export of general machinery increased 4.0% from the previous year, as the export of machineries and equipment except office machines which is main item in general machinery category (12.8% decreased) and power generating machinery (1.1% decreased) was in trend of increase. The export of electrical machinery increased 2.0%, as the main item visual apparatus increased 11.7%. In the items of transport equipment, road motor vehicles increased 1.4% and parts of road motor vehicles increased 8.6%, and as the result, the total export of transport equipment increased 2.0% from the previous year. The export of precision instruments marked a 6.7% increased due to 16.6% increase of the export of liquid crystal devices, an 8.5% increase of measuring equipment and instruments, and a 10.9% increase of copying apparatus.

Looking at the share of each item in the total export of machinery and equipment, the share of the export of general machinery increased 7.8 points from 20.3% in the previous year to 28.1%, and the share of electrical machinery increased 9.8 points from 22.9% to 32.7%. The share of the export of transport equipment increased 8.8% from 24.9% to 33.7%, and precision instruments also increased 1.6% from 3.9% in 2002 to 5.5% in 2003.

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 decrease of 10.7% from the previous year. On the other hand, the U.S. share in all exports of machinery and equipment dropt from 32.0% in the previous year to 27.3%, due to the increased exports to almost all other countries except some ones. As exports to China drastically increased 43.0% from the previous year, China, the number 2 destination, increased its share from 7.7% to 10.5%.

By region, North America decreased its share 4.9 points to 29.2% from 34.1% in the year earlier. On the other hand, Asia increased its share to 40.7% from 37.1% in the previous year, and marked the second consecutive year of the top share position.

Table 3-24. Exports of Machinery and Equipment (by machinery, yen base)

[million yen]

Machinery	2001	2002	2003	03 / 02 (%)	Weight (%)
Total	35,525,071	37,542,230	39,296,844	104.7	100.0
General machinery	10,232,855	10,553,698	11,024,774	104.5	28.1
Power generating machinery	1,720,184	1,748,263	1,729,567	98.9	4.4
Agricultural machinery	119,652	139,429	153,755	110.3	0.4
Office machines	2,820,710	3,005,311	2,619,148	87.2	6.7
Metal forming machinery	678,868	705,926	836,175	118.5	2.1
Textile machineries	225,722	247,561	280,644	113.4	0.7
Pulp and paper making machines	20,926	22,513	26,236	116.5	0.1
Printing and bookbinding machines	175,431	167,122	162,806	97.4	0.4
Construction and mining equipment	378,406	473,589	624,958	132.0	1.6
Heating and cooling equipment	354,775	360,053	415,206	115.3	1.1
Pump centrifuges	690,650	744,603	830,585	111.5	2.1
Mechanical handling equipment	378,478	409,980	460,019	112.2	1.2
Bearings	248,722	246,998	265,459	107.5	0.7
Electrical machinery	11,534,475	11,877,834	12,857,185	108.2	32.7
Electric power machinery	587,093	566,759	550,236	97.1	1.4
Apparatus for making, breaking electronic circuits	1,202,356	1,252,835	1,342,133	107.1	3.4
Visual apparatus	1,358,205	1,609,474	1,797,987	111.7	4.6
Audio apparatus	252,066	243,129	181,600	74.7	0.5
Telecommunications apparatus	766,820	577,331	609,450	105.6	1.6
Consumer electric appliances	65,550	60,837	60,563	99.5	0.2
Transport equipment	11,129,051	12,992,280	13,260,757	102.1	33.7
Railway vehicles	62,207	52,051	39,123	75.2	0.1
Road motor vehicles excl. parts	7,210,812	8,774,645	8,895,012	101.4	22.6
Parts of road motor vehicles	1,880,380	2,117,162	2,299,826	108.6	5.9
Cycles with engines mounted	573,926	560,628	533,041	95.1	1.4
Parts for cycles with engines mounted	115,128	115,056	108,463	94.3	0.3
Bicycles	793	828	1,152	139.1	0.0
Parts for bicycles	46,295	52,647	63,361	120.4	0.2
Aircraft	209,994	161,883	173,073	106.9	0.4
Ships	1,026,134	1,152,209	1,133,514	98.4	2.9
Precision instruments	2,628,691	2,019,379	2,154,128	106.7	5.5
Scientific & optical equipment	2,504,480	1,897,391	2,037,701	107.4	5.2
Camera and parts thereof	82,481	57,566	40,013	69.5	0.1
Copying apparatus	273,958	32,632	36,190	110.9	0.1
Liquid crystal devices	187,269	211,989	247,255	116.6	0.6
Measuring equipment and instruments	228,423	222,093	240,926	108.5	0.6
Watches, clocks and parts	124,621	121,988	116,427	95.4	0.3

(Source) METI [White Paper on International Trade 2004]

Table 3-25. Exports of Machinery and Equipment (by machinery, dollar basis)

[thousand dollar]

Machinery	2001	2002	2003	03 / 02 (%)	Weight (%)
Total	292,550,544	300,449,752	339,936,913	113.1	100.0
General machinery	84,268,724	84,442,707	95,347,273	112.9	28.0
Power generating machinery	14,151,136	13,959,321	14,961,460	107.2	4.4
Agricultural machinery	987,956	1,107,883	1,330,570	120.1	0.4
Office machines	23,239,707	24,045,387	22,630,799	94.1	6.7
Metal forming machinery	5,593,927	5,647,273	7,237,832	128.2	2.1
Textile machineries	1,860,034	1,988,132	2,425,549	122.0	0.7
Pulp and paper making machines	172,582	180,109	225,705	125.3	0.1
Printing and bookbinding machines	1,444,005	1,337,589	1,406,777	105.2	0.4
Construction and mining equipment	3,112,574	3,785,612	5,403,624	142.7	1.6
Heating and cooling equipment	2,921,697	2,880,037	3,591,178	124.7	1.1
Pump centrifuges	5,682,718	5,963,201	7,180,549	120.4	2.1
Mechanical handling equipment	3,116,033	3,282,806	3,985,845	121.4	1.2
Bearings	2,048,794	1,978,265	2,293,227	115.9	0.7
Electrical machinery	95,020,872	95,179,493	111,313,799	117.0	32.7
Electric power machinery	4,832,431	4,527,890	4,760,067	105.1	1.4
Apparatus for making, breaking e lectronic circuits	9,902,775	10,034,008	11,619,229	115.8	3.4
Visual apparatus	4,964,233	12,924,406	15,593,257	120.6	4.6
Audio apparatus	2,077,214	1,948,018	1,565,548	80.4	0.5
Telecommunications apparatus	6,321,743	4,623,263	5,256,234	113.7	1.5
Consumer electric appliances	539,988	487,100	524,301	107.6	0.2
Transport equipment	91,605,420	103,876,597	114,608,944	110.3	33.7
Railway vehicles	511,786	413,268	339,248	82.1	0.1
Road motor vehicles excl. parts	59,333,193	70,227,813	76,920,821	109.5	22.6
Parts of road motor vehicles	15,474,809	16,937,525	19,888,784	117.4	5.9
Cycles with engines mounted	4,736,384	4,447,490	4,605,650	103.6	1.4
Parts for cycles with engines mounted	947,527	918,254	934,673	101.8	0.3
Bicycles	6,520	6,629	9,987	150.7	0.0
Parts for bicycles	380,948	421,510	550,065	130.5	0.2
Aircraft	1,726,051	1,288,245	1,487,099	115.4	0.4
Ships	8,460,411	9,174,159	9,748,767	106.3	2.9
Precision instruments	21,655,528	16,163,819	18,666,898	115.5	5.5
Scientific & optical equipment	20,633,802	15,186,327	17,658,442	116.3	5.2
Camera and parts thereof	679,627	460,694	343,749	74.6	0.1
Copying apparatus	2,261,165	260,094	315,416	121.3	0.1
Liquid crystal devices	1,542,162	1,696,168	2,144,262	126.4	0.6
Measuring equipment and instruments	1,880,266	1,781,126	2,084,197	117.0	0.6
Watches, clocks and parts	1,025,096	977,492	1,008,456	103.2	0.3

(Source) METI [White Paper on International Trade 2004]

Table 3-26. Exports of Machinery and Equipment (by area, yen base)

[million yen]

Area	2001	2002	2003	03/02 (%)	Weight (%)
Total	35,525,071	37,542,230	39,296,844	104.7	100.0
U.S.A.	11,910,294	12,020,703	10,736,142	89.3	27.3
Taiwan	1,811,083	2,000,836	2,223,520	111.1	5.7
R. Korea	1,706,693	1,989,561	2,309,604	116.1	5.9
Hong Kong	1,870,674	2,126,212	2,361,799	111.1	6.0
China	2,066,495	2,880,153	4,117,509	143.0	10.5
Germany	1,462,322	1,318,697	1,482,590	112.4	3.8
Singapore	1,267,752	1,215,220	1,153,581	94.9	2.9
U. Kingdom	1,144,707	1,172,245	1,222,300	104.3	3.1
Netherlands	1,133,952	1,051,808	1,068,220	101.6	2.7
Malaysia	941,016	944,512	857,450	90.8	2.2
Asia	12,232,051	13,930,575	16,000,416	114.9	40.7
ASEAN	4,535,911	4,663,736	4,661,072	99.9	11.9
Middle East	1,029,031	1,196,188	1,285,804	107.5	3.3
Western Europe	6,325,918	6,122,057	6,813,832	111.3	17.3
EU	6,031,810	5,837,863	6,515,250	111.6	16.6
CIS・Central/Eastern Europe	242,902	300,064	467,994	156.0	1.2
North America	12,587,511	12,799,086	11,467,518	89.6	29.2
Central and South America	1,786,735	1,669,703	1,592,280	95.4	4.1
Africa	423,578	491,761	514,399	104.6	1.3
Oceania	897,345	1,032,693	1,154,118	111.8	2.9

(Source) METI [White Paper on International Trade 2004]

Table 3-27. Exports iof Machinery and Equipment (by area, dollar base)

[thousand dollar]

Area	2001	2002	2003	03/02 (%)	Weight (%)
Total	292,550,544	300,449,752	339,936,913	113.1	100.0
U.S.A.	98,099,144	96,067,790	92,778,681	96.6	27.3
Taiwan	14,909,145	16,031,773	19,309,502	120.4	5.7
R. Korea	14,059,316	15,966,838	20,001,884	125.3	5.9
Hong Kong	15,388,481	17,037,791	20,444,372	120.0	6.0
China	16,994,000	23,155,996	35,650,525	154.0	10.5
Germany	12,060,427	10,557,147	12,818,733	121.4	3.8
Singapore	10,448,728	9,718,634	9,981,687	102.7	2.9
U. Kingdom	9,429,440	9,365,727	10,558,716	112.7	3.1
Netherlands	9,348,667	8,418,759	9,235,007	109.7	2.7
Malaysia	7,751,227	7,558,688	7,410,751	98.0	2.2
Asia	100,687,397	111,699,952	138,554,256	124.0	40.8
ASEAN	37,351,486	37,342,505	40,316,000	108.0	11.9
Middle East	8,459,547	9,590,157	11,145,081	116.2	3.3
Western Europe	52,138,884	48,955,782	58,913,841	120.3	17.3
EU	49,716,267	46,681,613	56,328,799	120.7	16.6
CIS・Central/Eastern Europe	1,997,860	2,400,271	4,059,285	169.1	1.2
North America	103,676,666	102,282,157	99,085,213	96.9	29.1
Central and South America	14,714,802	13,308,681	13,743,610	103.3	4.0
Africa	3,487,934	3,940,476	4,451,100	113.0	1.3
Oceania	7,387,454	8,271,461	9,980,328	120.7	2.9

(Source) METI [White Paper on International Trade 2004]

3-6. Imports of Machinery and Equipment

In 2003, imports of machinery and equipment (yen base) increased 4.0% from the previous year to ¥13,973.6 billion, while the share of imports in the machinery industry in the total imports decreased by 0.3 points to 31.5% from the previous year.

Looking at the type of machinery imported, we see that imports of general machinery increased 2.6%, electrical equipment increased 4.6%, and transport equipment and precision instruments increased 5.4% and 4.5% each from the previous year.

The share of general machinery in the total imports of machinery and equipment fell 0.5 points from 34.1% in the previous year to 33.6. On the other hand, the share of electrical equipment increased 0.2 points from 43.2% to 43.4%, the share of transport equipment increased 0.2 point from 13.2% to 13.4%, and precision instruments also increased share 0.1% from 9.5% to 9.6%.

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, to 25.7% in 2002, and 22.6% in 2003.

Looking at the ratio of 2003 imports from the year earlier for 5 main countries, it was 91.4% for U.S.A., 125.4% for China, 95.1% for Taiwan, 111.7% for R. Korea, and 104.7% for Germany.

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

[million yen]

Machinery	2001	2002	2003	03/02 (%)	Weight (%)
Total	13,218,798	13,434,300	13,973,582	104.0	100.0
General machinery	4,622,477	4,582,626	4,701,553	102.6	33.6
Power generating machinery	510,294	562,036	507,268	90.3	3.6
Agricultural machinery	37,100	39,145	44,387	113.4	0.3
Office machines	2,764,027	2,697,546	2,744,797	101.8	19.6
Metal working machinery	76,815	88,770	99,358	111.9	0.7
Textile machines	26,837	30,302	38,136	125.9	0.3
Machinery for the mfrs. of paper or pulp articles	25,142	15,440	10,848	70.3	0.1
Printing and bookbinding machines	54,447	50,263	56,425	112.3	0.4
Construction and mining machinery	32,013	40,397	48,924	121.1	0.4
Heating and cooling equipment	177,549	198,856	213,091	107.2	1.5
Pumps and centrifuges	199,306	209,830	232,793	110.9	1.7
Mechanical handling equipment	50,272	46,918	59,077	125.9	0.4
Plastic processing machinery	25,776	34,862	28,404	81.5	0.2
Bearings	46,251	44,158	43,490	98.5	0.3
Power transmissions, gears	60,295	67,686	76,195	112.6	0.5
Vending machines	6,251	8,539	12,368	144.8	0.1
Electrical machinery	5,877,964	5,802,241	6,069,644	104.6	43.4
Electric power machinery	438,737	428,969	443,262	103.3	3.2
Apparatus for making, breaking electronic circuits	241,131	245,954	277,516	112.8	2.0
Visual apparatus	420,173	372,694	396,043	106.3	2.8
Audio apparatus	305,737	303,059	286,692	94.6	2.1
Parts of audio and visual apparatus	366,777	413,129	473,999	114.7	3.4
Telecommunications apparatus	531,330	411,505	341,983	83.1	2.4
Domestic electrical equipment	202,884	258,446	276,780	107.1	2.0
Others	3,277,731	3,212,642	3,381,592	105.3	24.2
Transport equipment	1,449,253	1,772,642	1,867,598	105.4	13.4
Road motor vehicles excl. parts	781,392	803,760	827,902	103.0	5.9
Parts of road motor vehicles	257,646	319,640	352,023	110.1	2.5
Trailer, semitrailer	13,289	12,707	13,868	109.1	0.1
Cycles with engines mounted	32,460	38,809	50,679	130.6	0.4
Parts for cycles with engines mounted	14,039	14,300	13,685	95.7	0.1
Bicycles	51,023	57,030	55,149	96.7	0.4
Parts for bicycles	14,094	12,275	11,676	95.1	0.1
Aircraft	239,253	461,175	506,215	109.8	3.6
Ships	27,013	33,512	13,709	40.9	0.1
Precision instruments	1,269,104	1,276,790	1,334,787	104.5	9.6
Scientific & optical equipment		1,066,436	1,126,558	105.6	8.1
Cameras	51,265	37,444	23,711	63.3	0.2
Meters, measuring and scientific instruments	135,368	130,766	140,961	107.8	1.0
Copying apparatus	87,145	63,989	55,878	87.3	0.4
Medical instruments	404,100	413,830	417,804	101.0	3.0
Optical fiber cables	33,023	22,567	17,884	79.2	0.1
Contact lenses	54,617	54,799	57,129	104.3	0.4
Laser	32,788	37,552	30,889	82.3	0.2
Watches, clocks and parts	200,326	210,354	208,229	99.0	1.5

(Source) METI [White Paper on International Trade 2004]

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

[thousand dollar]

Machinery	2001	2002	2003	03/02 (%)	Weight (%)
Total	108,864,436	107,438,866	120,889,272	112.5	100.0
General machinery	38,072,694	36,569,543	40,659,611	111.2	33.6
Power generating machinery	4,199,514	4,499,571	4,384,401	97.4	3.6
Agricultural machinery	304,917	312,048	381,666	122.3	0.3
Office machines	22,769,810	21,488,312	23,752,869	110.5	19.6
Metal working machinery	634,956	707,731	859,728	121.5	0.7
Textile machines	221,282	242,806	330,137	136.0	0.3
Machinery for the mfrs. of paper or pulp articles	207,195	122,734	93,550	76.2	0.1
Printing and bookbinding machines	448,263	402,758	487,915	121.1	0.4
Construction and mining machinery	263,437	323,204	422,950	130.9	0.3
Heating and cooling equipment	1,459,991	1,585,273	1,832,557	115.6	1.5
Pumps and centrifuges	1,640,466	1,678,891	2,013,245	119.9	1.7
Mechanical handling equipment	413,564	375,027	510,616	136.2	0.4
Plastic processing machinery	212,192	276,986	245,529	88.6	0.2
Bearings	380,995	353,523	375,266	106.2	0.3
Power transmissions, gears	496,025	542,402	658,533	121.4	0.5
Vending machines	51,430	68,039	106,688	156.8	0.1
Electrical machinery	48,423,208	46,421,675	52,513,914	113.1	43.4
Electric power machinery	3,612,589	3,430,998	3,826,394	111.5	3.2
Apparatus for making, breaking electronic circuits	1,985,771	1,969,885	2,400,513	121.9	2.0
Visual apparatus	3,455,640	2,982,218	3,440,339	115.4	2.8
Audio apparatus	2,513,033	2,420,180	2,482,514	102.6	2.1
Parts of audio and visual apparatus	3,021,067	3,313,557	4,111,777	124.1	3.4
Telecommunications apparatus	4,370,463	3,278,461	2,945,021	89.8	2.4
Domestic electrical equipment	1,667,219	2,069,043	2,400,157	116.0	2.0
Others	27,030,588	25,712,154	29,247,965	113.8	24.2
Transport equipment	11,924,463	14,231,025	16,161,320	113.6	13.4
Road motor vehicles excl. parts	6,429,284	6,439,736	7,187,869	111.6	5.9
Parts of road motor vehicles	2,121,081	2,563,976	3,043,287	118.7	2.5
Trailer, semitrailer	109,146	101,825	119,825	117.7	0.1
Cycles with engines mounted	266,596	311,429	437,287	140.4	0.4
Parts for cycles with engines mounted	115,527	114,365	118,259	103.4	0.1
Bicycles	419,427	452,879	474,477	104.8	0.4
Parts for bicycles	116,235	97,639	100,929	103.4	0.1
Aircraft	1,969,468	3,728,460	4,365,595	117.1	3.6
Ships	220,644	266,507	117,766	44.2	0.1
Precision instruments	10,444,071	20,216,622	11,554,427	57.2	9.6
Scientific & optical equipment		8,530,224	9,747,076	114.3	8.1
Cameras	422,606	298,366	203,597	68.2	0.2
Meters, measuring and scientific instruments	1 117,003	1,046,632	1,222,874	116.8	1.0
Copying apparatus	718,083	510,707	480,562	94.1	0.4
Medical instruments	3,322,605	3,308,653	3,608,116	109.1	3.0
Optical fiber cables	271,948	179,553	153,497	85.5	0.1
Contact lenses	448,709	437,901	493,920	112.8	0.4
Laser	270,166	300,554	266,812	88.8	0.2
Watches, clocks and parts	1,645,956	1,686,399	1,807,351	107.2	1.5

(Source) METI [White Paper on International Trade 2004]

Table 3-30. Imports of Machinery and Equipment (by area, yen base)

[million yen]

Area	2001	2002	2003	03/02 (%)	Weight (%)
Total	13,218,798	13,434,300	13,973,582	104.0	100.0
U.S.A.	3,661,134	3,459,206	3,161,443	91.4	22.6
Taiwan	1,093,787	1,065,127	1,012,570	95.1	7.2
R. Korea	872,613	882,717	985,722	111.7	7.1
Hong Kong	87,847	80,077	65,481	81.8	0.5
China	2,000,524	2,592,038	3,250,933	125.4	23.3
Germany	937,983	969,388	1,014,720	104.7	7.3
Singapore	439,402	381,538	380,748	99.8	2.7
U. Kingdom	333,822	277,759	301,429	108.5	2.2
Netherlands	82,019	80,024	69,175	86.4	0.5
Malaysia	773,857	626,094	613,472	98.0	4.4
Asia	6,655,033	7,068,183	7,824,646	110.7	56.0
ASEAN	2,581,040	2,426,252	2,483,972	102.4	17.8
Middle East	44,344	33,763	33,699	99.8	0.2
Western Europe	2,456,911	2,458,461	2,514,614	102.3	18.0
EU	2,207,137	2,202,415	2,247,138	102.0	16.1
CIS・Central/Eastern Europe	61,878	56,512	54,025	95.6	0.4
North America	3,782,872	3,571,483	3,276,385	91.7	23.4
Central and South America	146,749	152,961	137,584	89.9	1.0
Africa	37,734	62,632	102,478	163.6	0.7
Oceania	33,277	29,530	30,152	102.1	0.2

(Source) METI [White Paper on International Trade 2004]

Table 3-31. Imports of Machinery and Equipment (by area, dollar base)

[thousand dollar]

Area	2001	2002	2003	03/02 (%)	Weight (%)
Total	108,864,436	107,438,866	120,889,272	112.5	100.0
U.S.A.	30,167,724	27,659,799	27,298,579	98.7	22.6
Taiwan	9,014,976	8,502,344	8,756,228	103.0	7.2
R. Korea	7,191,231	7,068,769	8,542,937	120.9	7.1
Hong Kong	723,215	639,163	565,506	88.5	0.5
China	16,446,785	20,760,150	28,155,379	135.6	23.3
Germany	7,718,919	7,765,486	8,791,127	113.2	7.3
Singapore	3,622,745	3,045,018	3,293,410	108.2	2.7
U. Kingdom	2,754,664	2,219,217	2,611,593	117.7	2.2
Netherlands	675,258	638,012	597,990	93.7	0.5
Malaysia	6,373,384	4,993,189	5,306,501	106.3	4.4
Asia	54,797,404	56,525,643	67,731,258	119.8	56.0
ASEAN	21,262,798	19,379,112	21,487,267	110.9	17.8
Middle East	365,906	270,405	291,307	107.7	0.2
Western Europe	20,227,227	19,671,249	21,771,320	110.7	18.0
EU	18,172,856	17,620,045	19,453,969	110.4	16.1
CIS・Central/Eastern Europe	509,340	456,036	468,057	102.6	0.4
North America	31,170,814	28,553,462	28,290,383	99.1	23.4
Central and South America	1,208,482	1,215,689	1,185,515	97.5	1.0
Africa	311,101	503,207	890,423	176.9	0.7
Oceania	274,162	236,777	261,009	110.2	0.2

(Source) METI [White Paper on International Trade 2004]

3-7. Foreign Direct Investment by the Machinery Industry

(1) Foreign Investment for Sector

According to the statistics of MOF's "Foreign Direct Investment", F.Y.2003 Japanese foreign direct investment (dollar base) consecutively decreased 2.1% from the year earlier to $36,092 million (¥4,079.5 billion and a 9.2% decrease in yen base), around same level in the previous year. Japanese direct investment for foreign manufacturing industries increased 10.6% from the year earlier to $16,245 million, and it for foreign non-manufacturing industries decreased 10.3% to $19.599 million.

Japanese direct investment for foreign electrical machinery industry increased 27.7% from the previous fiscal year to $5,005 million, while it for foreign general machinery industry decreased 25.7% to $957 million. This growth of direct investment for electrical machinery contributed to increased total for manufacturing industries.

Direct investment for foreign transport machinery industry decreased 38.7% from the year earlier to $3,014 million, but still it kept the activity of high level sharing 8.4% in total of Japanese foreign direct investment.

Looking at the share in total of Japanese foreign direct investment, those for general machinery was 2.7%, for electrical machinery 13.9% and transport machinery 8.4% each. And the share of total for these three industries decreased to 24.9% (27.5% in the year earlier) in the total of Japanese foreign direct investment, and to55.3% (68.9% in the year earlier) in the total for manufacturing industries.

Table 3-32. Foreign Direct Investment by Sector

(million dollar, %)

	F.Y.2000	F.Y.2001			F.Y.2002			F.Y.2003			Total(1951 ～ 2003)	
	Volume	Volume	Weight	Change	Volume	Weight	Change	Volume	Weight	Change	Volume	Weight
Food	258	824	2.6	219.4	222	0.6	△ 73.1	428	1.2	92.8	27,439	3.1
Textiles	222	216	0.7	△ 2.7	200	0.5	△ 7.4	178	0.5	△ 11.0	10,235	1.2
Wood & pulp	152	732	2.3	381.6	240	0.7	△ 67.2	28	0.1	△ 88.3	7,482	0.9
Chemicals	1,922	1,511	4.7	△ 21.4	1,916	5.2	26.8	4,749	13.2	147.9	40,219	4.6
Ferrous/non-ferrous metal	741	658	2.0	△ 11.2	633	1.7	△ 3.8	1,078	3.0	70.3	25,070	2.8
Machinery	1,411	1,219	3.8	△ 13.6	1,288	3.5	5.7	957	2.7	△ 25.7	24,376	2.8
Electrical machinery	3,056	3,865	12.0	26.5	3,920	10.6	1.4	5,005	13.9	27.7	84,086	9.6
Transport machinery	3,141	4,342	13.4	38.2	4,915	13.3	13.2	3,014	8.4	△ 38.7	47,628	5.4
Others	838	851	2.6	1.6	1,355	3.7	59.2	808	2.2	△ 40.4	32,478	3.7
Manufacturing Total	11,741	14,218	44.0	21.1	14,689	39.9	3.3	16,245	45.0	10.6	299,013	34.0
Farming & forestry	27	36	0.1	33.3	7	0.0	△ 80.6	158	0.4	2157.1	2,696	0.3
Fishery	132	27	0.1	△ 79.5	56	0.2	107.4	4	0.0	△ 92.9	1,697	0.2
Mining	675	495	1.5	△ 26.7	366	1.0	△ 26.1	1,915	5.3	423.2	30,819	3.5
Construction	91	65	0.2	△ 28.6	121	0.3	86.2	258	0.7	113.2	6,169	0.7
Trade	3,638	2,700	8.4	△ 25.8	3,694	10.0	36.8	4,315	12.0	16.8	86,771	9.9
Finance & insurance	8,452	10,753	33.3	27.2	12,801	34.7	19.0	7,639	21.2	△ 40.3	178,918	20.3
Service	1,763	1,612	5.0	△ 8.6	1,836	5.0	13.9	1,940	5.4	5.7	92,310	10.5
Transportation	21,884	1,387	4.3	△ 93.7	1,503	4.1	8.4	1,876	5.2	24.8	64,365	7.3
Real estate	378	692	2.1	83.1	1,449	3.9	109.4	1,494	4.1	3.1	97,823	11.1
Others	2	29	0.1	1350.0	27	0.1	△ 6.9	—	—	—	7,667	0.9
Non-manufacturing Total	37,042	17,796	55.1	△ 52.0	21,860	59.3	22.8	19,599	54.3	△ 10.3	569,235	64.7
Branches	251	283	0.9	12.7	309	0.8	9.2	248	0.7	△ 19.7	11,166	1.3
Total	49,034	32,297	100.0	△ 34.1	36,858	100.0	14.1	36,092	100.0	△ 2.1	880,008	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 2004]
(Original source data : MOF [Foreign Direct Investment])

(2) Foreign Direct Investment by Country and Region

Looking at Japanese direct investment (dollar base) in F.Y.2003 by area, North America increased 26.4% from previous year to $10,680 million, Europe decreased 18.2% to $12,623 million and Asia increased 12.9% to $6,399 million. For Asian countries, direct investment for China sharply increased 78.0% from the year earlier to $3,143 million, and it for ASEAN4 increased 27.1% to $1,936 million, while it for Asia NIES drastically decreased 41.2% to $1,154 million. The active investments of Japanese automotive manufacturers to China market to supply for the growing demands for automotives with rising income level affected to sharp increase of Chinese share.

Looking at the share of accumulating total of Japanese foreign direct investment from 1951 to 2003 by area, the share of North America is 39.1%, Europe is 25.0% and Asia is 17.2%.

Table 3-33. Foreign Direct Investment by Area

(million dollar, %)

	F.Y.2001		F.Y.2002		F.Y.2003		Total(1951 ~ 2003)	
	Volume	Change	Volume	Change	Volume	Change	Volume	Change
World	32,297	△ 34.1	36,858	14.1	36,092	△ 2.1	880,008	100.0
North America	6,550	△ 47.5	8,449	29.0	10,680	26.4	344,416	39.1
U. S. A.	6,461	△ 47.7	8,215	27.1	10,577	28.8	330,284	37.5
Canada	88	△ 34.2	234	165.9	103	△ 56.0	14,132	1.6
Central and South America	7,715	46.1	5,746	△ 25.5	5,262	△ 8.4	108,060	12.3
Cayman	4,996	82.6	4,036	△ 19.2	2,123	△ 47.4	34,126	3.9
Panama	992	△ 25.2	882	△ 11.1	1,216	37.9	32,505	3.7
Brazil	1,373	482.6	406	△ 70.4	1,551	282.0	15,896	1.8
Asia	6,639	10.5	5,669	△ 14.6	6,399	12.9	151,120	17.2
China	1,453	44.1	1,766	21.5	3,143	78.0	26,920	3.1
Asia NIES	2,379	△ 12.8	1,961	△ 17.6	1,154	△ 41.2	56,199	6.4
Korea	563	△ 31.1	626	11.2	284	△ 54.6	10,148	1.2
Taiwan	321	△ 37.1	375	16.8	152	△ 59.5	7,294	0.8
Hong Kong	348	△ 63.1	208	△ 40.2	396	90.4	20,727	2.4
Singapore	1,147	151.1	752	△ 34.4	322	△ 57.2	18,030	2.0
ASEAN4	2,558	24.9	1,523	△ 40.5	1,936	27.1	62,570	7.1
Thailand	884	△ 5.1	504	△ 43.0	629	24.8	16,885	1.9
Malaysia	257	10.6	80	△ 68.9	463	478.8	10,374	1.2
Indonesia	627	49.3	529	△ 15.6	648	22.5	27,813	3.2
Philippines	791	69.9	410	△ 48.2	196	△ 52.2	7,498	0.9
India	145	△ 13.6	310	113.8	87	△ 71.9	2,422	0.3
Europe	10,600	△ 56.7	15,428	45.5	12,623	△ 18.2	220,293	25.0
EU15	10,254	△ 57.2	15,067	46.9	12,034	△ 20.1	211,324	24.0
England	3,968	△ 79.3	4,412	11.2	1,785	△ 59.5	95,683	10.9
Netherlands	4,521	63.5	3,295	△ 27.1	6,869	108.5	55,314	6.3
France	309	△ 6.7	3,574	1056.6	1,561	△ 56.3	17,679	2.0
Germany	422	31.9	381	△ 9.7	694	82.2	12,951	1.5
Luxembourg	160	12.2	271	69.4	190	△ 29.9	7,386	0.8
Switzerland	66	79.0	112	69.7	73	△ 34.8	3,859	0.4
Middle & East Europe (5 Countries)	149	△ 52.3	201	34.9	472	134.8	2,094	0.2
Middle East	20	7.5	37	85.0	17	△ 54.1	5,952	0.7
Africa	219	286.8	194	△ 11.4	105	△ 45.9	10,390	1.2
Oceania	554	△ 21.1	1,335	141.0	1,006	△ 24.6	39,777	4.5

(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 (change) is in comparison to the year earlier.

(Source) JETRO [White Paper on Trade and Foreign Direct Investment 2004]
(Original source data : MOF [Foreign Direct Investment])

3-8. Plant Exports

According to METI survey, actual contracts for overseas plants for F.Y.2003 are as follows.

(1) General Conditions

In F.Y.2003, the contract amount of the construction of foreign plants and engineering by Japanese corporations sharply increased 35.2% from the previous fiscal year to $18.88 billion.

The factors for the increased contract amount are as follows:

1. The contracts of generating plants were in good condition supported with active demand for infrastructures in Asia and Middle East.
2. According to the worldwide energy shift and expanding usage of natural gas, the construction of gas treatment plant, where Japanese companies have competitive edge, increased.
3. Japanese enterprises could keep their competitiveness in the oversea projects, with their background of technical strength, actual achievement, short delivery time, high ability of project- management, and price competitiveness trained through oversea procurements.

Looking at plant exports by region, the top market was Asia (the share was 40.2% for the total contract amount), and Middle East (32.4%), and "Other"[former Soviet Union such as Russia, and Eastern Europe] (14.5%) followed. Malaysia ($1.81 billion), China ($1.79 billion) and Thailand ($1.25 billion) were top 3 nations for plant exports in Asia. Qatar ($1.70 billion), Iran ($1.56 billion) and UAE ($1.37 billion) were top three nations in Middle East. In other area except Asia and Middle East, the plant exports for Russia ($2.63 billion) was remarkable with great increase.

By sector, the energy plant sector sharply increased their contract amounts as they contracted big projects of LNG plants, and the generating plant sector getting contracts for big projects of thermal electric power plants also sharply increased their contract amounts. The steel plant sector where the demands for medium and small size plant were active and general plant sector also increased their plant export amount. On the other hand, other sectors decreased their contract amounts.

(2) Plant Exports by Destination

Looking at the actual contracts for overseas plants by destination in F.Y.2003, for Middle East, ”Other” (former Soviet Union, such as Russia), Asia, Western Europe and Oceania the amount of contracts increased from the year earlier. The sharp increase of the amount of contracts for Middle East, "Other" (former Soviet Union such as Russia, and Eastern Europe) and Asia (especially for ASEAN5) was contributed with the contracts of super projects (the project more than $1 billion) of energy plants and generating plants and with the contracts of big projects (the project more than $0.1 billion) each. On the other hand, for Africa, North America and Central and South America the contact amount dropped from the previous year, due to the decrease of contracts of big project.

Looking at the share of each region in the total amount of the contracts by Japanese companies, in F.Y.2003, Asia was

Table 3-34. Plant Exports (by Destination)

(100 million dollar)

Area	F.Y.2001		F.Y.2002		F.Y.2003	
	Number of plants	Volume	Number of plants	Volume	Number of plants	Volume
Asia	290	55.1 (44.3)	498	63.2 (45.3)	559	75.9 (40.2)
Middle East	40	20.5 (16.4)	75	24.5 (17.6)	68	61.2 (32.4)
Africa	19	18.7 (15.0)	45	16.7 (12.0)	37	3.5 (1.8)
Central and South America	55	4.9 (3.9)	63	7.7 (5.5)	85	6.8 (3.6)
Oceania	8	5.0 (4.0)	4	0.2 (0.2)	14	0.8 (0.4)
Western Europe	103	4.9 (4.0)	108	5.9 (4.3)	86	6.8 (3.6)
North America	78	10.5 (8.5)	68	12.2 (8.8)	88	6.7 (3.5)
Other	50	4.8 (3.9)	52	9.0 (6.5)	68	27.1 (14.5)
Total	643	124.4 (100.0)	913	139.7 (100.0)	1,005	188.8 (100.0)

(Note 1) The data include the service contracts unaccompanied with machineries or equipment exports such as by general constructers.
(Note 2) Each case is a contract for heavy machinery and related service valued at more than $500,000 excluding transport equipment.
The number in parentheses represents the share of the total.
(Source) METI

top with 40.2% in share. Each of Middle East and "Other" regions increased sharply its share due to the contracts of super projects and big projects in each region.

In China, the level of the contract amount was great, but the amount itself declined from the previous year, and as result the share of China decreased from 13.3% in 2002 to 9.5% in 2003.

Table 3-35. Plant Exports (by Sector)

(million dollar)

Sector	F.Y. 2001		F.Y. 2002		F.Y. 2003	
	Number of plants	Volume	Number of plants	Volume	Number of plants	Volume
Plant connected with life and environment	14	1.6 (1.3)	64	14.4 (10.3)	71	6.2 (3.3)
Information/communication	242	8.8 (7.1)	283	9.3 (6.6)	271	5.7 (3.0)
Transportation infrastructure	18	6.8 (5.5)	32	26.8 (19.2)	47	13.9 (7.4)
Energy	28	30.8 (24.7)	48	31.3 (22.4)	46	65.7 (34.8)
Generating	142	45.4 (36.5)	174	25.4 (18.2)	184	64.7 (34.2)
Chemical	62	22.8 (18.3)	84	18.5 (13.3)	108	14.5 (7.7)
Steel	41	3.3 (2.6)	67	6.2 (4.4)	82	9.7 (5.2)
Other	96	4.9 (4.0)	161	7.8 (5.6)	196	8.4 (4.4)
Total	643	124.4 (100.0)	913	139.7 (100.0)	1,005	188.8 (100.0)

(Note 1) The data include the service contracts unaccompanied with machineries or equipment exports such as by general constructers.
(Note 2) Each case is a contract for heavy machinery and related service valued at more than $500,000 excluding transport equipment. The number in parentheses represents the share of the total.
(Source) METI

Table 3-36. Top 10 in Plant Exports by Amount

(million dollar)

	F.Y.2001	F.Y.2002	F.Y.2003	Amount
1	Taiwan	Taiwan	Russia	26.3
2	China	China	Malaysia	18.1
3	Algeria	U.S.A.	China	17.9
4	Qatar	United Arab Emirates	Qatar	17.0
5	U.S.A.	Algeria	Iran	15.6
6	Libya	Brazil	United Arab Emirates	13.7
7	Saudi Arabia	Indonesia	Thailand	12.5
8	Singapore	Saudi Arabia	Oman	8.8
9	Iran	Nigeria	Taiwan	7.4
10	Australia	Thailand	Indonesia	6.8

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

(3) Plant Exports by Sector

Looking at the foreign plant contracts by Japanese corporations in F.Y.2003 by sector, in the sector of the plants connected with life and environment, the amount drastically decreased, affected by decreased contracts of big project both in number and amount. But the contract amount was great at the level more than $0.6 billion, a high level in resent six years (from F.Y.1998 to F.Y.2003).

In the information/communication plants sector, the total contracts amount dropt in 2003, due to the decreased contracts in regions except North America, Oceania and Africa. Especially, the affect of decrease of contact amount in Asia and ”Other” (former Soviet Union such as Russia and Eastern Europe) was great.

In the transportation infrastructure sector, the contracts amount in 2003 showed a sharp decrease affected by the decline in Asia. But considering the fact that in each of 2000 and 2002 the contract of super project of high-speed railway constructions in Taiwan pushed up the amount, the total contract amount in the sector in 2003 was at high level.

In the energy plant sector, there were several contracts of super project (the project more than $1 billion) such as LNG plant in Russia and gas making plants in Iran and Qatar, and contracts of big project (The project more than $0.1 billion) such as oil refinery plants in Oman, and as the result, the total amount of the contracts grew up to the double of the amount in the previous year.

In the generating plant sector, in addition to the contract of the super project of the coal fired generating plants for Malaysia, there were the export contracts of big projects including coal fired generating project for Thailand, generating plants and water desalinating and generating combined plant for United Arab Emirates. As the result the total amount of the contracts in this sector drastically increased. And the increase of the amount pushed up the share of this sector in the total of all sectors to 34.2% from 18.2% in the previous year.

In the chemical plants sector, the amount of contracts decreased from the previous year, due to the drop of the total contract amount of big projects, in spite of the contracts of three big projects, fertilizer plant for Iran, petrochemical plants for Saudi Arabia and Thailand.

In the steel plant sector, the contracts of mid-size and small projects less than $0.1 billion sharply increased in Asia especially in China, while big project more than $0.1 billion was not contracted. As the result, the both of the total amount and the number of contracts showed an increase.

In the general plant sector, both of the amount and the number of contracts increased, due to the increased contracts of mid-size and small projects less than $0.1 billion, in spite of decreased number and amount of the contracts of big projects more than $0.1 billion.

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

(1) By Sector

According to "2003 Survey of New Locations for Factories and Plants" conducted by METI, the number of new locations sharply increased by 24.6% (208) from the previous year to 1,052.

Looking at new locations in 2003 by sector, the sector of food manufacturing built 189 new plants (161 in 2002), the sector of manufacture of general machinery built 100 new plants (80 in 2002), the sector of manufacture of transport equipment built 95 new plants (51 in 2002), the sector of manufacture of fabricated metal products built 86 plants, and the sector of manufacture of plastic products built 82 (56 in 2002). And these top 5 sectors shared 52.5% of the total number (1,052) of new plants by all sectors (50.1% in 2002).

(2) By Region

Looking at the number of new locations in 2003 by region, in all regions the number of new locations increased from the previous year, especially in Coastal Kinki, the number of new locations increased 45 or 166.7% from the previous year to 72 in 2003. In other regions, the new location increased 45 or 45.0% to 158 in Tokai, 39 or 32.8% to 39 in Inland Kanto, 15 or 41.7% to 51 in Southern Kyusyu, 18 or 15.8% to 132 in Southern Tohoku, 11 or 34.4% in Northern Tohoku, and 11 or 31.4% to 46 in Hokkaido.

Table 3-37. New Locations for Factories and Plants by Industry

Industry	2001		2002		2003		Change (%)2003/2002	
	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)
Total	1,123	1,379	844	872	1,052	1,330	24.6	52.5
Domestic resource type	332	383	318	320	340	397	6.9	24.1
General merchandise type	186	165	137	139	183	203	33.6	46.0
Basic material type	141	232	103	131	123	133	19.4	1.5
Manufacturing/assembling	447	556	272	263	390	507	43.4	92.8
Manufacturing industry	1,106	1,336	830	853	1,036	1,240	24.8	45.4
Manufacture of food	169	153	161	122	189	161	17.4	32.0
Manufacture of beverages, tobacco and feed	35	53	49	69	46	65	▲ 6.1	▲ 5.8
Manufacture of textile mill products	5	3	3	4	3	17	0.0	325.0
Manufacture of apparel and other finished product made fabrics	17	7	10	5	16	9	60.0	80.0
Manufacture of lumber and wood products except furniture	41	62	40	52	31	58	▲ 22.5	11.5
Manufacture of furniture and fixtures	11	5	11	8	16	13	45.5	62.5
Manufacture of pulp, paper and paper products	32	30	20	20	28	31	40.0	55.0
Printing and allied industries	35	30	26	13	27	21	3.8	61.5
Manufacture of chemical and allied products	75	160	47	80	67	89	42.6	11.3
Manufacture of petroleum and coal products	8	5	10	8	5	4	▲ 50.0	▲ 50.0
Manufacture of plastic products	84	82	56	55	82	107	46.4	94.5
Manufacture of rubber products	16	17	11	23	17	21	54.5	▲ 8.7
Manufacture of leather tanning, leather products and fur skins	2	1	–	–	–	–	–	–
Manufacture of ceramic, stone and clay products	50	82	45	52	43	65	▲ 4.4	25.0
Manufacture of iron and steel	36	42	34	30	33	25	▲ 2.9	▲ 16.7
Manufacture of non-ferrous metals and products	22	24	12	12	18	15	50.0	25.0
Manufacture of fabricated metal products	98	106	62	74	86	70	38.7	▲ 5.4
Manufacture of general machinery	134	89	80	65	100	103	25.0	58.5
Manufacture of electrical machinery, equipment and supplies	52	100	31	16	36	44	16.1	175.0
Manufacture of information and communication electronics equipment	19	29	7	15	15	56	114.3	273.3
manufacture of electronic parts and devices	62	112	26	24	38	83	46.2	245.8
Manufacture of transport equipment (incl. Shipbuilding and railroad equipment)	62	109	51	62	95	132	86.3	112.9
Manufacture of precision instruments and machinery	20	12	16	9	20	18	25.0	100.0
Miscellaneous manufacturing industries	21	23	22	35	25	33	13.6	▲ 5.7
Electricity industry	13	29	11	13	12	83	9.1	538.5
Gas supply industry	4	14	3	6	4	7	33.3	16.7
Heat supply industry	–	–	–	–	–	–	–	–

(Note) As the Classification was revised, "Publishing and allied products(newspapers) industries" moved to "Information/communication (non-manufacturing industry)" and excluded from the table. "Manufacture of ordnance" was moved to "Miscellaneous manufacturing industries". The histrical data were also revised.

(Source) METI [2003 Survey on New Locations for Factories and Plants]

(3) Reasons for Selection of Location Site

Among the reasons for selecting a new location site in 2003, the top was "ease of acquiring enough area,"the same as in the previous year, with a 18.4% share. Next was "proximity to head office" (12.4%), "Short access to the market" (12.3%), "short access to related companies" (10.4%), and "subsidy and cooperation from the local government" (9.7%) followed.

(4) New Locations for Research Laboratories

In 2003, total new locations for research laboratories independent from other facilities were 17, a decrease of 2 from 15 in the year before.

By prefecture, 5 new laboratories were built in Kanagawa, 2 each in Ibaraki and Tochigi, and 1 each in Hokkaido, Yamagata, Gunma, Aichi, Nara, Okayama, Nagasaki and Miyazaki. The increase of new locations of research laboratories in Kanagawa (5) and in Inland Kanto was remarkable.

By field of research, the top was 7 of engineering laboratories. By industry, the number of new locations for research laboratories was 3 by manufacture of chemical and allied products, 2 by manufacture of general machinery, and 1 each by manufacture of food, manufacture of plastic products, manufacture of metal products, manufacture of information and communication electronics equipment, manufacture of electronic parts and devices, manufacture of transport equipment and manufacture of precision instruments and machinery. And the number of new locations by unknown sector was 5.

Table 3-38. New Locations for Factories and Plants by Region

Region	2001		2002		2003		Change (%) 2003 / 2002	
	Case	Area (ha)	Case	Area (ha)	Case	Area (ha)	Case	Area (ha)
Total	1,123	1,379	844	872	1,052	1,330	24.6	52.5
Hokkaido	59	84	35	47	46	41	31.4	▲ 12.8
Northern Tohoku	42	52	32	35	43	79	34.4	125.7
Southern Tohoku	177	190	114	120	132	141	15.8	17.5
Kanto, inland	186	350	119	132	158	273	32.8	106.8
Kanto, coastal	97	106	78	87	81	70	3.8	▲ 19.5
Tokai	154	213	109	110	158	226	45.0	105.5
Hokuriku	53	49	40	37	42	30	5.0	▲ 18.9
Kinki, inland	35	34	27	29	72	85	166.7	193.1
Kinki, coastal	73	62	78	56	87	82	11.5	46.4
San-in	0	8	9	11	10	7	11.1	▲ 36.4
Sanyo	44	49	45	50	40	96	▲ 11.1	92.0
Shikoku	38	55	37	25	45	40	21.6	60.0
Northern Kyushu	91	83	85	109	87	95	2.4	▲ 12.8
Southern Kyushu	64	44	36	24	51	65	41.7	170.8

(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, Mie
Hokuriku : Toyama, Ishikawa, Fukui
Kinki, inland : Shiga, Kyoto, Nara
Kinki, coastal : Osaka, Hyogo, Wakayama
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 [2003 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 100 regular members (50 company members of the leading companies in the fields of engineering and machinery manufacturing, and 50 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

Tsutomu Kanai
(Chairman and Director, Hitachi Ltd.)

Vice-President

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

Executive Director

Masaaki Hirano
Masanao Ito

(3) Organization

Executive Vice-President
Executive Director

Division	Functions
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.
Standards Development Division	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.

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.
FANUC, 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.
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 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
Hitachi Business International, Ltd.
Japan Information Technology Services Industry Association
Mitsubishi Research Institute, Inc.
Mizuho Information & Research Institute, Inc.
Shinkawa Electric Co., Ltd.
Shinko research Co., Ltd.
SICK K.K.
Spindler Associates Co., Ltd.
Toray Corporate Business Research, Inc.
TUV Rheinland Japan

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KEIRIN

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