

Chapter 6 Machine Elements Sector

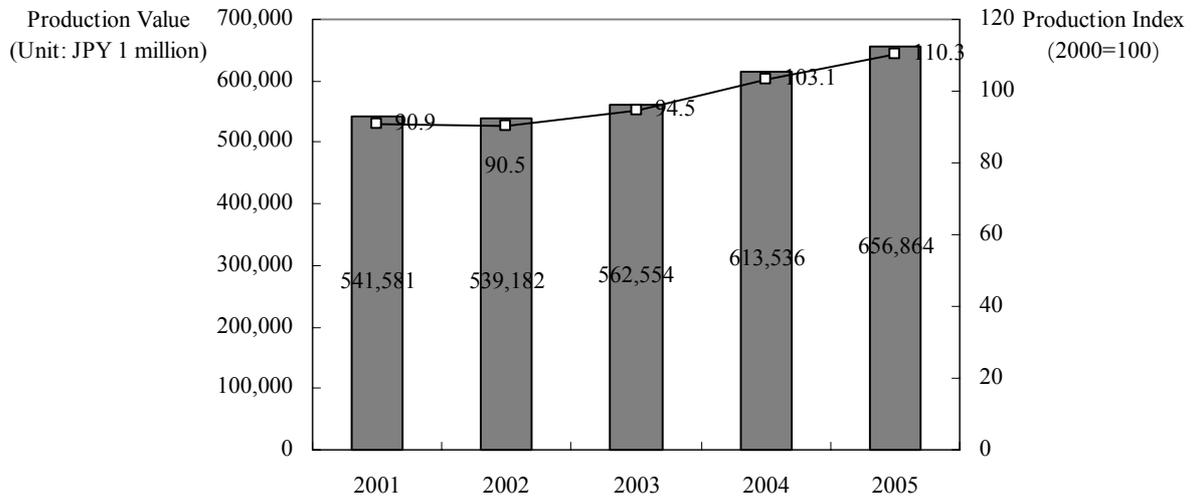
6-1. Bearings

6-1-1. Trends in Supply & Demand

(1) Overview

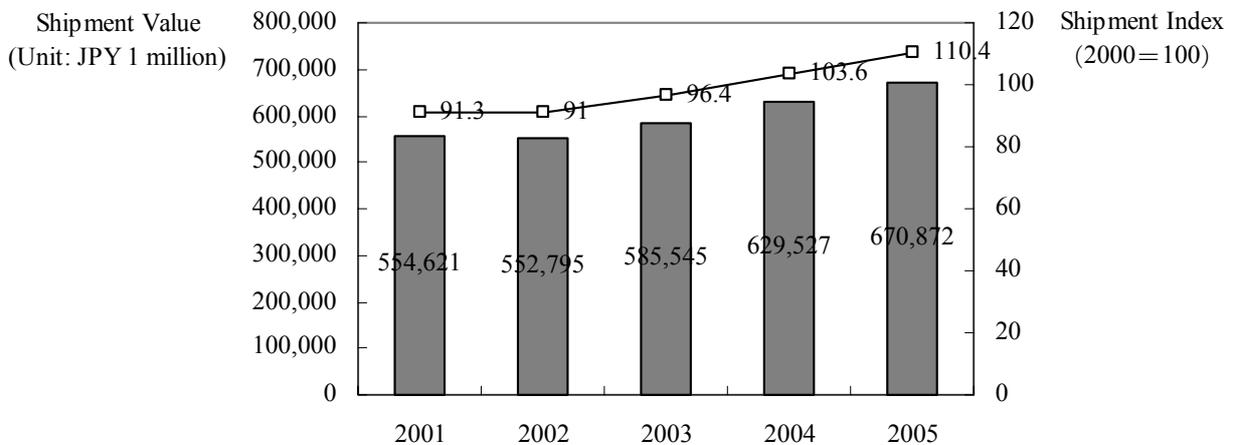
The total monetary value of bearing production (limited to ball and roller bearings) in 2005 rose 7.1% over the previous year to roughly JPY 656.8 billion, and shipments rose 6.6% to JPY 670.8 billion, indicating relatively favorable market conditions (see Diagrams 6-1-1 and 6-1-2).

The total monetary value of bearing exports (total bearings as finished products and parts) rose 10.8% over the previous year to roughly JPY 337.5 billion, while imports (as finished products and parts) rose to 15.9% to roughly JPY 60.6 billion.



Source: "Annual Report on Machinery Statistics" (METI)

Diagram 6-1-1. Monetary Value of Bearing Production



Source: "Annual Report on Machinery Statistics" (METI)

Diagram 6-1-2. Monetary Value of Bearing Shipments

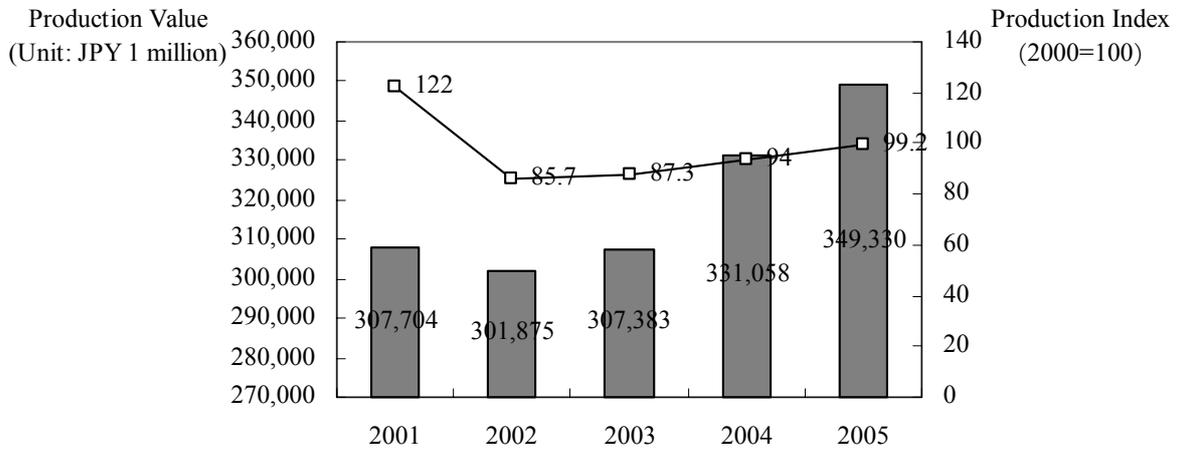
(2) Production

As Diagrams 6-1-3 and 6-1-4 show, the monetary value of ball bearing (excluding those used in bearing units) production in 2005 rose 5.5% over the previous year to roughly JPY 349.3 billion, and roller bearing (excluding those used in bearing units) production rose 9.0% to roughly JPY 286.6 billion.

In the ball bearing segment, the monetary value of radial ball bearing production rose 5.6% over the previous year to JPY 316.8 billion, thrust ball bearing production fell 9.6% to JPY 5.8 billion, and

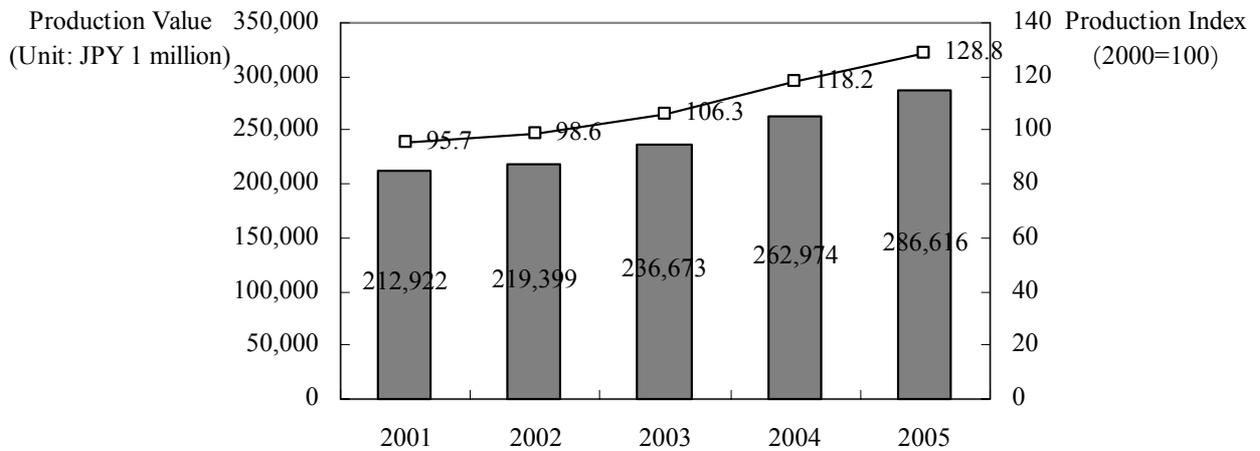
“other” ball bearing production rose 8.2% to JPY 26.6 billion.

In the roller bearing segment, the monetary value of cylindrical roller bearing production rose 10.7% over the previous year to roughly JPY 44.4 billion, conical roller bearing production rose 10.1% to JPY 117.4 billion, spherical roller bearing production rose 12.0% to JPY 23.3 billion, needle roller bearing production rose 6.5% to JPY 98.1 billion, and “other” roller bearing production fell 0.4% to JPY 3.2 billion (see Diagrams 6-1-3 and 6-1-4).



Source: “Annual Report on Machinery Statistics” (METI)

Diagram 6-1-3. Monetary Value of Ball Bearing Production



Source: “Annual Report on Machinery Statistics” (METI)

Diagram 6-1-4. Monetary Value of Roller Bearing Production

The total monetary value of bearing unit production in 2005 rose 7.2% over the previous year to roughly JPY 20.9 billion, maintaining favorable growth.

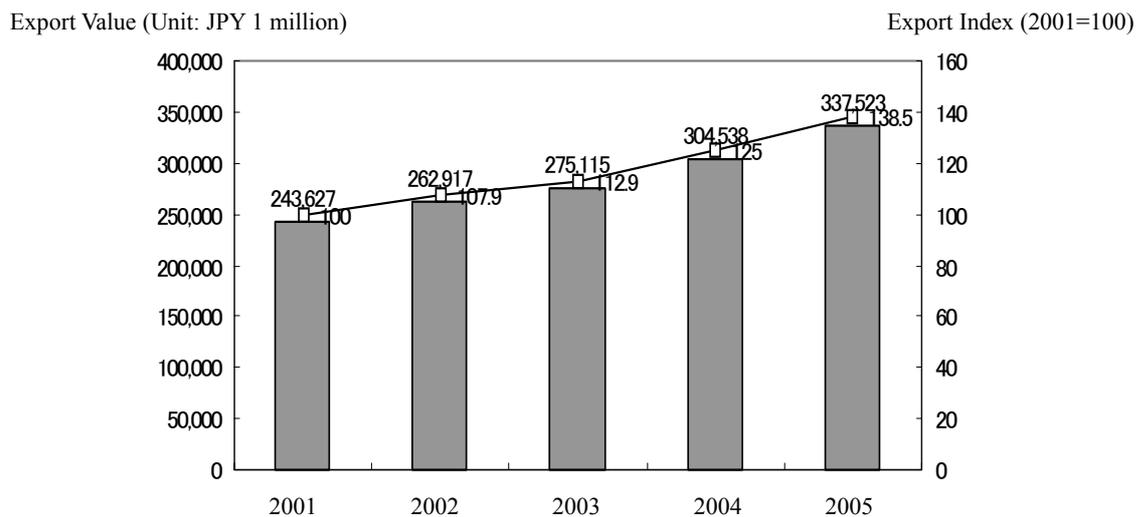
In summary, while some categories (thrust ball bearings and “other” roller bearings) saw figures drop, overall conditions in the bearing industry in 2005 were favorable.

(3) Imports & Exports

As mentioned above, the total monetary value of bearing exports (total bearings as finished products and parts) rose 10.8% over the previous year to roughly JPY 337.5 billion. Since 2001, when exports totaled roughly JPY 243.6 billion, bearing exports have grown steadily year-on-year. In 2004, exports finally surpassed the JPY 300-billion mark, and continued to rise in 2005.

As shown in Diagram 6-1-5, the export indexes for the years 2001 through '05 are as follows (based on a 2001 export index of “100”):

2002: 107.9
 2003: 112.9
 2004: 125.0
 2005: 138.5



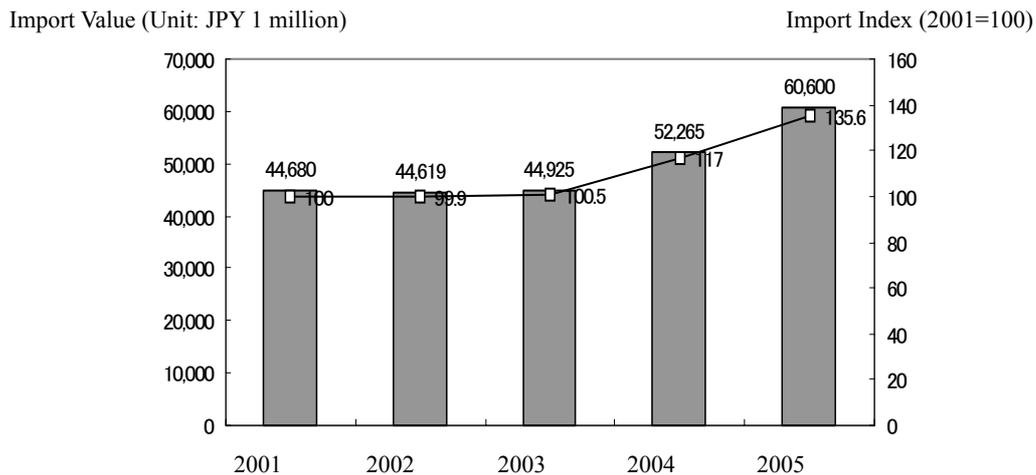
Source: Ministry of Finance trade statistics and data provided by the Japan Bearing Industrial Association (JBIA)

Diagram 6-1-5. Monetary Value of Bearing Exports

The total monetary value of bearing imports (total bearings as finished products and parts) rose 15.9% over the previous year to roughly JPY 60.6 billion, exceeding the export growth rate. While year-on-year growth was -0.1% in 2002, imports recovered in 2003 and have since been in an upward trend. The growth rate was particularly high (over 15%) in 2004 and '05.

As shown in Diagram 6-1-6, the import indexes for the years 2001 through '05 are as follows (based on a 2001 import index of “100”):

2002: 99.9
 2003: 100.5
 2004: 117.0
 2005: 135.6



Source: Ministry of Finance trade statistics and data provided by the Japan Bearing Industrial Association (JBIA)

Diagram 6-1-6. Monetary Value of Bearing Imports

6-1-2. Business Conditions & Industry Trends

(1) Business Trends

March 2006 financial reports from four leading bearing manufacturers indicate that each company saw both revenues and profits increase in 2005. In particular, NSK and NTN sales and profits have broken records for two consecutive years. Favorable conditions in the bearing industry may be attributed to heavy increases in capital investments in the auto industry, which in turn boosted bearing sales in domestic and overseas markets. Additionally, expanded sales, price hikes, and improved productivity helped to compensate for rising steel prices and enabled bearing manufacturers to increase their profits.

- JTEKT Corporation

The biggest development in the bearing industry in FY 2005 was the January 1, 2006, merger of Toyota-affiliated Koyo Seiko Co. and Toyoda Machine Works. The new company is called JTEKT Corporation. Koyo Seiko brought to the table expertise in bearings, steering systems, and machine tools (particularly surface grinders and other industrial-use machines), while Toyoda contributed expertise in bearing, driveline-related parts, steering system, and machine tool production (particularly cylindrical grinder and other machines for the

automobile industry). JTEKT Corporation integrated the strengths of each company and now operates in four broad business fields: 1) machine and tool parts, 2) driveline parts, 3) bearings, and 4) machine tools. From bearings to steering systems and driveline parts – JTEKT is able to supply automakers with optimum transmission systems.

The synergy created by JTEKT merger promises favorable performance – particularly in the company's steering system business – in the future. Before the merger, Koyo Seiki was the world's top supplier of steering systems, and Toyoda ranked sixth. By 2008, JTEKT plans to capture a 30% share of the global market. Based on the company's March 2006 financial report, steering system sales in Japan, North America, and Asia were on the rise, leading the company to revise its business forecast to indicate that consolidated sales will rise to JPY 1 trillion by March 2007 – two years earlier than originally predicted. This may be attributed to favorable demand for bearings in the auto industry, to the fact that an increasing number of car models with EPS (Electric Power Assisted Steering) systems are being manufactured, and to highly favorable machine tool demand. Moreover, there are no indications of a sudden downturn in the future.

- NSK, Ltd.

NSK reported favorable results in 2005 due to increased sales of EPS systems and other auto parts and components.

- NTN Corporation

NTN, too, reported favorable results that it attributed to increased bearings sales in Japan and other Asian markets, and to increased sales of CV (Constant-Velocity) joints to Japanese auto plants located primarily in North America.

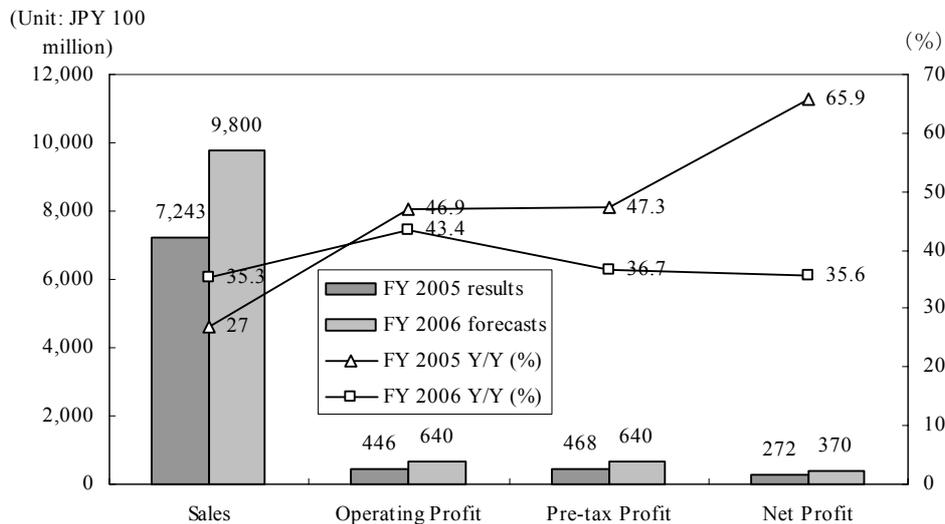
- Minebea Co.

Minebea reported favorable sales of aircraft bearings in North American and European markets,

and increased sales of LCD backlights. Although the company's electronics division is operating in the red, its deficit shrunk by JPY 2.2 billion this year, indicating a possible recovery in the future.

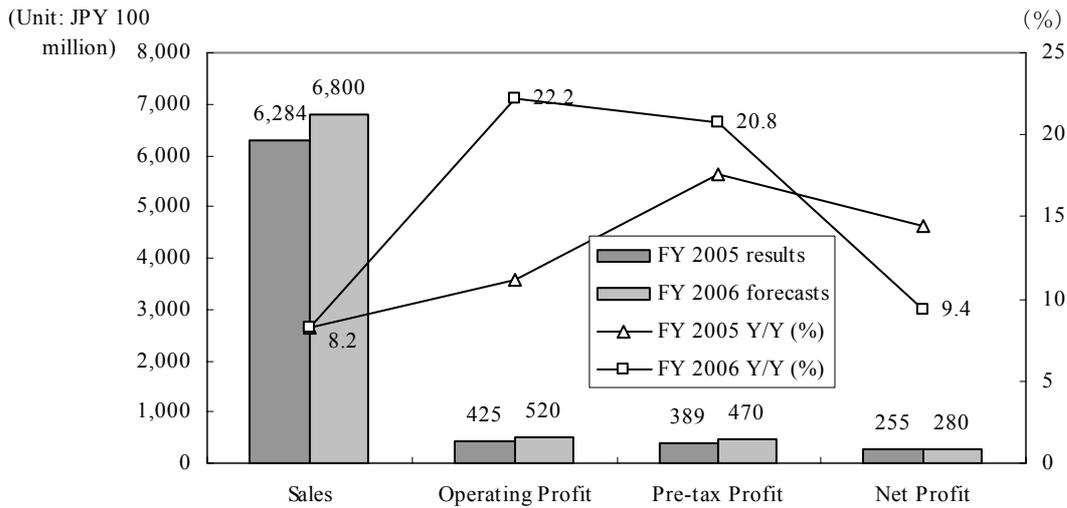
While overall conditions in the industry have up until now remained calm in comparison to other industries due to the bearing industry's oligopolistic nature, the JTEKT merger is certain to upset the balance of power, according to industry watchers. Nevertheless, NSK continued to boast the largest share of domestic sales in 2005.

Diagrams 6-1-7 through 6-1-10 show the leading companies' 2005 financial results and FY 2006 forecasts.



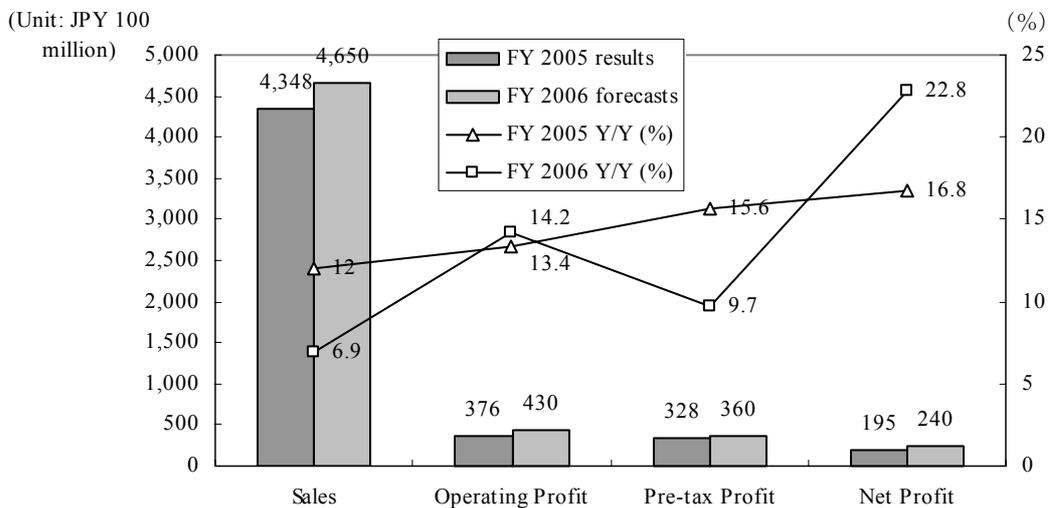
Source: Newspaper articles

Diagram 6-1-7. JTEKT Financial Results & Forecasts



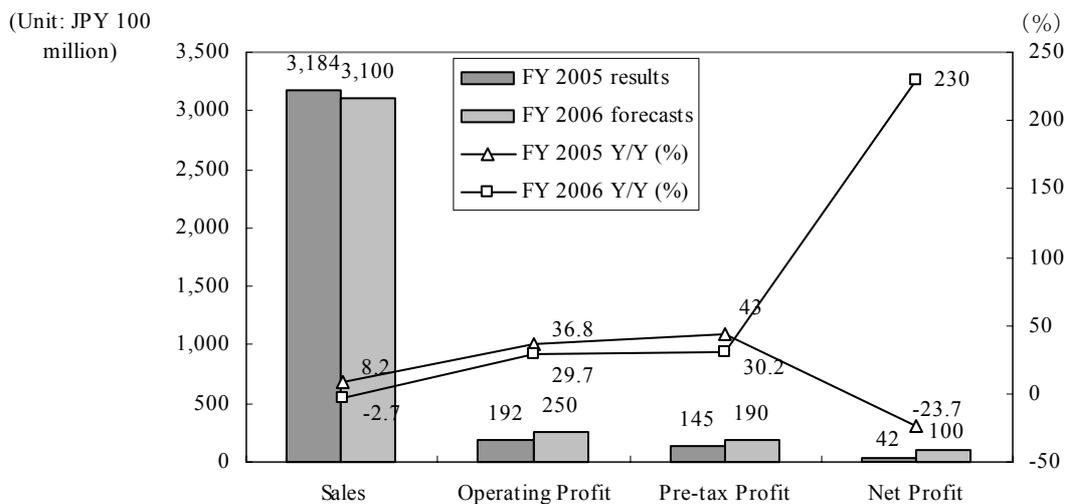
Source: Newspaper articles

Diagram 6-1-8. NSK Financial Results & Forecasts



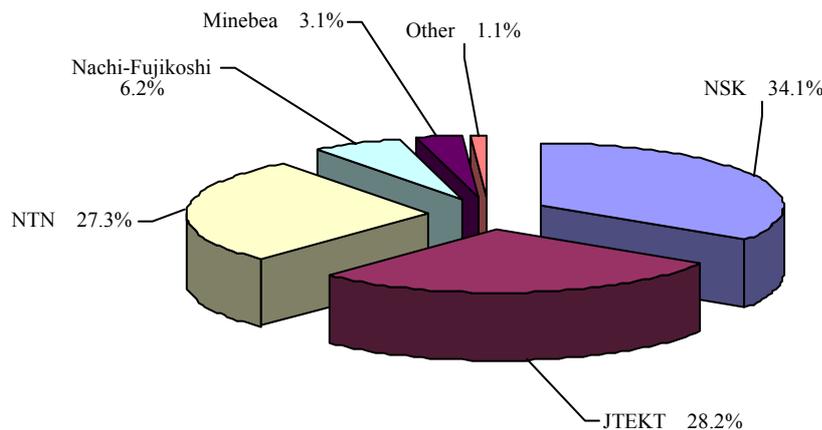
Source: Newspaper articles

Diagram 6-1-9. NTN Financial Results & Forecasts



Source: Newspaper articles

Diagram 6-1-10. Minebea Financial Results & Forecasts



Source: JBIA data and newspaper articles

Diagram 6-1-11. Leading Bearing Manufacturers' Domestic Market Shares Based on Sales

(2) Trends in Technological Innovation

- NSK, Ltd.

NSK in mid-December 2005 announced a takeover bid for all outstanding shares of Amatsuji Steel Ball Manufacturing Co. stock. The company plans to integrate its ring-related technology with Amatsuji's steel ball technology to develop more advanced ball bearings in an effort to meet the needs of auto parts manufacturers – NSK's main customer segment – and general machine makers. The buyout would also provide Amatsuji access to NSK's global sales network. NSK's technical innovations include 1) ball bearings for use in car air conditioners that generate 50% less noise, and 2) bearings for use in industrial machine compressors that quadruple the life of the product when natural refrigerants are used.

- JTEKT Corporation

JTEKT successfully developed a low friction-torque tapered roller bearing that requires 80% less rotational torque. While other companies also manufacture low-rotational-torque tapered roller bearings, theirs were only able to reduce rotational torque by 50%.

Automobile environmental restrictions in Japan

and overseas are becoming stricter, particularly in Europe, where the European Automobile Manufacturers Association (ACEA) ratified a voluntary agreement to reduce carbon CO₂ emissions rates of vehicles sold in the European Union to a fleet average of 140 grams of CO₂ per kilometer (gCO₂/km) by 2008 – and to 120 grams by 2012. This new JTEKT product was developed in order to help automakers reduce CO₂ emissions rates. In 2007, the company has plans to start mass-producing new bearings for use in differential gears, and also plans to manufacture bearings for use in construction equipment.

- NTN Corporation

NTN developed unitized thrust needle bearings for eccentric applications, that are needle roller thrust bearings for use in automatic transmission torque converters that quadruple product lifespan. The bearings are included in the turbine component that transfers power from the engine to the transmission. The company made assembly easier to integrating the ball cage and race.

NTN also developed tapered roller bearings used for sprockets in traveling reduction gears for

hydraulic excavators. The advantage of a tapered roller bearing is that it has far greater rigidity and load capacity than angular contact ball bearings. This makes it possible to downsize bearings while maintaining the current required level of rigidity. Furthermore, the company was able to reduce production costs by switching the material for cages from steel to high-strength resin.

In December 2005, NTN established NTN Kamiina Corporation, a wholly-owned subsidiary that mass-produces roller bearings for use in CV joints and other types of bearings. The move was designed to take advantage of growing demand for precision roller bearings in the auto industry. The company has been effective in reducing costs and shortening lead-times.

- Fujikoshi Corp.

Fujikoshi developed energy-saving contactless sealed ball screw support bearings. With an outer diameter of 47-120mm, the bearings are for use in machine tools, injection molding machines, and industrial robots. Reduced start-up and rotational

torque enables energy conservation. The new bearings are in no danger of excessive heat accumulation, thus preventing system inconsistency. In the future, Fujikoshi plans to develop new products for use in electric-powered injection molding machines, precision measuring devices, and semiconductor manufacturing equipment.

- Minebea Co.

Minebea is the world's top manufacturer of special aircraft bearings with a global market share of approximately 50%. The company, in an effort to step up development and production of special bearings for use in aircraft, plans in FY 2006 to double spending to roughly JPY 1.0 billion and to rise the production capacity by 20% over the current level. It also plans to purchase testing equipment necessary for developing bearings for use in Boeing's next-generation 787 passenger airliner. Aircraft demand in BRIC nations (Brazil, Russia, India, and China) is rapidly increasing, and Minebea plans to fulfill this demand and capture an even larger share of the global aircraft bearing market.

(3) Overseas Developments

- JTEKT Corporation

JTEKT has taken steps to strengthen its manufacturing operations in conjunction with the expansion of production at overseas plants operated by Toyota (its main client) and others. The company is considering plans to set up auto bearing manufacturing operations in India and Russia, where demand is expected to increase in the future. In India, JTEKT plans to establish a branch office for the purpose of conducting market research and gauging market demand; if the market offers potential, it plans to establish a full-fledged sales business there. In Russia, Toyota plans to start manufacturing 20,000 Camry cars yearly; consequently, JTEKT plans to set up shop in Romania from where it will supply auto bearings to Toyota's European plants. The synergy between the development and manufacturing technologies of the two companies that merged to form JTEKT could enable the company to further strengthen its competitive strength.

- NSK, Ltd.

NSK is expanding its business operations in Asia, and has partnered with bearing manufacturers in China in order to broaden its sales network there. The company will also soon start manufacturing EPS systems in India in order to meet the needs of Japanese automakers with Indian plants. In Thailand, the company has aggressive plans to expand its workforce and capital investments to record levels in response to increased demand among Japanese automakers with Thai plants.

In March 2006, NSK established a new company in Shanghai that manufactures automatic transmission parts for a broad range of customers, including Japanese-owned manufacturers of cars and automatic transmissions, GM Shanghai, Beijing-Hyundai, and Zhejiang Geely Automobile (Zhejiang).

With a focus on the Chinese market, NSK continues efforts to expand production bases in other

Asian nations primarily to respond to demands from Japanese-owned manufacturers.

- Minebea Co.

Minebea is taking measures to strengthen its vertically-integrated production system. The company leveraged its ability to quickly implement domestic production expertise in overseas plants to successfully bring operations there into compliance with the European Union's RoHS Directive. At its

(4) Future Prospects & Challenges

Finding better ways of tapping demand in the auto industry, which continues to rise, will be a major priority for bearing manufacturers in the future. Put another way, the comprehensive capability of bearing manufacturers as "auto parts manufacturers" will increasingly come into question. The strategic JTEKT merger is expected to have a significant effect on trends in this industry. There are also companies like Minebea and NSK that are focusing the production of special aircraft bearings and electronic components (e.g. pivot assembly parts), respectively. Industry watchers predict that the industry in the future will be oriented along at least these two vectors: auto parts and specialty bearings. As such, competition is expected to become increasingly fierce.

Bearing manufacturers are expected to make

"mother" plant in Karuizawa, Japan, it has made significant advances in the enhancement of production operations and environmental compliance. Procured materials and components are inspected using an X-ray fluorescence spectrometer; when the existence of restricted substances is suspected, inductively coupled plasma (ICP) analytical equipment is used to perform a secondary check. It plans to install these types of inspection equipment at its plants around the world.

further advances into BRIC markets. In particular, Japanese automakers are expected to make efforts to set up manufacturing operations in Russia, and bearing makers will likely follow in order to supply them; they are expected to increase production activities in central Europe, where Japanese automakers have already established manufacturing plants. Furthermore, Japanese automakers have established plants in Brazil; consequently, demand for bearings in that market is expected to increase as well.

Just as with Minebea's RoHS compliance measures, bearing manufacturers – considered as part of the global auto parts and electronic component supplier network – are expected to place a greater focus on compliance with environmental regulations – particularly the EU's RoHS Directive.