

## Principal Products

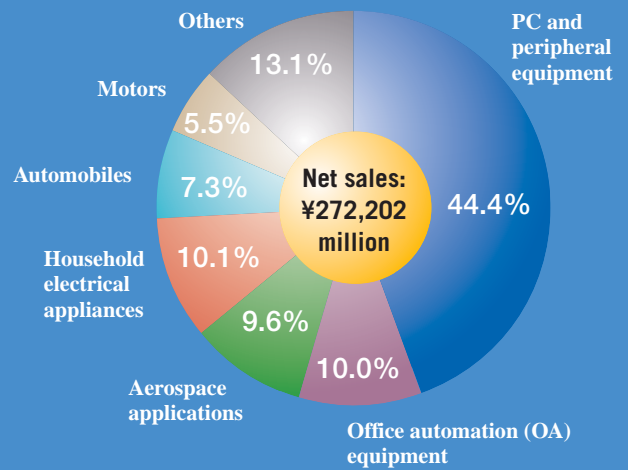
### Applications

Minebea is the world's largest manufacturer of small ball bearings, up to 22mm in external diameter, and has a global market share in excess of 60%. The Company also manufactures a broad range of small motors and other electronic components for which it also enjoys a significant competitive advantage.

Bearings, the core product group in Minebea's Machined Components business segment encompasses standard ball bearings; integrated-shaft ball bearings and RO bearings, for high-end applications; and fluid dynamic bearings, which deliver outstanding quietness and robustness. The Company is positioned to respond swiftly and accurately to customers' needs for quality, manufacturing costs and supply for all of these products. Minebea is also a leading global manufacturer of bearings for highly demanding applications, such as rod-end and spherical bearings, which are used primarily by the aerospace industry.

In addition to mainstay HDD spindle motors, Minebea's Electronic Devices and Components business segment includes fan motors and stepping motors, which maximize the ultraprecision machining and mass production technologies Minebea has accumulated as a manufacturer of small bearings and have given the Company outstanding competitiveness in the electronics market. This competitiveness is also evident in other products in this segment, including PC keyboards and measuring components.

**Sales by Application**  
For the year ended March 31, 2003



#### Miniature and Small-Sized Ball Bearings



Each ball bearing comprises an outer ring, inner ring, balls, retainers, shields and snap rings. Essential to high-precision motors and other rotary components, ball bearings determine rotational accuracy. The average motor contains two ball bearings. Minebea manufactures more than 8,500 different types of miniature and small-sized ball bearings, most of which have external diameters of 22mm or less.

#### RO Bearings



RO bearings are high-precision bearings developed by Minebea for use in HDD spindle motors. Each RO bearing features two raceways on the inside of the outer ring and one each on the shaft and the inner ring fitted on the shaft, essentially combining the functions of two bearings in one. In addition to preventing misalignment and minimizing Non-Repeatable Run Out (NRRO), RO bearings facilitate more compact motor designs.

#### Fluid Dynamic Bearings



In a fluid dynamic bearing, a thin layer of oil or other lubricant is injected between the shaft and sleeve. The structure of the bearing features a rotating shaft, which generates a hydrodynamic force, causing the shaft to float. The noncontact construction of this bearing makes it particularly suited for improving rotational accuracy and enhancing quietness and robustness. The ultraprecision machining and mass production technologies Minebea has cultivated as a manufacturer of ball bearings also ensure a sharp competitive edge in terms of quality and manufacturing costs of fluid dynamic bearings.

#### Integral-Shaft Ball Bearings



An integral-shaft ball bearing has two raceways on the shaft, allowing the integration of the inner ring and shaft of two ball bearings. This facilitates more precise rotation than is possible with two independent ball bearings, making integrated-shaft ball bearings particularly suited to applications such as cylinder units for video cameras.

#### Pivot Assemblies



Pivot assemblies are fitted into the base of actuators to position HDD magnetic heads. Minebea enjoys the top share of the global market for these components. Standard pivot assemblies combine one or two ball bearings between a shaft and a graded sleeve.

#### Journal Bearings



Journal bearings are used in helicopters, primarily in the main rotor axes, and landing gear for fixed wing aircraft.

#### Rod-End Bearings



Used in aircraft components, such as wing flaps, engine and wing mounts and hatches, rod-end bearings function as joints. These bearings are also used extensively in helicopters, trains and automobiles.

#### Precision Machined Parts

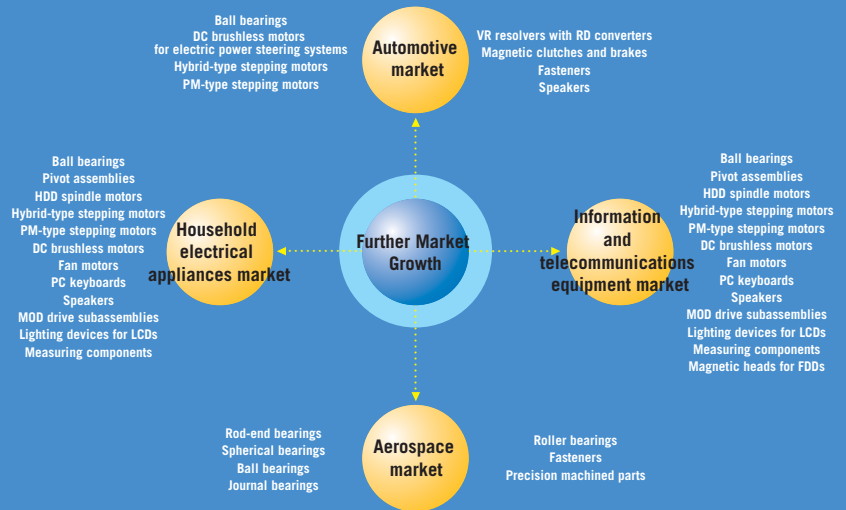


These parts combine bearings and other machined components and are used primarily to join aircraft parts together.

## Markets

When Minebea started out, it primarily supplied bearings for use in aircraft instruments and dental handpieces. The advent of the videocassette recorder (VCR) in the 1970s, OA equipment in the 1980s and PCs and information and telecommunications equipment in the 1990s, however, spurred market expansion and demands for ever-higher performance, a trend that boosted demand for Minebea's ball bearings, small motors and other ultraprecision components.

In addition to continued growth, these markets are expected to see demand rise for products that offer increased energy efficiency, safety and convenience. Accordingly, demand for precision motors and control sensors is rising, particularly from manufacturers of automobiles, information and telecommunications equipment—such as cellular phones and mobile devices—and digital household electrical appliances. Accordingly, Minebea expects new opportunities to maximize the competitive edge afforded by its ultraprecision machining and mass production technologies to enhance its responsiveness and cultivate customers in these important markets.



### Hybrid-Type Stepping Motors



These motors rotate at fixed angles by digitally controlled electronic pulses and are used in the paper-feeding devices of printers, copy machines, facsimiles and similar equipment. Hybrid-type stepping motors combine a rotor with a permanent magnet (PM) and a magnetic body and use ball bearings. PM-type stepping motors use a PM as a rotor and contain no ball bearings.

### PM-Type Stepping Motors



### Fan Motors



Fan motors are used to cool the inside of PCs and other OA equipment by directing heat outside. In September 2002, Minebea concluded a strategic joint development and consignment production agreement with Matsushita Electric Industrial Co., Ltd. The integration of the two companies' technologies will facilitate the development of high-performance and highly cost-competitive fan motors.

### PC Keyboards



Frames, key switches, membrane sheets and other key components are manufactured in-house. Minebea supplies keyboards on an OEM basis to leading global PC manufacturers for use in desktop and notebook PCs. The Company also markets multimedia keyboards under its own brand name.

### HDD Spindle Motors



HDD spindle motors are what cause the disks in HDDs to rotate. The precision of HDD spindle motors determines the capacity and speed of HDDs, making these components critical to HDD performance. Accordingly, HDD spindle motors must offer superior performance in terms of rotational speed and low NRRO. Minebea manufactures ball bearings, including RO bearings, and fluid dynamic bearings for HDD spindle motors in-house, giving it a sharp competitive edge in this key market.

### HDD Spindle Motors with Fluid Dynamic Bearings



### Lighting Devices for LCDs



Minebea manufactures lighting devices for LCDs used in cellular telephones, personal digital assistants (PDAs) and other applications. These lighting devices involve front and back lights, both of which comprise white light-emitting diode (LED) chips with micro-order prisms, facilitating unparalleled brightness and quality.

### Speakers/Speaker Boxes



Minebea capitalizes on its pressing and plastic injection-molding technologies to manufacture speakers. Speakers are also fitted into speaker boxes and supplied as units to leading global audio equipment manufacturers on an OEM basis.