

Minebea manufactures and sells a wide range of products around the world. These include ball bearings and other precision components that apply its expertise in ball bearings; aircraft components, notably rod-end and spherical bearings and high-end fasteners; and electronic components used in information and telecommunications equipment. Minebea and the companies of the Minebea Group also cooperate closely to conduct R&D in each of these fields.

Minebea has established six R&D bases, two in Japan (Karuizawa and Hamamatsu plants) and one each in Thailand, Singapore, China, the United States and Europe.

In fiscal 2006, R&D costs for the Minebea Group amounted to ¥9,048 million. This included ¥212 million allocated to basic research in Thailand, Singapore and China, including basic materials analysis and other research that cannot be apportioned to individual businesses.

R&D activities in each of our business segments in fiscal 2006 were as follows.

Machined Components

Efforts in the ball bearings business focused on product development, as well as on efforts designed to reinforce competitiveness and facilitate the steady, ongoing expansion of business. During the period, we established a Basic Bearings Technology Department within the Engineering Headquarters, with the aim of facilitating cross-business efforts to develop basic bearings technologies with a medium- to long-term perspective. R&D achievements included the development of a special grease for ball bearings used in copiers, printers and other information equipment that boasts four times the electroconductivity of existing greases. In line with our commitment to environmental protection, we also developed a small penetration grease and a high-precision machining technology especially for ball bearings used in high-efficiency, power-smart household electrical appliances. This achievement led to the development of a new ball bearing with lower torque than bearings previously available. In the area of bearings for use in aircraft, we completed development of a low-torque lever pinion bearing especially for the wing strut of the main passenger planes produced by European aerospace manufacturers and proceeded with development of a roller bearing for the next-generation of passenger planes to be offered by North American aerospace manufacturers.

In March 2006, our R&D center in Thailand was recognized by the Thai Ministry of Industry for its work in analyzing hazardous chemical substances, including lead, cadmium, mercury and hexavalent chromium. The same month, our R&D center in Shanghai was recognized by the government of China for its analysis work. Such acknowledgments assist our efforts to provide reliable analysis data to customers, as well as help us to reinforce management of chemical substances that could negatively affect the environment at our principal manufacturing bases.

R&D costs in the Machined Components segment in fiscal 2006 amounted to ¥1,828 million.

Electronic Devices and Components

In mainstay rotary components, we focused on the development of fan motors, stepping motors, PM-type stepping motors, HDD spindle motors and other products, as well established a Motor Technology Department within the Engineering Headquarters with the aim of facilitating cross-business efforts to develop basic motor technologies with a medium- to long-term perspective. For some years, we have been conducting research aimed at improving control technologies for specialty motors with the aim of increasing performance efficiency. We have also applied these technologies to develop VR resolvers and sensorless drive motors.

In other electronic devices and components, efforts in magnetic application and display-related products focused on R&D in the areas of materials technology, core technologies and product-related technologies. Magnetic application products include rare earth bond magnets for various types of motors and transformers for inverters, while display-related products include backlight assemblies for LEDs used in mobile devices and car navigation systems, inverter circuits for cold-cathode tubes used in LCD TVs, and high-pressure mercury lamp ignition circuits and optical units for projectors. By integrating and applying materials, core and product technologies developed through such research efforts, we have also developed a high-performance color wheel, an optical component for projectors, which was commercialized in early 2006.

We are also promoting the development of LCD backlight assemblies for next-generation mobile devices, optical components for projectors, and LED modules and other optical components for flat panel displays, by combining our noted ultraprecision machining, mold production and molding technologies with CAD/CAE engineering, optical engineering, thin film-formation and photolithographic technologies. In addition, we are combining analog circuit and thermal engineering technologies to develop such products as inverters for cold-cathode tubes used in next-generation LCD TVs, as well as xenon lamp inverters and next-generation, high-pressure mercury lamp circuits.

In fiscal 2006, R&D costs in the Electronic Devices and Components segment amounted to ¥7,008 million.