

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 bearings and high-end fasteners; and electronic components used in state-of-the-art electronics 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. These bases strive to leverage their particular expertise and promote complementary R&D with the aim of accelerating the development of products that will lead to the creation of new businesses.

In fiscal 2008, R&D costs for the Minebea Group amounted to ¥9,950 million. This included ¥385 million allocated to basic research at R&D centers in Thailand, Singapore and China, such as basic materials analysis, and other research that cannot be apportioned to individual business.

R&D activities in each of our business segments in fiscal 2008 are outlined below.

Machined Components

R&D in this segment focused on mainstay bearings, that is, on developing materials, lubricants, machining and processes, and on tribology for ball, rod-end and fluid dynamic bearings. Efforts also focus on responding to rising demand for all types of bearings, buoyed by robust operating conditions, from the information equipment, home electrical appliance, automobile and aerospace industries, and on responding to the requirements of manufacturers in new areas, through high-reliability and applied engineering.

With the majority of HDDs now using perpendicular magnetic recording to achieve higher recording densities, the cleanliness of key components has become an increasingly crucial consideration. To ensure a high level of cleanliness for our mainstay HDD-related products, which include fluid dynamic bearings, spindle motors and base plates, we have actively developed clean manufacturing technologies. We are also working to develop ever-smaller miniature ball bearings. Recently, we completed prototype production for the world's smallest miniature ball bearings, boasting an outer ring diameter of 1.5 mm and an inner ring diameter of just 0.5 mm.

In the area of bearings for the aerospace industry, we have completed development of and received approval for tierod mechanical assemblies, trunnion bearings for main landing gear and a wide range of bearings for flight control systems, by applying technology used in our rod-end bearings. These bearings will be marketed primarily to aircraft manufacturers in Europe and the United States.

R&D costs in the Machined Components segment in fiscal 2008 amounted to ¥2,488 million.

Electronic Devices and Components

Mainstay motors in this segment include fan motors, stepping motors, brush DC motors, brushless DC motors and HDD spindle motors. We are working to enhance our various core analysis technologies, control technologies and materials technologies, with the aim of being the first to launch advanced products that respond to customer requirements for compact size, high efficiency (low energy consumption), quietness and reliability, which vary depending on type of motor and application. For magnetic application products, our R&D efforts emphasize materials technology, core technologies and product-related technologies. These efforts continue to yield such outstanding products as rare earth bond magnets for high-performance motors and resolver sensors. To reinforce product development for HMSMs, which we have resolved to commercialize in fiscal 2009, we began conducting R&D combining our motor, fan, electronics and other technologies.

In the area of display-related products, we developed a new LCD backlight for high-brightness, high-efficiency LEDs, which we are proposing to manufacturers of cellular telephones and digital cameras. In addition to our noted ultraprecision machining, mold production and molding technologies, we succeeded in developing plastics molding technologies capable of accommodating larger, thinner optical devices and increasingly fine optical patterns. This has positioned us to expand our focus to include LED backlights for notebook and desktop PC monitors, for which LEDs are rapidly becoming mainstream.

In electronics-related products, we are promoting the development of driving circuits for high-efficiency backlight inverters for cold cathodes. We are also pursuing cutting-edge development in such areas as driving circuits for rare gas fluorescent lamps, which are expected to contribute to efforts to conserve energy. Moreover, by shifting from analog to digital control circuits, we have succeeded in significantly reducing the number of parts used, as well as in improving control precision, thereby enabling us to reduce engineering lead times. During the period under review, we also made notable achievements in the development of backlight inverter-related products, including tailored ICs and software, which we expect to contribute to increased sales of backlight inverters going forward. Additionally, in the area of wireless transmission technology, in which we began to pursue development efforts in fiscal 2007, we completed basic technological investigation and expect to move on to the next stage, i.e., actual product development, which will focus on PC keyboards, in the near future.

In fiscal 2008, R&D costs in the Electronic Devices and Components segment totaled ¥7,077 million.