

Minebea's Core Competencies







Ultraprecision Machining Technologies

Miniature and Small-Sized Ball Bearings: The Origin of Minebea's Ultraprecision Machining Technologies

The raceway roundness of the inner and outer rings for ultraprecision ball bearings manufactured by Minebea for use in applications requiring high precision, such as VCR cylinders and pivot assemblies for

HDDs, is less than 0.05 micron. One micron is 1/1,000th of one millimeter—a particle of cigarette smoke is between 0.01 mm and 1.0 micron. Minebea's ability to mass produce ultraprecision machined products is the root of its competitive advantage.

An approach to production that ensures consistently superior-quality products from Minebea's 10 mass production bases worldwide

Snap Rings	Shields	Retainers	Inner Rings	Balls	Outer rings
<p>Snap rings are C-shaped steel wires used to affix metal shields to outer rings.</p>	<p>Shields are fitted onto outer rings to prevent foreign matter and dirt from penetrating and lubricants from escaping. Materials commonly used to manufacture shields include metal, rubber and resin.</p>	<p>Retainers are used to separate the balls housed between the inner and outer rings and keep them in place within the raceway. Retainers are usually made of metal or resin.</p>	<p>The inner ring has a raceway on the outside in which the balls roll. Inner rings are made from chrome or stainless steel.</p>	<p>Balls—usually between five and 13, although the number varies depending on the type and size of bearing—are housed between the inner and outer rings. The most prevalent materials are chrome and stainless steel, with ceramics also popular.</p>	<p>The outer ring of a ball bearing has a raceway on the inside, in which the balls roll, and grooves on the top and bottom which hold protective shields. Outer rings are made from the same materials as inner rings.</p>
					
Pressing	Pressing	Pressing	Cutting ↓ Heat treatment ↓ Grinding ↓ Super finishing	Cold forging ↓ Polishing ↓ Super finishing	Cutting ↓ Heat treatment ↓ Grinding ↓ Super finishing

Ultraprecision machining technologies and mass production of superior-quality products

The level of precision in each ball bearing production process is an essential factor in determining the quality of the finished product.

Minebea conducts all processes in-house, as well as manufactures the dies, jigs, tools and production and assembly equipment used therein. This ensures consistently superior-quality products from Minebea's 10 mass production bases worldwide.

A global network of ball bearing production facilities



Thailand

NMB Thai Ltd.



Singapore

Pelmech Industries (Pte.) Ltd.



Thailand

Pelmech Thai Ltd.
NMB Hi-Tech Bearings Ltd.



Singapore

NMB Singapore Ltd.



China

Minebea Electronics & Hi-Tech Components (Shanghai) Ltd.



United States

New Hampshire Ball Bearings, Inc.
Chatsworth plant



United States

New Hampshire Ball Bearings, Inc.
Peterborough plant



United Kingdom

NMB-Minebea UK Ltd.
Skegness plant



Karuzawa Manufacturing Unit (Parent plant)






Production and maintenance of dies, jigs and tools




Production of pressed parts



Production of steel balls



Cutting



Heat treatment



Grinding and polishing



Assembly



Polishing

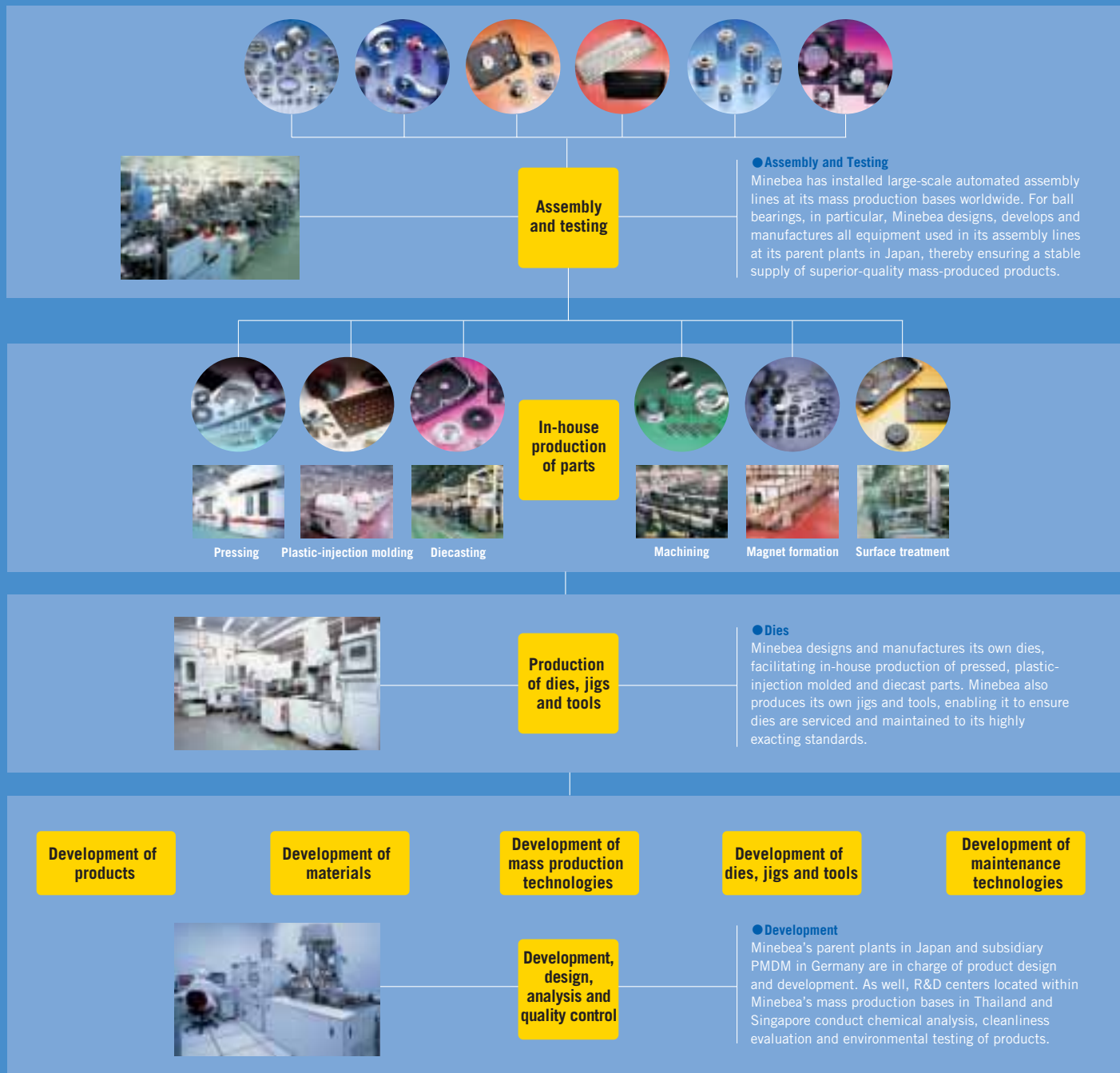
Vertically Integrated Manufacturing System

Minebea's vertically integrated manufacturing system maximizes its ultraprecision machining technologies

The level of precision in each production process is an essential factor in determining the quality of the finished product. Minebea's vertically integrated manufacturing system enables it to conduct all

processes in-house—design and development; manufacture and maintenance of dies; production of pressed, plastic-injection molded, diecast and machined parts and ferrites; and final assembly. This system facilitates mass production of Minebea's ultraprecision components.

Vertically Integrated Manufacturing System



Mass Production Technologies

Minebea's vertically integrated manufacturing system facilitates the use of its mass production technologies

Responding swiftly and effectively to the increasingly diverse needs of customers requires unparalleled superiority in terms of supply capabilities and manufacturing costs. All of Minebea's mass production facilities worldwide operate under the same vertically integrated

manufacturing system. Productive, organic links between facilities—especially those in Thailand, China and Singapore, which account for approximately 80% of the Minebea Group's production, the parent plant in Japan and global R&D bases—ensure the effective integration of Minebea's vertically integrated manufacturing system and mass production technologies.

