

**Developing Unparalleled Precision Machining Technologies**



**BALL BEARINGS**

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Often called the primary element of industry, ball bearings are found in innumerable products in contemporary society. The precision of the ball bearings used in these products plays a crucial role in determining their performance.

Miniature and small-sized ball bearings, particularly those up to 22 millimeters in external diameter, are the most prevalent classes and are used extensively in information and telecommunications equipment, as well as household electrical appliances. Minebea is the world's leading manufacturer of these ball bearings, with a 65% global market share.

Growing technological sophistication in key customer industries continues to spur demand for higher levels of ball bearing precision. In particular, the growing technological sophistication of HDDs is increasing demand on bearing manufacturers to achieve constantly higher levels of quality. Moreover, such industries demand this improved quality at greater-than-ever levels of production. Minebea's unmatched competitiveness in this market and reputation for product reliability are due to its unique vertically integrated manufacturing system, which facilitates internal sourcing of all parts used in its ball bearings.



**TOPIC**

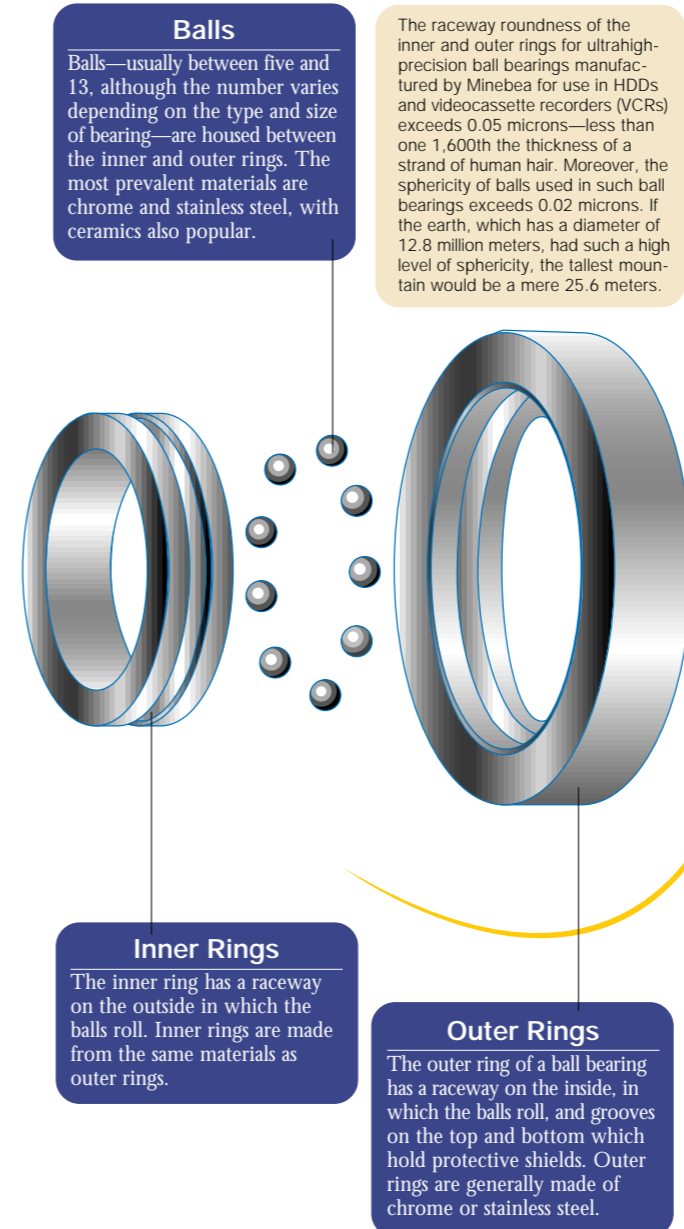
**Raceway Roundness and Ball Sphericity**

Improving the raceway roundness of a ball bearing's inner and outer rings and the sphericity of the balls greatly enhances the bearing's rotating speed, non-repeatable run-out (NRRO), sound level and life span. This, in turn, strengthens the quality of the motors or other components in which the bearing is used. Minebea develops and builds all jigs and tools used in the production of ball bearing parts in-house, enabling it to ensure consistently high levels of raceway roundness and ball sphericity for ball bearings manufactured at its 10 mass-production facilities worldwide.

Minebea produces approximately 8,500 different varieties with outer-ring external diameters between three millimeters and 28 millimeters, with monthly output worldwide totaling approximately 120 million pieces.

**● Bearings**

External diameter (mm) 3 5 7 9 11 13 14 16 20 22 28



**Internal Sourcing of All Parts**

The typical ball bearing comprises an outer ring, inner ring, between five and 13 balls, two retainers, two shields and two snap rings. Enhancing the precision of each of these parts is essential to raising the quality of the finished ball bearing. Minebea manufactures all parts used in its ball bearings in-house, giving it complete control over part precision and enabling it to mass-produce ball bearings of unsurpassed quality.

**Minebea's Vertically Integrated Manufacturing System**

The level of precision in each ball bearing production process is another essential factor in determining the quality of finished products. Minebea conducts all processes in-house, as well as manufactures most production and assembly equipment used therein, thus ensuring complete control over the precision of each process and facilitating mass-produced superior-quality ball bearings.

