

THK Products



LM Guides are machine parts that are essential to the precision and speed of machine tools and various other industrial machinery. In the future their application will expand from capital goods to consumer goods.

About LM Guides

Machine movement can be classified into two primary types: rotary motion and linear motion. To put it in everyday terms, spinning around on a swivel chair is rotary motion, and opening and closing a drawer is linear motion. THK's linear motion (LM) guide is an essential machine part that smoothly transforms the sliding linear motion of mechanical devices into a rotary motion, ensuring uniform and precise movement.

Until relatively recent times, the sliding motion that occurs in machines when rotary and linear motion parts meet created friction, producing resistance and heat. Smoothness and speed were also low. Approximately a century ago, the invention of rotary bearings solved these problems for rotary motion parts.

The linear bushing, which uses balls to create rotary motion in linear motion parts, was developed in the 1960s. But linear bushings were not durable enough, making them unsuitable for widespread use in machining equipment. Linear motion parts weren't capable of rolling with the necessary smoothness and speed until THK introduced the LM Guide in 1972. The LM Guide, characterized by strength and long life, came into common use in machining equipment after a major American machine tool manufacturer adopted it.

Our LM Guides are currently employed in a broad range of capital goods, including machine tools, industrial-use robots and semiconductor production equipment. We have also recently expanded the LM Guide's application range to include uses closer to the end consumer, including

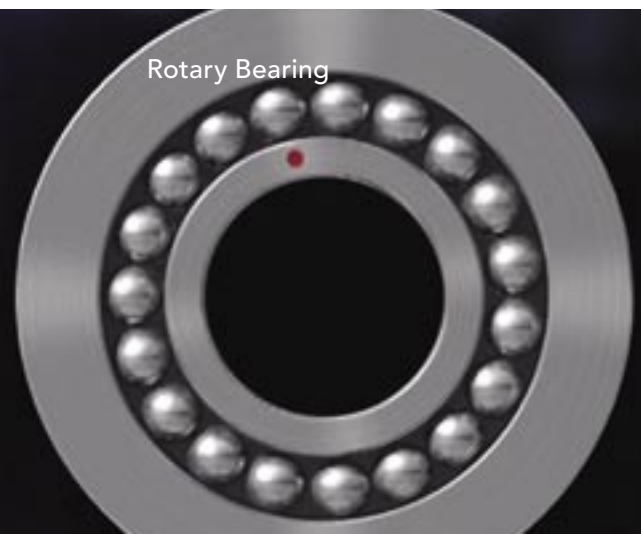
seismic isolation devices to protect human life, buildings and property from the threat of earthquakes as well as parts to improve the safety and comfort of automobiles.

As the world's LM Guide pioneer, and as the top maker with a No. 1 market share, THK offers a wide range of products to respond to the various needs of our customers.

LM Guide

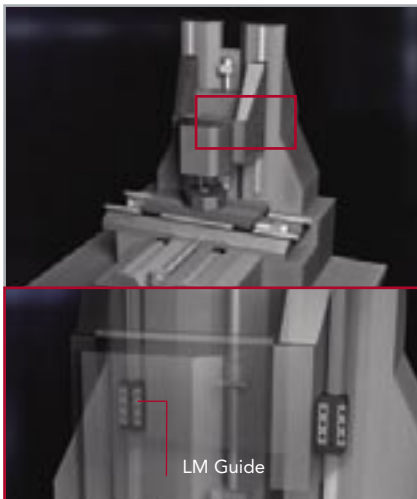


Rotary Bearing



LM Guide with Caged Ball Technology

LM Guides with Caged Ball Technology keep the balls within the ball cage in the form of a belt, preventing the balls from coming into contact with one another and resulting in long service life and less noise, heat and dust. This contributes to overall cost reductions for our clients.



Application of LM Guides (Machine tools)

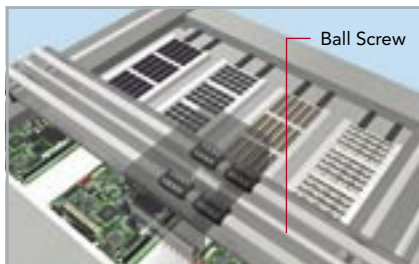
Our company's main product now is the next-generation LM Guide, the LM Guide with Caged Ball Technology, a pioneering device we developed in 1996. The ball cage is a resinous part that maintains and guides the balls. Compared to the previous LM Guide, the caged ball model creates less noise, has a longer life, and a longer maintenance-free period. It also offers increased speed and eliminates interference noise and friction between balls. The LM

Guide with Caged Ball Technology is used in all types of industrial machinery, including machine tools and semiconductor production equipment.

THK maintains a full line of other products in addition to these LM Guides.

Ball Screw with Caged Ball Technology

Ball Screws with Caged Ball Technology have the balls evenly spaced within a cage, resulting in more speed, long service life, and less noise in keeping with the needs of our clients.



Application of Ball Screws (Electronics-related machinery)

The Ball Screw is an essential machine part that transforms rotary motion into linear motion by rotating multiple balls between the screw shaft and the nut. Its primary use is in the drive portion of linear motion parts in industrial-use machinery. The Ball Screw with Caged Ball Technology employs a ball cage, along with the older Ball Screws. The ball cage offers increased speed, reduced noise and

longer life in machine tools, industrial-use robots, semiconductor production equipment and other machines. THK also produces high-load Ball Screws, perfect for replacing hydraulic cylinders in injection molding machines, presses, die-cast machines, blow molding machines, extrusion molding machines and many more applications.

Actuator

This is our Actuator series that combines LM Guides and Ball Screws or Linear Motors. The integrated structure allows for compactness as well as high precision and rigidity.



Application of Linear Motor Actuator
(Medical instruments)

An Actuator is a combination of an LM Guide with either a Ball Screw or a Linear Motor.

The need for such modules is growing in order to shorten development time and reduce manufacturing lead time, primarily in the electronics industry. We are planning an expansion of the Actuator lineup. The Linear Motor Actuator, for example,

is a unit product that combines a Linear Motor, a linear encoder and an LM Guide with Caged Ball Technology, producing smooth movement and highly precise positioning. We provide not only individual components but also this type of hybrid product to serve the increasingly diverse needs of our customers.

Link Balls

Link Balls utilize an all-in-one manufacturing process which makes use of an aluminum die-cast. As a result, they are light-weight but also highly resistant to corrosion and wear-and-tear. They are extensively used in the underbody of automobiles.



Application of Link Balls (An automobile)

Link Balls are spherical joints primarily used as automotive parts. They are created through a unique process that involves placing precision-made steel ball bearings on a spherical surface, wrapping this in a die-cast and then, after molding the holder, welding the shank portion. Using a unified aluminum die-cast for molding improves resistance to corrosion and reduces friction, and also greatly reduces weight when compared to older steel

products. Link Balls are often used in the undercarriage system, such as in height sensors and the joints connecting the automobile's stabilizers and the suspension, which improves vehicle safety and comfort. Beginning with the major automakers, use of Link Balls has been on the rise worldwide.