

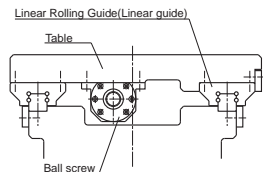
# A-1 Characteristics of NSK Linear Rolling Guides

## Characteristics of the NSK linear rolling guides are:

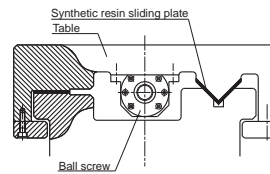
- Designs are simple and economic. This contributes to highly accurate and low cost machines.
- Low friction coefficient facilitates a compact and low cost driving mechanism.
- Ultra-high purity of materials and superb processing technology provide long-term highly reliable operation.
- Prompt delivery thanks to interchangeable components variation.
- The user can select the most suitable guide from a variety of the ball guides and roller guides.

## A-1-1 Comparison of Rolling Guides and Sliding Guides

The following describes a characteristic comparison between general rolling and sliding guide.



Example of rolling guide



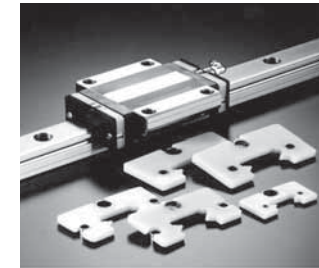
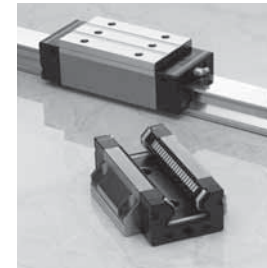
Example of sliding guide

### Comparative characteristics of rolling and sliding guide way

Function	Rolling guide	Sliding guide
Friction	<ul style="list-style-type: none"> <li>• Friction coefficient: 0.01 or lower</li> <li>• Difference between static and dynamic friction is small.</li> <li>• Change by speed is slight.</li> </ul>	<ul style="list-style-type: none"> <li>• Friction is great.</li> <li>• The difference between static and dynamic friction coefficient is great.</li> </ul>
Positioning accuracy	<ul style="list-style-type: none"> <li>• Lost motion is slight.</li> <li>• Stick-slip is slight.</li> <li>• Easy to achieve sub-micron positioning</li> </ul>	<ul style="list-style-type: none"> <li>• Lost motion is great.</li> <li>• Stick-slip at low speed is great.</li> <li>• Difficult to achieve sub-micron positioning</li> </ul>
Life	<ul style="list-style-type: none"> <li>• Possible to estimate useful life</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to estimate useful life</li> </ul>
Static rigidity	<ul style="list-style-type: none"> <li>• Generally high</li> <li>• No play because of preload</li> <li>• Easy to estimate rigidity</li> </ul>	<ul style="list-style-type: none"> <li>• Rigidity is great against load from a particular direction.</li> <li>• There is mechanical play.</li> <li>• Difficult to estimate rigidity</li> </ul>
Speed	<ul style="list-style-type: none"> <li>• Wide range of use from low to high speed</li> </ul>	<ul style="list-style-type: none"> <li>• Unsuitable for extremely low or high speed</li> </ul>
Maintenance, reliability	<ul style="list-style-type: none"> <li>• Long life through simple maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Precision is lost greatly by deteriorated guide surface.</li> </ul>

In response to the demand for guideways with high-speed, high-precision, high-quality, as well as to the demand for easy maintenance, rolling guides which have above features are becoming prevalent. Utilizing the technology we sharpened in anti-friction rotating bearings, NSK makes various types of rolling linear guides which are highly accurate and reliable.

## A-1-2 Structure and Characteristics of NSK Linear Guides



### (1) Structure of NSK Linear Guides

By avoiding structural complexity, and by reducing the number of components, we not only enhanced the precision of linear guides, but also are able to keep costs low. We have added NSK's patented unique structural feature to the original invention (Fig. 1). This contributes to higher precision and lower prices.

NSK linear guide consists of a rail and a ball or roller slide (Fig. 2). The balls or rollers roll on the race way surface, and are scooped up by the end caps attached to both ends of the ball or roller slide. Then, the balls or rollers go through a passage made in the ball or roller slides and circulate back to the other end.

### (2) Characteristics of NSK Linear Guides

The use of a unique offset Gothic arch groove (Fig. 3) allows the ball type of NSK linear guides to satisfy groove designs required for specific purposes.

This unique ball groove design facilitates precise measurement of the ball groove, thus enabling stable and highly accurate production of the ball slides and the rails for random matching. (Fig. 4)

On top of that, we have developed and marketed the NSK Roller Guides, representing the culmination of NSK's analysis technology and tribology.

Such technologies ensure the feature of NSK linear guides outlined below.

#### 1 High precision and quality

- High precision and quality come from our superb production and measuring technologies, strengthened by extensive experience in antifriction rotary bearings and ball screw production. Our quality assurance extends to the smallest components.

#### 2 High reliability and durability

- Logical simplicity in shape, along with stable processing, maintains high precision and reliability.
- Super-clean materials, our advanced heat treatment and processing technologies increase product durability.

#### 3 Abundant in type for any purpose

- Various series are available, and their slide models and size categories are standardized to satisfy any requirement. Our technology, polished by abundant experience in the use of special materials and surface treatments, meets the customer's most demanding expectations.

#### 4 Development of random-matching parts for short delivery time

- The adoption of the Gothic arch groove which makes measuring easy, and a reliable quality control method has made random-matching of the rails and the ball slides possible. The parts are stocked as standard products, thereby reducing delivery time.

#### 5 Patented static load carrying capacity (impact-resistance)

- When a super-high load (impact) is applied, our Gothic arch groove spreads the load to contact surfaces which usually do not come into contact in ball type. This increases shock resistance (Fig. 5).

#### 6 Lineup of extremely high-load capacity series

- The LA series provides a top class high-load capacity for the ball linear guides through a unique load carrying configuration with three ball recirculation circuits on the one side.

By installing rollers that are the largest possible diameter and length, the NSK roller linear guides have realized the world highest load capacity, far superior to the roller linear guides of other companies.

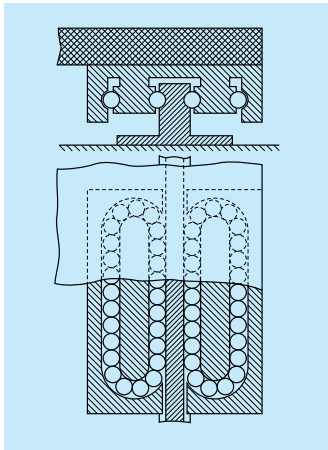


Fig. 1 • French Patent in 1932.  
• Inventor : Gretsh (German)

NSK added its patented technology to the invention in Fig. 1, and improved the linear guide structure and realized low cost design.

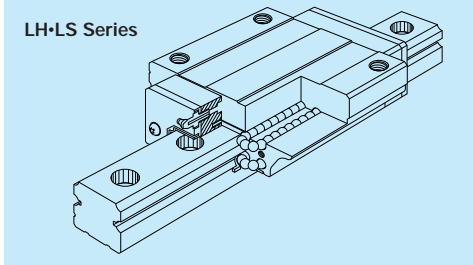
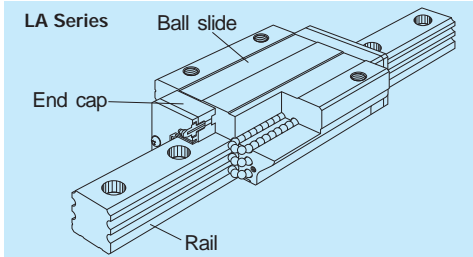
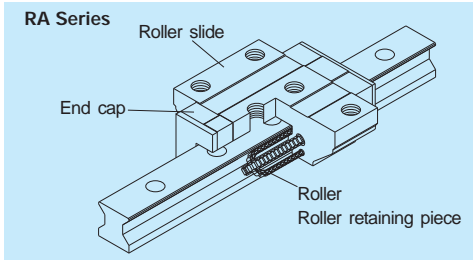


Fig. 2 Structure of NSK linear guides

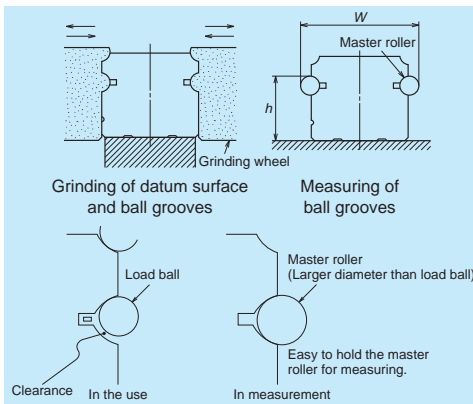


Fig. 4 Processing and measuring grooves

Measuring grooves is easy. You can obtain highly accurate results for all types of NSK series. This is why you can purchase rails and slides separately for random matching.

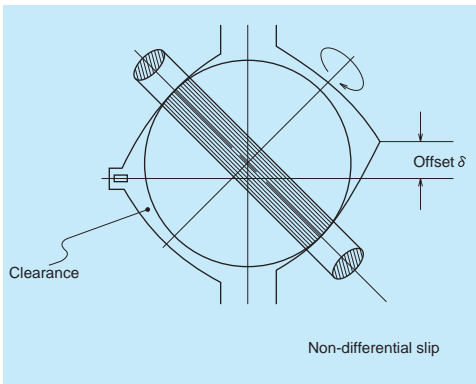


Fig. 3 Two contact point at offset Gothic arch groove

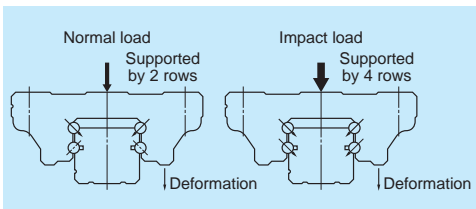


Fig. 5 Shock-resistance