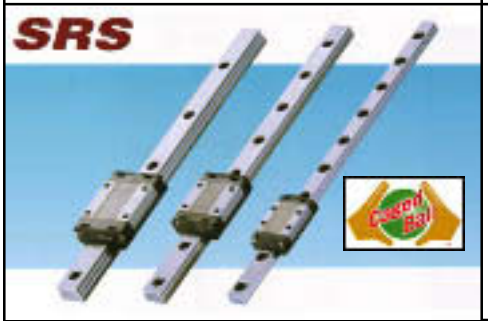
THK LM Rail Selection Guide

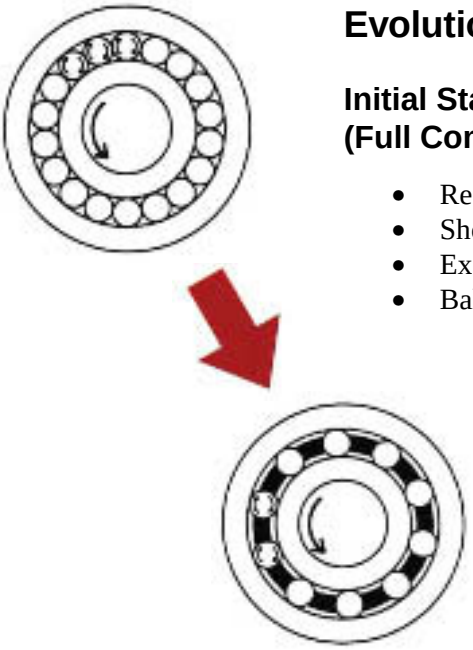
PHOTOGRAPH	DESCRIPTION	PAGE
	**SSR: High Radial Load Capacity LM Guides** **Caged Ball™ Technology** **Sizes: 15, 20, 25** *High load capacity and very rigid in radial direction.*	**64**
	**SHS: 4-Way Equal Load Capacity LM Guides** **Caged Ball™ Technology** **Sizes: 15, 20, 25** *Compact design with low center of gravity and high rigidity. Conforms to type HSR.*	**66**
	**SHW: Low Profile Wide Rail LM Guides** **Caged Ball™ Technology** **Sizes: 17, 21, 27** *Ideal choice for locations where space is very limited and rigidity under M_c Moment is required. Conforms to type HRW.*	**68**
	**SRS: Miniature LM Guides** **Caged Ball™ Technology** **Sizes: 9, 12, 15** *Bearing is compact and lightweight with a single row of balls on each side of the rail. Conforms to type RSR.*	**70**
	**SR: High Radial Load Capacity Conventional LM Guide** **Size: 20** *High load capacity and very rigid in radial direction.*	**72**

Introduction to the Caged Ball™ Concept

When rotary ball bearings were originally introduced over 150 years ago, they were not equipped with a cage. This design resulted in high noise levels, short service life and low maximum rotating speed. Consequently, the cage was introduced into the bearing design resulting in low noise levels and high rotating speeds. In addition, the bearings equipped with the cage demonstrated long service life despite the reduced number of balls vs. the full complement type. Rotary ball bearings with the cage evolved significantly over the years, thus allowing for a wide range of applications.

The same cage concept would clearly work in linear ball bearings, except for elliptical path of the balls inside the linear bearings being different from the circular path of the balls inside rotary bearings. Thus, the metal cage employed by the rotary bearings could not have worked for the LM Guides.

THK, the first manufacturer in the world to develop the LM Guide, is also the first to introduce the LM Guide that incorporates Caged Ball™ Technology. This revolutionary LM Guide is able to achieve a dramatic improvement in performance over conventional products. It delivers long service life and excellent high-speed performance in the same manner as rotary bearings equipped with cage, while eliminating maintenance for prolonged periods of time.



Evolution of Rotary Bearings

Initial Stage of Development (Full Complement of Balls)

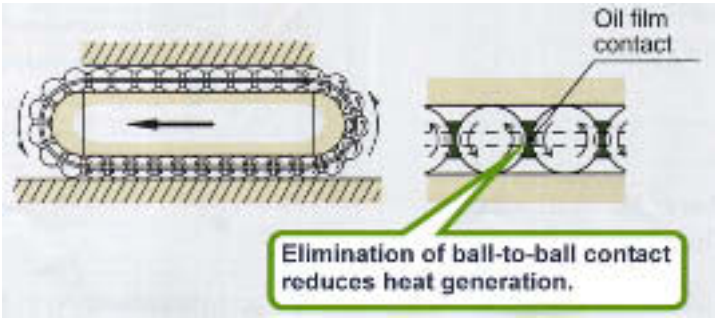
- Reduction of grease life
- Short service life
- Excessive heat generation
- Ball collision noise

Current Design (with Cage)

- Excellent grease retention inside the cage
- Extended service life
- Low heat generation
- Elimination of noise caused by metal-to-metal contact between the balls
- Smooth operation due to orderly ball movement

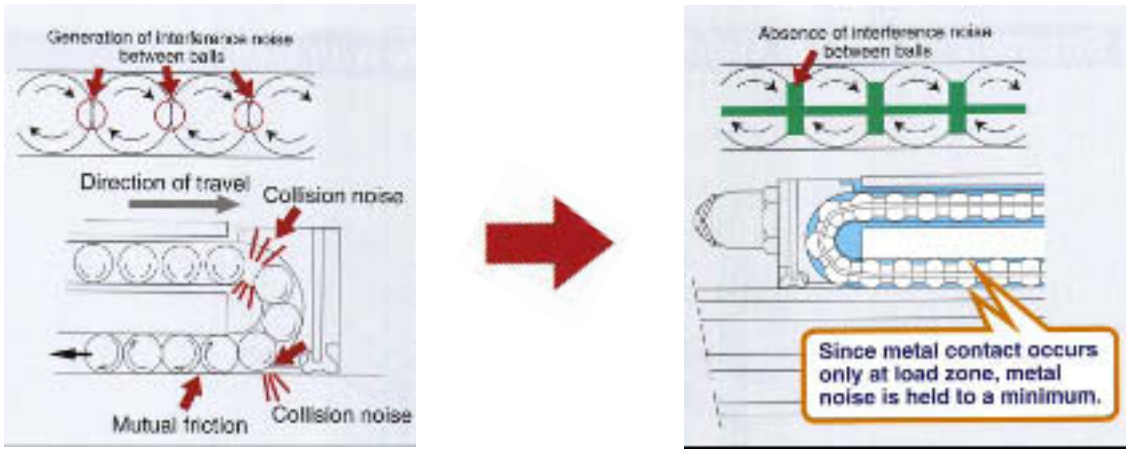
Advantages of Caged Ball™

1. **Excellent High-Speed Performance**
   The use of ball cage eliminates generation of heat caused by friction between balls resulting in excellent high-speed performance.



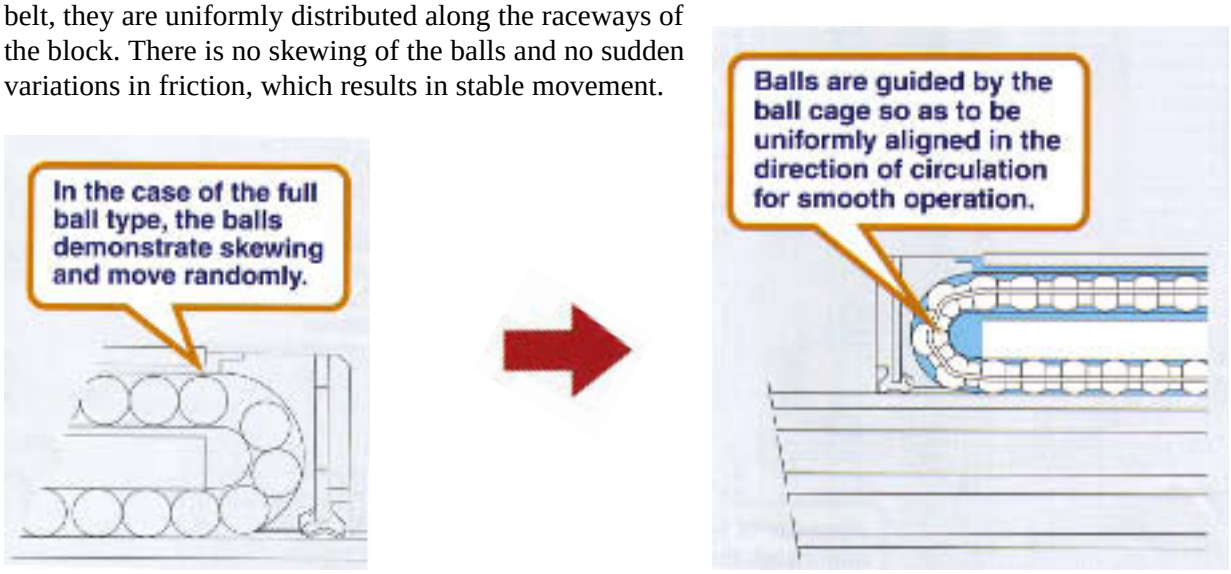
2. Quiet Operation

Metal-to-metal contact between the balls is eliminated by the ball cage resulting in a quiet operation.



3. Orderly Ball Movement

Since the balls are held by the ball cage in the form of a belt, they are uniformly distributed along the raceways of the block. There is no skewing of the balls and no sudden variations in friction, which results in stable movement.



4. Long-term Maintenance-free Operation

Grease pockets are provided consecutively over the entire ball circulating path to constantly lubricate the balls enabling long-term maintenance-free operation.