

PRECISION IMPROVEMENT OF THE LM GUIDE

The merits of the LM Guide include its easy maintenance and the improvement of the machines productivity. Also, it includes a high energy saving and a better improvement of the design with a low total cost.

Changing the load condition of the body in the different stroke generates a waviness phenomenon. Therefore, it was adopted the guidance of the static oil pressure for the high performance machine.

The goal is adding the merit of achieving the ultra-high precision of the LM Guide by realizing the waving of nano-level.

HOW TO MINIMIZE THE WAVING

As previously seen, the objective for achieving a functioning LM Guide, is increasing the number of effective balls in order to have a better distribution of the load. This objective tries to meet the merits of hydrostatic guides with the advantages of caged ball LM Guides (Figure 4).

Therefore, the first action to be taken in order to increase the number of effective balls, is reducing the diameter of the balls. The reduction of the balls by $\frac{1}{2}$ allows increasing the number of effective balls two times.

Also, increasing the number of rows from 4 to 8, allows having contact with the double of balls.

At last, changing the length of the guide's block is another way of increasing the number of effective balls. An expansion of the LM Guide block of two times its standard length, increases the number of effective balls by 2.

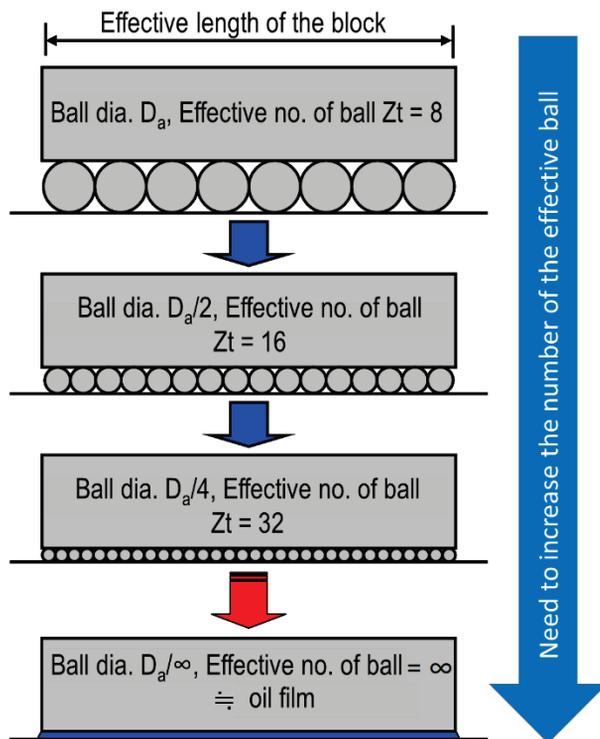


Figure 4: Reduction of the waving.

ADVANTAGES

By the adoption of the previously indicated actions, the SPR/SPS LM Guide meets several advantages.

In the first place, it allows increasing the number of effective balls around 8 times. This has as a consequence a higher accuracy and the achievement of a super-low waving.

These guides allow a high accuracy in a rolling guide that reaches the level of the nanometric scale. The waving phenomenon can be reduced around an 80%.

Also, the SPR/SPS models reach a super high rigidity and a higher load rating. The rigidity of these guides is higher than a roller's guide rigidity.

According to the experimental tests, the measurement of the waving results of 9.5 nm in the vertical direction (Figure 5), and 21 nm in the horizontal direction (Figure 6).

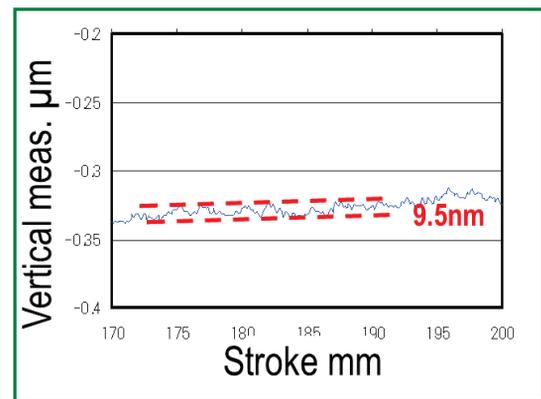


Figure 5: Vertical measurement.

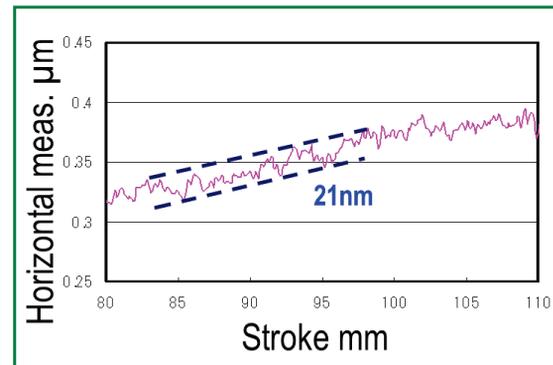


Figure 6: Horizontal measurement.