Double-row angular contact roller rings, Model RW

1. What is double-row angular contact roller rings?

Model RW (Fig. 1) is a high functional bearing with compact body, lower torque, higher rigidity and easy to handle by arranging cylindrical rollers on double-row with DB contact structure, mainly used for the rotary table of machine tools.

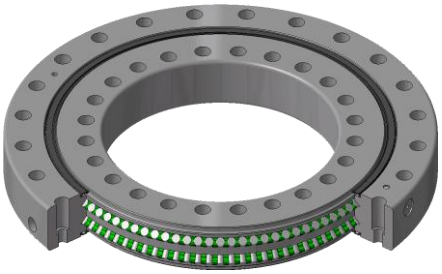


Fig. 1. Double-row angular contact roller rings, model RW

2. The background of the development

Cross-roller ring, so far, is used for the rotary table of machine tools and joints of industrial robot. Cross-roller ring is a bearing having 45° contact angle with cylindrical rollers arranged by orthogonal array on one raceway.

Recently bearing with higher rigidity for the rotary table is requested by the improvement of machine tools, however, larger size and the increase of rotational torque were unavoidable by the conventional structure.

Model RW, with above reasons, has developed with the compact body, higher rigidity and minimizing the increase of rotational torque.

The comparison of model RW and conventional cross-roller ring RU is shown in fig. 2 and table 1.

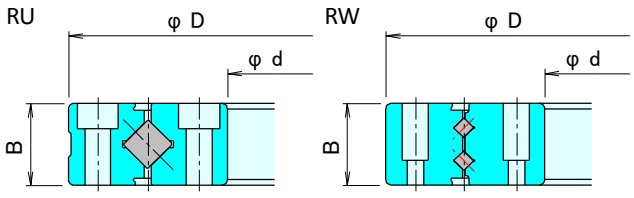


Fig. 2 Structural comparison of RW and RU

[unit : mm]

Model no.	ID : d	OD : D	Width :B
RU228	ϕ160	ϕ295	35
RW228			
RU297	ϕ210	ϕ380	40
RW297			
RU445	ϕ350	ϕ540	45
RW445			50

Table 1. Dimensional comparison between RW and RU

3. Structure of Model RW

Model RW, as above, is a bearing incorporated cylindrical rollers as rolling element with DB contact structure using rolling element of smaller diameter compared with model RU. Model RW made a possible to arrange rolling element in double array without changing the dimensions against model RU (except some models).

The number of rolling element increased approximately 4 times compared with the model RU by employing smaller rolling element on double-row, increased 50% more higher rigidity (refer fig.3).

Smaller-diameter rolling element has achieved to reduce the rotational torque by minimizing “differential slip” of the rolling element and frictional resistance. Reducing the rotational torque made to minimize the heat generation, achieving higher rotational speed operation rather than before.

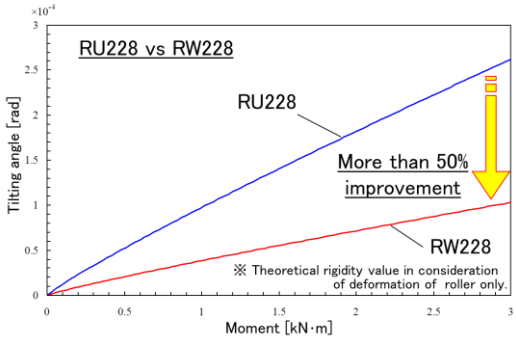


Figure 3. Theoretical rigidity value of RW and RU

Adopting the structure to secure higher and stable accuracy of model RW by reviewing the position of bolts to fix a bearing through FEM analysis. Specifically, reducing the size of bolt compare with RU, and increasing the depth of counter bore to prevent the deformation of inner and outer ring by the tightening force. Additionally, the increase of the number of the bolts allows to spread its tightening force, equalizing the deformation toward the circumferential direction. This will enable to minimize the variation of running torque after tightening of bolt, then could be obtained stable performance.

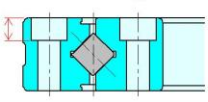
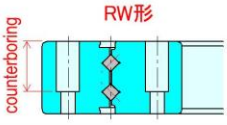
	RU形	RW形
		
#228	M10(x 12)	M6(x 24)
#297	M12(x 16)	M8(x 24)
#445	M12(x 24)	M8(x 32)

Table 2. The comparison of bolts of RW and RU

4 Sales Performance

Model RW was sold more than 15,000 sets worldwide till January, 2014.

5. Conclusion

Double-row angular contact roller rings: model RW is a bearing which has characteristic such as compactness, higher rigidity and lower torque by the structure of rolling element of smaller diameter in double-row arrangement, widely utilizing for the rotary table of machine tools, contributing the improvement of its performance.