Long- Life Rotary Dresser for Rigid Wheels

1. Outline

The market for industrial robots is rapidly expanding due to labor shortages, cost reductions, and productivity improvements in industry, and the demand for precision bearings (linear guides and ball screws) is growing. Profile grinding is often used to grind the rolling surfaces of the main parts of bearings because it requires particularly high productivity. Profile precision depends on the diamond rotary dresser (RD) that trues and dresses the profile grinding wheels.

To further enhance efficiency, conventional and general grinding wheels have been replaced by rigid wheels, which use the most rigid material after diamond and enable high-speed grinding. In step with this, the development of profile RDs with high abrasion resistance has been required.

In response to requests from the bearing industry, we have developed and begun marketing a new RD for rigid wheels, such as vitrified cubic boron nitride (CBN) wheels, using our original plating technique.

2. Features

2-1 Improving abrasion resistance

To improve the abrasion resistance of RDs, the most effective method is to enlarge the diamond area that processes the grinding wheel.

Using our original plating technique, we have enlarged the processing area as much as possible and successfully achieved three or more times the processing area of conventional RDs. As a result, abrasion resistance is now five or more times higher than that of conventional RDs.

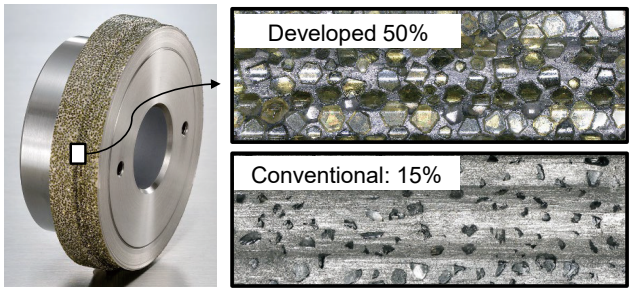

Photo 1. Grinding surface of the developed RD

2-2 Balancing with dressing resistance

The profile precision of the rolling surface is important for bearings, which require high sliding property. However, enlarging the processing area for the non-rolling surface increases the resistance of the whole RD, leading to chattering and other issues.

To address these issues, we enlarged the limited area requiring high abrasion resistance, thereby prolonging the tool life and improving the dressing resistance (Fig. 1).

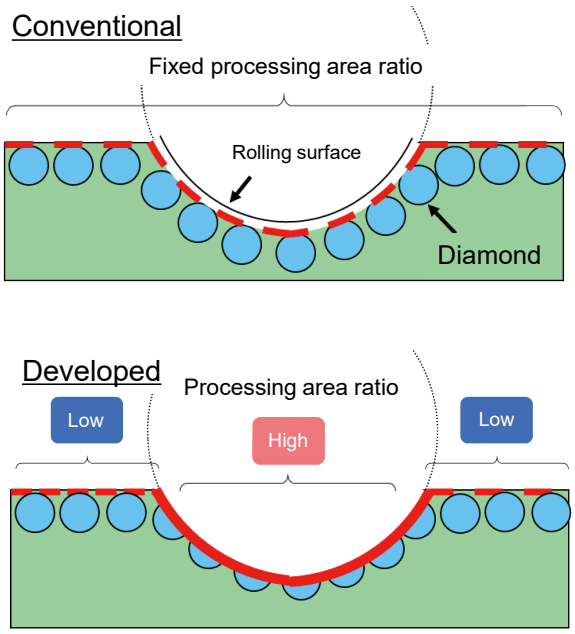

Fig. 1. Cross-sections of conventional and developed RDs

The relationship between the processing area ratio and dressing resistance is shown in Fig. 2. The dressing resistance of the developed RD shows less increase when the processing area only for the rolling surface is enlarged compared to when the entire processing area of the RD is enlarged.

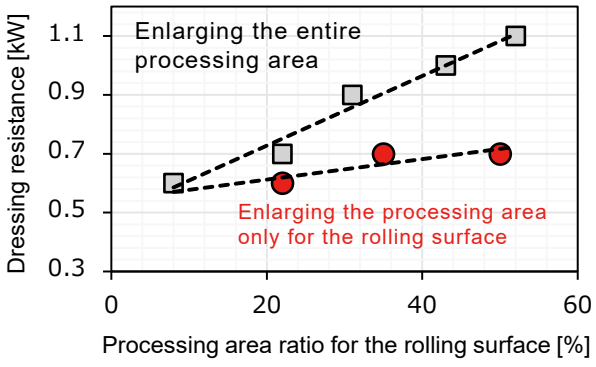

Fig. 2. Relationship between the processing area and dressing resistance

3. Processing Examples

Figure 3 shows an evaluation example of the relationship between the dressing amount and abrasion amount of a rolling surface with the linear guide shape shown in Fig. 1. The developed RD, whose processing area ratio for the rolling surface is set to 50%, achieves a tool life about five or more times longer than that of the conventional RDs, whose processing area ratio for the rolling surface is 15%.

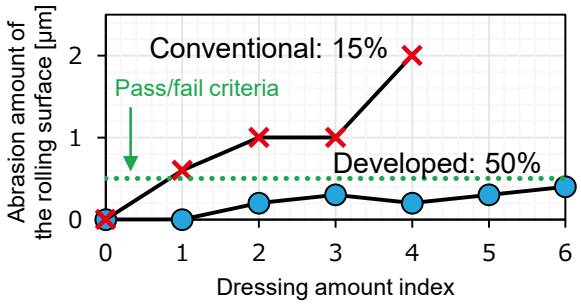

Fig. 3. Relationship between the dressing amount and abrasions of the rolling surface

In conclusion, in the expanding market for high-efficient profile grinding with rigid wheels, the developed RD will contribute to the reduction of tooling changes due to its longer tool life, and higher grinding precision and productivity can be expected.