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Turntable Bearing

The rotary table commonly used in CNC machine tools has an indexing table and a CNC rotary table. When machining certain parts of CNC machine tools, in addition to the linear feed motion of the three coordinate axes X, Y and Z, sometimes there is a need to have circular motion around the three coordinate axes X, Y and Z, respectively A, B, C axis. The CNC rotary table can be used to achieve the circumferential feed motion, in addition to the indexing movement. The function of the indexing table is only to change the surface of the workpiece, and it can be used together with the automatic tool changing device to realize the multiple installations of several surfaces in one installation of the workpiece, thus greatly improving the working efficiency. The shape of the CNC turntable and the indexing table are not much different, but there are a series of features in the structure. Since the CNC rotary table can realize the feed motion, it has much in common with the feed drive mechanism of the CNC machine. The difference is that the drive mechanism realizes the linear feed motion, and the CNC rotary table realizes the circular feed motion.

The rotary table is widely used in various CNC milling machines, boring machines, various vertical lathe and vertical milling machines. In addition to

requiring the rotary table to withstand the weight of the workpiece well, it is also necessary to ensure its rotation accuracy under withing loads. The rotary table bearing, as the core component of the turntable, not only needs a high load carrying capacity during the operation of the turntable, but also needs to have high rotation precision, high anti-overturning capability, and high rotational speed capability.

1. YRT rotary table bearings:



YRT Rotary table bearings are axial and radial combined cylindrical roller bearings, including two thrust needle roller bearings and a radial cylindrical roller bearing with the combination of axial and radial preload. For the convenience of transportation and fixing, two or three symmetrical screws are fastened to the two rings in order to prevent rollers and rings generating collisions which influence bearing accuracy.

There are another 3 types structure as below:

YRTS rotary table bearings;

YRTM rotary table bearings;

ZKLDF rotary table bearings;

2. thrust ball bearing + cylindrical roller bearing:



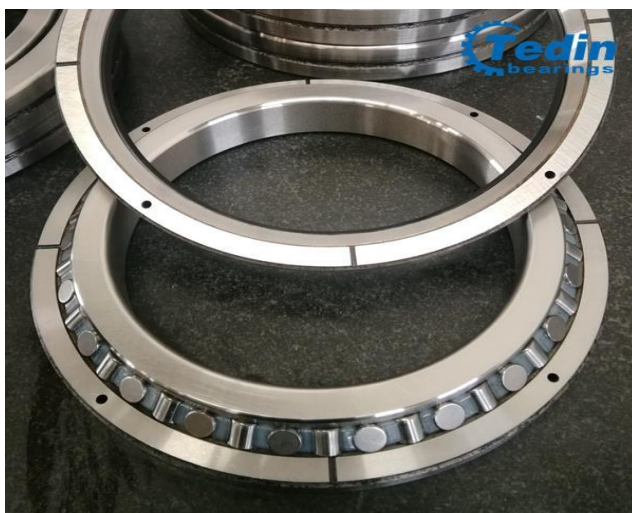
Thrust ball bearings can withstand certain axial forces, so the bearings are mainly used to bear the weight of the workpiece; cylindrical roller bearings are mainly used for radial positioning and external radial forces (such as cutting force, milling force, etc.) . This type of design is widely used and relatively inexpensive. Since the thrust ball is a point contact bearing, its axial bearing capacity is relatively limited, and it is mainly used for small or medium-sized machine tool rotary table. In addition, the lubrication of the thrust ball is also difficult.

3. hydrostatic bearing + precision cylindrical roller bearing

The hydrostatic bearing is a sliding bearing that supplies pressure oil externally and establishes a static pressure bearing oil film in the bearing to achieve

lubrication. The hydrostatic bearing always works under lubrication from start to stop, so there is no wear, long service life and low starting power. In addition, the bearing also has the advantages of high rotation precision, large oil film stiffness, and can suppress oil film oscillation. Precision cylindrical roller bearings have good radial bearing capacity, and the precision of the rotary table can be guaranteed due to the use of precision bearings. The rotary table designed with this type can withstand high axial forces. Some workpieces weigh is more than 200t and the turntable has a diameter of more than 10m. However, this type of design also has some shortcomings. Since the hydrostatic bearing must be supplied with a special oil supply system to supply the pressure oil, the maintenance is complicated and the cost is relatively high.

4. crossed roller bearings



Cross roller bearings are commonly used on turntables. Crossed roller bearings are characterized by two raceways in the bearing and two rows of rollers



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arranged in a row. Compared with the traditional thrust bearing + radial centering bearing combination, the cross roller bearing is compact and light-weight, and simplifies the workbench design, thus reducing the cost of the turntable. Thanks to the optimized preload, the bearings are highly rigid and the rigidity and precision of the turret are guaranteed. Thanks to the design of the two-row cross-roller, the effective span of the bearing can be significantly improved, so this type of bearing has a high anti-overturning moment. Crossed roller bearing is divided into two types: the first is crossed cylindrical roller bearing, and the second is crossed tapered roller bearing. In general, crossed cylindrical roller bearings are less expensive than crossed tapered roller bearings and are suitable for use in turntable applications where the rotational speed is relatively low. Crossed tapered roller bearings use a purely rolling design of tapered rollers for high running accuracy and speed capability. Thus, crossed roller bearings are suitable for all types of vertical or horizontal boring machines, as well as vertical grinding, vertical turning and large gear milling machines.

To select the appropriate size and type of bearing, it is necessary to consider various working conditions comprehensively, such as operating speed, lubrication, installation type, spindle stiffness, accuracy and other requirements. As far as the bearing itself is concerned, the bearing performance can be fully



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exploited only by fully understanding its design features and the advantages and disadvantages. As the core component of the machine tool spindle and turntable, the bearing plays a decisive role in the performance of the whole machine tool.

TEDIN Bearing Co., Ltd produce many types of turntable bearings: thrust ball bearing, cylindrical roller bearings and crossed roller bearings, which with high precision grade, high quality materials, longer working life. Welcome to contact our technical center for more information.

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