Pretightening method of spindle bearing

There are two ways to preload bearings: axial preload and radial preload. For ball bearings, axial preload is usually used only, and the axial preload methods of ball bearings are mainly divided into fixed pressure pre tightening and positioning pretightening. The pre tightening force of the fixed pressure preload is invariable in the working process of the bearing. It is usually used for high speed working conditions, and the relative position of the bearing is invariable during the working process of the pre positioned bearing, which is generally used for the low speed working condition. The rigidity of fixed pressure preload is small, which will affect the accuracy of the machine. However, the stiffness of the positioning preform is larger, but with the increase of the spindle speed, the heat output will increase, which will cause greater thermal deformation, which will cause the working condition of the bearing to deteriorate and affect the life of the bearing. Therefore, the fixed pressure pre tightening and positioning pretightening have their advantages and disadvantages. The advantages of the two are that variable pretightening is more suitable for the machine with large speed range. Therefore, the research on the pre tightening method and preload of the bearing is also continuous.

In order to achieve variable preload, on the one hand, a double spindle is installed on a CNC machine tool. One spindle is low speed and large torque type, the other spindle is high speed and high power, and it is automatically replaced according to the machining needs. But this kind of machine tool is not only complicated in structure, but also low in production efficiency. On the other hand, some people put forward the idea that the pre tightening force can be controlled. The pre tightening force control system is used to measure the preload of the bearing under the working condition by using the stress sensor, and the preload is controlled by the displacement of the piezoelectric actuator through signal processing, but the preload compensation can not meet the need of high voltage insulation for a wide range of thousands of volts. It is difficult and difficult to achieve large displacement, and the manufacturing cost is very high. Or using liquid plastic as medium, a kind of actuator for preload adjustment of precision machine tool spindle bearing is designed.

Variable pre tightening is the main pretightening mode of the high-speed bearings. The bearing assembly, especially the bearings installed in series, is very demanding for installation accuracy. Therefore, the installation surface must be ground to ensure accuracy while installing, but there will always be errors in the processing.