

Fault analysis and control measures of rolling bearing

Rolling bearing is an important mechanical element. The basic structure is composed of outer ring, inner ring, rolling body and cage. There are many types of rolling bearings. They are divided into ball bearings, roller bearings and needle bearings according to their shape. According to their load bearing directions, they can be divided into centripetal bearings, centripetal thrust bearings and thrust bearings. Their performance and service life depend not only on the manufacturing accuracy of the bearings themselves, but also on the holes matched with them. It is related to the dimension accuracy, shape accuracy and surface roughness of the shaft, the matching nature of the selection, and the correctness of the installation. The following is a simple analysis of the problems encountered during the installation process, so as to find out solutions to failure and improve the service life of rolling bearings.

I. several failure modes of bearing during assembly process

1. damage caused by unqualified size of workpiece with bearing.

The bearing bore and shaft are matched with the base hole system, and the bearing outer circle and the bearing seat hole are matched with the base shaft system. The rotating seat ring (the inner race of most bearings is a rotating seat, the outer race is not a rotating seat, and the opposite part of the bearing is not). Interference fit is usually used to avoid rolling and sliding on the mating surface of the axle diameter and the bearing seat hole under load. Inaccuracy or matching surface roughness is not up to standard, resulting in excessive interference fit, resulting in the reduction of radial clearance of the bearing itself, causing the bearing to turn difficult, heat, wear aggravated or jammed, which will cause the cracking of the bearing inside and outside the seat ring during installation. In this way, it is possible for the non rotating seat ring to produce slight creeping, so that the contact surface between the seat ring and the rolling element is constantly changed, and the raceway wear is uniform, which can eliminate the axial clamping phenomenon of the rolling element in the bearing due to the thermal elongation, but the excessive clearance fit will cause the non rotating seat to rotate along with the rolling body. Cause serious wear of the shaft (or bearing seat bore) and the inner race (or outer seat ring), and friction causes the bearing to generate heat so as to cause vibration.

For example, during the processing, the shoulder of the workpiece shaft and the hole of the casing is not perpendicular to the mating surface, or the roughness of the bearing location surface is not qualified, and the bending of the shaft will cause the skew of the bearing inner ring and the outer ring axis to cause the misalignment of the bearing assembly, resulting in partial contact between the ring and the roller surface. The force increases significantly, resulting in fatigue spalling (as the spalling surface continues to expand, and tends to extend deep into deep spalling), causing damage to the bearing.

2. impact of bearing installation environment

Before installation, if the workpiece is not cleaned or the lubricating oil is not clean (such as sand, dust, stolen goods, etc.) or because of the unreliable sealing and the dusty environment,

some hard particles will enter the bearing raceway, which will cause abrasive wear. The surface will show fine groove marks or tiny pockmarks, which will increase the bearing clearance. It causes a lot of impurities in the running process, which accelerates the friction between raceway and ball and accelerates wear. During the running process, the uneven plastic deformation is produced at the contact between the inner and outer ring of the bearing and the roller. The indentation will increase the vibration and noise of the bearing, increase the temperature and increase the wear. Serious spalling, shortened service life and even failure of bearings.

The bearing shall be regularly cleaned during the use until the cleaning is thoroughly cleaned, the qualified grease is replaced, the contamination is avoided, and the clearance between the bearing cover and the shaft hole is checked to meet the sealing requirements.

3. improper temperature control during assembly process

When the rolling bearings are assembled, the interference fit is generally used with the shaft diameters. The hot charging method is used to assemble the bearings. The bearings are put into oil tanks filled with oil, and the oil tanks are heated by hot water or flame. The oil temperature controlled by the process is controlled at 80 -90 C, and generally does not exceed 100 degrees centigrade. The maximum temperature is not more than 120 C. After heating, the bearing is quickly removed and sleeved on the axle neck. If the heating temperature is too high due to improper temperature control, the bearing will be tempered and the hardness will be reduced, so that the bearing will wear, peel and even crack during operation.

Install the heated bearing, and push it into the bearing table quickly and accurately, and pay attention to wearing gloves to prevent scalding the hands. Slow motion will cause the bearing temperature to drop and the inner diameter to shrink, which may lose a good opportunity. The installed bearings can be cleaned with clean gasoline when the temperature drops to room temperature. During the cleaning process, the bearings must be continuously rotated to ensure that all parts are cleaned, cleaned and cleaned with clean white cloth to ensure that the bearings are clean. Then the grease can be added.

4. improper assembly method.

When the interference between bearing and axle diameter or bearing seat hole is small, the indentation method is used. Assembly must use a special sleeve tool to smoothly press the bearing. If the operation is improper, it will cause the seat ring to deform and crack, or the hammer hammers on the non interference fit seat ring, which will cause the raceway and rolling body to indentation or the bearing to be indirectly destroyed. When assembling the inner components with special sleeve tools, attention should be paid to the inside and outside diameters of the sleeves, so as not to cause the sleeve to be pressed on the end face of the cage to cause deformation of the cage.

The steel sleeve with a smooth face and almost the same thickness as the inner wall of the bearing is pressed evenly, and the force must be uniform. Then check the allowable radial deflection of shaft extension.

5. adjustment of bearing clearance during assembly process