**Thrust bearing**

(1) Thrust Ball Bearing

Thrust ball bearing is a separated type bearing, only withstand axial load, one-way bearing for axial load in one direction, two-way bearing for axial load in two directions. Thrust ball bearing can’t limit radial displacement of the shaft, its limit rotational speed is very low, one-way thrust ball bearing can limit the axial displacement of the axis and shell in one direction, two-way bearing could limit the axial displacement in two directions.

This type of bearings is separable, which can only carry axial load. The single direction, while the double can carry alternating axial load in either direction. Before using they have to be preloaded. The thrust ball bearings are used in lathe centers, automobile clutches, reducers and so on. The double direction angular contact thrust all bearings are suitable for machine tool spindles, while the single are used to support ball screws.

(2) Thrust Roller Bearing

Cylindrical Roller Thrust Bearings

Due to their design, cylindrical roller thrust bearings use only little space and are able to take up high axial forces as well as impact loads. They are typically used at relatively low speeds. Due to the bearings internal geometry, high slippage forces are produced between raceway and rollers, which can be reduced by appropriate lubrication. Thanks to their separability, cylindrical roller thrust bearings are easy to install.

(3) Thrust Ball Roller Bearing

Ball roller, thrust bearings, load and its axial cord are formed a certain angle, from one raceway pass away another. So, this kind of bearings are different from other thrust bearings. Ball roller thrust bearings are able to support radial load and axial load, and their another important characteristic is able to make self-alignment, so as to guarantee that they are not sensitive to the angle that formed by axial and bearing case and deflection errors.

5. Spherical bearing/ Self-aligning Bearing

(1) Spherical Ball Bearing
This type of bearings is separable, which can only carry axial load. The single direction bearings of them can only carry axial load in one direction, while the double can carry alternating axial load in either direction. Before using they have to be preloaded. The thrust ball bearings are used in lathe centers, automobile clutches, reducers and so on. The double direction angular contact thrust ball bearings are suitable for machine tool spindles, while the single are used to support ball screws.

(2) Spherical Roller Bearing

Spherical roller bearing is in the article has two ways the inner circle and rolling way for outer surface, between the drum of assembly roller bearings.

Spherical roller bearing has two columns of roller, the main bear radial load, at the same time also can withstand any direction of the axial load. Have high radial direction load capacity, especially suitable for heavy work load or vibration, but unable to bear pure axial load. The bearing outer ring groove is spherical shape, the heart because of its good performance and can compensate the coaxial tolerance of error.

Spherical roller bearing inner ring with two columns of raceway, for spherical outer ring raceway and rolling element bearings for drum. Outer ring raceway surface center and bearing center consistent, two inner ring raceway relative bearing line slanting Angle, can automatically bearing, thus susceptible to shaft and bearing box alignment error or shaft bending. In addition to bear radial load, bearing also can withstand the two-way.

With the same center as the bearing, the spherically formed outer ring raceway can make self-alignment. Their rolling elements linearly come into contact with the raceways of inner ring and outer ring. The bearings can take greatly radial load, suitable for heavy machinery used in mining, metallurgical, paper-making and instructing, etc.

It is used to bear mainly the radial and also certain axial load, The outer ring of such bearing is of spherical shape, hence, it has center adjusting function. When the axis is bended of inclined upon force exercised on it, the bearing still functions normally if the relative inclination of the centerline of the inner ring is within 1°-2.5°. This bearing has greater loading capacity, but lower rotation speed limit.

Spherical roller bearings offer an attractive combination of design features, which are making them irreplaceable in many demanding applications.
- Self-aligning Spherical roller bearings accommodate misalignment between the shaft and housing without increasing friction or reducing bearing service life.
- Very high load carrying capacity Optimized internal geometry within the available cross section provides maximum radial and axial load carrying capacity.
- Robust Insensitive to misalignment caused by shaft or housing deflections as a result of heavy loads.
- Easily fitted for loads in all directions The bearings are non-separable and ready to install, having a choice of mounting methods.
- Simplify the application The favourable design characteristics combined with simplified mounting procedures enable more efficient and compact machine designs.

CA design To facilitate efficient bearing lubrication WQK standard spherical roller bearings are provided with three lubrication holes in the outer ring, usually in combination with an annular groove. Depending on the series and size, standard WQK spherical roller bearings are basically manufactured to four different designs. one of them is CA design which consists of symmetrical rollers, a double pronged, machined brass or steel cage, centred on the inner ring via a floating guide ring between the two rows of rollers, an inner ring with retaining flanges. CA design items.

(3) The self-aligning roller thrust bearing

The self-aligning roller thrust bearing is just like the self-aligning roller bearing. The raceway surface of housing washer is a spherical surface focused on the points of central axis, so the rollers of such bearings are of spherical shape and have the self-aligning function. Besides, they’re not so sensitive to coaxiality and shaft deflection. Different from other thrust bearings in the sample, these bearings can withstand extremely high axial load and can meanwhile withstand much radial load, but the radial load cannot exceed 55% of axial load. So long as the load P and P0 does not exceed 0.05° and the shaft washer rotates, the aligning angles specified in the following table are permitted for such bearings.

These bearings are mainly used in oil rig, the iron steel machinery, hydraulic generators, vertical motor for ships, propeller shaft, crane, extrusion machine, etc.

Spherical roller thrust bearings are single row bearings which, due to their internal geometry, can adjust their angle to compensate shaft misalignments. Solid shaft washers and housing washers as well as steel, steel plate or brass cages ensure an excellent load capacity. Spherical roller thrust bearings are able to take up radial forces and are suitable for higher speeds.
(4) **Tapered Roller Thrust Bearing**

Tapered roller thrust bearings can absorb very high axial forces and offer despite their relatively small axial space requirements an optimum shock resistance. Bearings with tapered roller bearings are very stiff.

(5) **Double Row Self-aligning Ball Bearings**

With two structures of bore cylindrical or tapered and retainers made of steel sheet or synthetic resins, the bearings are characteristic of their spherically formed outer ring raceways allowing for misalignment within 3 degree deflection between inner ring and outer ring, so as to compensate concentricity and deflection errors.

(6) **Self-aligning roller bearing series, double row**

Self-aligning roller bearings generally have two rows of rollers, and the performance characteristics are: low speed, impact resistance, vibration resistance; with automatic aligning function, namely it normally operates with larger inclination for the inner axis relative to outer axis (generally within 3 degree); mainly bear greater radial load as well as smaller axial load. Mainly being applied in metallurgical and mining machinery, engineering machinery, hoist-transport machinery, paper manufacturing machinery and textile machinery, etc.

The self-aligning roller bearing has two rows of spherical. The outer ring raceway is in sphere shape. It has the function of self-alignment and can compensate the error generated in bearing deformation or problems of bearing block. The roller and raceway are in the line contact, able to bear comparatively large radial load and bi-directional axial load. The error of angle alignment allowed differs in different series of bearing size and it cannot exceed 2.5°.