Manufacture For Slewing Bearings
Structure Type

Four point contact ball slewing bearing

Double-row angular contact ball slewing bearing

Cross cylindrical roller slewing bearing

Three-row roller slewing bearing

Ball and roller combine slewing bearing

Double-row angular contact ball slewing bearing
Flow chart of production process

Outer Ring (01)

Lathe Rough ➔ Slack quench ➔ Semi-finished Turning ➔ Raceway soft Grinding ➔ Grind ➔ Hole making ➔ Raceway Finished Grinding ➔ Lathe Finish seal groove

Finished Products Consignments ➔ Packaging ➔ Re-inspect of Finished Products ➔ Washing and Assembling ➔ Spray on Commission ➔ Inspection of Finished Goods ➔ Washing and Assembling ➔ Inspection of Parts

Washing and Assembling ➔ Re-inspect of Finished Products ➔ Lathe Finish seal groove

Inner Ring (02)

Lathe Rough ➔ Quenching ➔ Semi-finished Turning ➔ Raceway soft Grinding ➔ Raceway Quenching ➔ Preliminary Grinding ➔ Finish Grinding ➔ Gear Machining ➔ Gear Hardening ➔ Raceway Finish Grinding ➔ Digital Controlled Lathe R5*1

Hole making ➔ Spray on Commission ➔ Final Grinding ➔ Washing and Assembling ➔ Inspect of Finished Products ➔ Packaging ➔ Washing and Assembling ➔ Inspect of Finished Products ➔ Lathe Finish seal groove

Digital Controlled Lathe R5*1 ➔ Inspect of Parts ➔ Packaging ➔ Re-inspect of Finished Products ➔ Washing and Assembling ➔ Spray on Commission ➔ Inspection of Finished Goods ➔ Washing and Assembling ➔ Inspection of Parts
Production Line

1.6m imported vertical grinder group

Gear hobbing machine, and its max outer diameter of gyration is 5m

Machine tool for quenching gear surface, Max pitch outside diameter 6m. Hardened layer depth 2~6mm.
The main processing equipment used in slewing bearing production

93 lathes
117 grinding machines
12 drilling machines
7 gear cutting machines

There are 37 sets of heat-treated pit type carburization furnaces, pit type tempering furnaces, 4000mm quenching equipment, surface-induction quenching machine tools and so on, and among which have 2 raceway or tooth surface induction equipment. (the work range of raceway quenching $\leq 5m$).
LYC QA
For
Slewing Bearings
Quality Control Process

1. To verify and evaluate the suppliers and determine the qualified suppliers according to the performance;

2. Ring forgings will purchase with the qualified suppliers according to the technical requirements, and the manufacturer is required to supply the raw material quality report (chemical composition, mechanical property and NDT, etc);

3. The cages and ball material will be purchased with the qualified suppliers according to the technical requirements, and the manufacturer is required to supply the raw material quality report;

4. The company will inspect the forgings and raw material entered in according to the requirements of the technical document and the inspection procedure;

5. The ultrasonic test will be carried out according to need after the large forgings’ lathe rough quenching and tempering;

6. To those that confirmed as the key technics will be standardized by the directors who direct the related technology, process document and inspection procedure selected by the technical section;

7. To emphasis on the establishment of the product moving card which moves with the product so as to keep the traceability of the product quality;

8. The dye penetrant inspection will be carried out on the large scale key ring;

9. To test the key parts before assembling and test the products after assembling according to the inspection procedure and keep the perfect quality record.
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**Notes:**
- After Rough Turning: Check for any surface imperfections or defects.
- Quenching & Tempering: Ensure the material is properly hardened.
- After Raceway Hardness: Check the hardness of the gear surface.
- Gear Testing: Measure the constant cord thickness and test the hardness of the gear surface.
- After Finished Grinding: Check the appearance of the finished product.
- Ball/Roller Test: Ensure the proper ball/roller contact is achieved.
- Finished Production: Review the inspection report for all dimensions and other normal inspection items.
- Others: Ensure all inspection regulations and standards are strictly followed.
Application Test for Medical Equipment CT
Application
Major Applications for Slew bearings

- The products of our factory are widely used in the fields of harbor, metallurgy, military engineering, high technology and so on.
- The application fields include: grab, ladle turret, caterpillar crane, harbor crane, quaternion crane, stacker & reclaimers, TBM (Tunnel Boring Machine), wind power and so on.
Product Record

- the maximal diameter bearing: 6.07m
- The heaviest slewing bearing: 134·80·4500 (the finished product weighs 17 ton)
- the heaviest spherical thrust bearing: 294/850 (weighing 21.9 ton)
- the bearing with the most parts: D3-826(2386 parts in one single)
- the most peculiar structure bearing: 3-641 for “Haihong-7” guided missile destroyer
- the largest split bearing: NU6/1200D (inner diameter is 1.2m)
- the largest stainless steel bearing: LY-Q024
6.07-metre super-huge bearing rolls off the production line at LYC

The Asia’s independent intellectual property possessed, the most heavy and diameter maximal Slewing Bearing of which weight is 16.722tons, diameter is 6.07m, and erection height is more than two floors took off the line smoothly on July 23rd, 2008 at LYC. This is the largest order in domestic at present signed by LYC after he researched the largest bearing-5.492m Extra Large Size bearing in domestic in 2004. It is not only filled up the blank of the domestic Bearing Industry, but also furthest satisfied the customer’s individualized need, and reached the world advanced level.
Wind Turbine Bearing
Application in Turbine Energy

- In 1997 LYC has successfully developed the first set of domestic home-made Pitch Bearing 2788/1712 which was used for the wind turbines 600KW produced by Xinjiang Gold Wind Science and Technology Co., Ltd.

- LYC windmill bearings with self-own intellectual property passed national key technological achievements acceptance and filled in the domestic blank by such kinds of bearings in 1999.

- Our company has developed series of wind turbine bearings for Xinjiang Goldwind, shenxin Hengli, Xi’an Ward, Beijing Wandian, China CPC, Shenyang Gongda, Dongfang Steam Turbine Works and so on.

  The bearings we have researched and developed are 600KW, 660KW, 750KW, 1500KW windmill pitch bearing, blade bearing, mainshaft bearings, gearbox bearing, generator bearing, and so on.

- The wind turbines with LYC’s bearings have been put into the commercial operation in the wind fields such as Xinjiang, Gansu, Hebei and Dalian. Etc. and the longest operating time has been more than 11 years.
In the Development of Wind Turbine Bearing

• In the process of developing the windmill bearing, in accordance with its characteristic, our company has solved many key technologies, such as:
  1) solved the difficult problems of bearing’s high carrying capacity, long lifetime and high reliability;
  2) solved the problem of pitch bearing’s clearance;
  3) solved the problem of pitch bearing’s surface preservative treatment;
  4) ensured that there should be reliable sealing and dustproof properties;
  5) solved the problems of ring’s heat treatment deformation and so on.

• Drew up the industry standard of domestic wind power bearing firstly.

At present, 2.0 megawatt yawing bearing, pitching bearing, and shaft used on wind turbine have been delivered to customers. 2.5 megawatt yawing and pitching bearing are being researched and developed. The Industry standard for wind turbine rolling bearings which was made by LYC had been implemented from September, 2007.
Application in the wind turbine

- Blade Bearing
- Yaw Bearing
Application in the wind turbine

Gear-box Bearing
Pitch Gear-box Bearing

Main Bearing
Production Ability at Present

LYC has advanced technology, deep strength and stable quality in the domestic windmill bearing area. And the ability we can supply for the multi-megawatt windmill annually as follows:

2008
- 1. 2000 sets of the slewing bearings used for yawing and blading, and the size range is \( \phi 1600mm \sim 6000mm \)
- 2. 4000 sets of spherical roller bearings used for the spindle, and the size range is \( \phi 400mm \sim 1300mm \)

2009
- 1. 4000 sets of the slewing bearings used for yawing and blading, and the size range is \( \phi 1600mm \sim 6000mm \)
- 2. 5000 sets of spherical roller bearings used for the spindle, and the size range is \( \phi 400mm \sim 1300mm \)
Wind-driven generator bearing is the main part of wind power equipment, which includes yaw bearing, blade bearing, shaft bearing, generator bearing and gear box bearing. As wind generators run under relative hard working condition in open field. Temperature and bearing load changes sharply and wind-speed is up to 30mps. It subjects heavy impact load. The main bearing is mounted in the high support of 40~50m, therefore, it is difficult to dismount and mount and costs a lot. It requires that the bearing should be good sealed, anti-impact, smooth rotation and steady as well excellent lubrication, long life and high reliability.

- Yawing bearing is mounted on yaw structure of the carriages of wind generator sets, it is used for adjusting the facing wind angle of the wind generator at proper time and transits thunders and lighting to the ground. It supports the whole weight (radial load, axial load and tilt moment) of the main driven system of wind-driven generator. The bearing is required to be tight sealed, high reliability, smooth rotation and strong stability, surface anti-corrosive and long life over 20 years. This kind of bearing is generally designed into extra-sized four-point contact ball bearing or cross cylindrical roller slewing bearing.

- Pitch bearing (blade bearing) is located on its oar system. It is used for adjusting the blade facing wind direction. It mainly supports radial load, axial load and tilt moment. The bearing is required to be sealed tightly, high reliability, smooth rotation, strong stability, surface anticorrosive and long life over 20 years. This kind of bearings are generally designed in four-point contact ball bearings or extra-sized double-row ball slew bearings.

- Shaft bearing is mounted on the fan shaft. It is required to be loaded heavily and be able to compensate the shaft's deformation. Therefore, the bearing should have well ability of alignment, higher load capacity and longer service life. It adopts optimal designed spherical roller bearing. The inner diameter of the fixed end of the bearing adopts straight hole and the floating end is with taper hole and withdrawal sleeve which can compensate floating due to temperature affection on main shaft.

- Generator bearing and gear box bearing adopt cylindrical roller bearing and deep groove ball bearing, which require higher load, lower noises as well as longer service life. Therefore, the bearing should be optimally designed and its structure and process should be improved in order to make the bearing's quality and performance superior.