

# YANTAI HAIYING MACHINERY CO., LTD

THE BEST SOLUTION  
FOR YOUR APPLICATION

FOCUS ONLY ON SLEWING RING  
BEARING  
PROFESSIONAL MANUFACTURER  
LONGEVITY, PERFORMANCE,  
FLEXIBILITY





**烟台海英机械有限公司**

**Yantai Haiying Machinery Co., Ltd.**

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# About Haiying Anyuan

- Located in the Yantai City, Shandong Province, nearly to Qingdao/Tianjin Sea ports.
- Provides motion solution from engineering design, mass productions, marketing and after market service
- 10000M2 production area, 100+employees
- Full product series from small, single-row ball slewing ring bearings for light-duty applications to large, triple-roller slewing rings for demanding heavy applications and geared bearings for everything in between with size from 200mm-4500mm
- Customize per customer needs, high quality standards and supported by in-house experts, can cross over major brands for an exact fit.





# Our Service

Professional in researching, developing, manufacturing & marketing precision slewing bearing since 2018;

Bearing ring production tracking & quality control to make sure every production process be monitored and each bearing parts be inspected;

Professional technical & exporting team ensure excellent product design, quotation, delivering, documentation & custom clearance.

Fast response in presale & after sale service.



# Our Values

- Our mission is to "let people work easier", we pursue the secular sense is not only money and status of success, we believe that our first responsibility is to learn to respect others. In order to meet their needs, we must uphold the spirit of modesty, courage, straight forwardness and perseverance, dare to recognize their mistakes, dare to take responsibility, dare to speak out their own opinions frankly, dare to face difficulties and challenges. Everything we do must be of high quality, and we must keep working hard to reduce costs and improve efficiency so that we can serve our customers more accurately.



# Slewing Ring Production Process

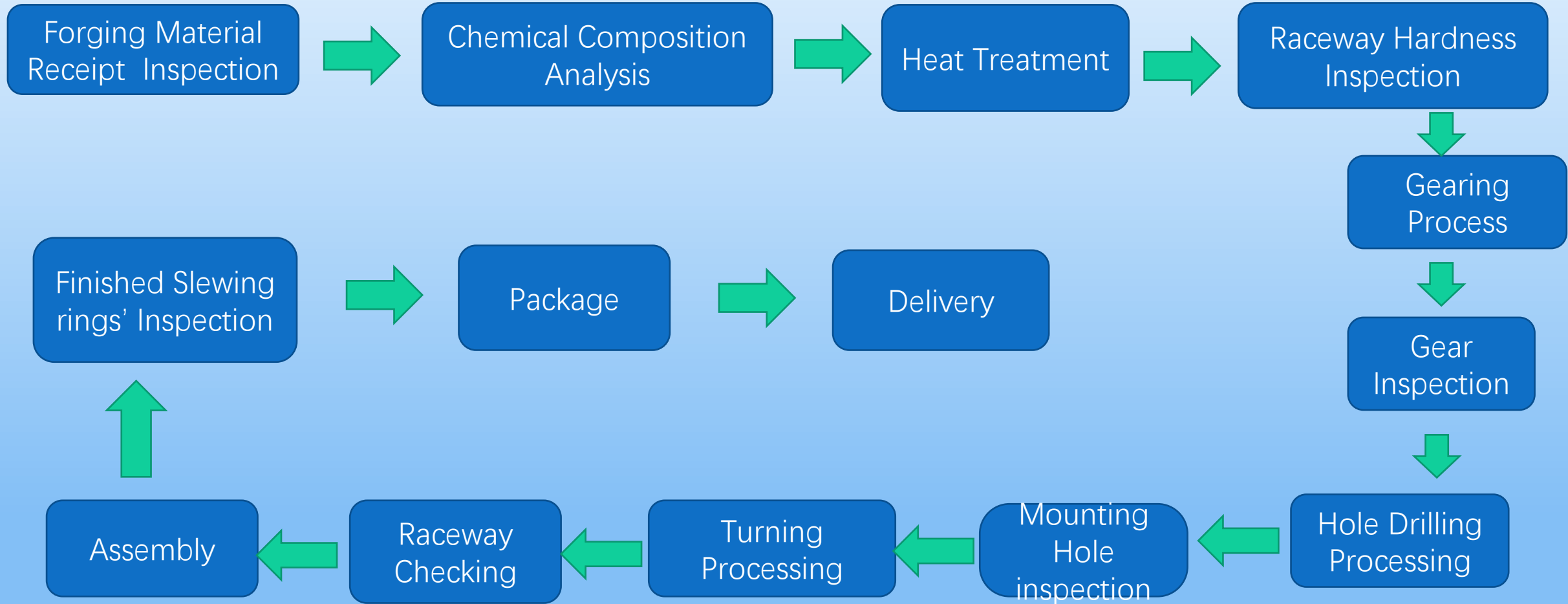
A slew bearing includes the following main elements:

- Inner ring, shaped in turning operation from a forged ring
- Outer ring, shaped in turning operation from a forged ring
- Drills for grease zerco and lubricant refill
- Integral inner or outer gear cut by gear cutting process
- Drills for fasteners (thru or tapped)
- Drills for filler plug(s) and filler plug(s)
- Balls and/or rollers added during the assembling process
- Polymer based spacers or polymer/metal cages added during the assembling process
- Rubber based sealing systems added during the assembling process





# Slewing Ring Production Process



# Production Process



Forging Material  
Receipt Inspection



Rough Turning



Raceway Heat  
Treatment



Gear Making



Gear Quenching



Package



Shipment



Mounting Holes  
Drilling



Sealing strip



Assembly



Finish Turning



# Forging Material Receipt Inspection



Raw material of slewing ring bearing is normally 50Mn, 42CrMo, Stainless Steel, etc.

Material test report and quality certificate will be supplied.



# Taper Pin & Load Plug Drilling



According to the roughing process drawings, roughing processing.



# Rough Turning and Shaping before raceway quenching



According to the roughing process drawings or the special requirements of international customers, we will make the roughing processing. The steel ring is loaded into the machine tool and the rough turning of the machining is carried out. Various groove raceways are turned out. Ultrasonic flaw detection is to perform on forgings after rough turning to detect whether there are pores, slag inclusions, laminates and other defects inside the material.



# Raceway Heat Treatment



The heat treatment process is to subject the forged and machined bearing ring to high temperature treatment, which directly affects the uniformity of carburization in the bearing ring, improves the wear resistance and hardness, fatigue strength and toughness of the slewing bearing and also affects the reliability and the life of bearing rings. After quenching, a tempering stabilization is carried out to reduce subsequent processing deformation and reduce the risk of raceway cracking.



# Gear Processing



Internal and external gear wheel bearings, grinding roller milling process, strict accordance with technical requirements of processing, accuracy class to meet process requirements.

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# Gear Heat Treatment



In order to meet the tooth strength and service life, high-frequency quenching is carried out on the tooth surface, tooth heel and tooth top according to different needs. Hardness HRC40-55, depth 2.8mm. After quenching, tempering stabilization treatment is carried out to eliminate quenching stress, reduce the risk of cracking in the quenched part and perform hardness and crack detection at the end of stability.

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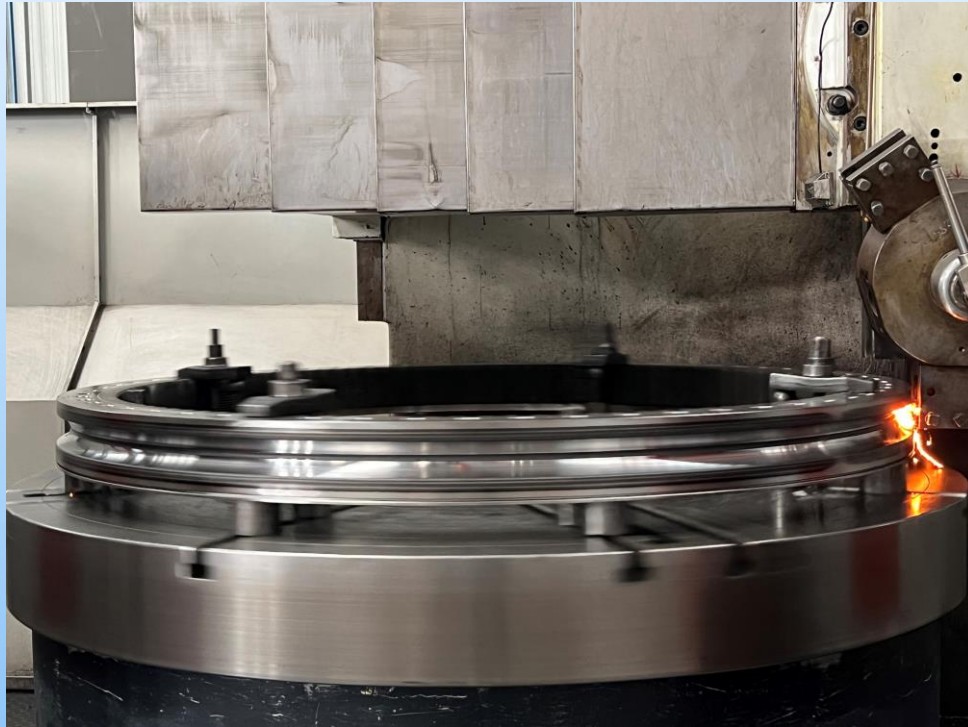


# Mounting Holes Drilling



- When drilling the slewing bearing, the center and cutting angle should be determined and the drilling machine, hand-held electric drill and hand-operated drill should be selected for operation.
- During the processing, the chord length, wall thickness, aperture and other items are controlled and corrected in time. The threads with high precision requirements are inspected.

# Finish Turning & Grinding



- Finishing is to trim the fine parts of the slewing bearing roughly formed after drilling to ensure the refinement of the appearance.
- Finishing has an effect on the rotation flexibility of the bearing ring and the precision of the bearing surface. Once again, the raceway surface of the steel ring is refined.
- Modify the deformation caused by the previous process. Effectively control the ellipse, wall thickness and flatness of the ferrule.

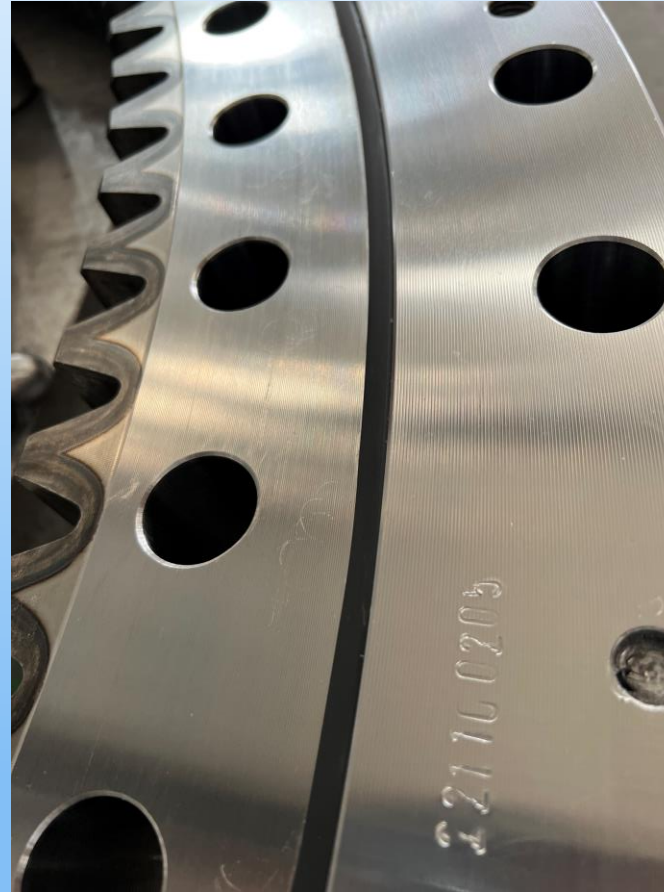


# Assembly & Inspection



Assemble parts(Outer ring, inner ring, roller, cage) processed through various process, such as inserting steel balls, spacers and inserting butter seals. Rotation detects whether the rotation is flexible and there is no abnormal noise.

# Sealing Strip





# Cleaning, Package & Delivery

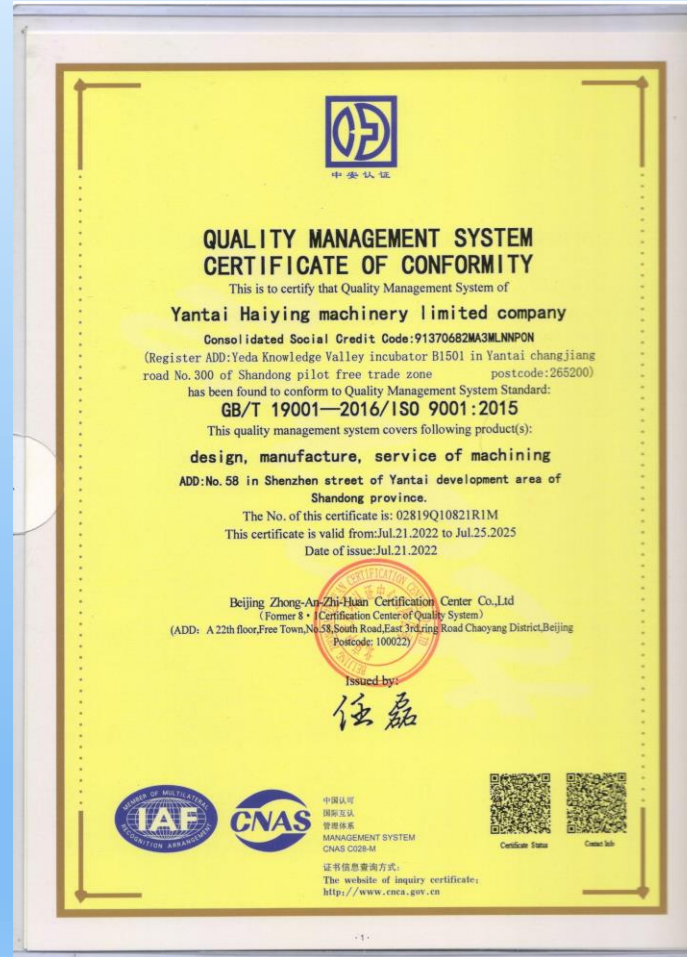
When slewing ring bearings are ready for shipment, we usually give a light coating of preservative oil and packaged in a tire wrap of protective paper and a shipping container.

1. Plastic film
2. Kraft paper
3. Blue belt
4. International Standard Wooden Case for shipment by Sea or by Air



# Quality Verifications

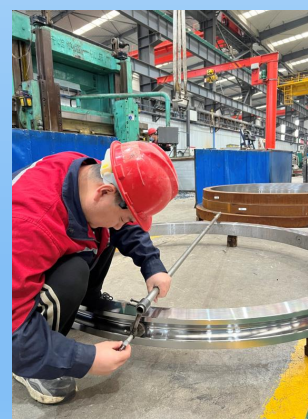
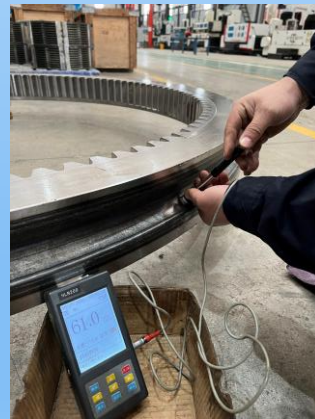
- We have passed GB/T 19001-2016/ISO9001:2015 quality management system certification in 2019.
- And also passed GB/T 24001-2016/ISO 14001:2015 environmental management system certification in 2021





# Quality Verifications

- Our internal quality control includes first inspection, mutual inspection, in-process quality control and sampling inspection to ensure product quality. The company has complete testing equipment and advanced testing methods.
- Portable hardness test equipment, UT instrument for the hardness depth determination, instruments for coating check and measuring machines are available devices in the plant, dedicated to the controls during all manufacturing steps ensuring high quality products meeting customer requirements.



# Quality Verifications

## 100% Traceability Guarantees the Quality

Our quality control begins at the beginning of the manufacturing process. As each forging ring is received and inspected for chemical composition and core hardness, it is stamped with a unique tracking number, and it continues through all the stages of production until the final delivery of the product.

The tracking number enables our workers to trace the material through each step of manufacturing, including where the forging came from, when it was processed, who did the processing, and the results of each inspection. This number will then correlate to the final inspection report for review by customers.





# Quality Verifications



- We inspect 100% of the manufactured bearing for functionality. If one bearing does not meet the design performance, the Quality Dept. will identify, remove and segregate it. Upon completion of a technical analysis, a technical team will decide to rectify or rebuild the bearing.

# Our Equipment

- We have a full assembly line production capacity of heat treatment, raceway/teeth making, machining process and finished product assembly. Our main processing equipment includes CNC vertical lathes, CNC horizontal lathes, CNC gear hobbing machines, CNC gear shaping machines, gear grinding machines, CNC grinding machines, CNC boring and milling machines, etc. All of which are based on CNC machining to ensure product accuracy
- The company has complete research and development, verification and inspection equipment, including automatic turret microhardness tester, microcomputer-controlled universal testing machine, metallographic microscope, magnetic particle flaw detector, digital ultrasonic flaw detector, bearing measuring instrument, Leeb hardness tester, ultrasonic surface quenching layer thickness gauge, three coordinates, etc. A variety of testing and control methods are used to escort the manufacture of high-quality products.





# Our Equipment



1.6m CNC lathe



Drilling machine-oil cup



2m slewing bearing raceway quenching lather ( heat treatment process)



1.7m slewing bearing raceway quenching lather ( heat treatment process)



# Our Equipment



1.5m High Speed Milling  
Machine for gear



1.7m High Speed Milling  
Machine for gear



1.7m raceway high  
precision CNC machine



# Our Equipment



2.3m raceway high precision  
CNC machine



2.5m CNC Drilling Machine  
(Mounting holes)



2.6m raceway high  
precision CNC machine

# Our Equipment



2m CNC Drilling Machine  
(Mounting holes)-3



2m gear teeth quenching lather  
( heat treatment process)



2.5m gear teeth quenching  
lather ( heat treatment process)



# Product Information

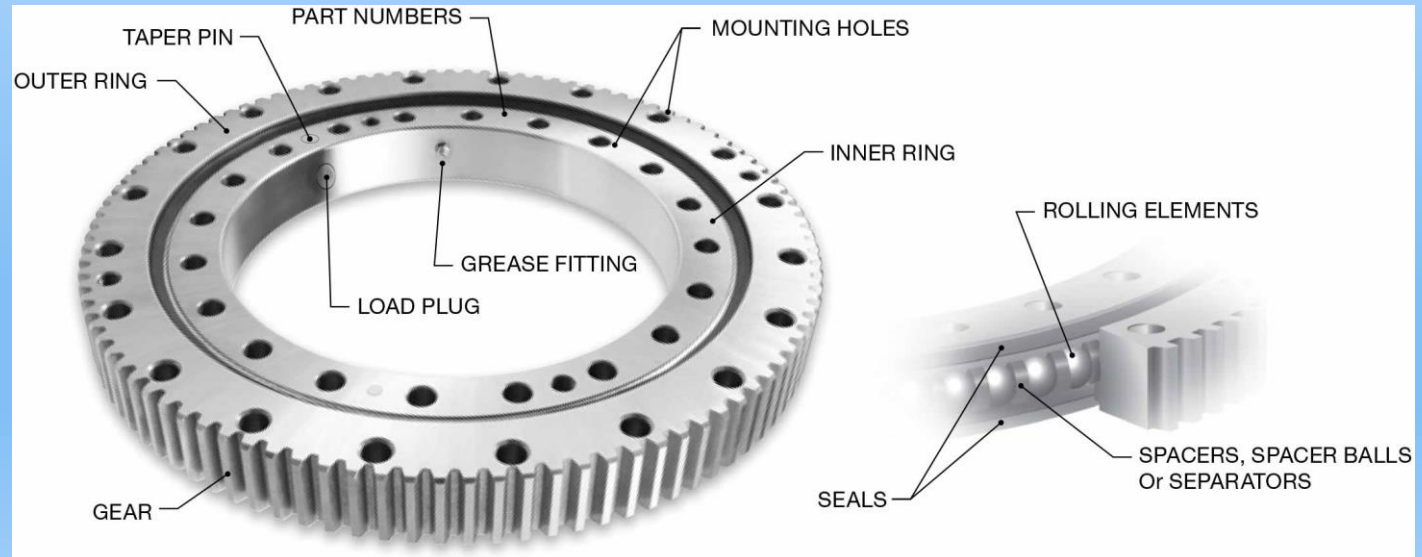
- Slewing bearings are large size bearings which can carry higher axial, radial loads and overturning moments at the same time.
- The material of our products are generally high alloy-structural steels, such as 42CrMo 50Mn.
- The slewing bearing can work normally at a temperature of  $-30^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and we can design special type as customer need.



# Product Information

The bearing in standards design are made up of the following components:

- ① Bearing inner and outer rings with closing plug in one ring.
- ② Rolling elements
- ③ Balls for four point contact bearings
- ④ Cylindrical rollers for crossed roller bearings
- ⑤ Plastic spacer or special spacers
- ⑥ Seals
- ⑦ Grease nipples







## Materials of slewing bearing

1. Material of slewing ring: 42CrMo is generally used for ZYS slewing ring with surface quenching treatment of the raceway. Other kinds of surface quenched steel can also be used according to customer specification and operating conditions.
2. Material of rolling element: The material of rolling elements in ZYS bearing is GCr15 or GCr15SiMn steel.
3. Material of cage: Various types of cage are used in ZYS slewing bearing, which can be divided into integrated cage, segmented cage, spacer and etc. 20 steel or ZL102 cast aluminum alloy is used for integrated cage and segmented cage. For spacer, the material is polyamide 1010 resin, ZL102 aluminum bronze, QA110-3-1.5 aluminum bronze or GRPA66-25 nylon.
4. Material of sealing ring: The sealing ring is made of NBR.

Rolling elements: Steel Ball/Cylinder Roller: GCr15/GCr15SiMn/Customized for rolling Material

Cage: include integral cage, segment cage and spacer-type cage. We use 20# steel or copper for integral and segment cages, PA 1010 resin or QA110-3-105 al bronze for spacer-type cages.

Sealings: We use NBR or VI-TON, few felted wool.



# Product types



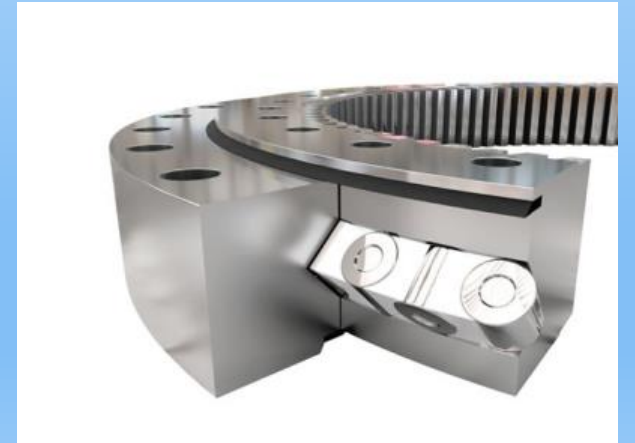
MAIN PRODUCTS		
		
Single row cross roller slewing bearing	Single row four point contact slewing bearing	Flange type slewing bearing
		
Light type slewing bearing	Three row roller slewing bearing	Double row ball slewing bearing



# Product types

## Slewing Ring Bearing

- Four-point Contact Ball slewing bearing( 01/HS/Q series)
- Single Row Crossed Roller Slewing Bearing (11/HJ series)
- Double row different diameter ball slewing bearing 02 series
- Three row roller type bearing 13 series
- Roller and Ball Combination Slewing Ring
- Light type slewing bearing
- Flange type slewing bearing 23 series



## Four-point Contact Ball slewing bearing( 01 series)

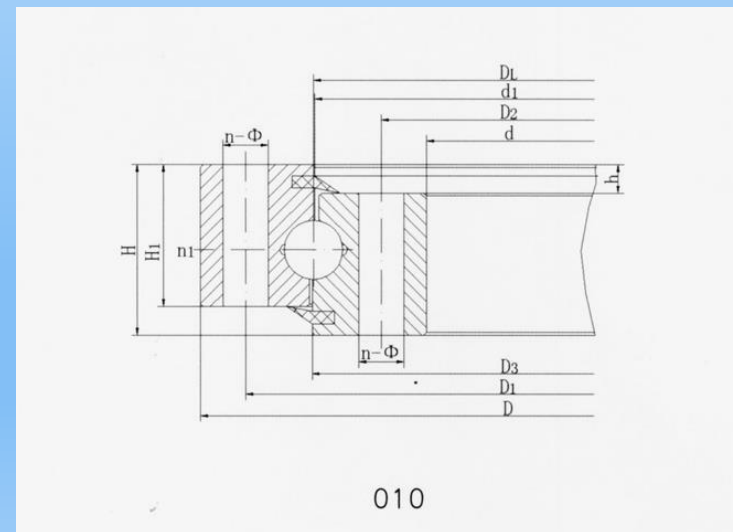
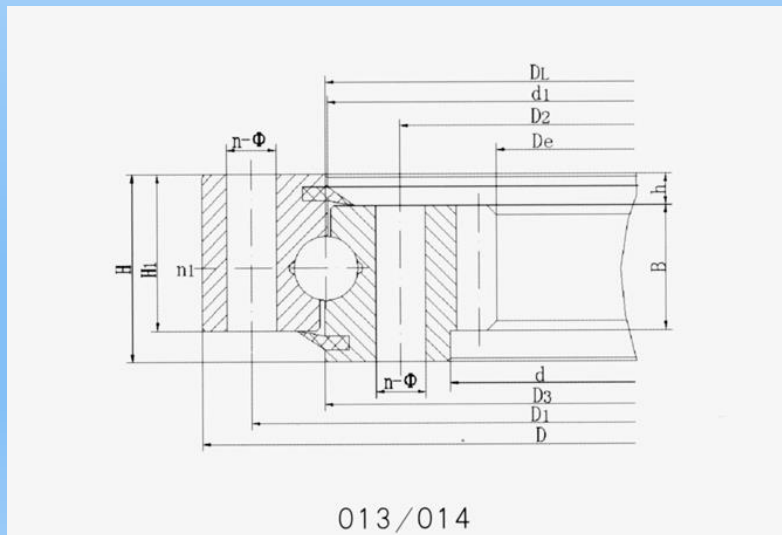
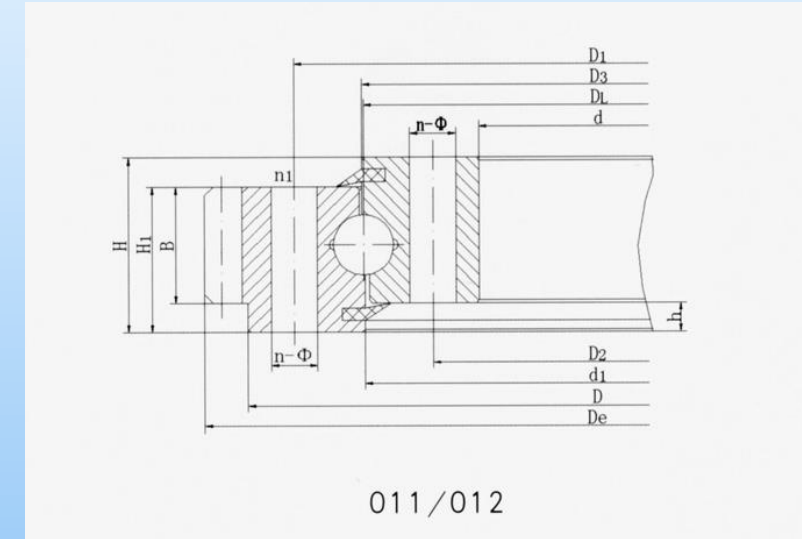
- Single row four points contact ball slewing rings are composed of two seat rings, which design in compact structure and light weight, steel ball contacts with the circular raceway at four points, via which the axial force, radial force and resultant moment may be born simultaneously.
- The single row ball slewing bearings has three different types:
  - swing ring with external gear teeth
  - slew ring with internal gear teeth
  - slewing ring without gear teeth





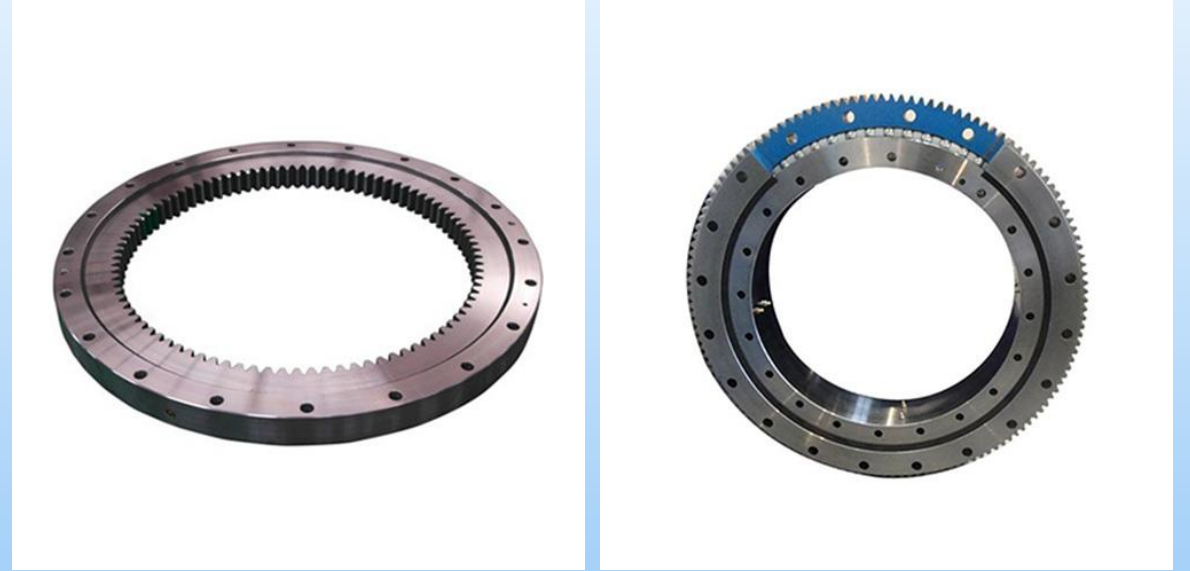
## Four-point Contact Ball slewing bearing( 01 series)

- One row four-point contact slewing ring bearings without preload are robust and proven under very demanding operation. They place only slight demands on the flatness and perpendicularity of the adjacent construction. They are suitable for applications with low requirements for accuracy and rigidity of the bearing arrangement, such as slewing conveyor, welding manipulator, light and medium duty cranes (mobile cranes, tower cranes, deck cranes, aerial platform etc.), different excavators.



## Single-row four-point contact ball slewing bearing JB2300-78A (HS Series)

- The single row four-point contact ball slewing bearing is composed of two raceways, with compact structure, light weight, four-point contact between the steel ball and the arc raceway, and can bear axial force, radial force and tipping moment at the same time.
- The internal configuration consists of deep groove gothic arch raceways and maximum ball complement. This results in a four-point contact design which provides exceptional moment, thrust, and radial load capacities. Integral seals are provided to assist in the exclusion of contaminants.
- Geared rings have tapped holes, while non-geared rings have through holes.
- HS Series bearings are available in internal geared, external geared, and non geared configurations.

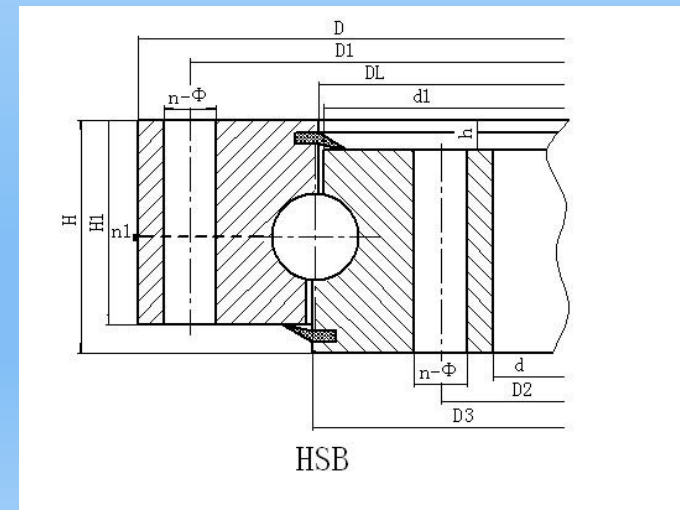
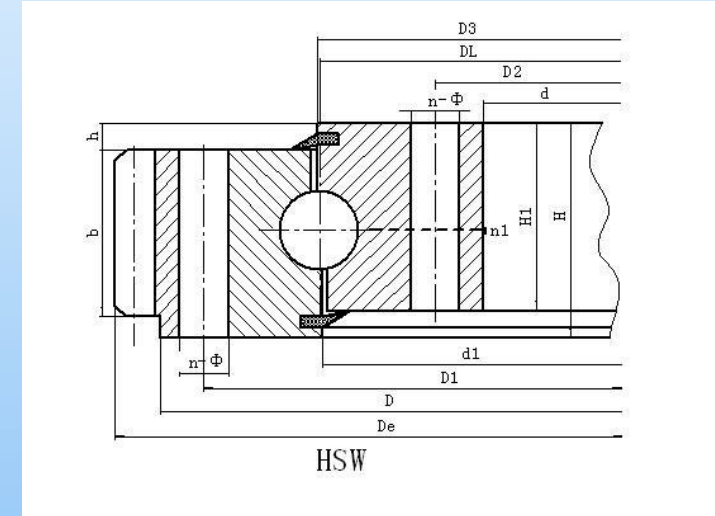
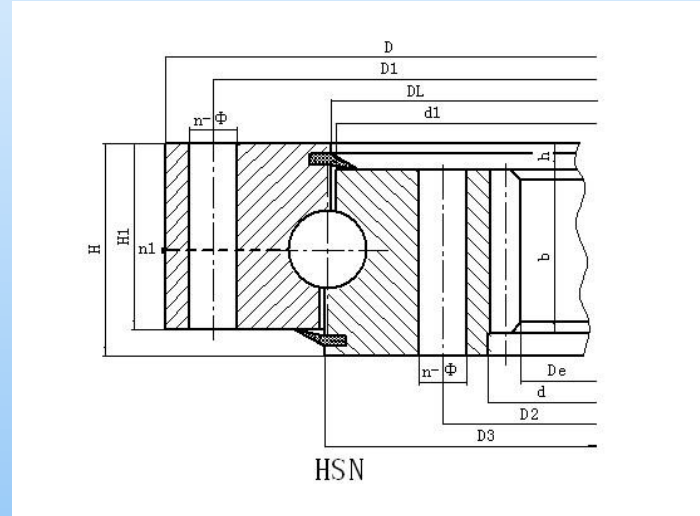




## Single-row four-point contact ball slewing bearing JB2300-78A (HS Series)

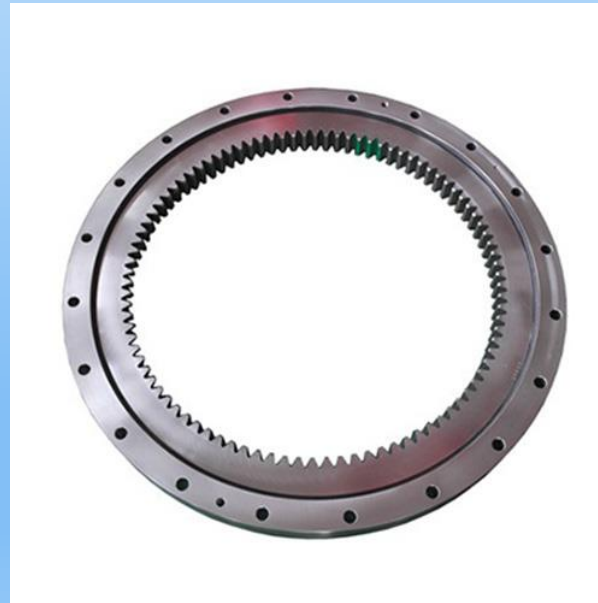
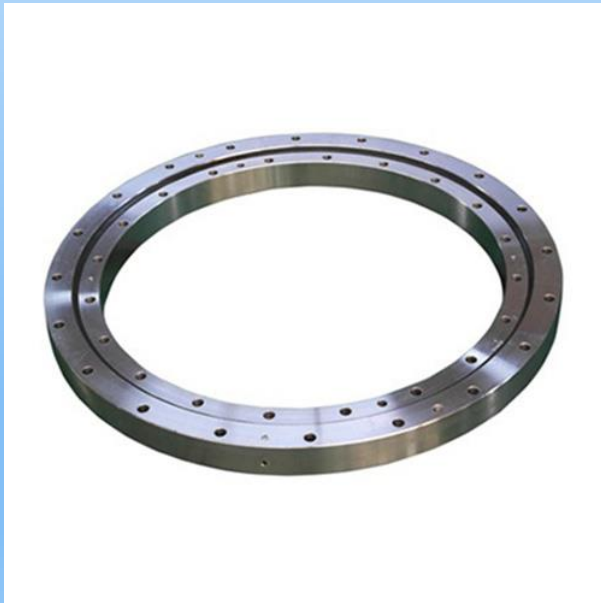
• HS Series bearings have been used successfully in a variety of medium to heavy duty applications including:

1. Cranes
2. Aerial lifts
3. Digger derricks
4. Chute swivels
5. Lift truck rotators
6. Industrial turntable



## Four-point Contact Ball slewing bearing Q series

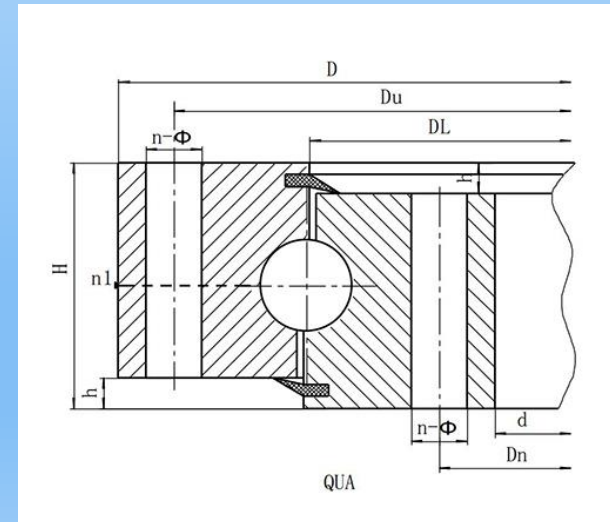
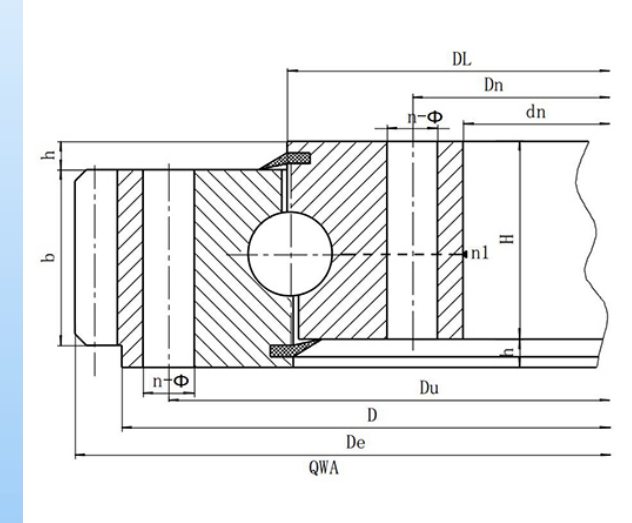
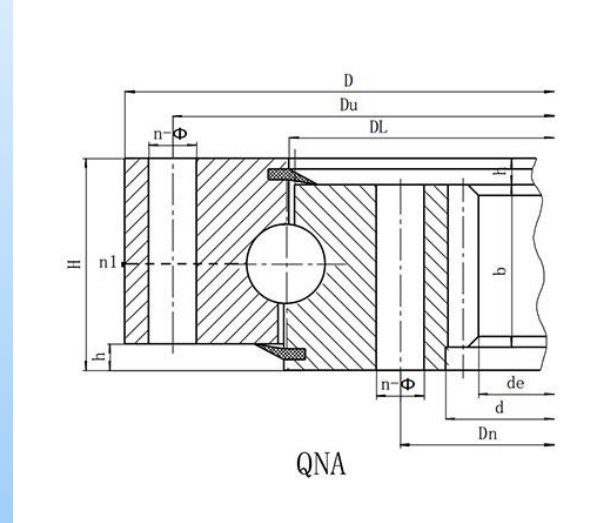
- The single row four point contact ball slewing bearing is composed of two seat rings, which design in compact structure and light weight, steel ball contact with the circular raceway at four point, it can bear the axial force, radial force and the tilting moment at the same time.





## Four-point Contact Ball slewing bearing Q series

- Q Series bearings are available in internal geared, external geared, and non geared configurations.
- It can be used for slewing conveyer, welding manipulator, light & medium duty crane, excavator, and other construction machinery.



## Single Row Crossed Roller Slewing Bearing 11 series

The single row crossed roller slewing rings are composed of two seat rings, which design in compact structure and light weight, high precision, and small assembling clearance. The internal configuration consists of cylindrical rollers in a v-shaped groove in each ring. The rollers are oriented with alternating axes of rotation. Positioned in this manner, the bearing accepts all combinations of radial, thrust, and moment loads. Rotational torque is less than a four-point contact ball design because each roller only transmits load in a single direction, and the greater contact area and geometry of a roller versus a ball provides a higher degree of stiffness and rigidity. A roller of approximately the same size as a ball has greater load-carrying ability. However, because not all the rollers are oriented in one direction, their thrust and moment load capacity is less than that of a four-point ball bearing. Gear teeth or other drive mechanisms can be provided on the inner or outer support ring, and your choice of hole pattern can be added for bearing retention.

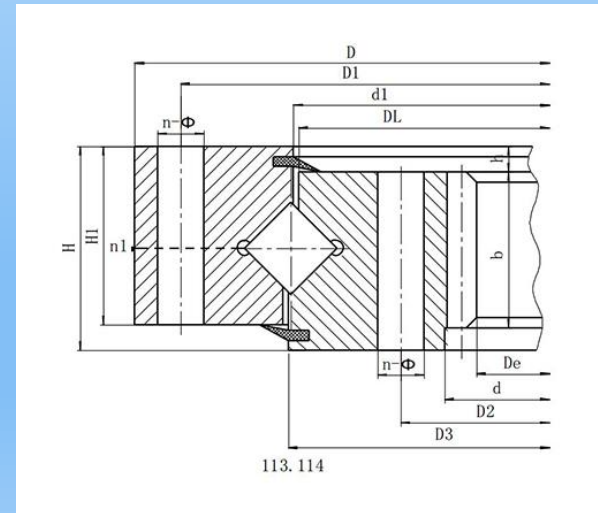
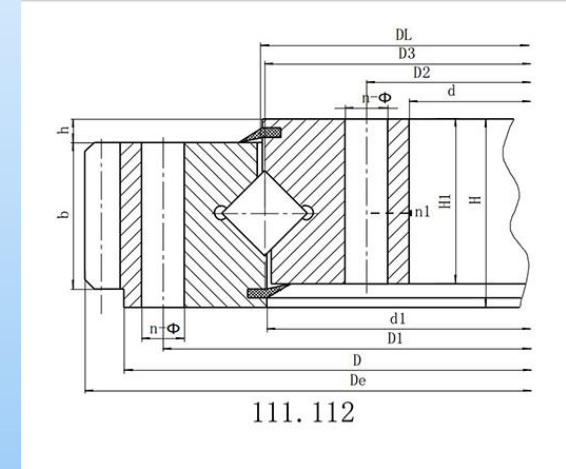
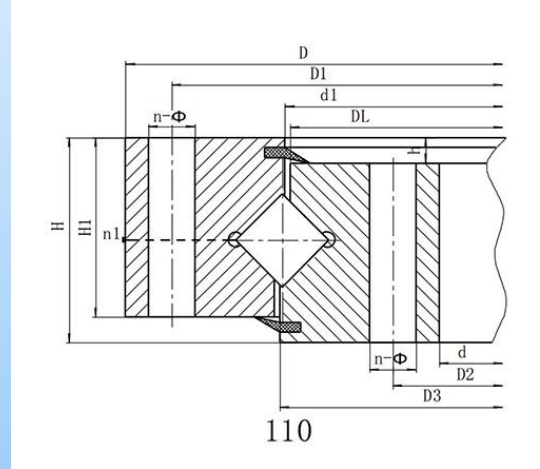




## Single Row Crossed Roller Slewing Bearing 11 series

The single row crossed roller slewing bearing has been widely used in many applications

1. Lifting transportation
2. Construction machinery
3. Military products
4. Automation machinery, Robots
5. Medical equipment
6. Radar equipment
7. Grinding machine and drilling machine



## Single Row Crossed Roller Slewing Bearing HJ series

The single row crossed roller slewing rings are composed of two seat rings, which design in compact structure and light weight, high precision, and small assembling clearance. The rollers are crossed one by one, can support higher loads than four point contact bearings. They have proved themselves particularly where bearings are subjected to high radial forces and moderate axial and tilting moment loads. As the rollers are 1:1 cross arranged, it is suitable for high precision mounting and capable to bear axial force resultant moment and considerable large radial force. Our single row crossed roller slewing bearing ring's axial and radial clearance's precision is high.

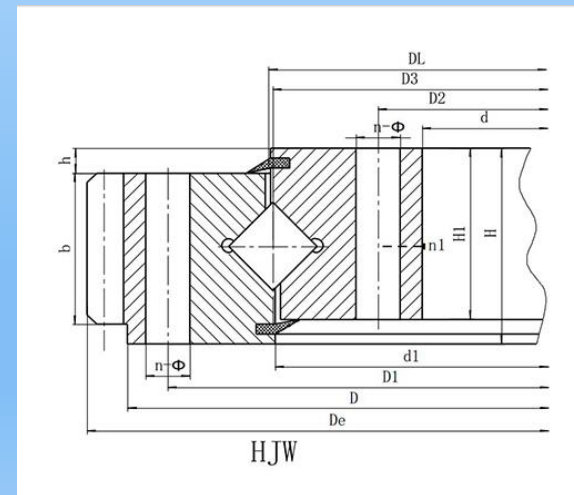
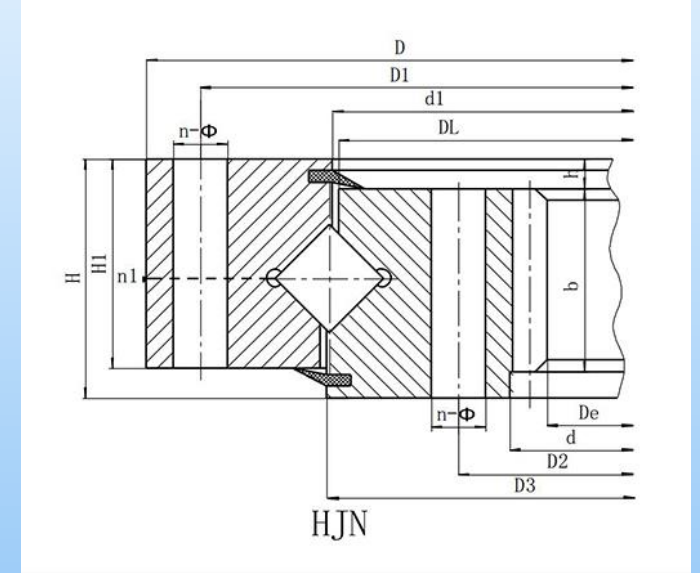
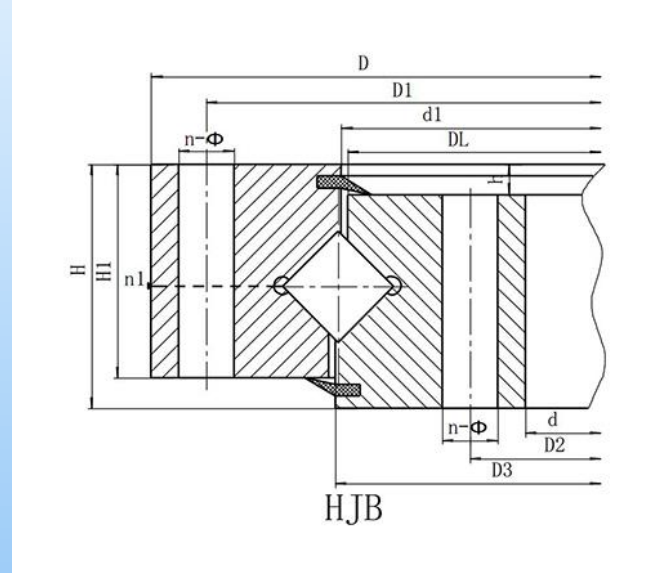




## Single Row Crossed Roller Slewing Bearing HJ series

They are suitable for applications with uniform running free from stick-slip, low rotational resistance and high requirements for axial and radial runout accuracy and rigidity, for example in robots, handling systems and machine tools. The single row crossed roller slewing bearing has been widely used in many applications

1. Lifting transportation
2. Construction machinery
3. Military products
4. Automation machinery, Robots
5. Medical equipment
6. Radar equipment
7. Grinding machine and drilling machine



## Double row different diameter ball slewing bearing 02 series

- Double row ball slewing bearing has three seat rings, the steel ball and the spacing block can be directly discharged into the upper and lower raceways, two rows of upper and lower steel balls with differently diameter are fitted according to the stress condition. The bearing angle of the track is  $90^\circ$ , which can bear a large axial force and tipping moment. When the radial force is greater than 0.1 times the axial force, the raceway must be specially designed.
- Double row ball slewing bearing has three different types:

Slewing ring without gear

Slewing turntable bearing with external gear

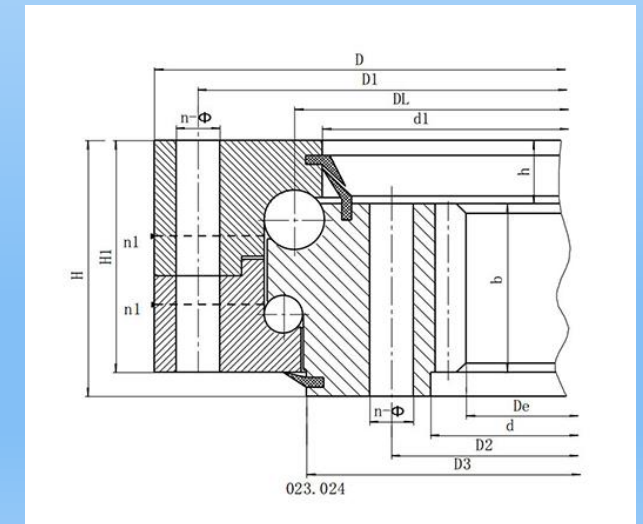
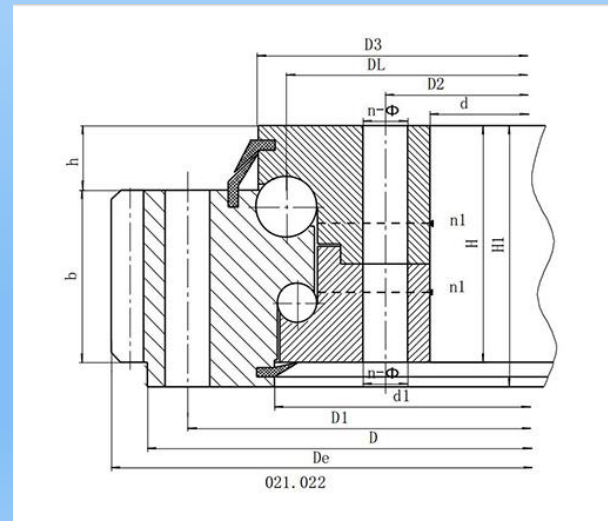
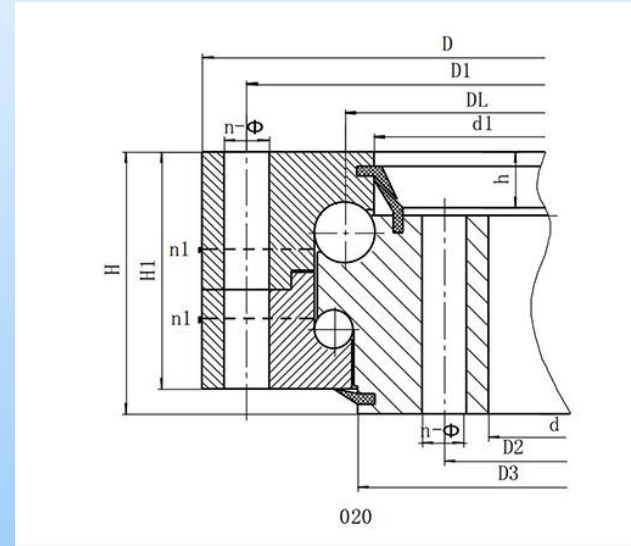
Slewing rotary rings with internal gear





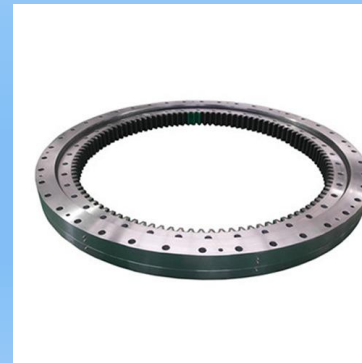
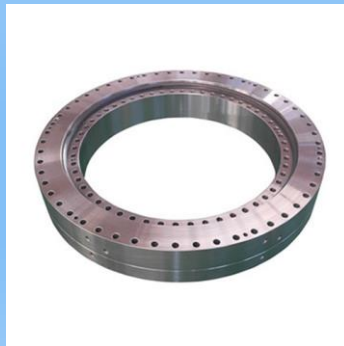
## Double row different diameter ball slewing bearing 02 series

The axial and radial dimensions of the double-row ball slewing bearing are relatively large, and the structure is firm, especially suitable for loading and unloading machinery such as tower cranes and truck cranes that require a medium diameter or above. It is also widely used in other construction machinery, such as earthmoving machinery, excavators, stacker and retractor, grader, roller, rock drilling machinery, riding machine, etc.



## Three row roller type slewing bearing 13 series

- The three-row roller slewing bearing has three row raceways, the rolling element is steel roller. This structure could bear the heaviest load comparing to other structure bearing type. The bearing has three independent rows of rollers oriented normal to the direction of loads being transmitted through the bearing. Their orientation is selected to optimize capacity, provide low frictional resistance and minimize deflection. The top and bottom rows of rollers transmit any opposing thrust loads and combine to transmit any moment loading, while the middle row transmits any radial loads. The rollers, the separator configuration used for each and the mating raceways are sized to meet load or other application requirements.
- Usually, the triple row roller slew bearing is used for some heavy-duty machinery. Neither orbit and radial orbit is separated individually, it makes the load of each row of the rollers can be confirmed, making it can undertake all kinds of different load simultaneously. Three row roller slewing bearing's carrying capacity is the biggest among four models and the axial and radial size are rather large to some extent, the structure of the three-row roller slewing bearing ring is very firm.



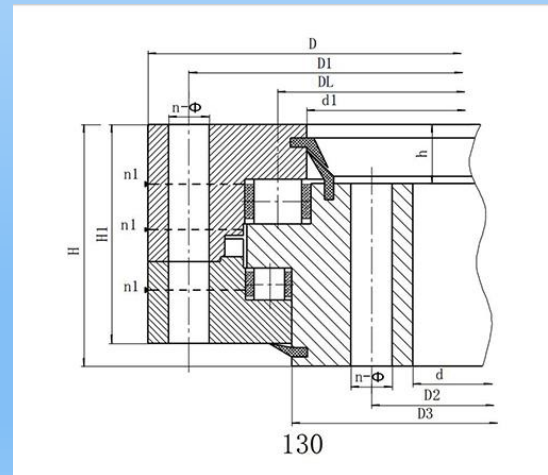
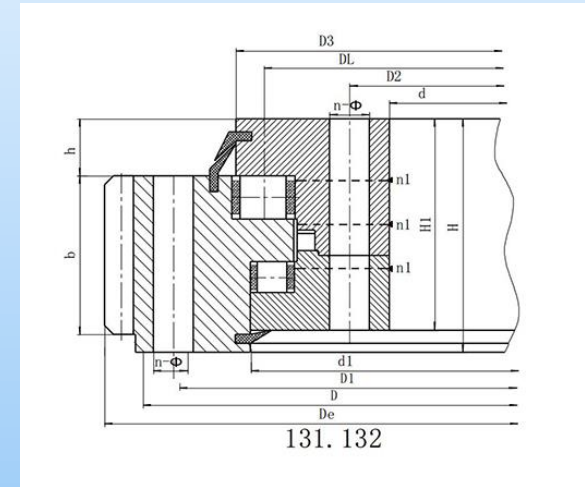
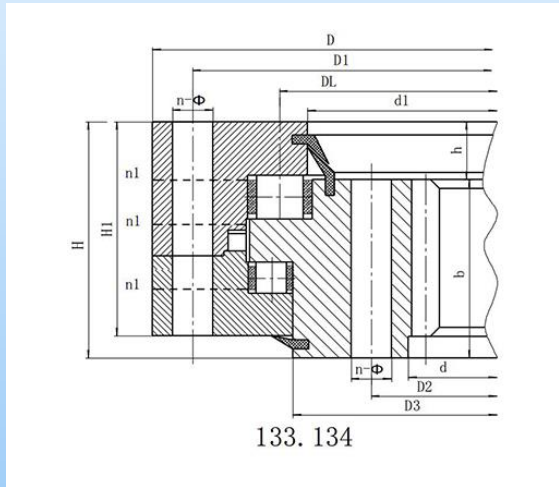


## Three row roller type slewing bearing 13 series

Three row roller slewing bearing is mainly made of 50Mn, 42CrMo, C45.

The three row roller slew bearing rings have been used successfully in heavy duty applications requiring extra stiffness and capacity including:

1. Radar
2. Cranes
3. Mining shovels
4. Stackers and reclaimers
5. Heavy mill equipment
6. Tunnel boring machines



## Roller and Ball Combination Slewing Ring Bearing

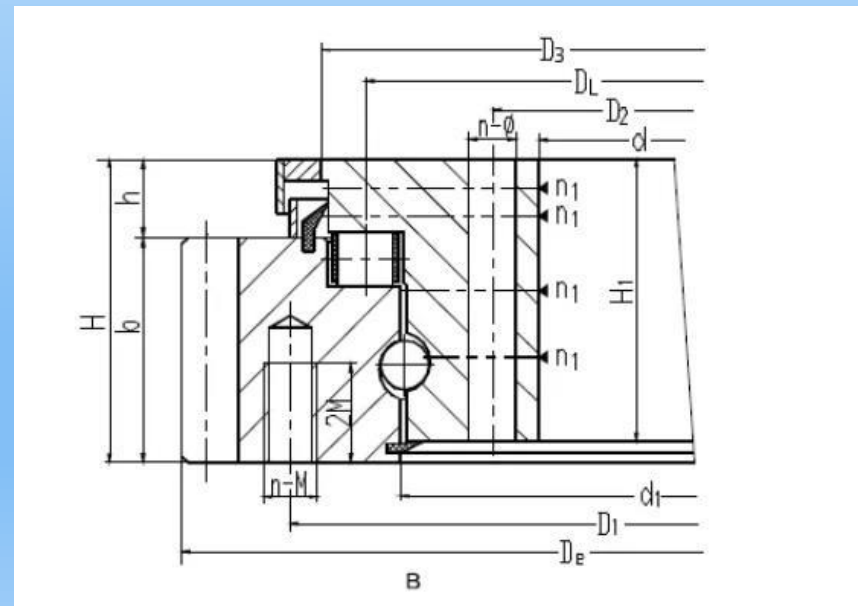
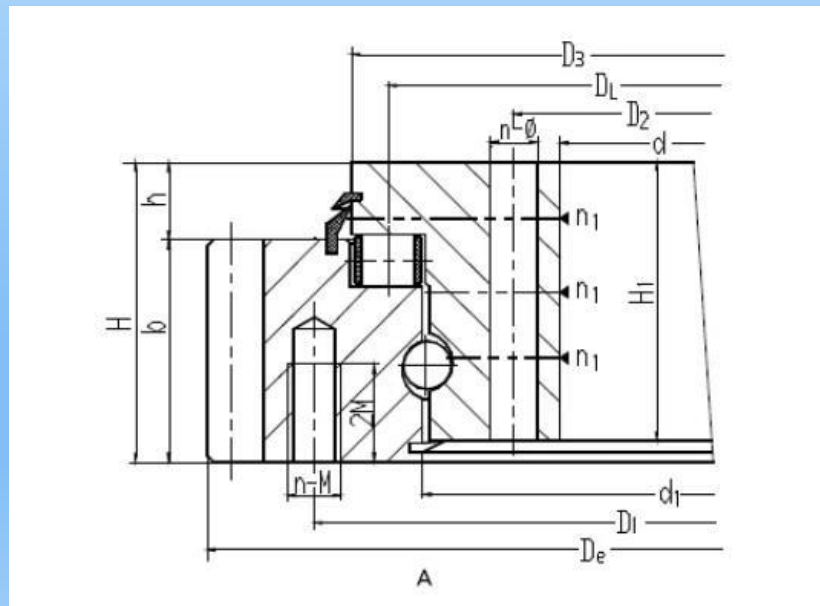
The Series 10 combines both rollers and balls to account for small movement eccentricities at relatively high axial loads for enhanced load support and stability.

Ball & Roller combined slewing bearing is applied for heavy axial loading, the eccentric rate( $e$ ) less than 1.2 and continuous rotating and long life. The top roller mainly carries the axial load and positive tilting moment. The drop ball takes the opposite tilting moment. This is the reason for the loading capacity of the roller/ball combination slewing bearing being larger than the double-row ball slewing bearing, however, the frictional resistance is much larger than the latter. Generally double-row roller/ball combination slewing bearing has advantage of large load carrying capacity and low frictional resistance. In order to accommodate the various working condition at different axial load, tilting moments and axial load, the angle of contact on drop row balls would be adjusted accordingly.



## Roller and Ball Combination Slewing Ring Bearing

The rings structure can be divided into two types, integral type and split type. Generally, the integral type maintains a stronger rigidity. The split type is more convenient to adjust; the two segregate rings are fastened by bolts prior to delivery. The double-row roller/ball combination slewing bearing has cages (or spacing blocks) among the balls. Only when large loading is requested would the full ball type be applied. Loading capacity for full ball type is definitely larger. However, the increased friction generated by this design allows for the balls to be easily scratched. The double row slewing bearing is mainly for the working conditions when carrying an axial load, larger tilting moment and low friction resistance. This structure provides good performance when fit into an installation when an amount of deformation may be allowed.





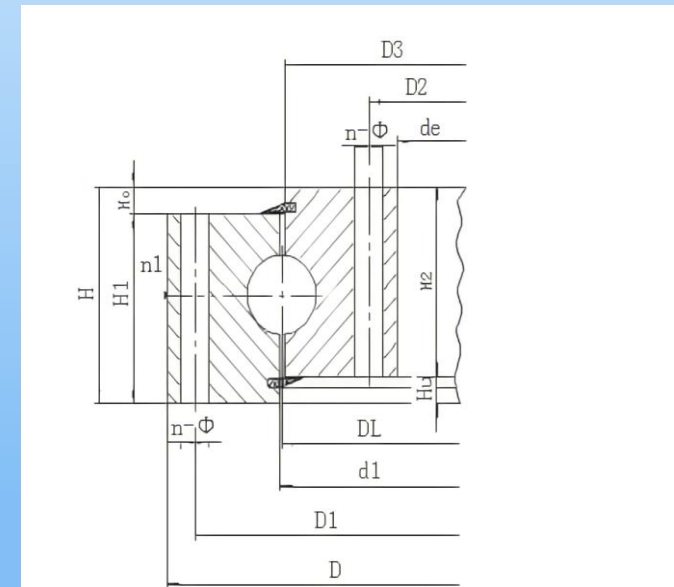
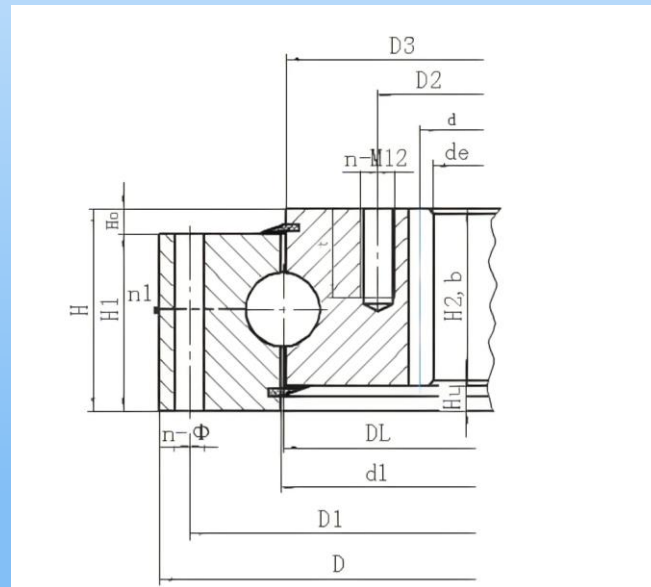
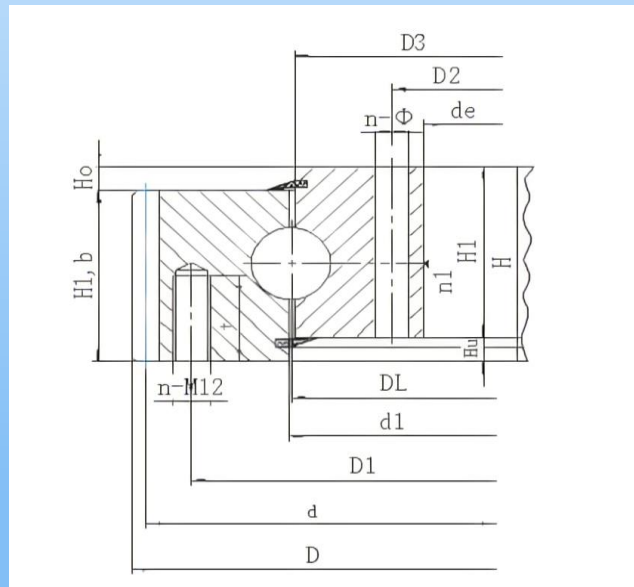
## Light Slewing Ring Bearing

The light slewing rings bearing has the same structure with four-point contact ball slewing bearing, but the weight is light and could be used for some light type machinery applications. The Thin Section Slewing Bearing has the same structure with the ordinary slewing bearing, but the weight is light and rotate flexibly, which widely used in the food machinery, canning machinery and environmental machinery etc.



## Light Slewing Ring Bearing

The Thin Section Slewing Bearing has the same structure with the ordinary slewing bearing, but the weight is light, and rotate flexibly, which widely used in the food machinery, canning machinery and environmental machinery etc.



## Flange Slewing Ring Bearing

The flange slewing rings bearing has the same structure with four-point contact ball slewing bearing, but the weight is light and could be used for some light type machinery applications.

The flanged slewing bearing is a new type of mechanical part, it has inner and outer rings, rolling body, etc., is a large bearing that can bear comprehensive load, can bear large axial, radial load and overturning moment at the same time. Its design can reduce weight and provides the equipment designer greater flexibility for configuration of adjacent mounting structures and bolting arrangements.

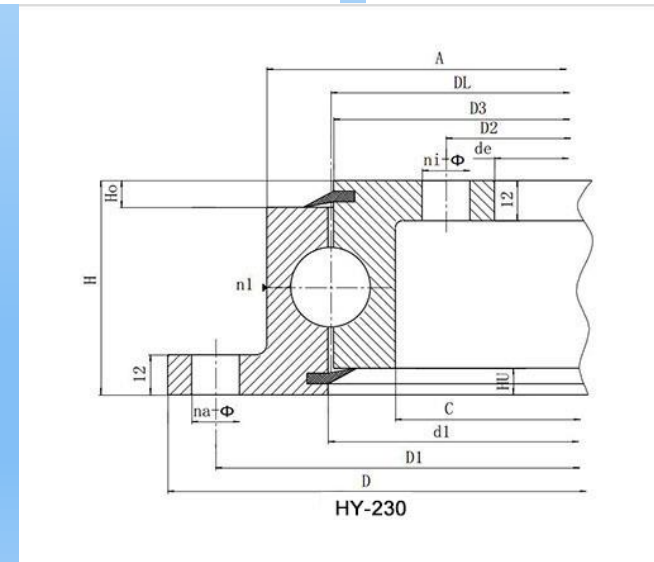
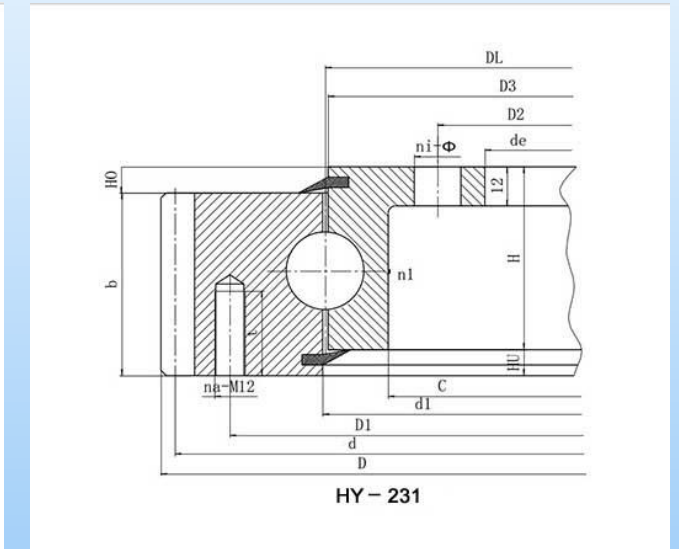
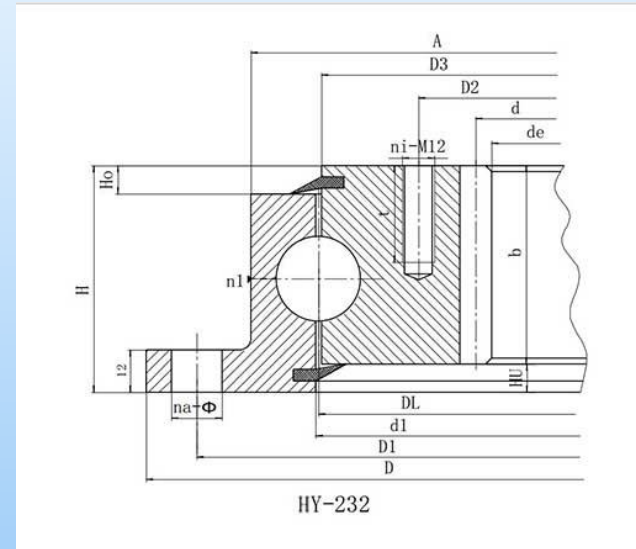




## Flange Slewing Ring Bearing

The flanged rotary bearings have been used successfully in a variety of light to medium duty applications including:

1. Small cranes, booms, and lifts
2. Industrial positioners and rotary tables
3. Chute swivels
4. Stretch wrapping machines
5. Bottle filling machines
6. Conveyors and related material handling equipment
7. Rotating displays



# Applications



- Our company's revolving support products have reasonable structure design, stable and reliable quality, light weight, large carrying capacity, complete specifications and wide application. The products are widely used in construction machinery, such as automobile crane, excavator, tower crane, mining machinery, such as bucket wheel machine, metallurgical industry, such as mud gun, ladle turret, furnace cover rotation. It is also used in port machinery, welding machinery, wind power equipment, medical equipment, such as CT machine.



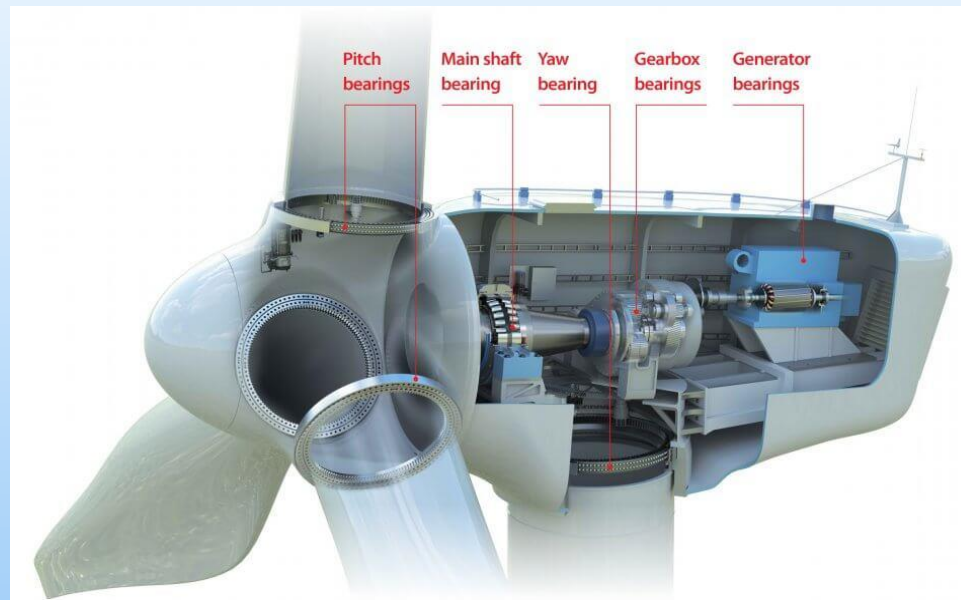
# Applications

1. Construction machinery
2. New energy vehicle  
changing station
3. Intelligent manufacturing  
production line
4. Forest industry machinery  
& agricultural machinery
5. Solar power generation  
(photovoltaic)
6. Hydropower
7. Environmental protection  
Automobile, Ship,  
Aerospace
8. Port cranes, tower cranes,  
concrete mixers, etc
9. Logistics and warehousing  
Other rotating parts





# Applications-Renewable Energy Wind & Solar



# Applications-Heavy Equipment





# Applications-Heavy Equipment



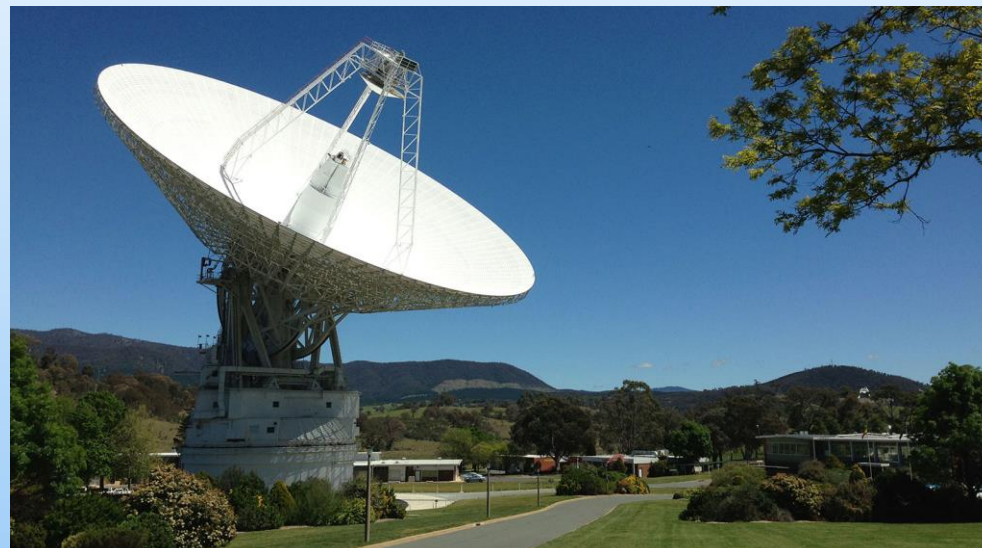


# Applications-Machinery





# Applications-others



# Our Clients

- We always upholds the enterprise spirit of "sincerity, farsightedness, steadiness, realism, sincere unity, innovation and development". With the goal of providing users with high-quality products and services wholeheartedly, We has established a perfect sales service network and advanced management mechanism and has cooperated with SANY, ZOOMLION, SCMG, GYG, HUBA and with other well-known domestic enterprises have established long-term cooperative relations.







**Thank you for your watching**

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