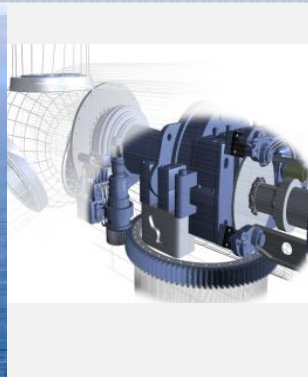


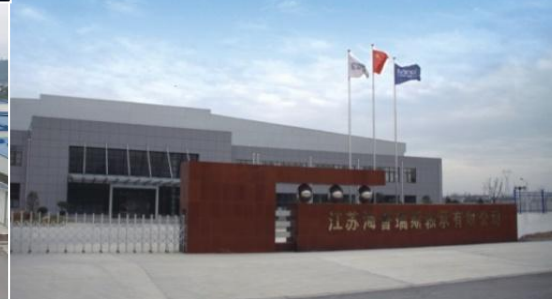


Rotational solutions
where & when you need them

WIND TURBINE BEARING



PROFILE



- Founded in 1954
- Headquarters in Luoyang, Henan, China
- Facility Size: 1,733,000 square metres
- Employment: 9,000 total
1,000 Technical Personal
- Annual Output: 150 Million bearings in 10 Categories
- Sales in more than 70 countries

PROFILE



**Production area for wind turbine bearing :
15,000 square meter
Maxim OD of finished products:
Φ6300 mm**



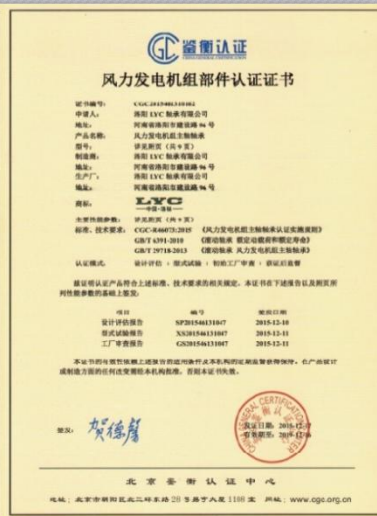
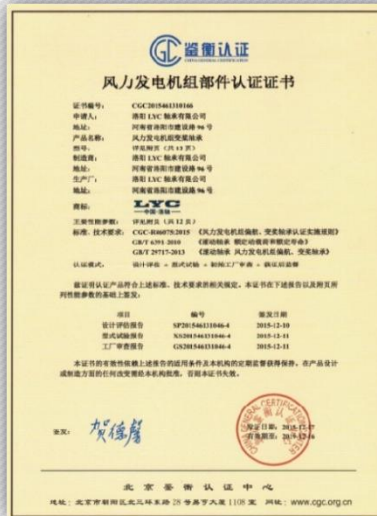
PROFILE



**Production area for wind turbine bearing :
49,000 square meter
Maxim OD of finished products:
Φ13,500 mm**



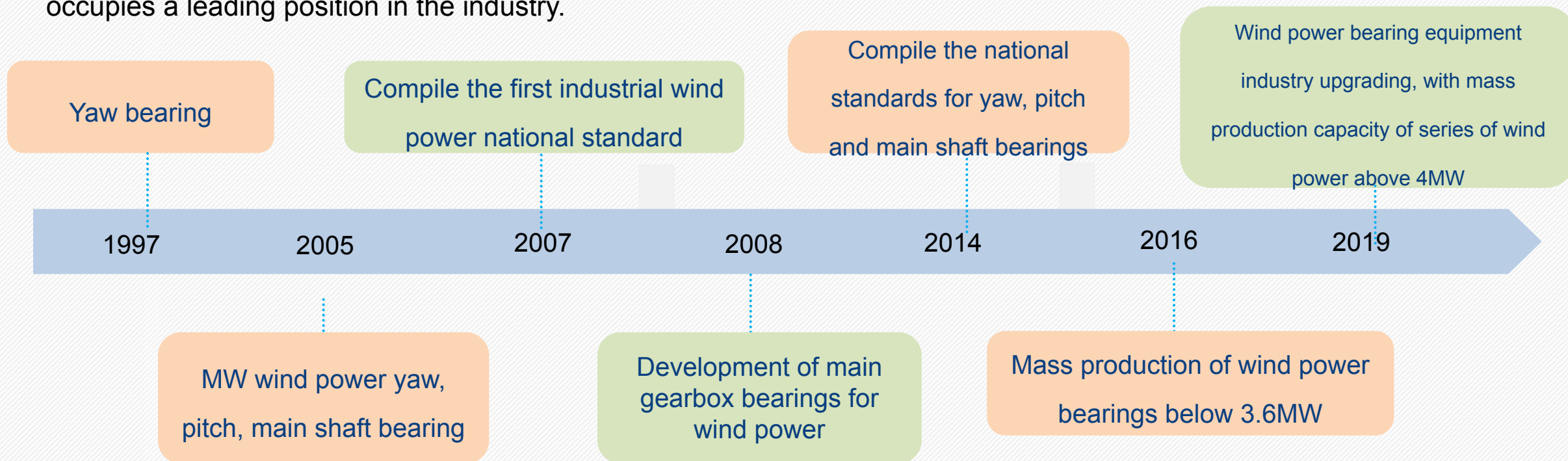
QUALITY ASSURANCE



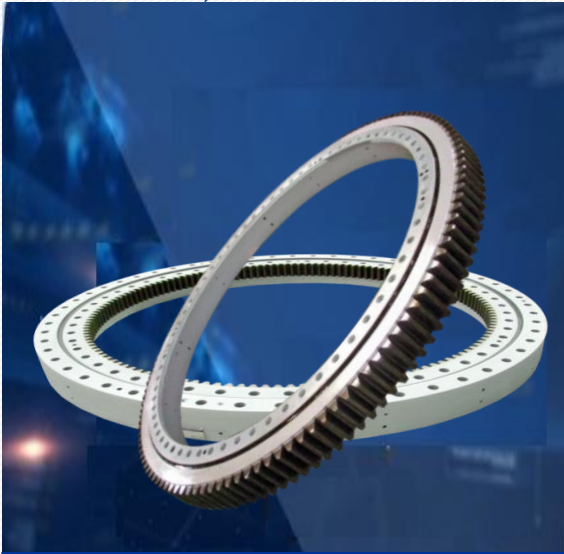


We've been working to build your future

LYC is the earliest manufacturer of wind power bearings in China, and wind power bearings have always been the core industry plate of Luoyang. Since 1997, the company has developed a series of wind power bearings such as yaw, pitch, main shaft, speed box, generator and driver, etc. It is one of the most comprehensive enterprises engaged in wind power bearing research and development, manufacturing, testing and testing, and occupies a leading position in the industry.



STRENGTHS



LYC Wind Turbine Bearing

1

20 years of processing experience in wind turbine bearing industry within China

2

Drafted of Yaw, Pitch & Main bearing production standard in China

3

Offer full range products for wind turbine transmission from 600KW to 6MW

4

More than 13000 set yaw & pitch bearings operation freely in wind farm

5

Passed GL and CGC certification with safety and reliability at international level

STRENGTHS



Yaw Bearing

Four Point Contact Ball Slewing Bearing

Pitch Bearing

Four Point Contact Ball Slewing Bearing

Cross Cylindrical Roller Slewing Bearing

Main Shaft Bearing

Spherical Roller Bearings,

Cylindrical Roller Bearings

Tapered Roller Bearings

Generator Bearing

Deep Groove Ball Bearings,

Cylindrical Roller Bearings

Gearbox Bearing

Deep Groove Ball Bearing,

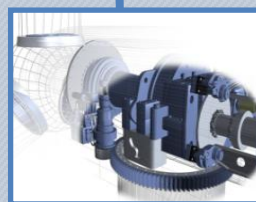
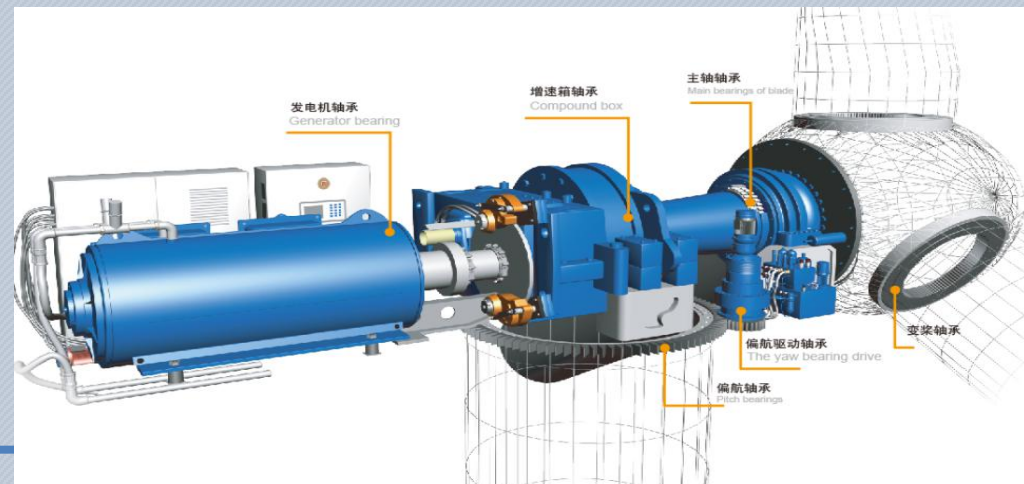
Cylindrical Roller Bearing,

Double-row Tapered Roller Bearing,

Spherical Roller Bearing,

Thrust Spherical Roller Bearing,

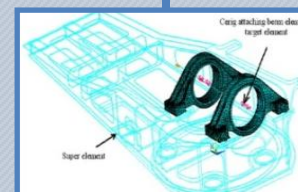
Four point Contact Ball Bearing



Yaw Bearing (1 pc)



Pitch Bearing
(3 pcs)



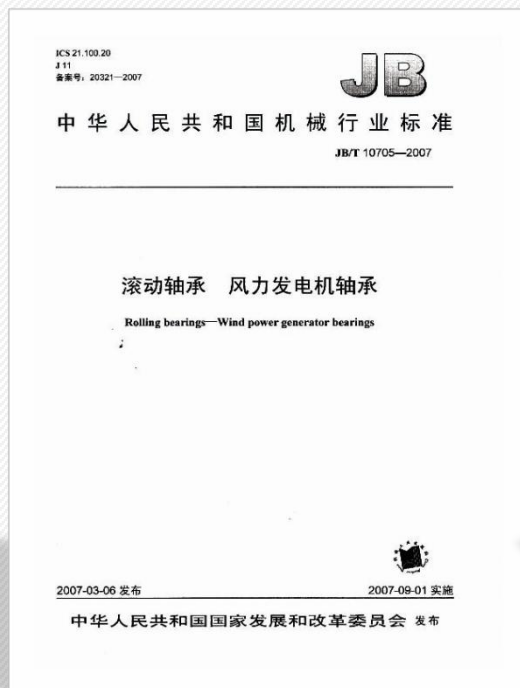
Main Shaft Bearing
(1-2 pcs)



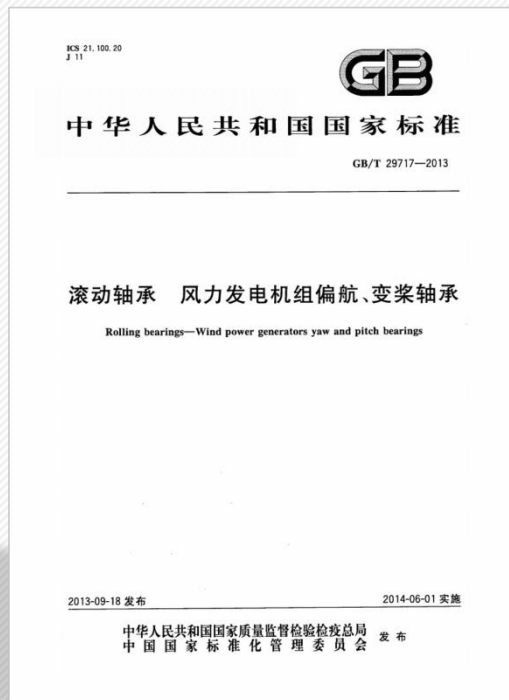
Generator Bearing
(3 pcs)



Gearbox Bearing
(15 -23 pcs)



JB/T10705-2007



GB/T29717-2013



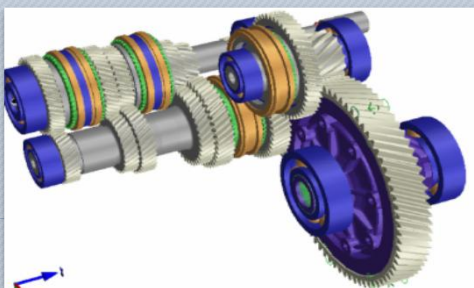
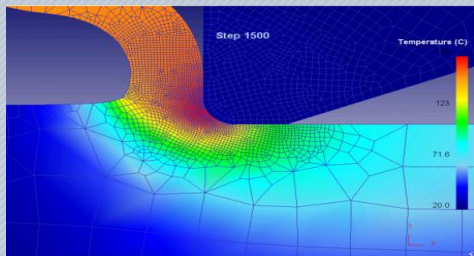
GB/T29718-2013

- In 2007: “Wind Turbine Bearing (JB/T10705-2007)” drafted by LYC becomes the national industrial standard of wind turbine bearings, and put into force from Sep.1st, 2007 in China.
- In 2013, LYC drafted the national standard of Rolling bearing: “Wind power generators yaw and pitch bearings GB/T29717” and “Rolling Bearings-Wind power generators main Bearing GB/T29718”, which standardized the design, manufacture, inspection and acceptance of generators yaw and pitch bearings.

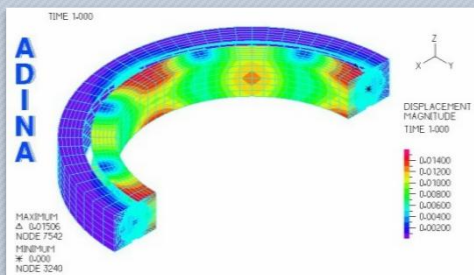
R&D ABILITY



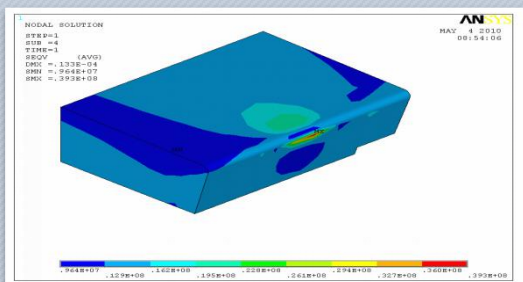
DEFORM



ADINA



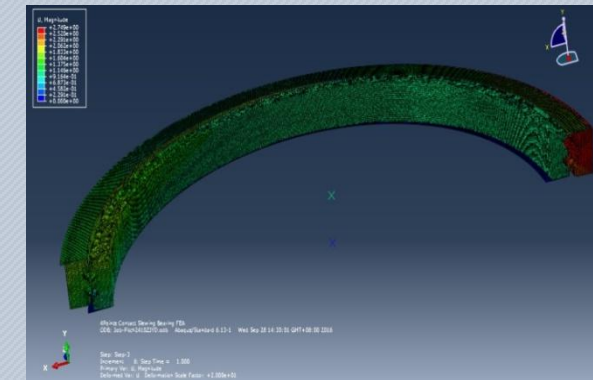
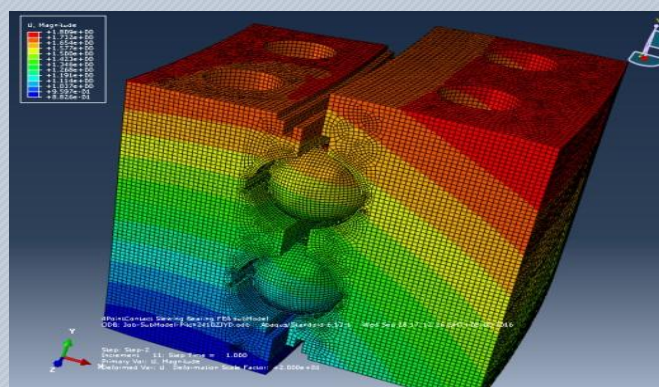
ANSYS



- LYC have developed bearing CAD/CAE/CAPP software independently.
- Jointly developed the Info Center PDM platform, integrate CAD, process design, CAPP as a whole.
- Finite element analysis software from ADINA, ANSYS, ROMAX, DEFORM

Items	Standard	Calculation Items
Raceway load capacity	ISO 76 Newton-Raphson GL	safety factor of inner ring and outer ring's contact stress
Tooth Verification	ISO 6336 Kisssoft GL	Dynamic strength, fatigue strength
Bolt Verification	VDI 2230 DRE/CON GL	Pre-tighten (F_M , F_{mreq})、Clamp strength (F_{kr} , F_{kreq})、Fatigue Load、Fatigue strength

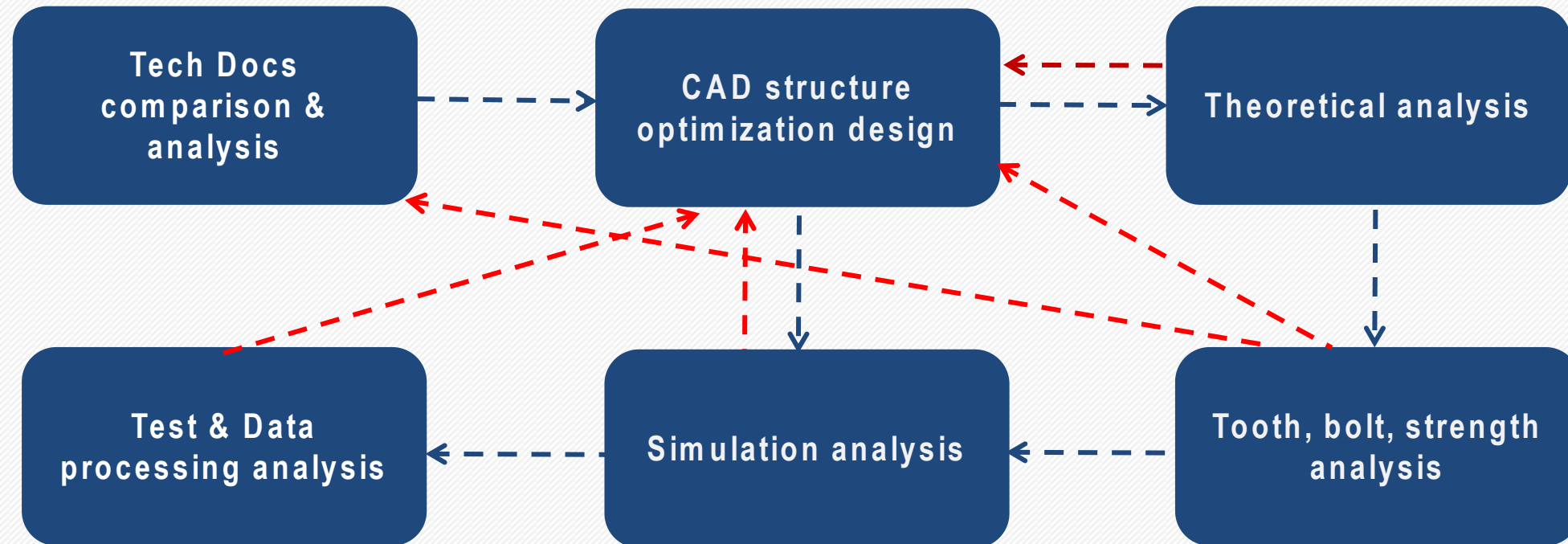
LYC



LYC



■ Design and analysis process for wind power products

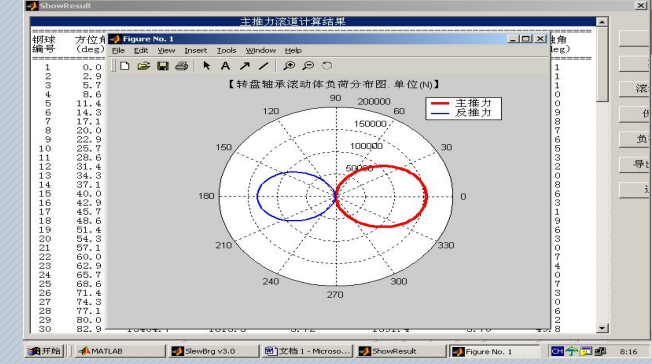
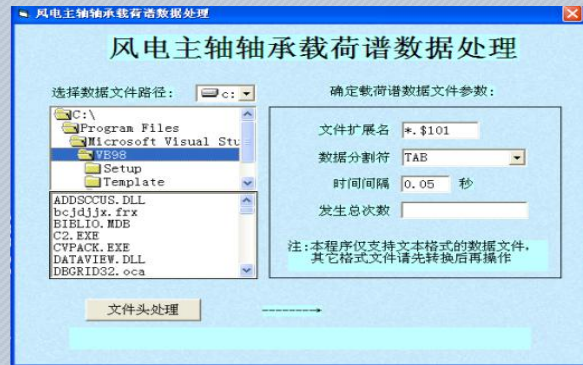




Technology Strength

■ Research Software for wind turbine bearings

LYC developed independently a series of software with intellectual property rights, with the help those series of software, our technicians can analyze properly the factors of load data processing and bearing strength, rigidity and load distribution, the stress distribution, the life, and clearance matching etc.



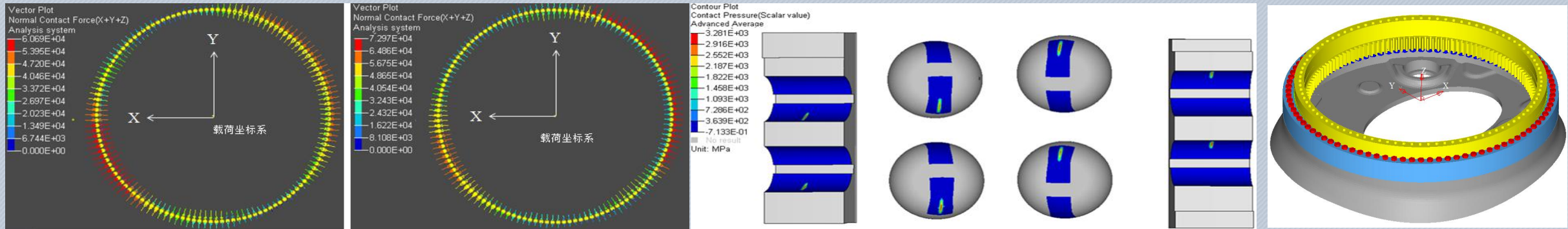
1. "Rolling bearing 3D computer aided design system RBDS ver5.0"
2. "Data processing for LDD load spectrum of wind power bearing",
3. "wind power bearing checking & the friction torque control technology software"
4. "Slewing Bearing's rolling element load distribution diagram"



Theory analysis of pitch bearing & yaw bearing

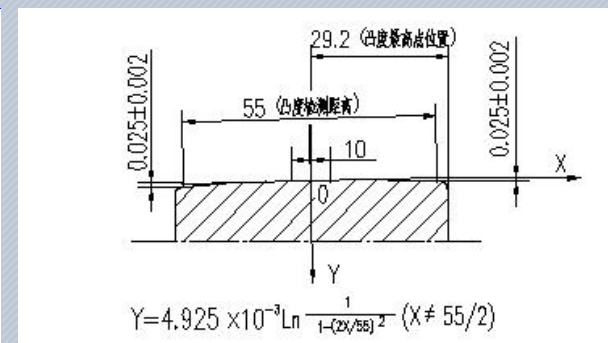
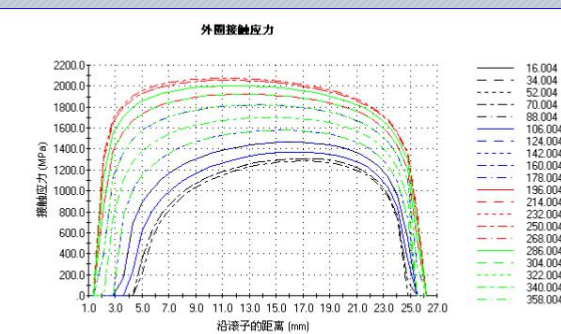
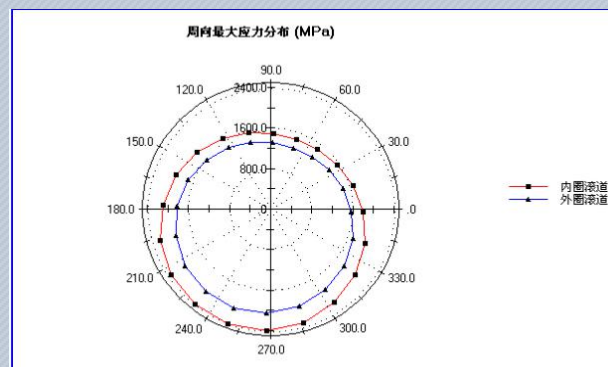
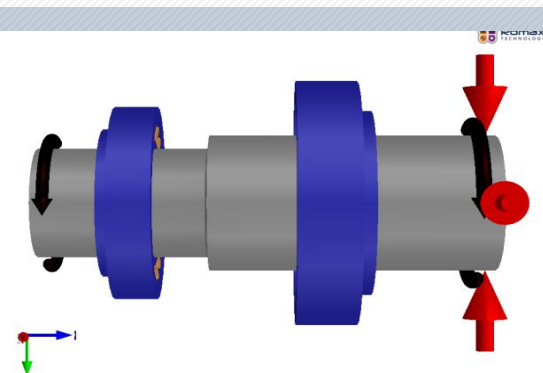
- Through calculating the bearing working condition of extreme load spectrum intensity and service life, the stress safety coefficient satisfies the requirement of GL specification 2010 version 1.1.
- Bolt installation checking should be on those factors of the bolt strength, life and residual pre-tightening force, according to VDI2230-2003 (association of German engineers), .
- Tooth checking is according to KISSsoft software respectively tooth strength and life to meet 2010 GL specification version SH, SF, (1.0, 1.2) intensity, (life is 1.1, 1.25).

The Finite element analysis for yaw & pitch bearing

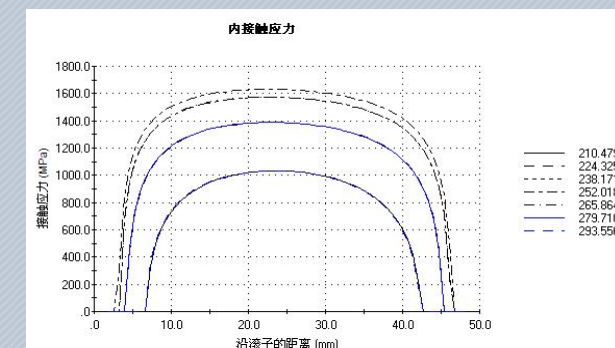
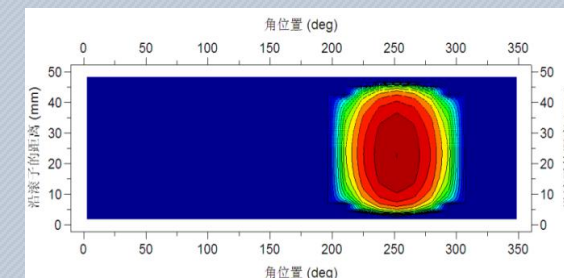
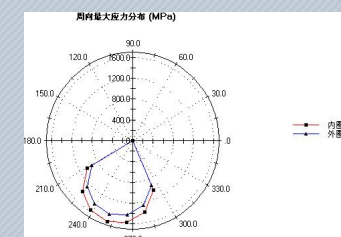
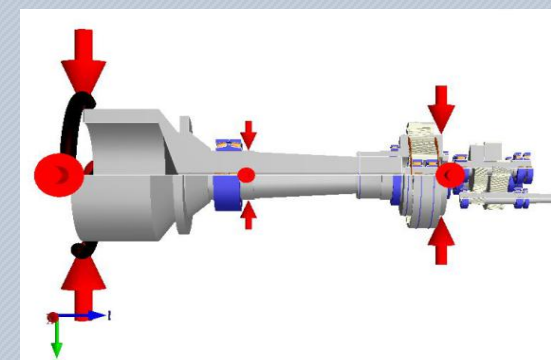




Design and Analysis of the main bearing



■ Using advanced software “Romax” for simulation analysis



■ ANSYS、ADINA and Romax software are used. Based on the analysis of those simulation analysis software, design scheme will be optimized.

QUALITY CONTROL



1

Perfect quality system

2

Regular professional training of staff

3

Special production line

4

SPC(Statistical Process Control) in site



■ Training of staff



QUALITY CONTROL



PROCESS	KEY PROJECT INSPECTION	QUANTAM OF CHECK	RELATED QUALITY RECORD
RAW MATERIAL	Material Inspection, UT test	100%	Mfr's Certificate / UT Report
FORGING	UT Test ,Q+T, Hardness, Mechanical Property	100%	UT Test ,Q+T, Hardness, Mechanical Property report
TURNING	Dimension & Tolerance	100%	Process Quality Inspection Report
HEAT TREATMENT	Hardness, Case Hardened Depth,FLaw Detection (MT / ET / DPT)	100%	Process Quality Inspection Report
GEAR PROCESS	Dimension & Tolerance	100%	Process Quality Inspection Report
HOLE PROCESS	Dimension & Tolerance	100%	Process Quality Inspection Report
RACEWAY GRINDING	Dimension & Tolerance, Roughness	100%	Process Quality Inspection Report
	Hardness, Case Hardened Depth,FLaw Detection (MT / ET / DPT)	100%	UT Test, Hardness, Mechanical Property report
ASSEMBLING (FINAL INSPECTION)	All Dimension, Clearance, Run-out	100%	Final Inspection Report
	Appearance, Rotation Precision	100%	Final Inspection Report

FLOW CHART



- From bearing parts manufacturing process, strictly control the source of material source, production process , and set up Critical Control Points to ensure stable quality.



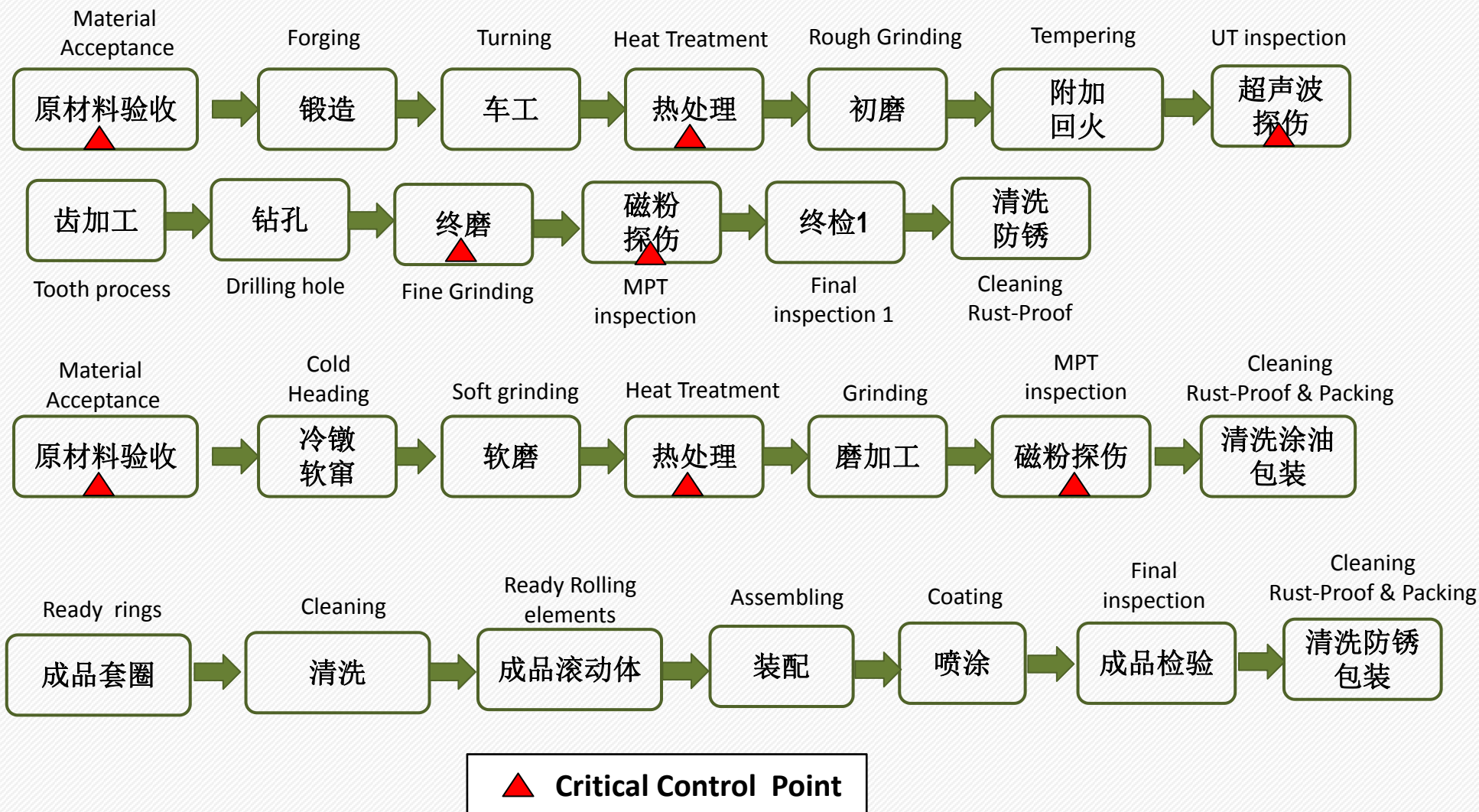
Rings



Rolling element



Assembly



TEST CAPACITY



Yaw Bearing Test

Test bearings' max OD
4000mm
Bearing Rotation Speed:
0~40rpm
Bearing Testing Loading:
Max radial loading 7000KN
Max axial Loading: 1600KN
Max Overturning Moment
Loading: 6000KNm



Pitch Bearing Test

Test bearings' max OD
3000mm
Bearing Rotation speed:
0~2rpm
Bearing Testing Loading:
Max overturning moment
loading 6000KN



Main Bearing Test

Scope:
Test ID : ϕ 500-800mm
Bearing Rotation Speed:
0~40rpm
Bearing Test Load: Max
Radial Load 1000KN, Max
Axial Load :600KN



**Comprehensive Performance
Test Bench for
Gear Box Bearing**

Scope:
Low speed test LY-325:
 ϕ 120mm~ ϕ 710mm;
High speed test LY-324:
 ϕ 220mm~ ϕ 440mm。
Bearing rotation speed:
Low Speed 18rpm~
120rpm, High Speed
100rpm~1000rpm



Material

- Rings: 42CrMo, 42CrMo4
- Hardness: 260~300HB (42CrMo)
- -40°C Impact $KV_2 \geq 27J$ (42CrMo)
- Rolling element :GCr15, GCr15SiMn or G20Cr2Ni4A
By Electroslag remelting Steel

Steel supplier

- Daye special steel
- Xining special steel
- Xingcheng steel
- Bao steel

Raw material inspection

- Steel factories provides all inspection reports including chemical composition and mechanical properties.
- LYC re-inspect the steel's chemical composition by metallographic testing, with additional checks carried out with ultrasonic testing.
- All material can be traced.





■ Direct-reading spectrometer



■ Oxygen and nitrogen



■ Carbon and sulfur analyzer



■ Microscope

INSPECTION

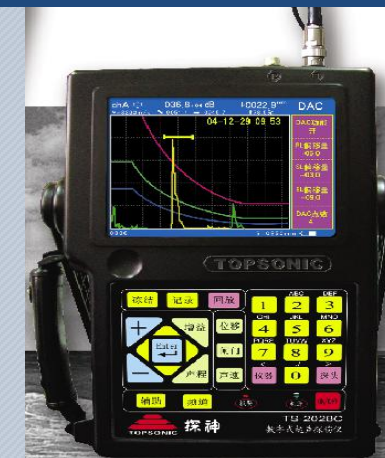
Raw Material Inspection



■ Tomography Scanning System



■ Image Processing and Analysis System



■ Ultrasonic flaw detector



■ Handheld fluorescence spectrometer



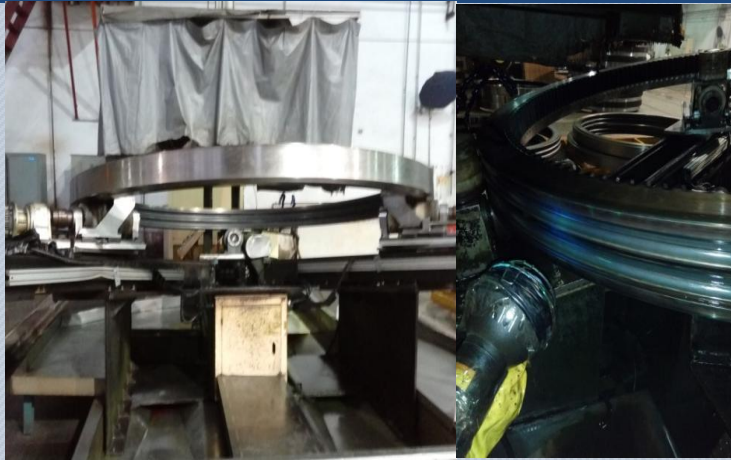
■ OLYMPUS Phased array detector



■ OLYMPUS GX51 inverted metallurgical microscope and image analysis system

INSPECTION

In process Inspection



■ Bearing Ring Fluorescent Magnetic Particle Flaw Detector



■ Impact Testing Machine



■ Electronic Tensile Testing Machine



■ Surface Hardness Depth Tester



■ X-ray Stress Tester



■ Spacer Tester



■ Length Measuring Instrument



■ Trilinear Coordinates Measuring Instrument



■ Bridge Leveling ruler



■ Model 73 Taylor Roundness Meter



■ Trilinear Coordinates Measuring Instrument



■ Tube Ruler

INSPECTION

Finished Products Inspection



Finished Products Inspection- *before Spraying and coating*



■ Assembly Height Measurement

■ Clearance Measurement

■ Surface Run-out Measurement

■ Radial Run-out Measurement

Finished Products Inspection- *after Spraying and coating*



■ Dimension measurement

■ Coating Thickness Measurement

■ Clearance Measurement

■ Friction Torque Measurement

TRACEABILITY



LYC built traceability computer management system for slew bearing.

“Product (parts) Card”. “Product Process Movement Card“, “Assemble Record Card“ will be built in process. to realize each bearing could trace back to raw material supplier ,material name ,material heat number ,material report, as well as each process ,assembling , inspection, packing quality and operator, inspector.

LYC转盘轴承质量跟踪系统

系统设置
权限管理
组织机构
用户管理
角色管理
基础字典
业务管理
型号/零件号打字记录
转盘轴承质量跟踪记录
装配追溯记录
质量记录查询

外观风格
张雪峰 修改密

系统首页 组织机构 * 型号/零件号打字记录 * 装配追溯记录 * 质量记录查询 * 转盘轴承质量跟踪记录 *

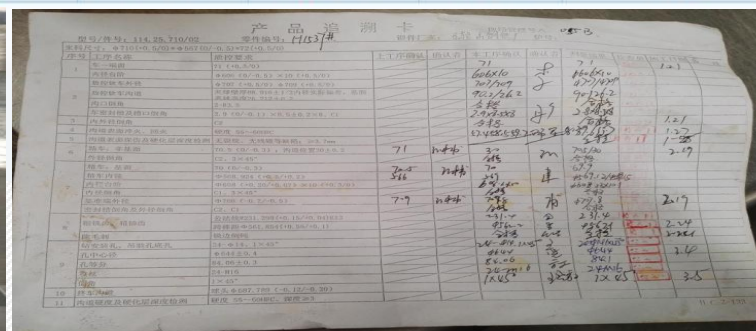
转盘轴承质量跟踪记录

添加 修改 删除

型号/零件号 _____ 打字编号 _____ 单据状态 请选择--

录入开始日期 2015-06-01 录入结束日期 2015-06-19

型号/零件号	单据状态	打字编号	材料牌号	材料规格	材料生产单位	材料炉号	热处理炉号
--------	------	------	------	------	--------	------	-------





TOTAL 500 SETS EQUIPMENT

**Forging
Equipments**

**Turning
Equipments**

**Heat Treatment
Equipments**

**Grinding
Equipments**

**Drilling
Equipments**

**Gear Process
Equipments**

**Other
Equipments**

MANUFACTURE

Forging



LYC have the independent ring forging process capacity, it could make diameter $\Phi 4200$ mm and below size ring forgings.



4 meter CNC ring rolling mill



Heating furnace



2500T Hydraulic press



AMP30 high speed forging line from Swiss (HATEBUR)



Pda630 high speed forging line from Germany (WAGNER)



Loading and discharging manipulator



LYC have hundreds of CNC equipments, it could make turning parts of $\Phi 200$ mm ~ $\Phi 13500$ mm, high precision 0.01mm.



■ 1.25M High Precision CNC Vertical Machine Tool



■ 4M High Precision CNC Vertical Machine Tool



■ 5M High Precision CNC Vertical Turning / Grinding Machine Tool



■ 6.3M High Precision CNC Vertical Turning / Grinding Machine Tool

MANUFACTURE

Heat Treatment



LYC owns tens of raceway, tooth quenching and tempering equipments, can meet the surface of raceway of slewing bearing surface hardening, gear foot hardening, raceway surface hardening 55 ~ 62HRC, depth of hardening 7mm, gear surface & gear root hardening 50 ~ 60HRC, depth of hardening 4mm.



■ 8M quench machine



■ 8M temper stabilizing stove



■ 4M quench machine

4M CNC induction quench machine, process work-piece out diameter $\Phi 4\text{M}$, Double induction head set can be manual and full automatic operation function, fit for single and lot parts production, in high automatic level, hardening layer average, production high efficient.

8M quench machine and 8M temper stabilizing stove process work-piece out diameter $\Phi 8\text{M}$, can quench and temper race and gear of various slewing bearings.

MANUFACTURE

Heat Treatment



LYC owns tens of raceway, tooth quenching and tempering equipments, can meet the surface of raceway of slewing bearing surface hardening, gear foot hardening, raceway surface hardening 55 ~ 62HRC, depth of hardening 7mm, gear surface & gear root hardening 50 ~ 60HRC, depth of hardening 4mm.



■ Pit Furnance



■ Automatic Salt Quenching Heat Treatment Line



LYC owns tens of gear processing equipments .can drill, hob, shape gear of kinds of slewing bearings , maxi module reaches 40



- 5M CNC shaping gear machine
Max diameter: $\Phi 3500$ mm
Max module: 24



- 5M CNC precise gear milling machine



- 12 M shaping gear machine
Max diameter: $\Phi 12000$ mm
Max module: 40



LYC owns tens of hole-making equipments, can unthreaded hole below diameter $\Phi 13500\text{mm}$ slewing bearings , thread machining.



The milling machine can process diameter $\Phi 5\text{ m}$, adjusting drilling pipe, drilling piece , CNC development, can process hole diameter $\Phi 14 \sim \Phi 150\text{ mm}$ and under M60 screw CNC drilling boring, milling hole locating, degree can reaches $\Phi 0.20\text{mm}$.

■ 5M Dragon Gate Mobile CNC Milling Machine

MANUFACTURE

Grinding & Super Precise



LYC owns the most precise NC machines that can process identical sizes in bearing industry ,not only grinding diameter $\Phi 13500\text{mm}$ slewing bearing ,but also precisely grinding within diameter $\Phi 2800\text{mm}$ slewing bearings and super precisely grinding diameter $\Phi 1600\text{mm}$ slewing bearings , max precision 0.001mm , roughness, $Ra0.05\mu\text{m}$.



CNC vertical mill from Switzerland, processing range diameter $\Phi 1600\text{ mm}$, comprehensive machining precision 0.002 mm .

CNC twin column vertical mill from Italy maxi process diameter $\Phi 2800\text{mm}$, can process inner, outer diameter and abnormal groove in high precision . It is one of the best equipments in such sizes in China .

Supfina super finish machines from Germany, process range $\Phi 1600\text{ mm}$, super finish surface roughness $Ra0.05\mu\text{m}$.

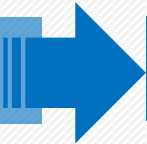
MANUFACTURE

12.5m double-column CNC lathe

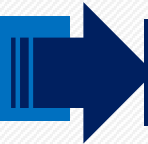


12.5m double-column CNC lathe, process max outer diameter 13.5M work-piece , once clamping can finish turning inner and outer cylindrical surface ,circular conical surface ,end face, metric and inch screw thread and grooving ,complicated surface of revolution etc processing , fit for hard turning or rough and precise extra large size bearing ring with drilling ,milling, grinding function , max precision 0.01mm, it is the first class level in bearing industry.

Turning



Drilling



Grinding



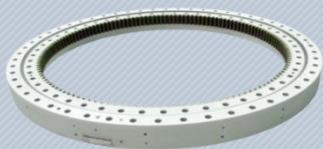
New main bearing and gearbox bearing production line plan

LYC planned 12000 square meter new wind power main shaft bearing and gearbox bearing production line is under construction and will be put into production by the end of 2021. After putting into production, the capacity of main shaft bearing and gearbox bearing will be expanded to 1500 sets / month.



Yaw Bearing

LYC extra large s extra-large slewing bearings four-point contact or crossed cylindrical roller seat in the bottom of wind turbine, used to adjust the angle timely and transmit the thunder into the earth. The major load: radial load, axial load and tilting moment. The requirements come up to good sealing, reliability, rotating smoothly and stably, surface anti-corrosion and life over 20 years.



Blade Bearing

LYC extra large four-point contact ball slewing bearings or double-row ball slewing bearings seat in the blade system assembly, mainly support radial, axial load and tilting moment. The requirements come up to good sealing, reliability, surface anti-corrosion and life over 20 years.



Main Bearing

LYC spherical roller bearings or taper roller bearings seat in main spindle with high load, fit for the deformation of main spindle. The bearings have good spherical function, high load capacity and long working life.



Gear Box Bearing

LYC bearings (spherical roller bearings, cylindrical roller bearings, taper roller bearings, four-point contact ball bearings) used in gear-box have great importance for the reliability of wind turbine. The range of torsional moment and rotation speed the bearings suffer is very wide.

PERFORMANCE



Yaw Bearing

Main Structure: External Gear

Single row / double row four point contact bearing

No	Application	Common Bearings	ID	OD	H	Weight
1	750KW	1788/1877	1877	2195	111	974
2	2MW	FD-9798/2335K	2335	2818	200	2183
3	1.5MW	FD-1787/2350K	2350	2896	175	2066
4	1.5MW	FD-2787/2553	2553	2908	137	1478
5	3MW	FD-9798/2570K4	2570	3040	212	3240
6	2.5MW	FD-032.50.2800.03	2600	3230	203	3730
7	2MW	FD-012.48.2800.03	2617	3096	159	1859
8	2.5MW	FD-011.65.3050.03	2830	3358	180	2504
9	3MW	FD-034.50.3480.03	3150	3700	236	3941
10	5.5MW	FD-031.65.3960.03	4387	3712	251	6540
11	7MW	FD-032.60.4650.03K	4420	4994	204	6270
12	6MW	FD-032.60.4755.03	4500	5000	300	7450



Pitch Bearing

Main Structure: Internal Gear
Double row four point contact bearing

No	Application	Common Bearings	ID	OD	H	Weight
1	750KW	FD-8787/1344	1344	1660	114	640
2	1.5MW	FD-8787/1716	1716	2080	168	1230
3	850KW	FD-9787/1795	1795	2208	200	1750
4	2MW	FD-8787/2000K1	2000	2410	199	1900
5	2MW	FD-033.50.2410.03K	2144	2620	197	1943
6	3MW	FD-034.70.2453.03	2206	2720	298	3977
7	2.5MW	FD-033.65.2430.03	2215	2660	253	2800
8	2.5MW	FD-033.65.2440.03	2215	2670	248	2850
9	3MW	FD-8787/2225K2	2225	2620	195	1900
10	5MW	FD-8787/3060	3060	3620	264	5180
11	7MW	FD-034.75.3355.03	3060	3620	264	5210
12	6MW	FD-030.85.3778.03	3450	4064	300	7060

REFERENCE



Main Bearing

Main Structure: Spherical roller Bearing, Cylindrical roller bearing, Double row taper roller bearing

No	Application	Common Bearings	ID	OD	H	Weight
1	1.5MW	FD-240/530CA/W33	530	780	250	411
2	1.5MW	FD-240/630CA/W33	630	920	290	660
3	1.5MW	FD-3519/710X2	710	950	248	461
4	2MW	FD-240/750/W33	750	1090	335	1060
5	3MW	FD-LY-3077	800	1150	345	1180
6	2MW	FD-240/850/W33	850	1220	365	1440
7	850KW	FD-NU18/900MA	900	1090	85	180
8	3MW	FD-240/900/YA	900	1280	375	1610
9	2MW	FD-NU30/1000EM	1000	1420	308	1630
10	2MW	FD-3706/1350	1350	1720	380	2200
11	3MW	FD-N6/1600M/YA	1600	1950	155	997
12	3MW	FD-LY-3063	2000	2500	320	2951

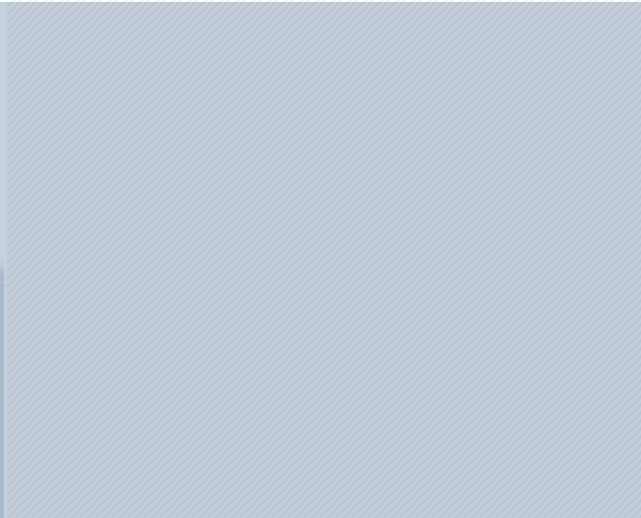
REFERENCE



Gear Box Bearing

Main Structure: Spherical roller Bearing, Cylindrical roller bearing, Double row taper roller bearing , four point contact bearing

No	Application	Common Bearings	ID	OD	H	Weight
1	1.5KW	23060CA/S0W33	300	460	118	80.9
2	1.5MW	FD-32972	360	480	76	36.4
3	1.5MW	NU1072EM	360	540	82	67.5
4	1.5MW	NCF2888V/P5S0	440	540	60	28.7
5	2MW	FD-NCF28/750V/YB	750	920	100	140
6	2 MW	FD-QJ232N2MA	160	290	48	15
7	2 MW	FD-NU2240EM/YB	200	360	98	44.5
8	2MW	FD-2324CC/W33	200	360	128	56.8
9	2MW	FD-NNCF5052V	260	400	190	85.7
10	2MW	FD-NCF29/800V/YB	800	1060	150	356
11	3MW	NNCF5060V/P53DRS0	300	460	218X2	121
12	3MW	306/500	500	670	85	73.5



LYC team provides you one-stop service and technical consulting to save your cost and increase efficiency maximumly. This will ensure LYC's bearing working perfectly where & when need.

PACKAGE

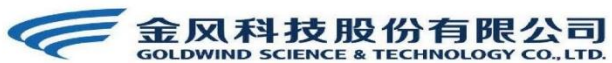


In order to ensure the slewing bearing safety and reliability while warehousing, transportation, LYC specially make the standard like slewing bearing cleaning oil packing process regulation, slewing bearings technology conditions with wood packaging ,LYC made specific provision for rust prevention of bearing products and packaging, to ensure the slewing bearing in the cleanliness and safety in the process of storage and transportation.





长期合作伙伴 Long-Term Partners



中国海装



湘电风能有限公司
Hara XEMC Windpower Co., Ltd



太原重工股份有限公司
TAIYUAN HEAVY INDUSTRY CO.,LTD



清平
QINGPING



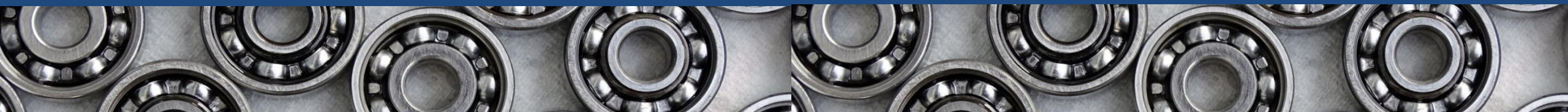


THE END

LUOYANG BEARING CORP. (GROUP)

Add. : 96#, Jianshe Road, Jianxi District, Luoyang, Henan, China.

www.lycbearing.com



© 2020 Luoyang Bearing Corp.(Group))All Rights Reserved

© 洛阳轴承集团进出口有限公司版权所有 2020