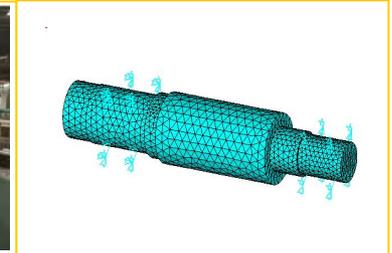


*China famous brand*

*Forbes China Potential Enterprise*

**ZYS**<sup>®</sup>

Honesty, Rigorousness,  
Innovation and Win-win



## Introduction Of ZYS spindle

*Email: [sales@zys.com.cn](mailto:sales@zys.com.cn)*

*[www.zys-bearing.com](http://www.zys-bearing.com)*

**Intelligent Equipment Division**

**Luoyang Bearing Research Institute Co., Ltd.**

# Catalog

**01**

Intelligent Equipment Department is committed to research and development of high-precision spindles and precision bearing testing instruments.

**02**

The strongest technical strength in China.

**03**

Have technical, manufacturing and test support.

**04**

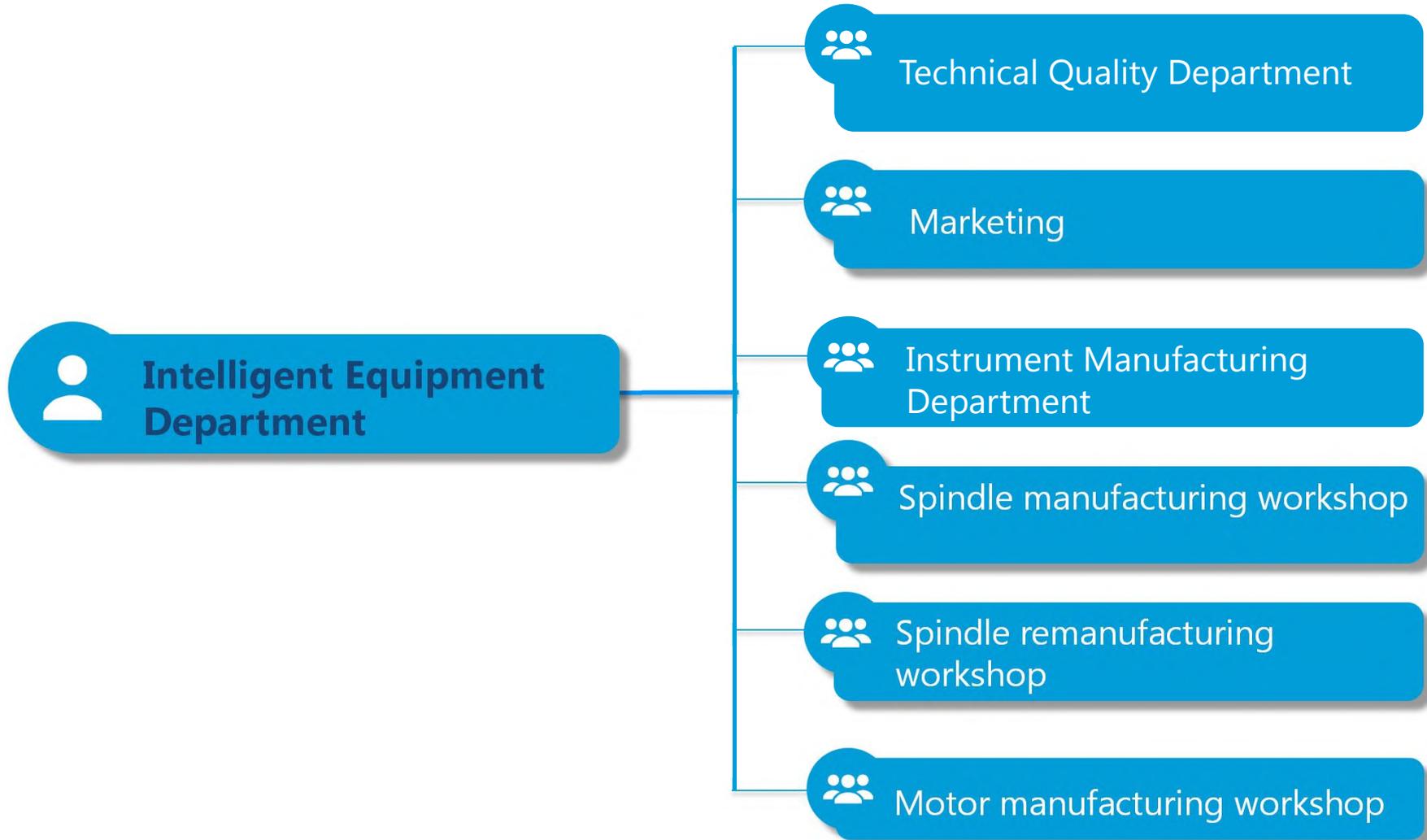
Long-term cooperation with many well-known domestic companies.

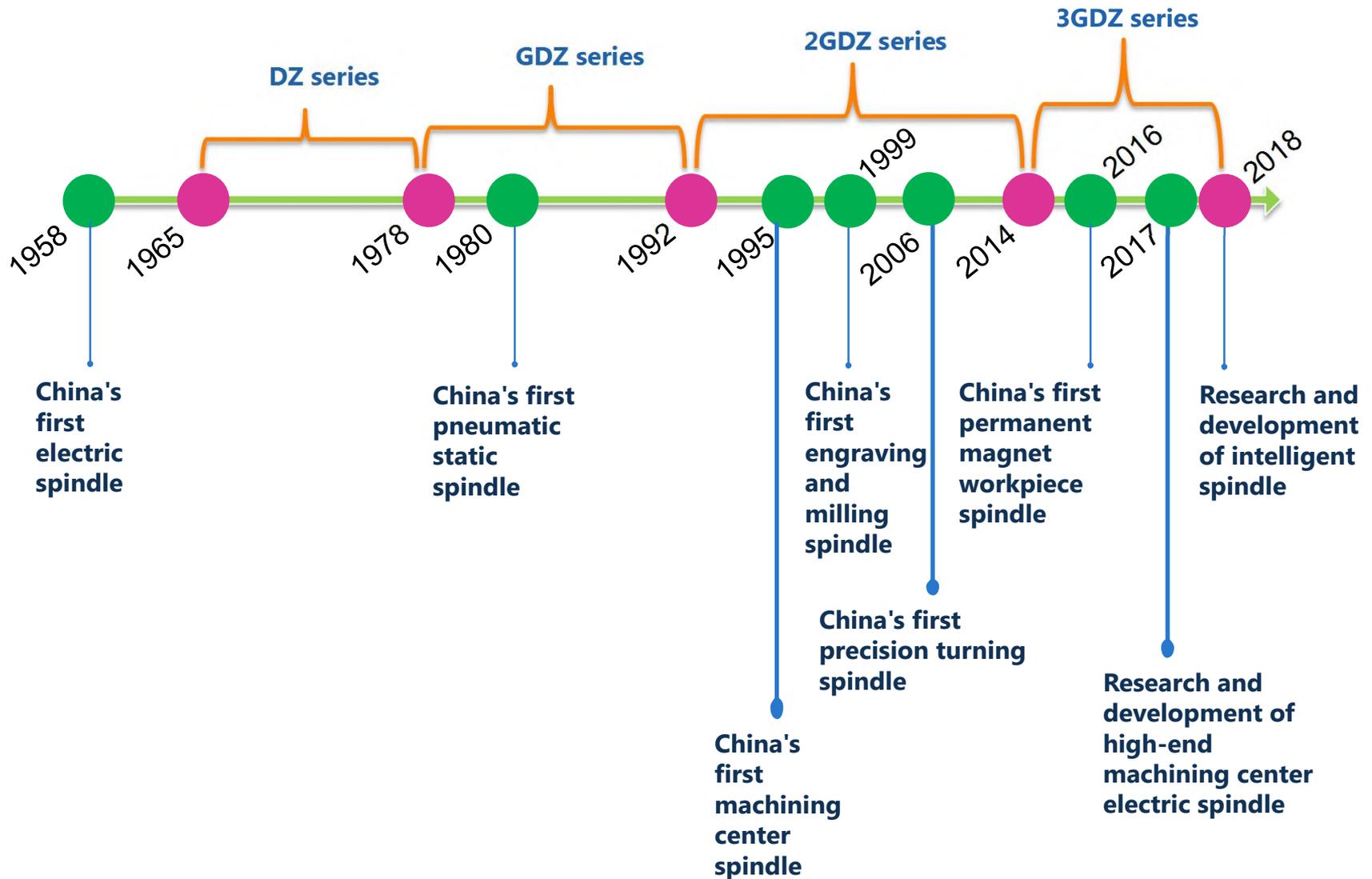
**01**

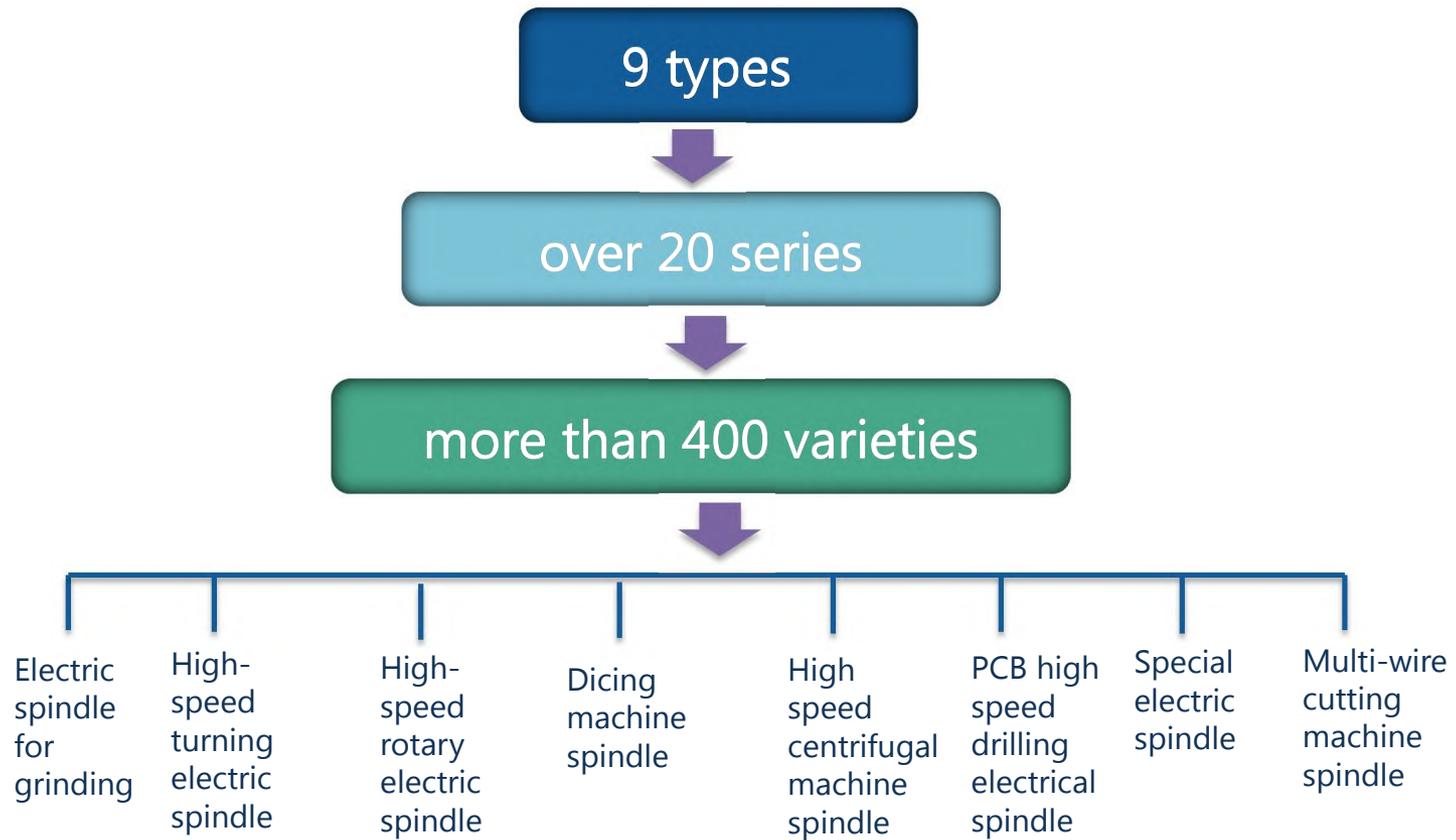
The predecessor of Intelligent Equipment Department was the 308 Research Group of Luoyang Bearing Research Institute which was established in 1958. After 55 years of development, it has gradually developed from the original scientific research institution into the current department which collects the spindle and instrument research, development and production as a whole. The production area of this department reached 32,800 square meters.

It is the main drafting unit of spindle national standard, the chairman unit of the spindle branch of China Machine Tool Industry Association, the leader of the 863 spindle project, the responsible unit of the “Eighth Five-Year Plan” , “Ninth Five-Year Plan” , “Tenth Five-Year Plan” and major national science and technology projects for CNC machine tool spindle. It is also the location of Henan Machine Tool Spindle Engineering Technology Research Center.

It has an annual production capacity of 6000 sets of spindles.









Power range: 0.45 ~ 50kW

Range of rotation: 300 ~ 50000r/min

Tool interface: BT、JT、ISO、HSK

Drive mode: built-in motor, direct connection, gear connection, band connection

Control mode: variable frequency control, servo control

Lubrication method: oil grease, oil gas

Cooling method: water-cooled, oil-cooled

Spindle accuracy: proximal/50mm 0.002mm remote end/300mm 0.004 ~ 0.008mm



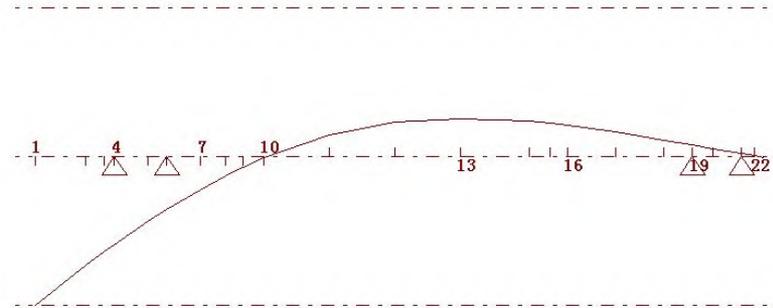
**ZYS**®

Spindle model	Mounting outer diameter (mm)	Power (kW)	Torque (N·m)	Rated speed (r/min)	Maximum speed (r/min)	Number of front bearings × inner diameter (mm)	Lubrication method	Tool interface	Center liquid	Tool blowing	Stop
120XDS20	120	3	3	10000	20000	2×50	Oil grease	BT30	/	YES	NO
160XDS30Q	160	22	10	22000	30000	2×45	Oil gas	HSK-E40	/	YES	YES
170XDS13Y15	170	15	11	13000	13000	2×65	Oil grease	BT40	/	YES	NO
180XDJ40Y20	180	20	19	10000	40000	2×45	Oil gas	HSK -E40		YES	YES
200XDS24Q	200	22	32	6500	24000	3×65	Oil gas	HSK-E50	/	YES	YES
220XDJ18Q22	220	22	70	3000	22000	2×70	Oil gas	HSK-A60	/	YES	YES
240XDJ10YB	240	28	89	3000	10000	4×65	Oil grease	BT40	/	YES	YES
260XDJ12Y	260	14	111	1200	12000	4×65	Oil grease	BT40	/	YES	YES
230XDJ03Z31	225	31	129	2300	3000	4×100	Oil grease	BT50	YES	YES	YES
240XDJ24Y22	240	22	42	5000	24000	3×65	Oil gas	HSK-A63	YES	YES	YES
260XDJ20Y50	260	50	95	5000	20000	3×65	Oil gas	HSK-A63	YES	YES	YES

**02**

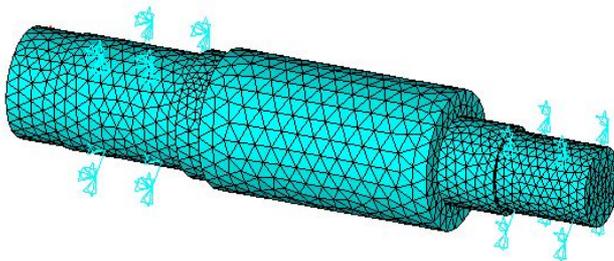
The Spindle Equipment Department has excellent technical support, production support, quality system support and test equipment support.

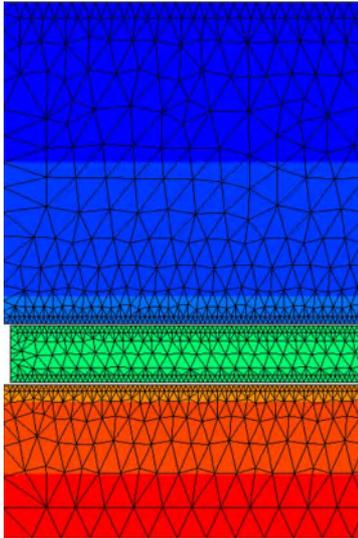
The curve of the dynamic station



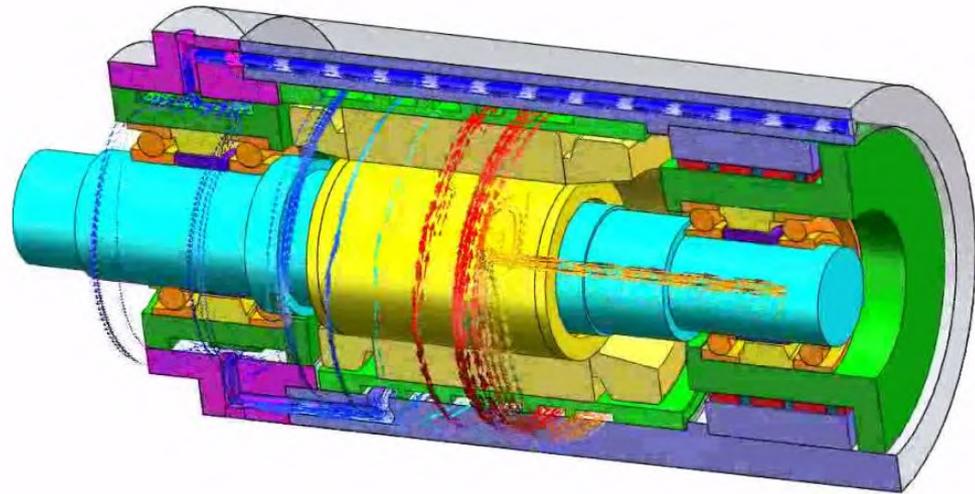
In cooperation with Tsinghua University (a well-known university in China), we integrated ZYS expert experience accumulated in the high-speed shafting dynamic analysis and developed the analysis software for spindle shafting dynamic.

We achieve the accurate calculation and analysis of the spindle rotor system under different stress conditions, different bearing assembly forms and different bearing spans. Through parameter adjustment and optimization of the shafting mechanism, the quantitative value of key indicators can be obtained during the design initial stage, such as spindle mode, bearing service life and critical speed.



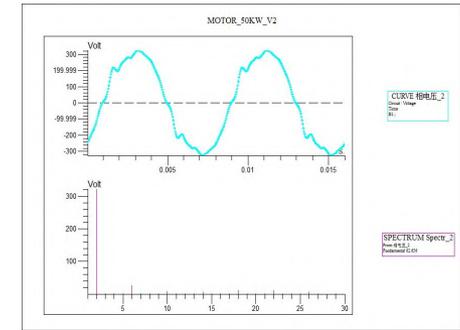
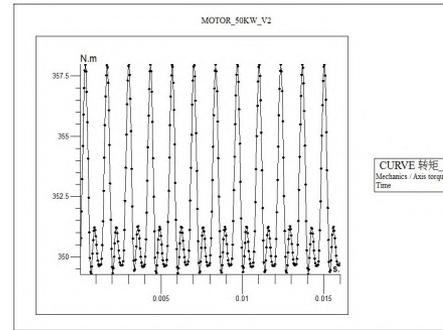
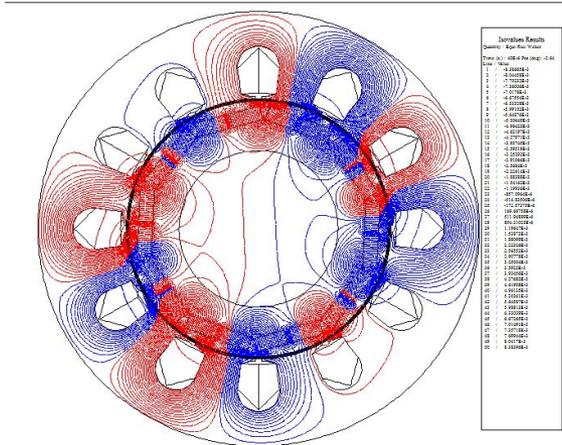


**Heat conduction analysis**



**Fluid field analysis**

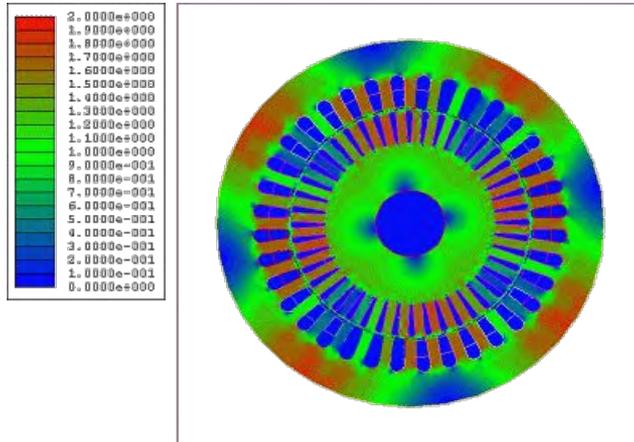
The finite element simulation software is used to analyze the temperature field distribution, bearing stress variation and spindle thermal deformation law of the current spindle.



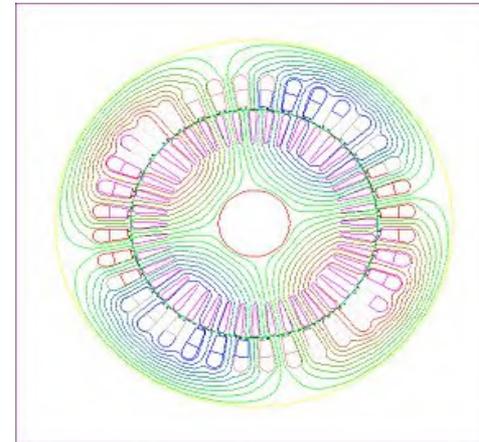
磁路参数					
磁路总长度	2656.61146605626	磁路总宽度	1.3301016688771	磁路总高度	5.37254513185179
磁路厚度	12.1326962624661	磁路总磁阻	8.8921212105967	磁路总磁导	67.4032391184366
磁路面积	82549485972201	磁路总磁通	2.8549318052842	磁路总磁通密度	31.8064307473262
磁路磁阻	894.49309701918	磁路率	100791.885236108	磁路总磁阻系数	52130299498912
磁路磁导	8086	磁路率	4	磁路总磁导	12.732020877424
其它参数					
定子齿磁阻	2.42951482224831	转子齿磁阻	4.62674973791032E-02	空载磁阻	870611827490697
定子齿磁导	3.46100594484621	转子齿磁导	1.69159527504436E-02	空载磁导	512079142623506
磁路磁阻	3.38090084379991	磁路总磁阻	8.12744938913216E-02	空载磁阻	3.77759684240959
磁路磁导	6010141229421918	磁路总磁导	119991050950000	空载磁导	6.1379117420902
磁路磁阻	508199111423508	磁路总磁阻	646870511736208	磁路总磁阻	6.3070498081188
磁路磁导	373784326584673	磁路总磁导	4.8526249593198E-02	磁路总磁导	2164.30528098
磁路磁阻	1.73055446236177	磁路总磁阻	OK	磁路总磁阻	8.1049713246322
磁路磁导	3.53117682120818	磁路总磁导	1.62067992029468E-02	磁路总磁导	2.6529739232859
磁路磁阻	3.00065024572148E-02	磁路总磁阻	1.05190387227928	磁路总磁阻	6.47929014649505E-02
磁路磁导	4.12749914686611E-02	磁路总磁导	8.89539917142508E-02	磁路总磁导	31.801979111958
磁路磁阻	7.34868587720782E-02	磁路总磁阻	8.4854941808237E-02	磁路总磁阻	2.18108887050505E-02
磁路磁导	7.46271274971148E-02	磁路总磁导	520637095306527	磁路总磁导	4.1734511207418E-04
磁路磁阻	3.4113123945436E-02	磁路总磁阻	581776231453	磁路总磁阻	1.52497951084648E-02
磁路磁导	2.4329702822448E-02	磁路总磁导	90700174406117	磁路总磁导	35605949898905

In cooperation with Hefei University of Technology, we integrated our expert experience and database accumulated in the design and analysis of high-speed motors, and developed the design and analysis software for spindle motors.

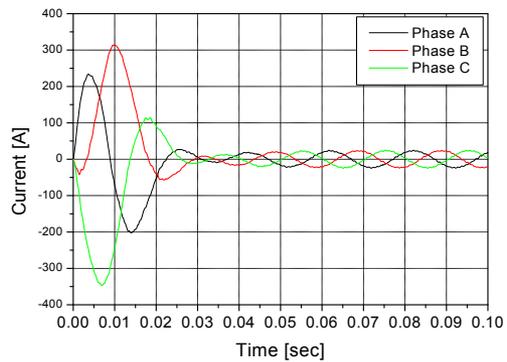
After the electromagnetic design of the spindle high-speed motor, we can analyze the spindle torque, output current and overload capacity at rated operating point through computer simulation, and calculate the motor heating condition under the simulated working condition to ensure that the spindle design can meet the requirements under actual situation.



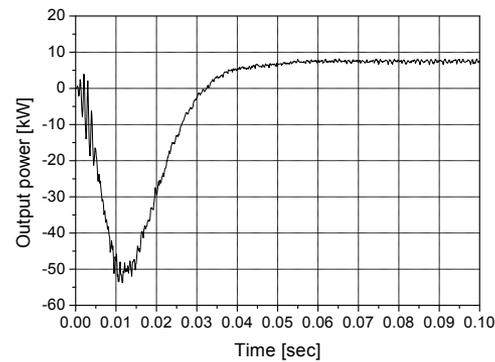
- Magnetic flux density map -



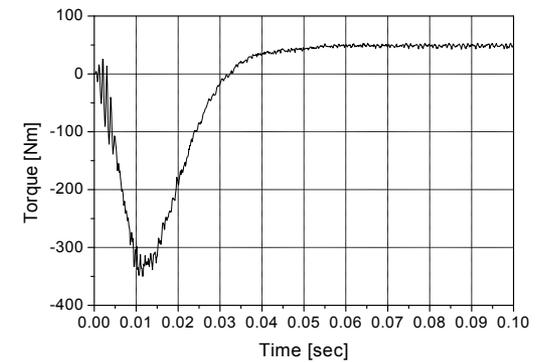
- magnetic flux distribution map -



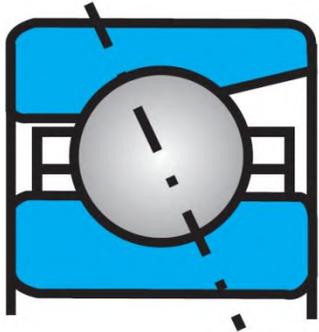
- Input Current -



- Output Power -



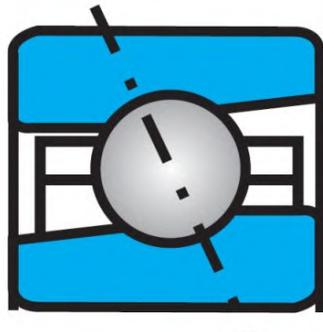
- Output torque -



**High precision standard series**

- 7-series
- Accuracy P4 and above
- $d_m n$  2.2\*10<sup>6</sup>mm·r/min

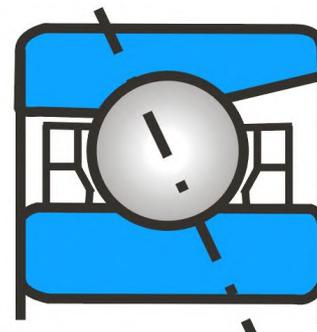
Application :  
✓ Machine tool spindle  
✓ High frequency motor



**Ultra high speed series**

- H7-、HS7-series
- Accuracy P4 and above
- $d_m n$  2.5\*10<sup>6</sup>mm·r/min

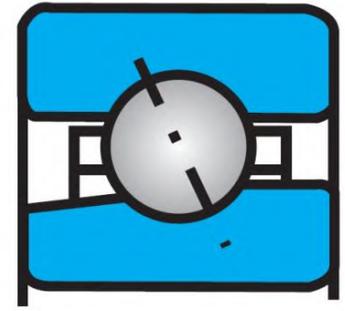
Application :  
✓ Ultra high speed machine tool spindle



**Medium and low speed series**

- 7TN1-series
- Accuracy P4 and above
- $d_m n$  1.4\*10<sup>6</sup>mm·r/min

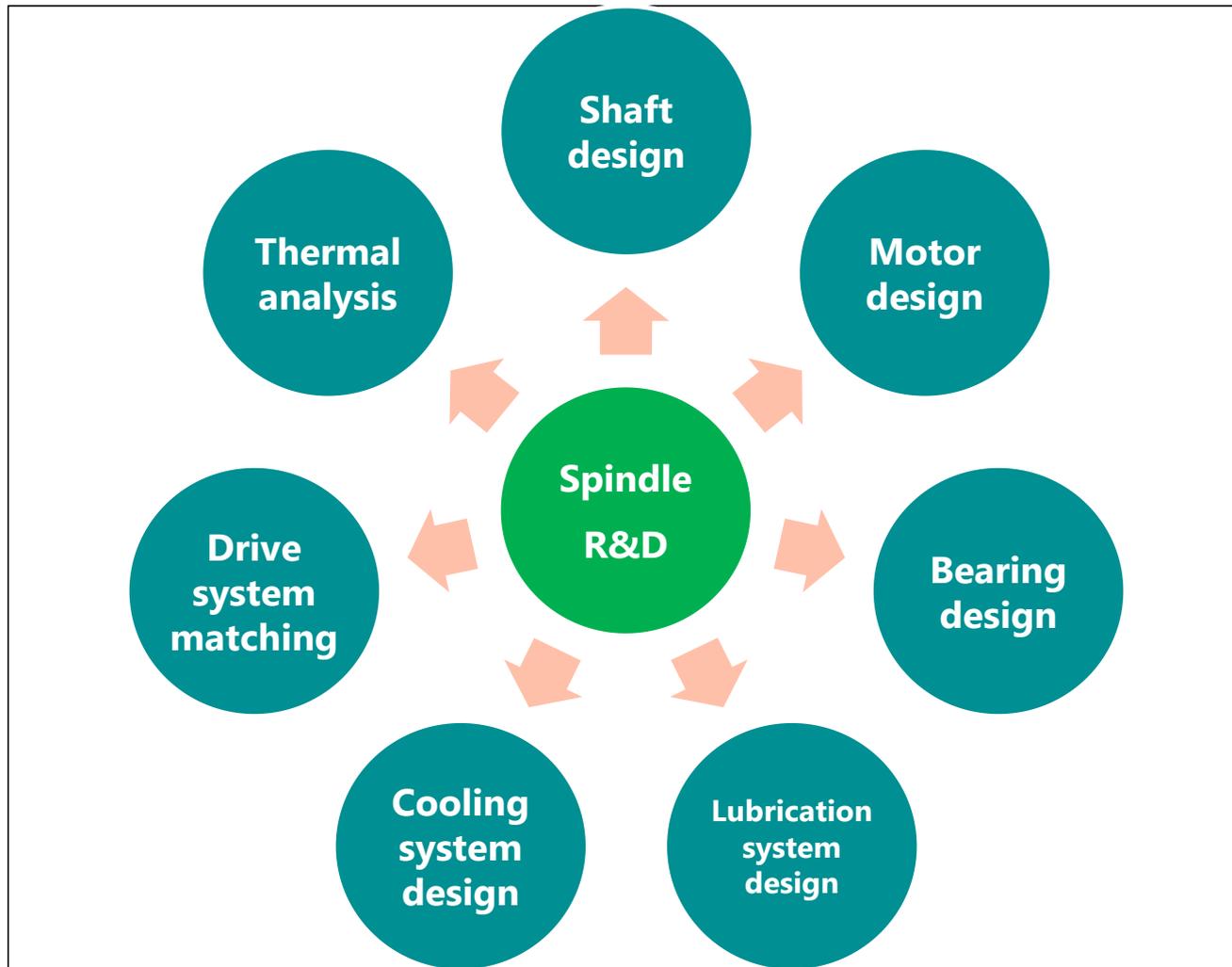
Application :  
✓ CNC machine tool spindle  
✓ Machining center spindle

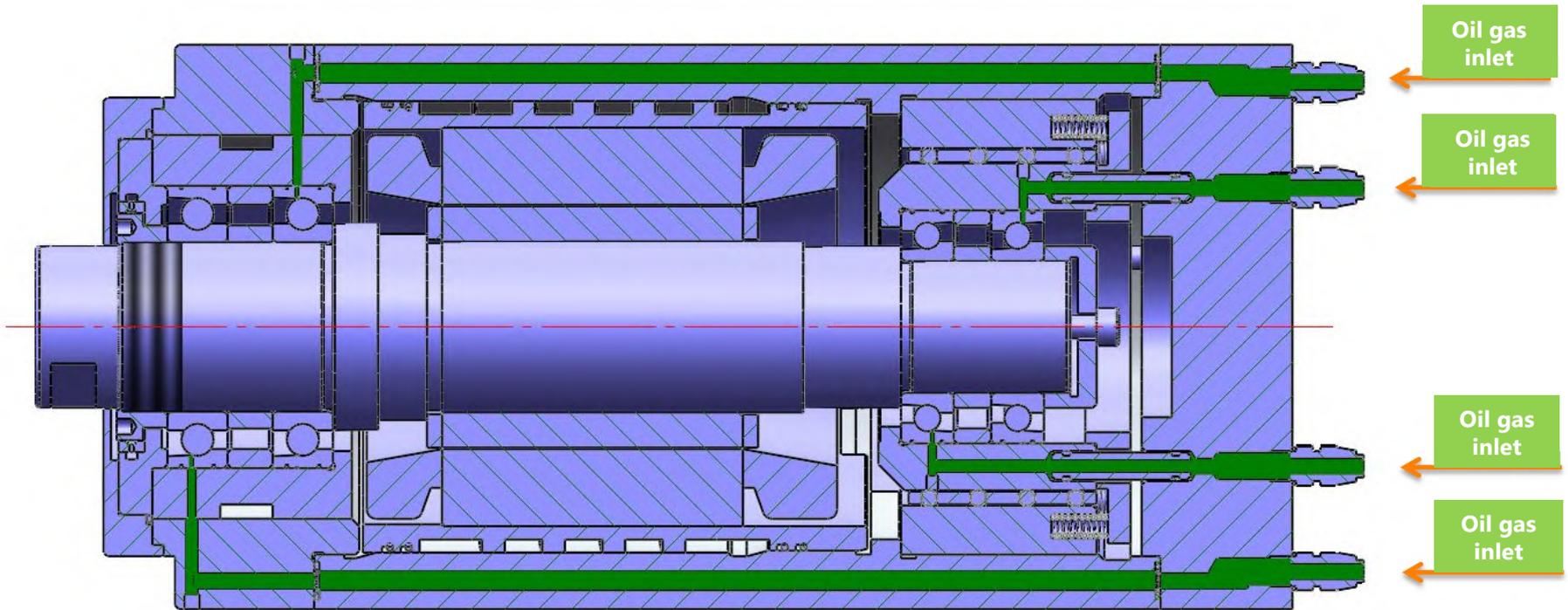


**High speed electric spindle series**

- B70C-series
- Accuracy P4 and above
- $d_m n$  2.4\*10<sup>6</sup>mm·r/min

Application :  
✓ Ultra-high speed internal grinding machine electric spindle  
✓ High speed motor

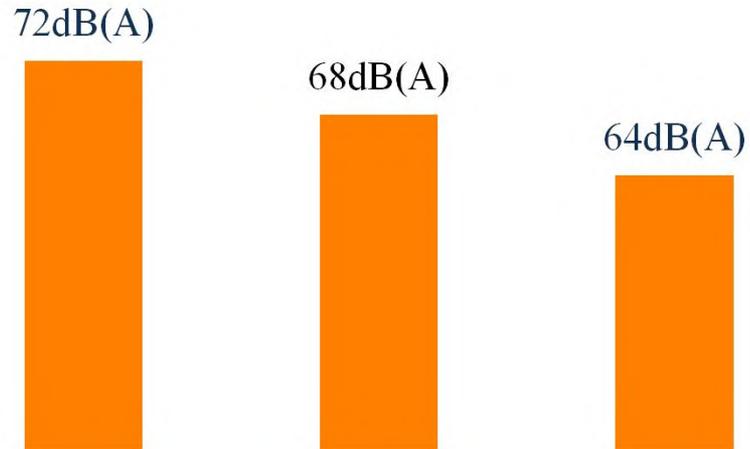




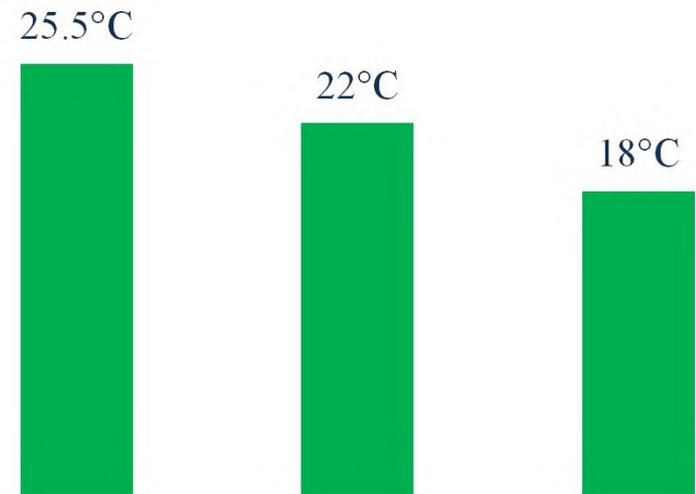
**Direct oil gas lubrication**

**Oil gas inlet with four paths**

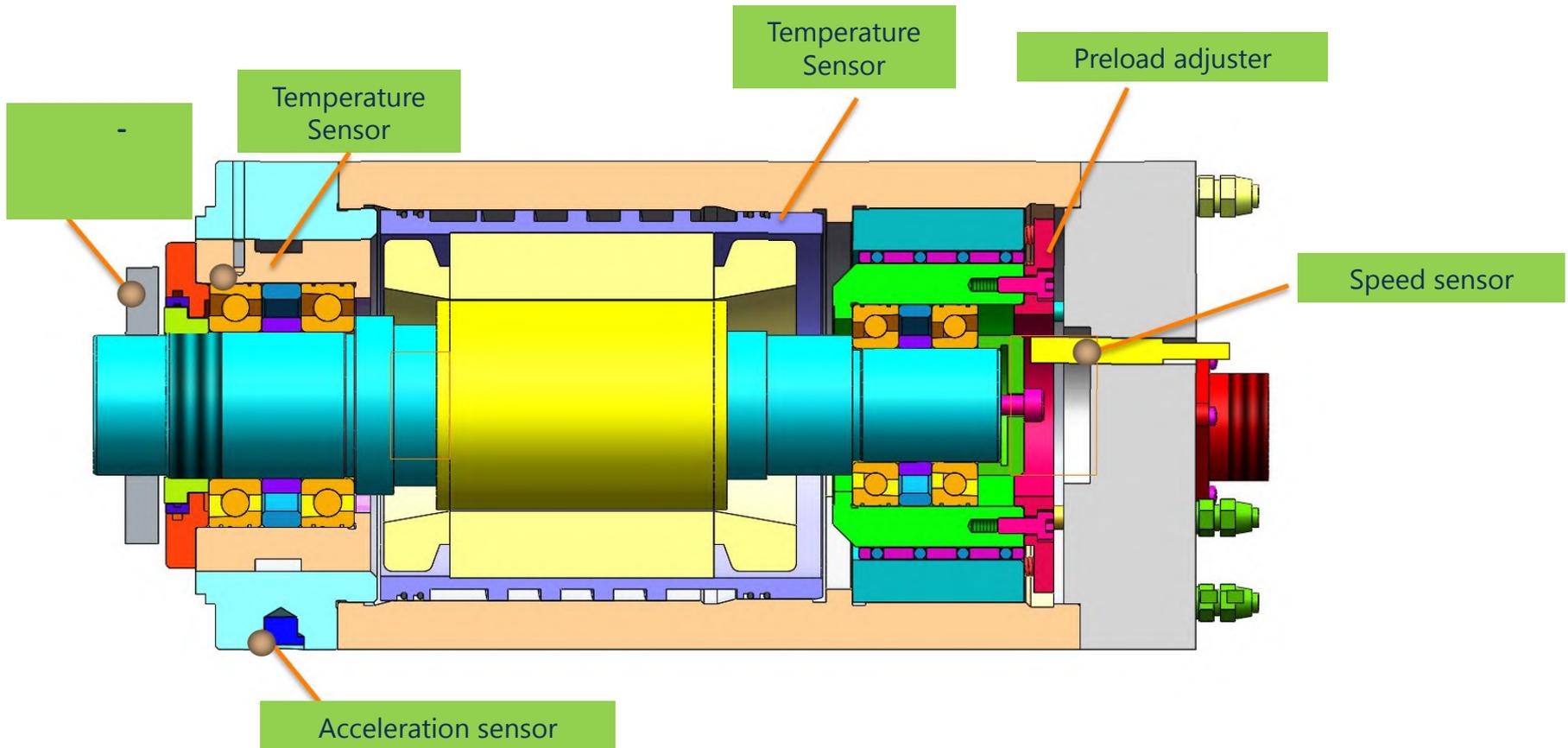
## 100000r/min spindle noise comparison



## 100000r/min spindle temperature rise comparison



- Low noise
- Low temperature rise
- Long service life
- High DmN value (up to 4.25 million mm·r/min)
- High rigidity



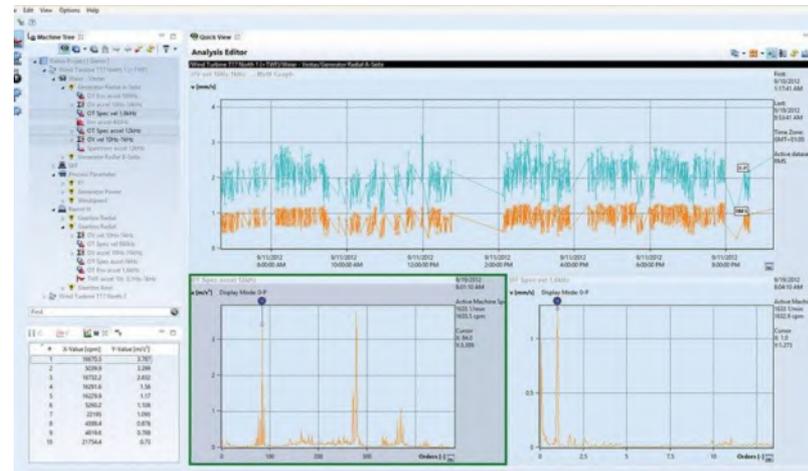
The spindle is equipped with various sensors such as temperature, vibration, displacement and distance. Sensor signals are continuously monitored by an intelligent system. It can prevent and protect the spindle when the temperature rises, the vibration intensifies, or the life of fixture is about to expire.



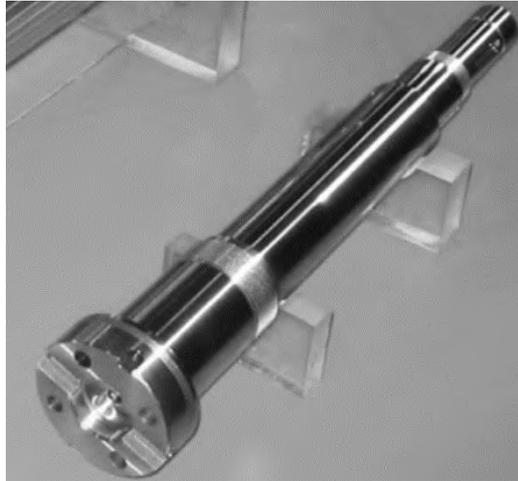
Swiss STUDER S21, S30, S41 grinding machine and Taiwan SUPERTEC grinding machine



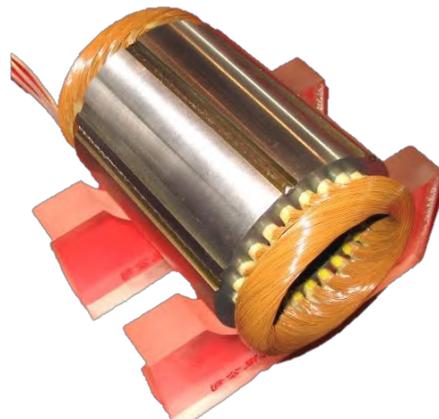
Germany SCHENCK dynamic balancing machine



Germany PROFTECHNIK movable online dynamic balancer



- ◆ High-precision spindle parts are produced by optimal control from materials, heat treatment, stability treatment and precision machining.



- ◆ The motor is completely developed independently. Motor has asynchronous aluminum rotor, asynchronous copper rotor, and permanent magnet synchronous motor.

## Spindle accuracy control

**1**

Unique identification number of important part

**2**

File important processing dimension record as quality documents for technical analysis

**3**

Increase the part accuracy and shape accuracy by 30% by improving equipment processing accuracy and optimize machining process

**4**

The accuracy of shaft end runout of the assembled product is less than 2 $\mu$ m, and partly 1 $\mu$ m.

## Spindle dynamic test control before delivery

**1**

Real-time monitoring of the spindle in no-load test

**2**

Improve the inspection standard: the spindle vibration value is increased from less than 1.5mm/s to less than 1mm/s at the maximum speed, and the highest standard is less than 0.6mm/s.

**3**

The temperature rise of the spindle is controlled at an optimum state of 15 $\pm$ 5 degrees at the maximum speed.

**4**

Spindle rigidity test



## CERTIFICATE

The Certification Body of  
TÜV SÜD AMERICA INC.

hereby certifies that

**Luoyang Bearing Research Institute Co., Ltd.**  
No. 1, Jilin Road, Jianxi District  
Luoyang City, Henan Province,  
P. R. China, 471039 China  
(Central Function)

(see page 2 for additional locations)

has implemented a Quality Management System  
in accordance with:

**AS9100D and ISO 9001:2015**

The assessment was performed in accordance with the requirements of AS9100:2015. TÜV SÜD America Inc. is accredited under the International Accreditation Co. Inc. (IAF) Group Industry Controlled Other Party Management System.

The scope of this Quality Management System includes:

Design, Manufacturing and Sales of  
Bearings for Aerospace Industry

Certification Structure: Several Sites

Certificate Expiry Date: February 18, 2022

Certificate Registration No: 951 19 4891

Issue Date: February 19, 2019

Reissue Date: N/A



*Mark Alpert*  
Mark Alpert  
Vice President, Business Assurance



Page 1 of 2

TÜV SÜD AMERICA INC • 10 Centennial Drive • Peabody, MA 01960 USA • www.TUVamerica.com TÜV®

ZERTIFIKAT • CERTIFICATE • CERTIFICADO • CERTIFICAT

LOB\_F\_12.02\_2012-02



### QUALITY MANAGEMENT SYSTEM CERTIFICATE

Certificate No.070 18 Q3 0340 R0M

This is to Certify that the Quality Management System of  
**Luoyang Bearing Research Institute Co., Ltd.**

Unified social credit code: 914103004156241492

Registration Address: No.1, Zhouyan Road, Science and Technology Industrial Park, Jianxi District, Luoyang City, Henan Province, P.R. China	471000
Address: No.1, Jilin Road, Jianxi District, Luoyang City, Henan Province, P.R. China	471039
Multi-site Address 1:No.6, Fenghua Road, High-tech Development Zone, Luoyang City, Henan Province, P.R. China	471000
Multi-site Address 2:No.1, Zhouyan Road, Science and Technology Industrial Park, Jianxi District, Luoyang City, Henan Province, P.R. China	471000

is in conformity with  
**GB/T 19001—2016/ISO 9001:2015**

The certificate is valid to the following product(s)/service(s):  
Design, Development and Production of Bearing, the Bearing Unit and Momentum Flywheel in the Space Aircraft, Clutch Component and Electric Spindles Product, Engineering Plastic Compound (Polyimide, Cotton Phenolic, PTFE) and it's Bearing Element, Particulate Powder Material (Ceramic Material) and it's Bearing Element; Design, Development and Production of Bearing Measuring Instruments and Mechanical Parts

Multi-site Certification Scope 1:Design, Development and Production of Bearing, the Bearing Unit and Momentum Flywheel in the Space Aircraft, Electric Spindles Product, Engineering Plastic Compound (Polyimide, Cotton Phenolic, PTFE) and it's Bearing Element; Design, Development and Production of Bearing Measuring Instruments and Mechanical Parts

Multi-site Certification Scope 2:Design, Development and Production of Bearing

The organization which has obtained the certificate shall ensure that the certificate conforms to prove whether the certificate is continuously valid. The first surveillance audit shall be carried out within 4—10 months after the initial site audit. The repeat surveillance audit shall be carried out every 12 months during surveillance audit. The certificate information is available on the IAF website: www.iaf-certificate.com

Initial Issue Date: 28-11-2018  
Issue Date: 28-11-2018  
Expiry Date: 27-11-2021  
Replace Date: 15-09-2018

General manager: *张斌*  
Floor 4 No.3 Yuetan North Street, Xicheng District, Beijing






中国认可  
国际互认  
管理体系  
MANAGEMENT SYSTEM  
CNAS C97-M

军友诚信订阅号  
军友诚信服务号



## CERTIFICATE

The Certification Body  
of TÜV SÜD Management Service GmbH  
certifies that

**Luoyang Bearing Research Institute Co., Ltd.**  
No. 6, Fenghua Road, High-tech Zone  
Luoyang City, Henan Province, P.R. China  
Post Code: 471000

has established and applies  
a Quality Management System for

**Design and Manufacture of Bearings  
for Automotive**  
(with Product Design as per Chapter 8.3).

An audit was performed and has furnished proof  
that the requirements according to

**IATF 16949**  
First Edition 2016-10-01

are fulfilled.

Issue date: 2019-03-15

Expiry date: 2022-03-14

Certificate Registration No.: 12 111 57590 TMS

IATF Certificate No.: 0351721

Part of the certificate is an appendix.

*E. Kohn*

Product Compliance Management  
March, 2019-03-15

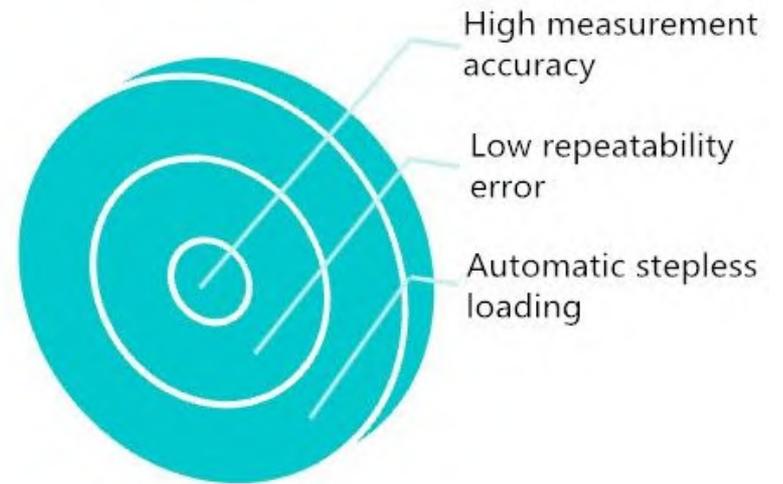
Page 1 of 2

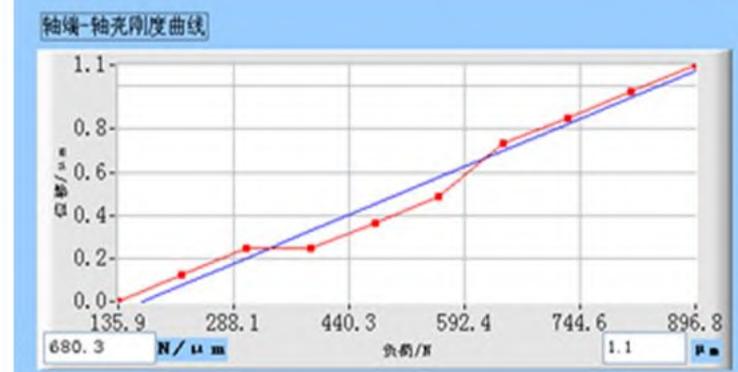
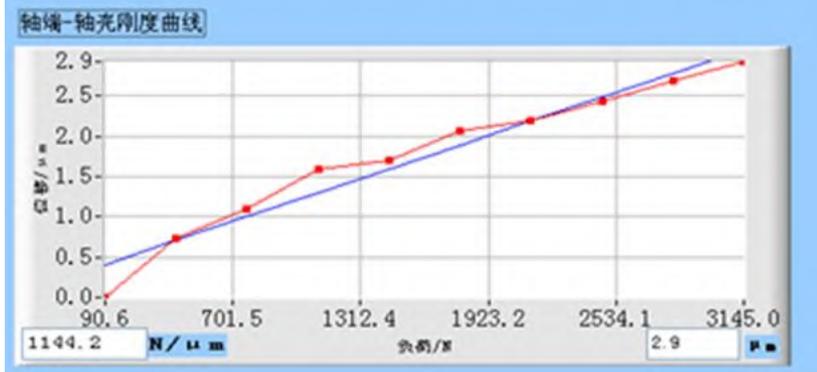
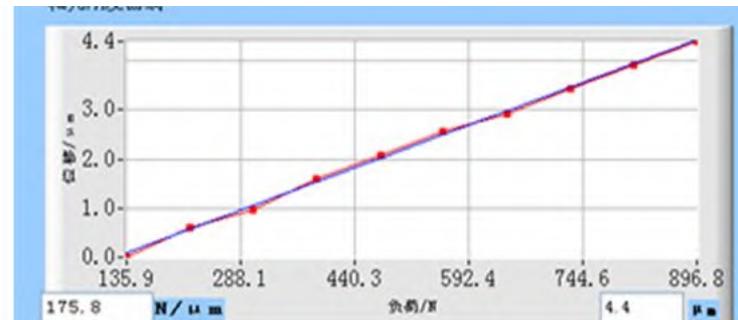
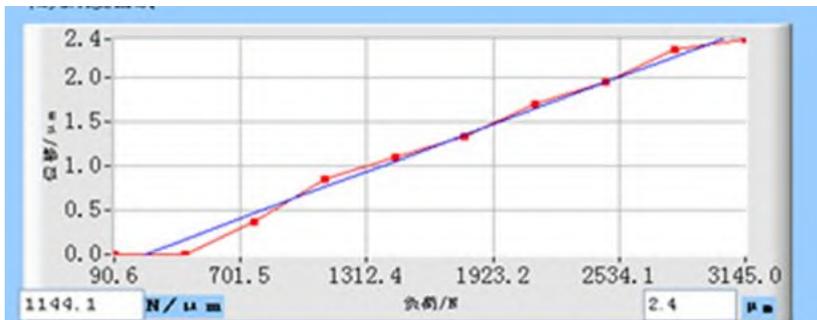
TÜV SÜD Management Service GmbH • Zertifikatsgesellschaft • Robertstrasse 57 • 80339 München • Germany  
www.tuv-sud.de/certificate-valuation-check

TÜV

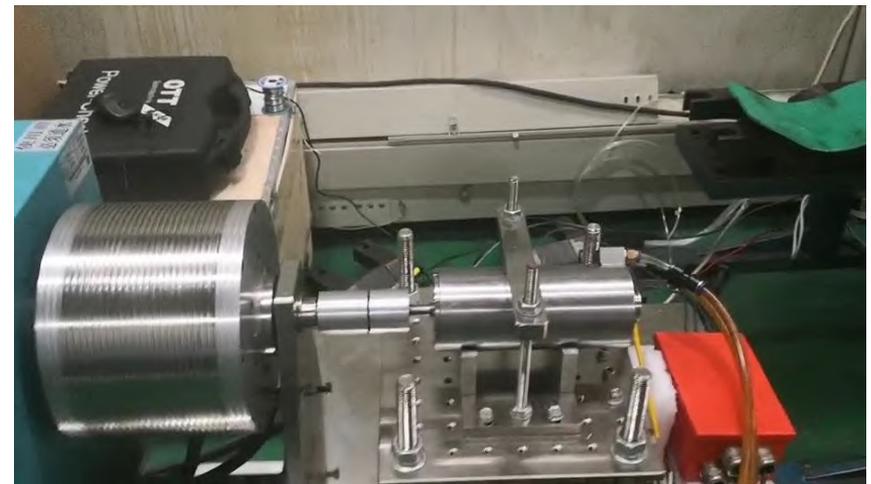
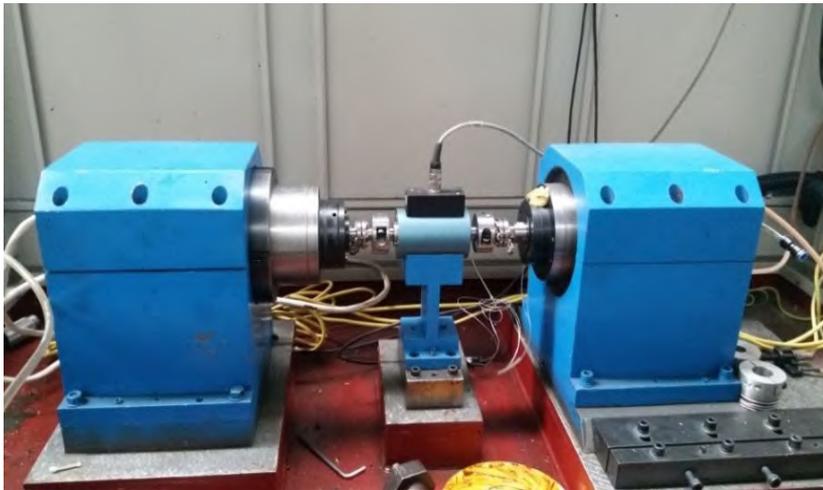
The sound quality system provides strong guarantee for the quality stability of the electric spindle products and promotes the common development of ZYS and customers.

Products obtained EU CE certification.

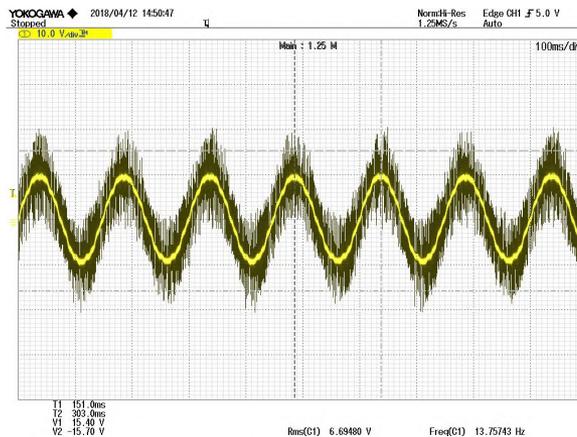
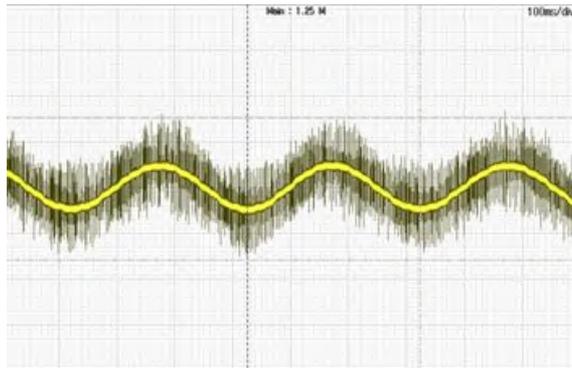




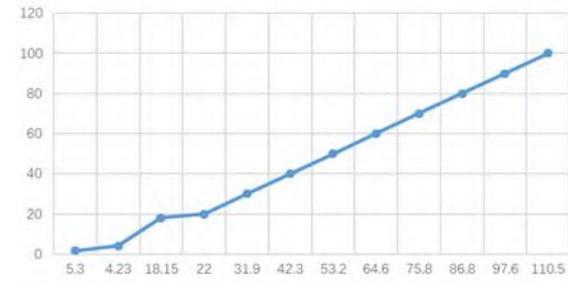
Shaft end-shaft shell rigidity curve



- ◆ It can test the torque, heat generation, efficiency, overload capability and power factor of the electric spindle.
- ◆ It can realize the torque-speed characteristic curve mapping.



转矩-电流



采样时间	测试轴数据						加载轴数据					
	两轴扭矩	电机转速	转速率(%)	频率(Hz)	电流(A)	电压(V)	温度(°C)	频率(Hz)	电流(A)	电压(V)	温度(°C)	
15:44:46.0	-2.10	5322	11	100	17.7	58.6	33.5	86.3	13.3	54.5	31.2	
15:44:45.0	-2.10	5317	11	100	17.7	58.6	33.5	86.3	13.9	54.5	31.1	
15:44:44.0	-2.09	5315	11	100	17.4	58.6	33.5	86.3	12.4	54.4	31.2	
15:44:43.0	-2.07	5297	11	100	17.7	58.6	33.5	86.3	13.7	54.6	31.2	
15:44:42.0	-2.10	5317	11	100	17.7	58.6	33.5	86.3	12.9	54.6	31.2	
15:44:41.0	-2.07	5331	11	100	17.7	58.6	33.4	86.3	12.7	54.6	31.2	
15:44:40.0	-2.12	5342	11	100	17.7	58.6	33.4	86.3	13.5	54.7	31.2	
15:44:39.0	-2.07	5346	11	100	17.7	58.6	33.4	86.3	13.1	54.5	31.2	
15:44:38.0	-2.07	5326	11	100	17.7	58.6	33.4	86.3	13.9	54.5	31.2	
15:44:37.0	-2.07	5317	12	100	17.7	58.6	33.5	86.3	13.3	54.6	31.2	
15:44:36.0	-2.09	5333	11	100	17.7	58.6	33.5	86.3	12.7	54.5	31.2	
15:44:35.0	-2.08	5337	11	100	17.7	58.6	33.4	86.3	14.1	54.5	31.2	
15:44:34.0	-2.09	5322	11	100	17.7	58.6	33.4	86.3	12.7	54.5	31.3	
15:44:33.0	-2.03	5328	11	100	17.7	58.6	33.4	86.3	13.5	54.4	31.2	
15:44:32.0	-2.07	5340	11	100	18	58.6	33.4	86.3	12.9	54.5	31.3	
15:44:31.0	-2.09	5337	11	100	17.7	58.6	33.4	86.3	12.9	54.6	31.3	
15:44:30.0	-2.11	5339	11	100	17.7	58.6	33.4	86.3	13.1	54.5	31.3	
15:44:29.0	-2.09	5326	11	100	17.7	58.6	33.3	86.3	12.9	54.6	31.3	
15:44:28.0	-2.06	5335	11	100	17.7	58.6	33.4	86.4	13.5	54.6	31.3	
15:44:27.0	-2.07	5326	11	100	17.7	58.6	33.4	86.4	12.9	54.6	31.3	
15:44:26.0	-2.11	5329	11	100	17.7	58.6	33.4	86.4	14.1	54.6	31.3	
15:44:25.0	-2.08	5333	11	100	17.7	58.6	33.3	86.4	13.7	54.6	31.3	
15:44:24.0	-2.11	5348	11	100	17.7	58.6	33.3	86.4	13.3	54.6	31.3	
15:44:23.0	-2.11	5333	12	100	17.7	58.6	33.3	86.4	13.5	54.6	31.3	
15:44:22.0	-2.09	5344	11	100	17.7	58.6	33.3	86.4	12.9	54.6	31.4	
15:44:21.0	-2.08	5335	11	100	17.7	58.6	33.3	86.4	13.5	54.6	31.4	
15:44:20.0	-2.06	5335	11	100	17.7	58.6	33.3	86.4	12.9	54.6	31.3	
15:44:19.0	-2.10	5335	11	100	17.7	58.6	33.3	86.4	13.5	54.6	31.4	
15:44:18.0	-2.07	5326	11	100	17.7	58.6	33.3	86.4	13.7	54.6	31.4	
15:44:17.0	-2.12	5326	11	100	17.7	58.6	33.3	86.4	13.5	54.6	31.4	



Bearing and motor interface temperature



Seal test bench



Spindle motor test



Spindle running test

**03**

According to the speed, power and application fields of the main shaft products of the department, we will fully understand the spindle products of the spindle equipment division.

## ◆ Alternative import

All key components of the product are independently researched and developed, and the performance has reached the same level of foreign products, and the quality is reliable.

## ◆ Professional customization

According to the actual work situation of the customer, the optimal design obtained from various factors can be integrated to meet the individual needs.

## ◆ Flexible configuration

The machining center spindle can be equipped with temperature sensor (temperature measurement and temperature switch), vibration sensor, proximity switch, encoder, rotary joint, etc. according to customer's requirements. At the same time, the spindle electrical components adopt well-known brands and have good compatibility.

## ◆ Quality service

Pre-sales technical exchange is sufficient, after-sales service response is fast, product maintenance cycle is short.



## Application background:

The flexible production line of a joint venture automobile engine factory mainly produces cylinder heads for aluminum alloy engines, and the original COMAU machining center machine tools are equipped with KESSLER electric spindles. Due to the long maintenance period and high cost of the spindle, domestic replacement is sought.

The main parameters of the spindle are:

Maximum speed: 24000r/min, rated speed 9500r/min, rated power 30kW (30Nm).

Accuracy: HSK A 63 test rod has a proximal jump of 0.002mm and a distal end (280mm) jump of 0.004mm.



## Application background:

Shenyang Machine Tool Group Zhongjie Lijia vertical processing machine production line, supporting independent research and development of I5 system and Siemens system, mainly produces vertical and horizontal high-end CNC machining center machine tools, and plans to develop HSK A63 tool holder CNC machine tools for automotive parts processing. .

According to the customer's actual working conditions, our company developed 220XDJ18Q22 and 220XDJ12Z22 two spindles to meet customer requirements. The actual use of the electric spindle is reliable and stable.



Designation	Lub.	Cutter Interface	Max. r/min	Rated Power	Rated Torque Nm
220XDJ18Q22	Oil&Gas	HSK A63	18000	22kW	70
220XDJ12Z22	Grease	HSK A63	12000	22kW	70

## Application background:

Based on the urgent need for high-speed machining centers in the industry, we developed HSK-E40 interface high speed electric spindle.

The spindle motor was jointly developed by Harbin Institute of Technology.

The fixed rotor is a three-phase permanent magnet synchronous motor and a matching custom drive of Huichuan. It realizes closed-loop high-precision positioning control with a maximum speed of up to 40,000r/min, reaching the international leading level.



## Electric spindle parameters

Voltage: 380 V

Rated power: 20 kW (S1)

Rated speed: 10000 r/min

Rated current: 45 A

Maximum speed: 40000 r/min

Rated torque: 19.1N•m

Spindle interface: HSK-E40

Encoder specifications: L+B GEL2443K

Status detection: broach, loose knife, cylinder reset

Center water: Yes

04

The Intelligent Equipment Division has long-term cooperation with many well-known domestic enterprises and research institutes.

Beijing 502, 529, 507, General Equipment Department

Shenyang 410 Factory, 606, Beijing Zhongbing Optoelectronics, 232 Factory

Xi'an 618, 212, Xikong, Xihang, Baoji 212 Factory

Luoyang 613, 612, Zhuzhou 608, Mianyang Jiuyuan

Shanghai 803, 805, China Aviation Business

Shijiazhuang 5721 Factory, Jiujiang 6354

China Academy of Railway Sciences

Henan University of Science and Technology / Dalian Jiaotong University

Dalian University of Technology / Nanjing University of Aeronautics and Astronautics

Harbin Institute of Technology / Tsinghua University



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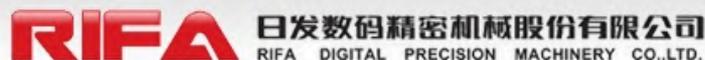
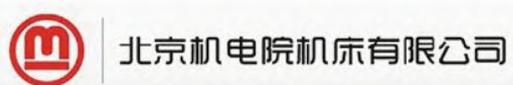


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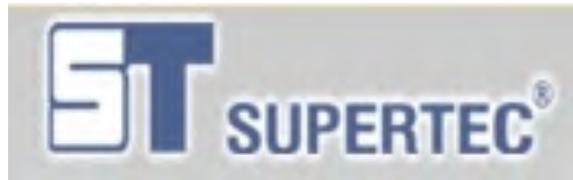


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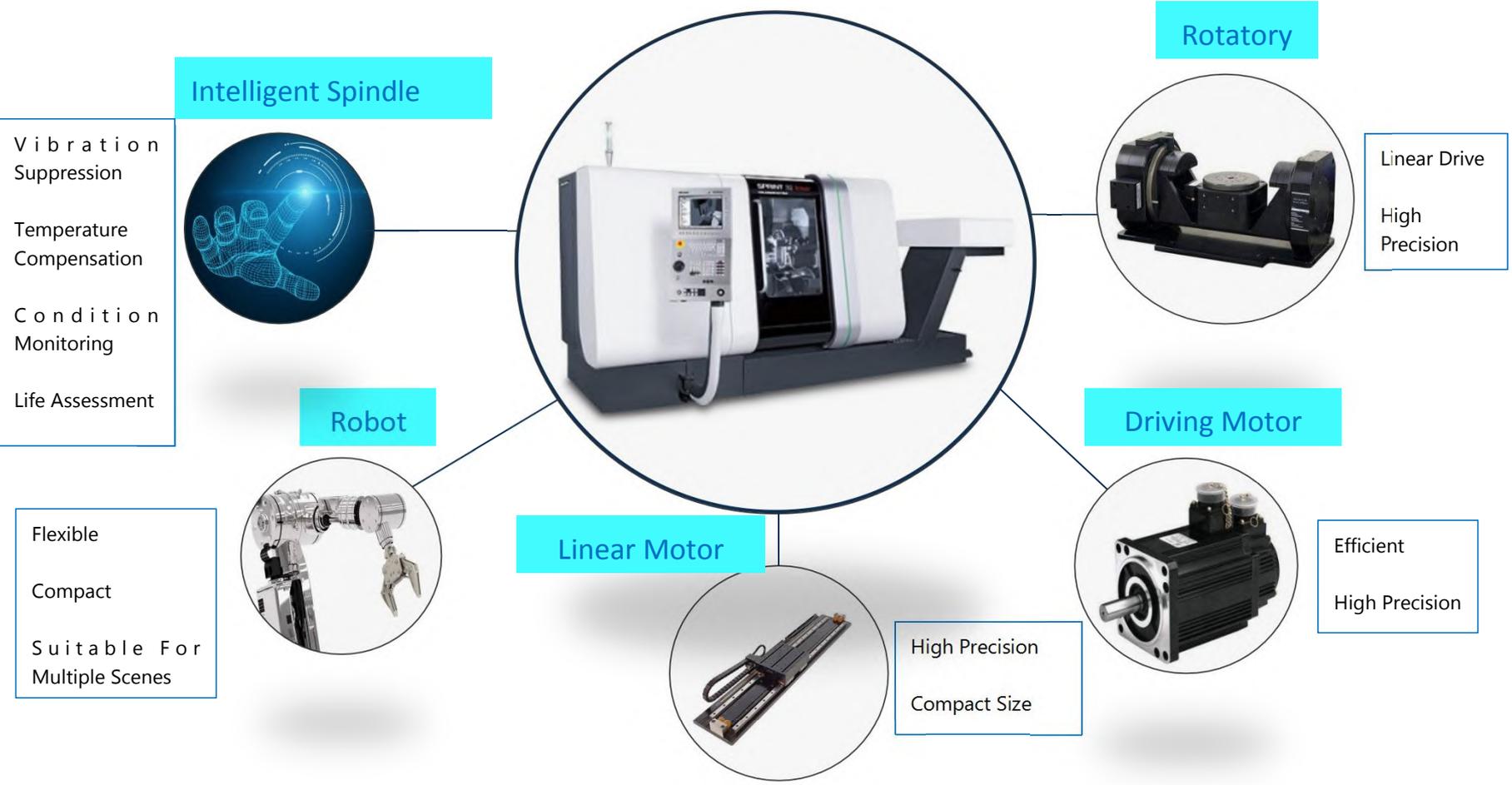


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**NSK**

# Vision - CNC Machine Tool Functional Component Integration Supplier





**THANK YOU!**