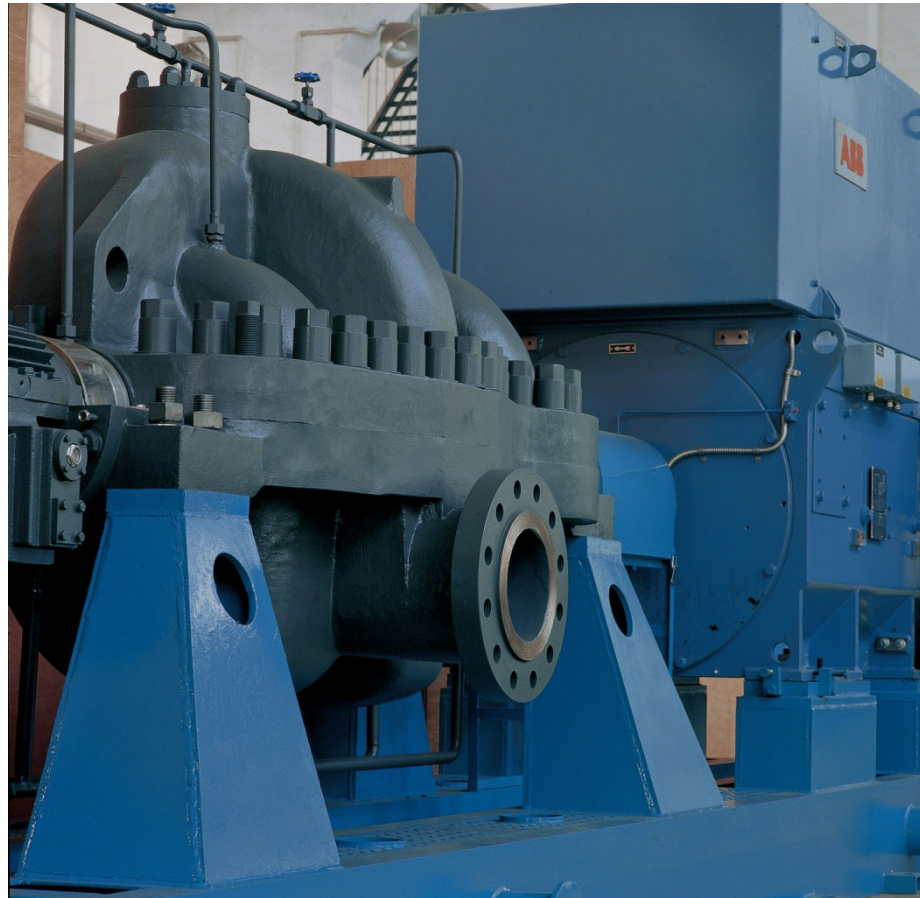




NDS Series Horizontal Multistage Split Casing Pump

南方泵业股份有限公司
NANFANG PUMP INDUSTRY CO.,LTD.

NS、NDS series horizontal multistage split casing centrifugal pump can be widely used in high pressure sea water desalination, long distance pipeline for oil and petrochemical industry, refinery process, crude oil pipeline and also can be used for mining, transporting water and other liquid with similar physical & chemical properties to water.



Model Meaning

NDS300-110×7

NDS: series code

300: pump rated capacity is 300m³/h

110: head for each stage 110m

7: stages

NS1800-220×2

NS: 2 stages double suction impeller

1800: pump rated capacity is 1800m³/h

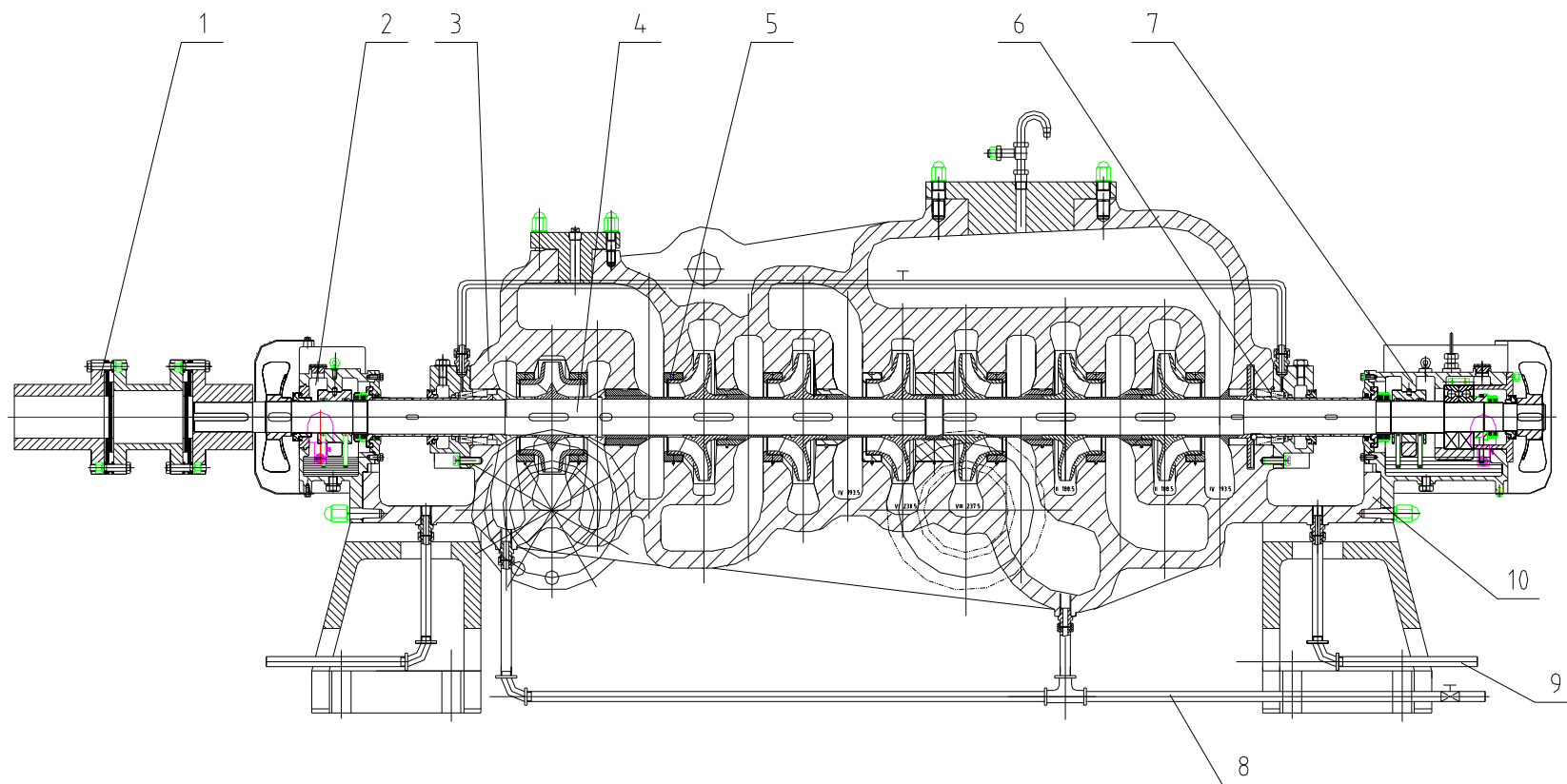
220: head for each stage 220m

2: stages



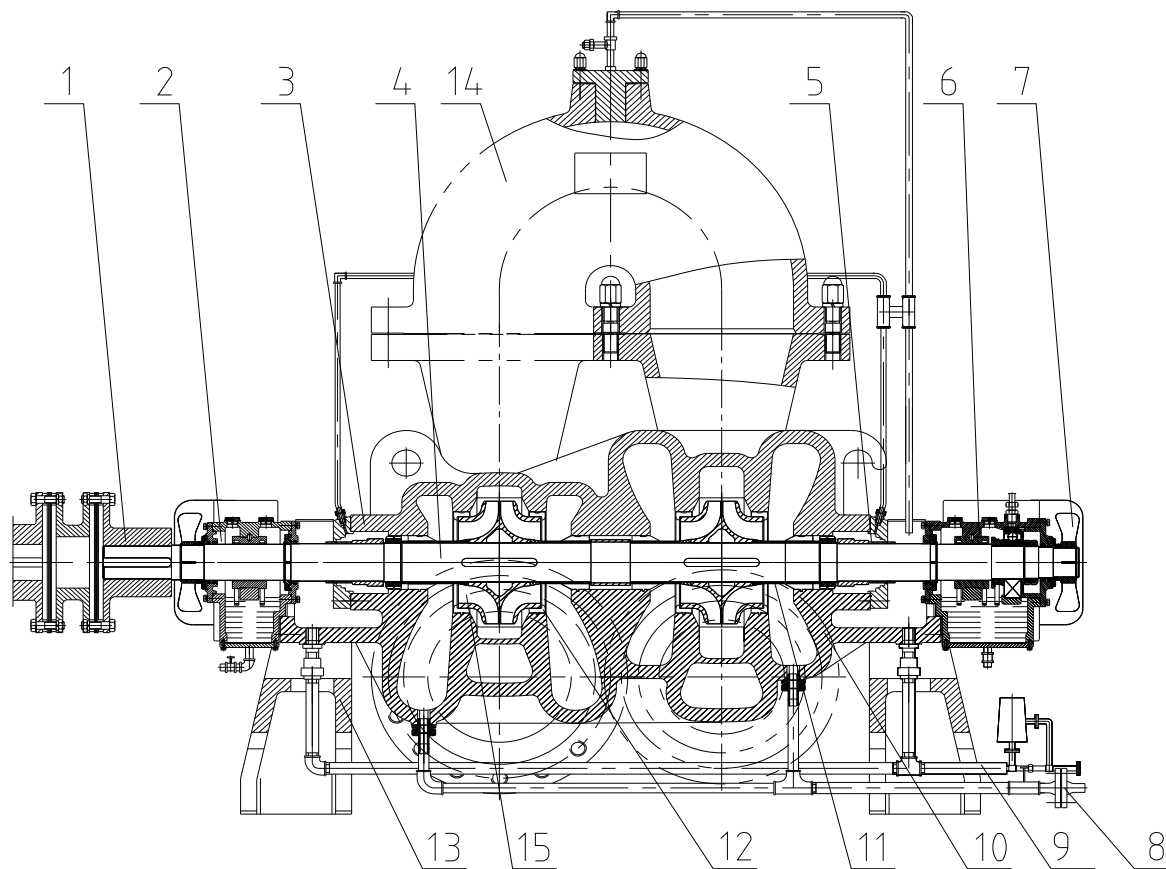
NDS结构图

七级泵结构图(内流道)



- 1.膜片联轴器 2.前轴承体部装 3.泵盖 4.转子总成 5.叶轮口环
6.机械密封 7.后轴承体部装 8.放油管 9.排污管 10.泵座

NS 水平中开双吸双级离心泵结构图



- 1、联轴器 2、前轴承体 3、泵盖 4、转子 5、机械密封 6、后轴承体 7、风冷部分
8、放油管 9、排污管 10、泵座 11、轴套 12、后密封环 13、泵脚 14、连接管
15、双吸叶轮

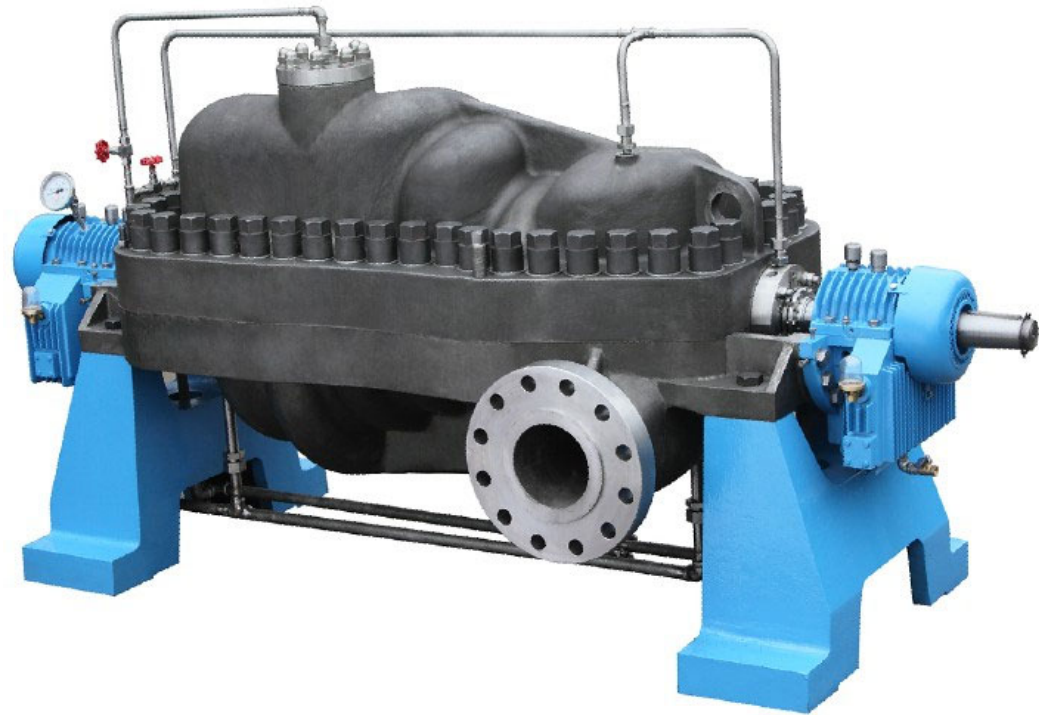
Performance

Q: 25 ~ 2400 m³/h.

H: 60 ~ 1200m.

Pressure: P ≤ 200bar

Temperature: -15°C ~ +200°C.

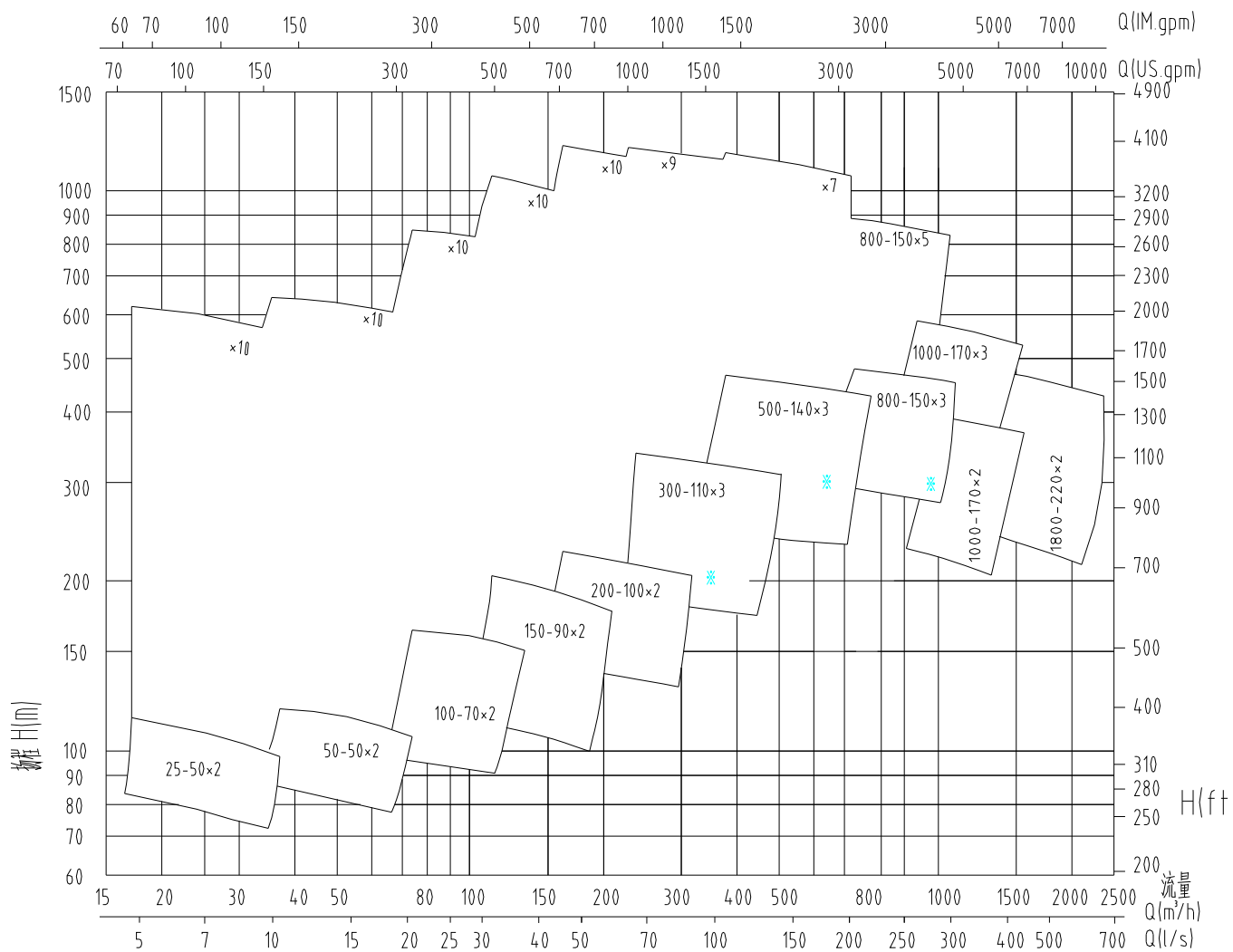


Model: API610 BB3

型谱

50Hz

2980rpm

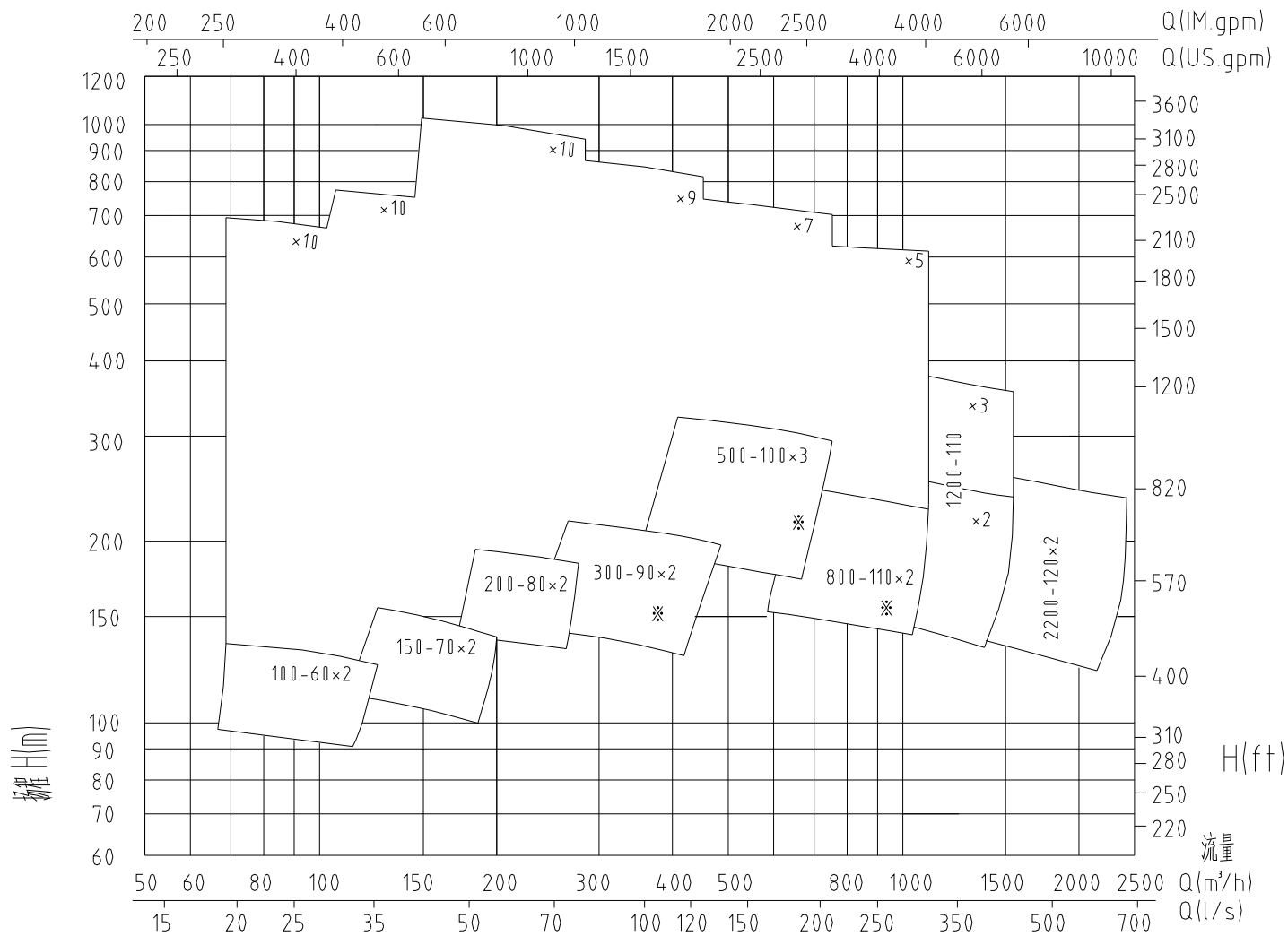


带※泵模型叶轮首级为双吸

型谱

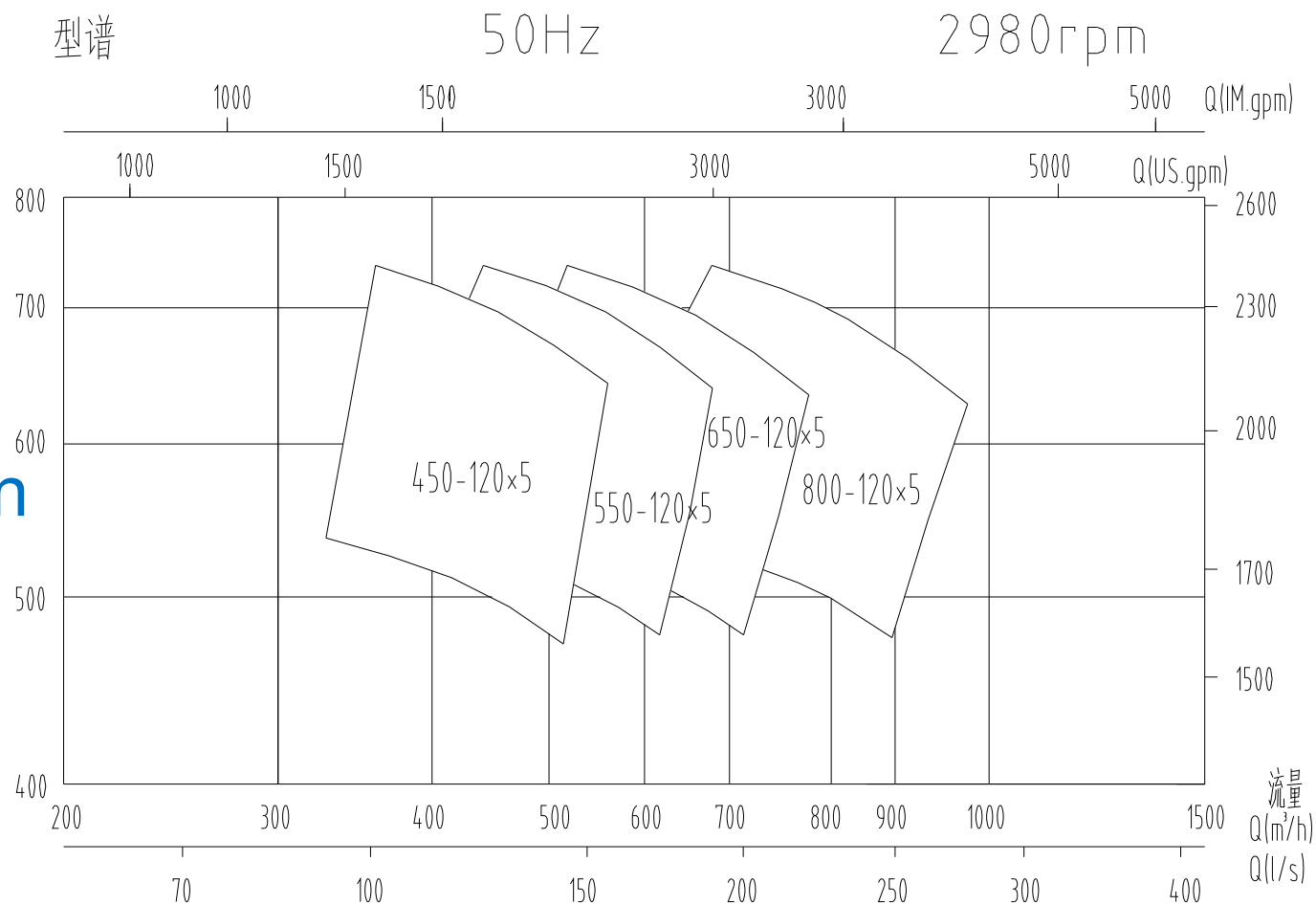
50Hz

1480rpm



带*泵模型叶轮首级为双吸

Pump for water desalination

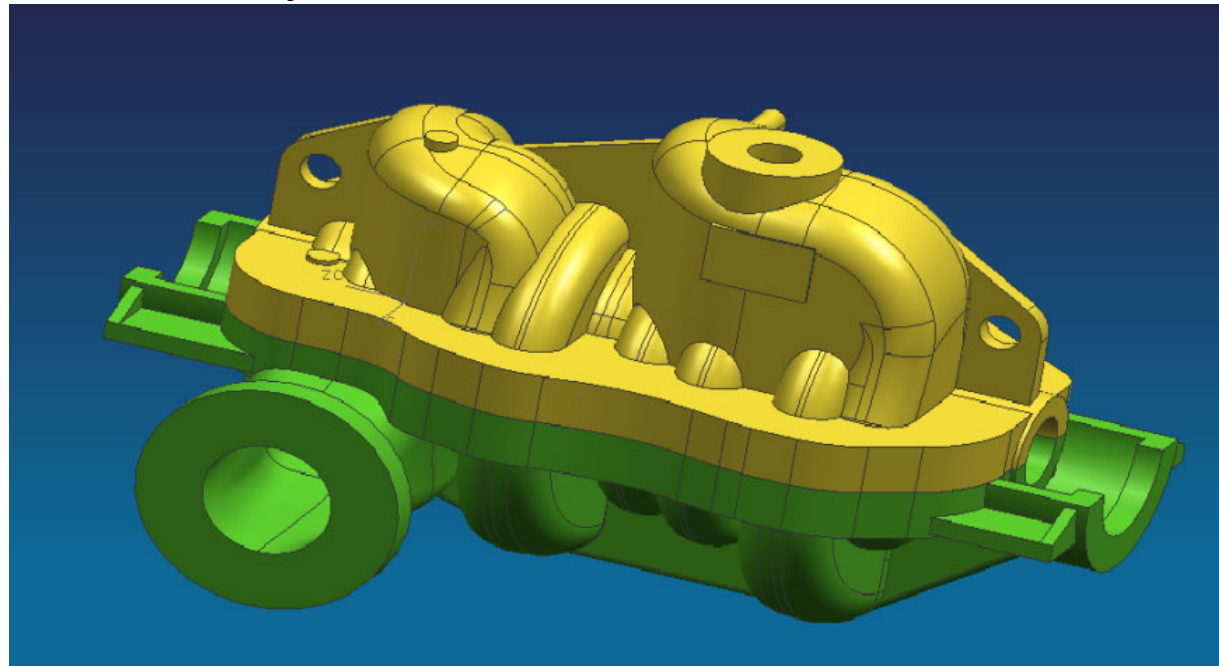


We developed water desalination pump with daily output 10,000T, 13,000T, 15,000T and 20,000T.

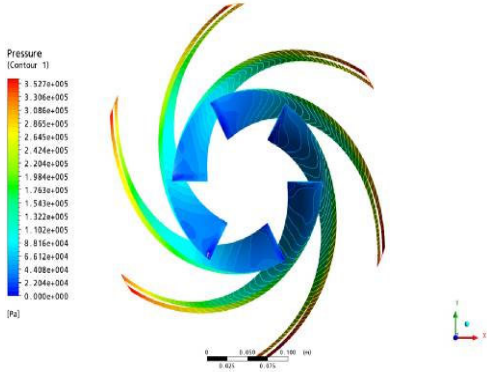
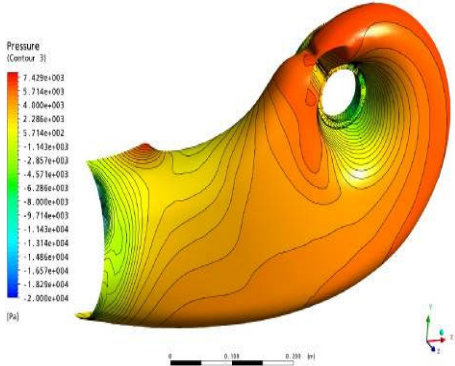
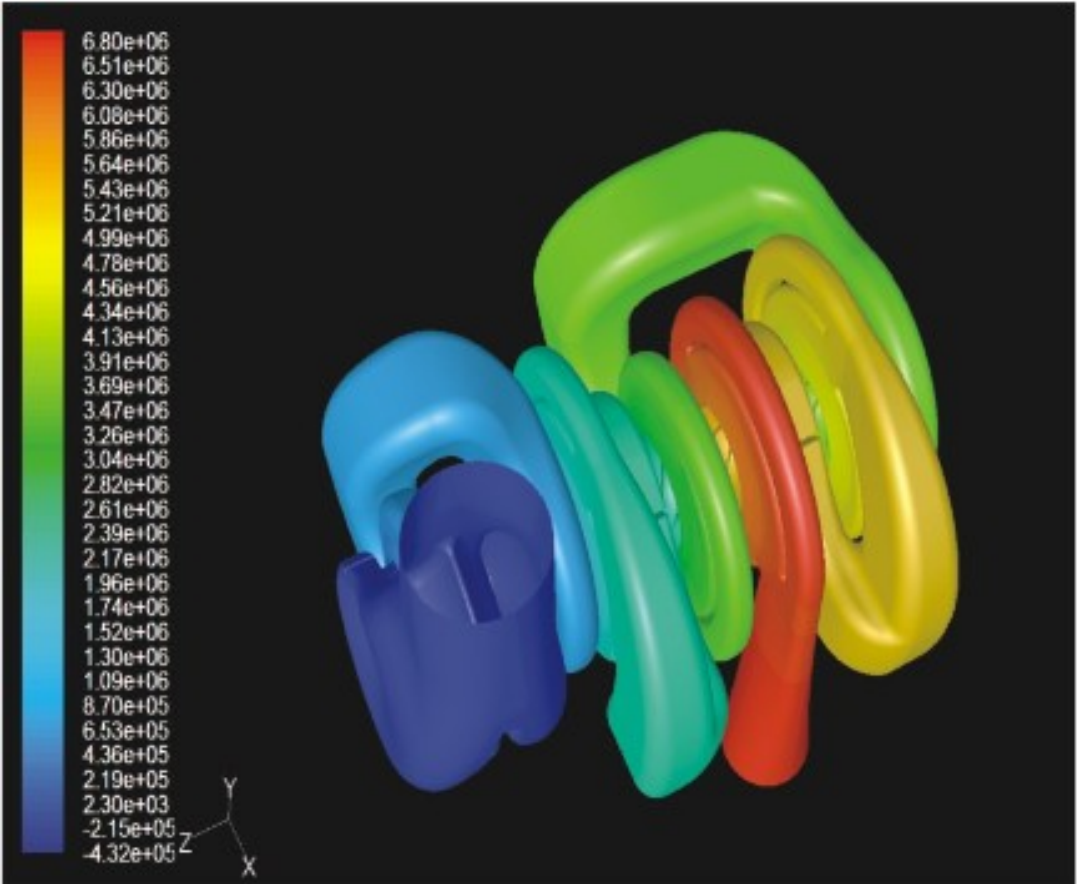
Design and Development

We have a team of excellent professional design and strong ability of product development, years of design experience and advanced technology program provide structure analysis, vibration analysis, noise analysis and water hammer emulation detailed design data to engineers, ensure the product reliability performance.

State of the Art 3D design tool namely CFD (Computational Fluid Dynamics)is used in every design and drawings. FEA (Finite Element Analysis) is used in design of strength engineering in all machine parts. Computer Added Manufacturing in factory to ensure that all new product to meet the desired specification in optimum steps. Ensure that all the CNP pumps are energy-saving, high efficiency, high reliability, provide the best solutions and finally create value for the customers.



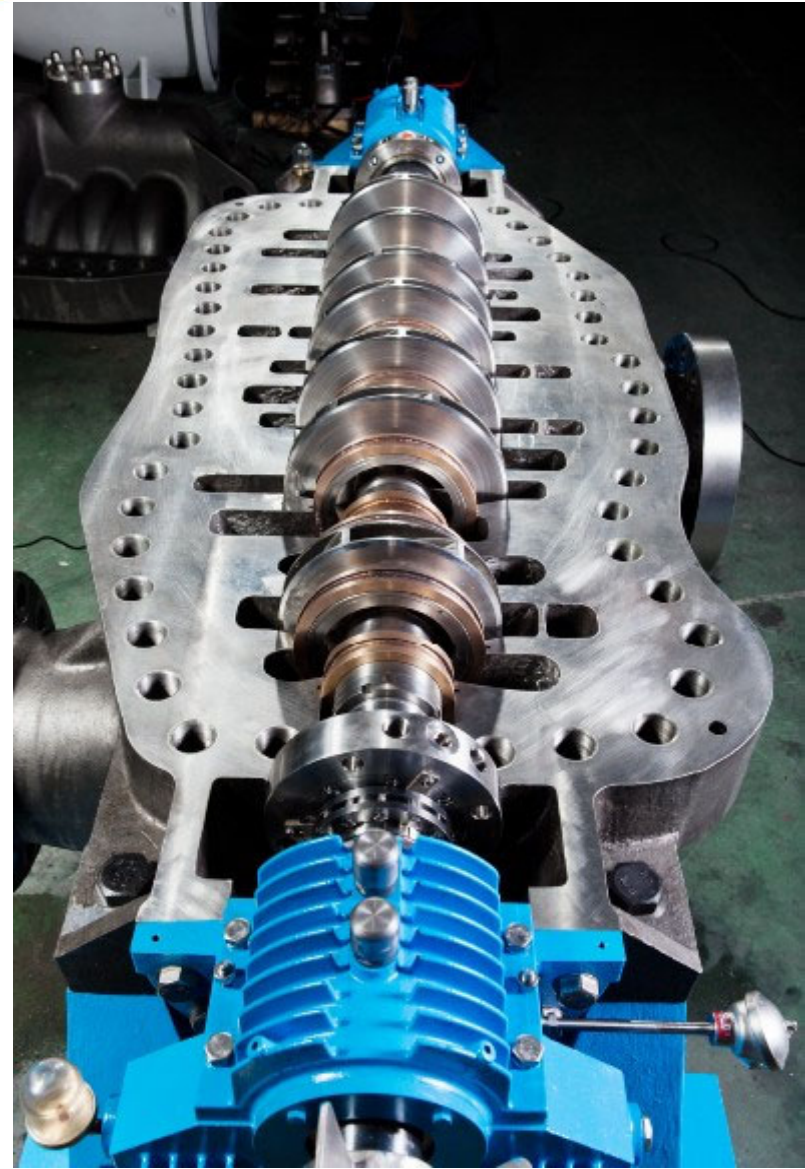
CFD Model Diagram

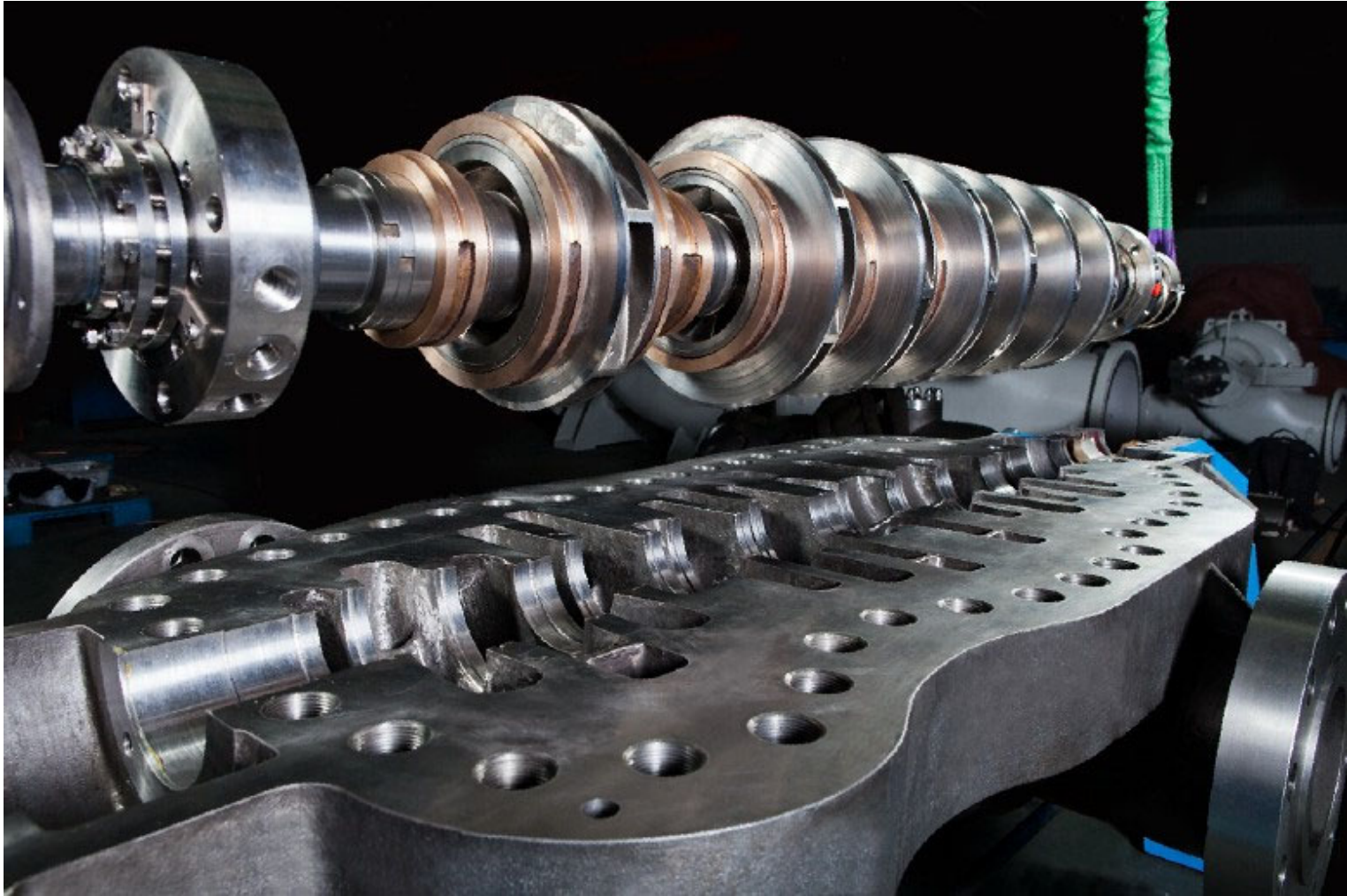




Pump Structure Features

NDS series pump structure belongs to API610 BB3 structure , NS series belongs to API610 BB1, they are multistage horizontal split casing centrifugal pump, mainly composed of casing, pump cover, rotor, front bearing housing, back bearing housing, mechanical seal, coupling and additional pipeline, etc.





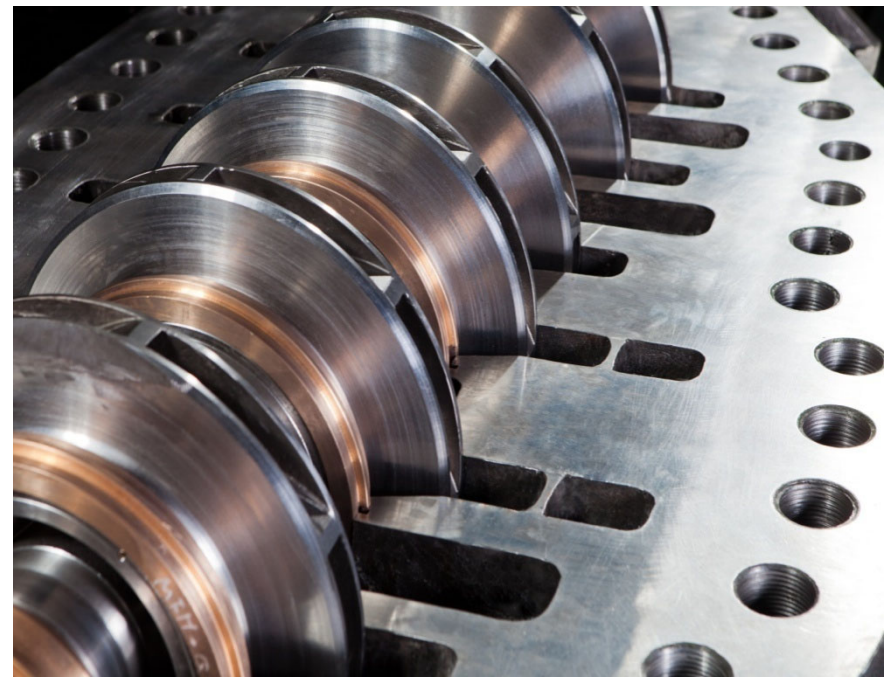
The structures are external and internal flow passage according to outline.



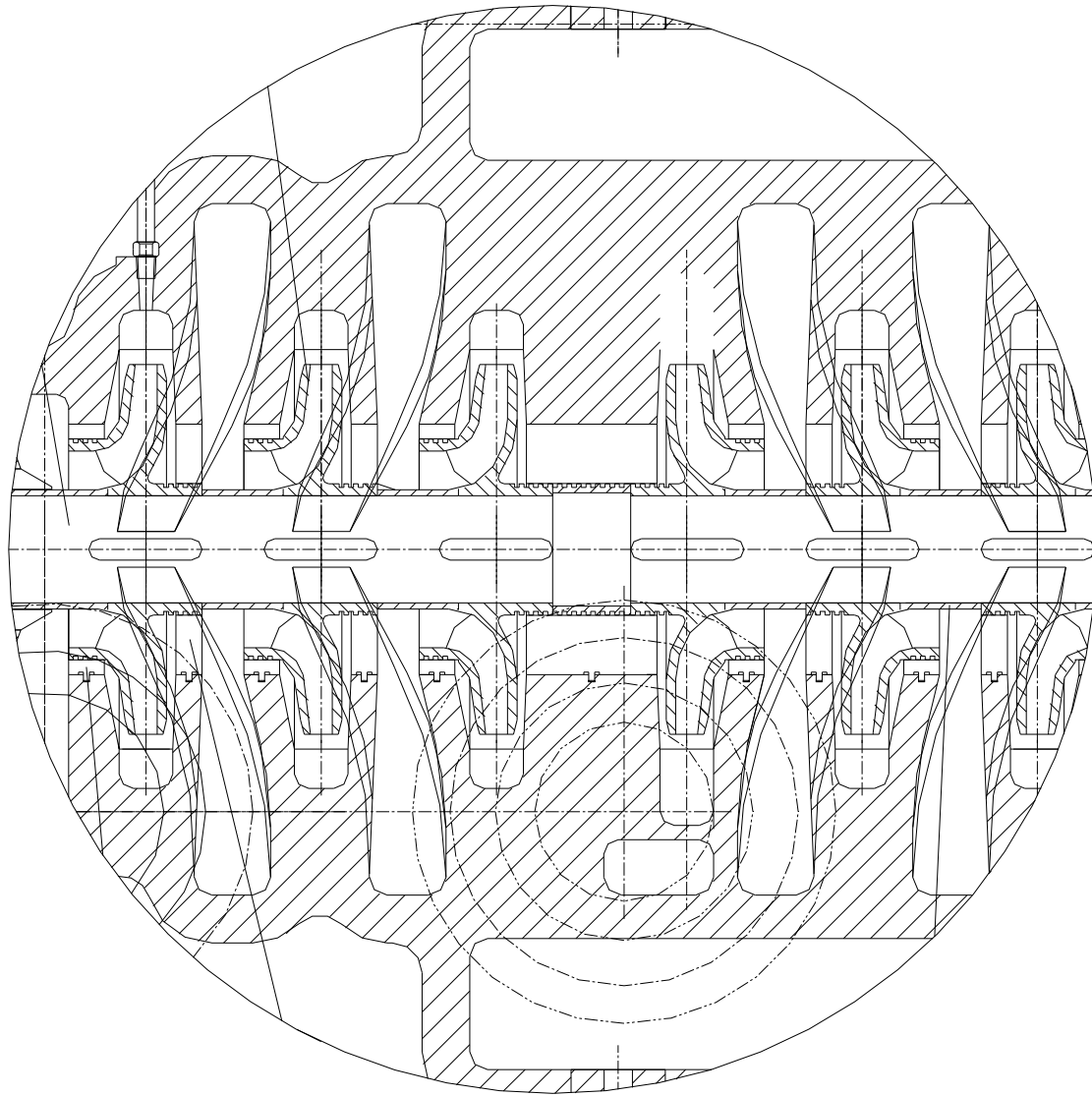
Divided by volute structure:



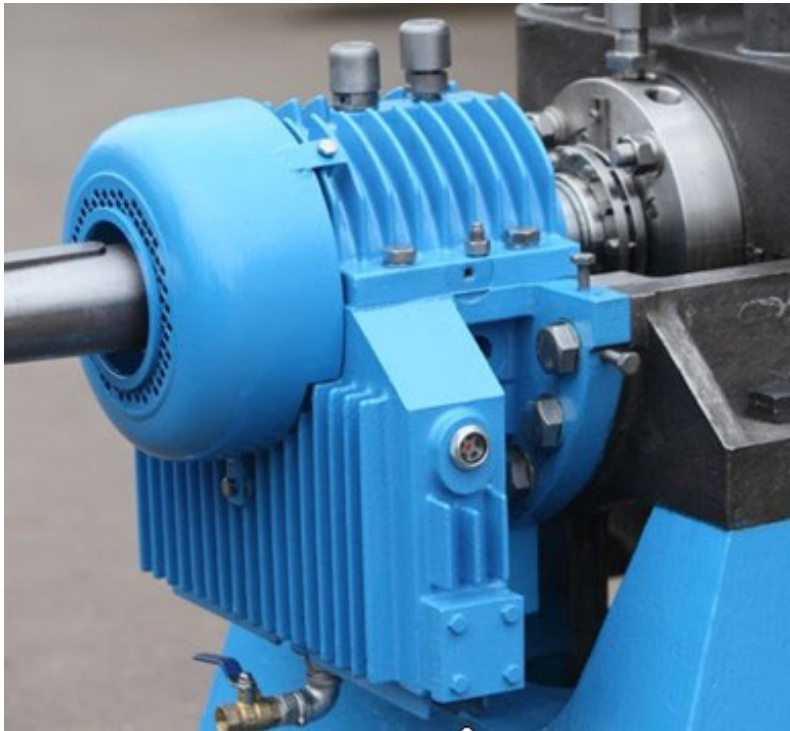
single volute
double volute
double flow passage



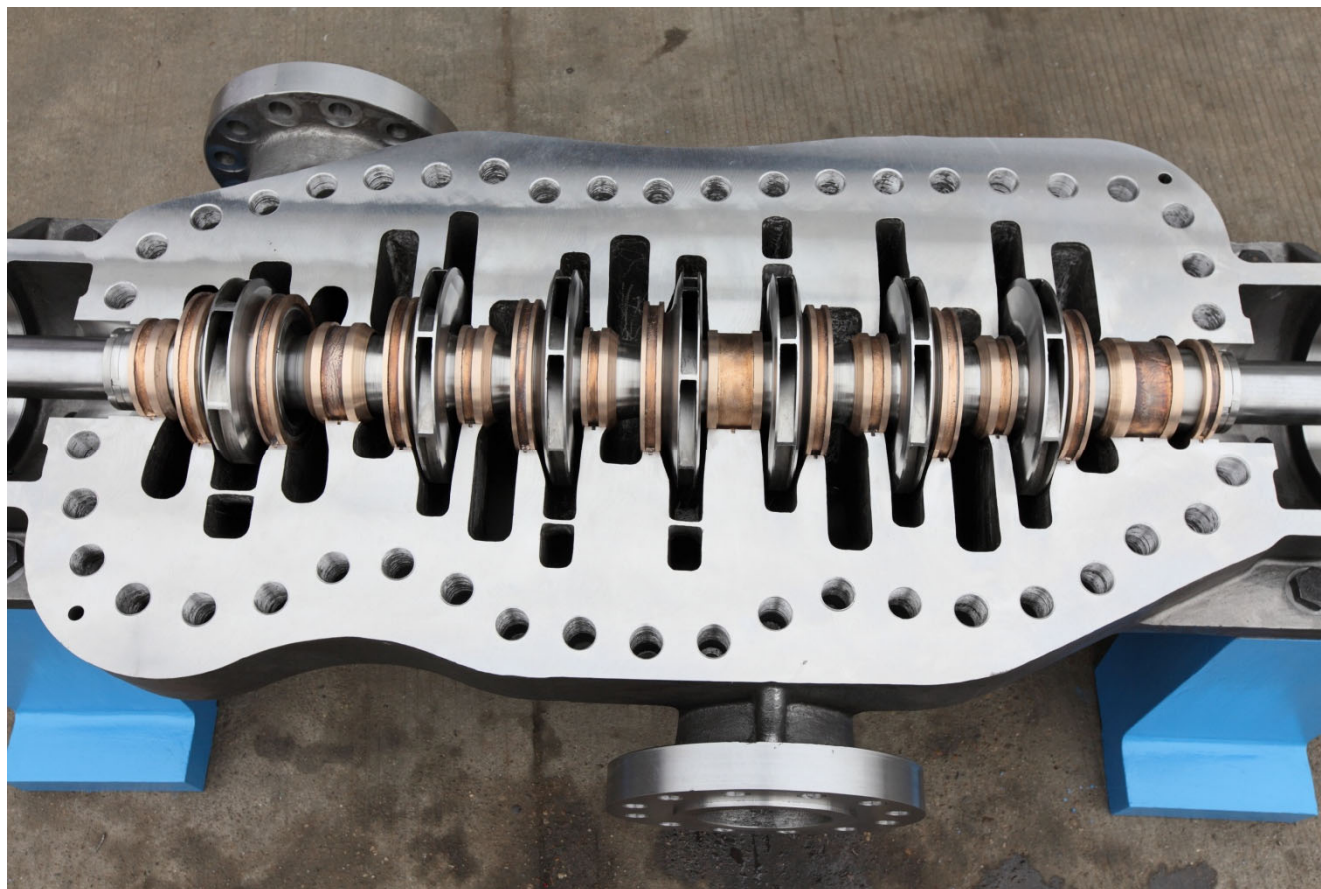
Drawing of partial
enlargement
(double flow passage)



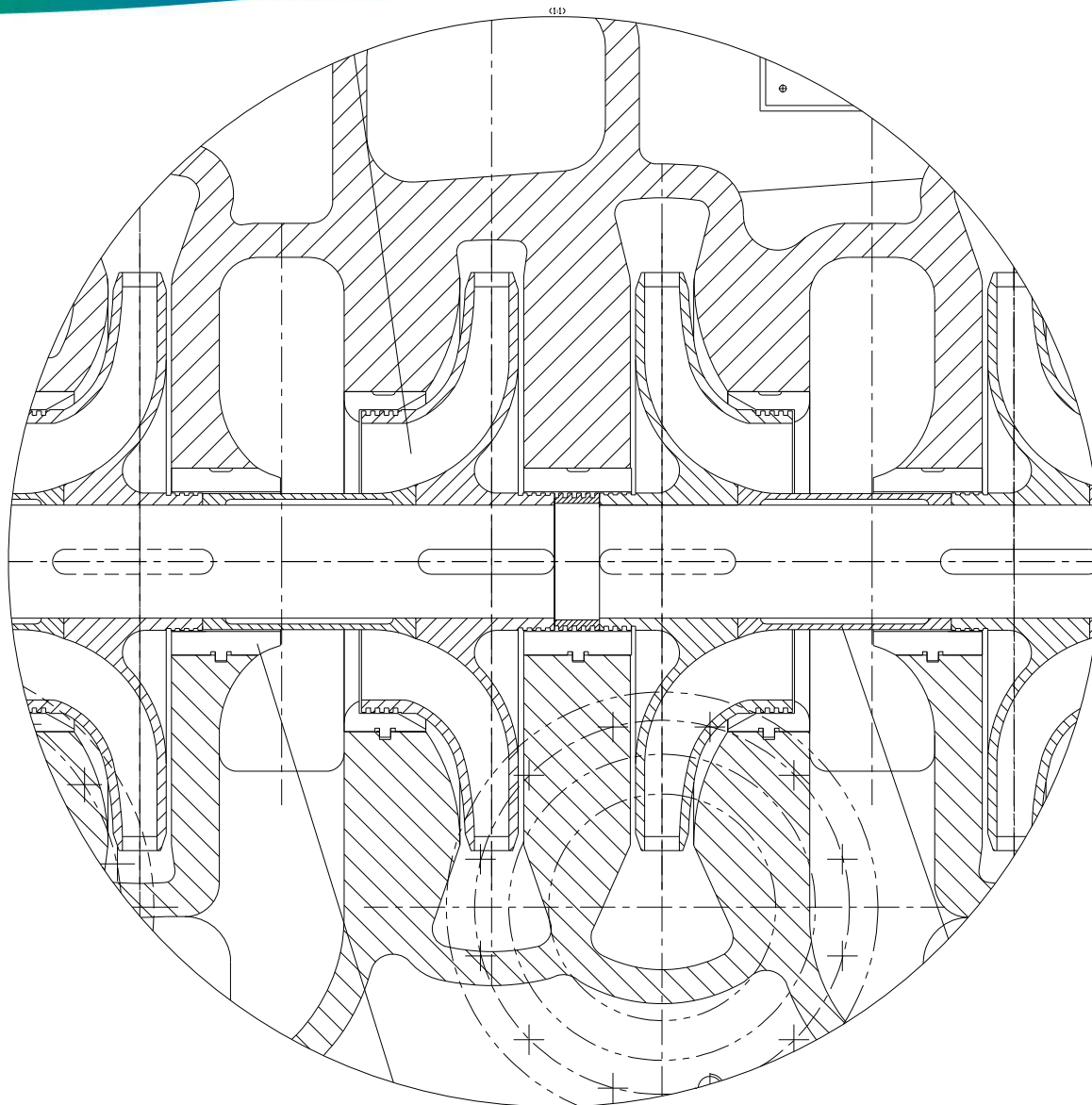
Divided by cooling method:
air cooling、 water cooling、 natural cooling



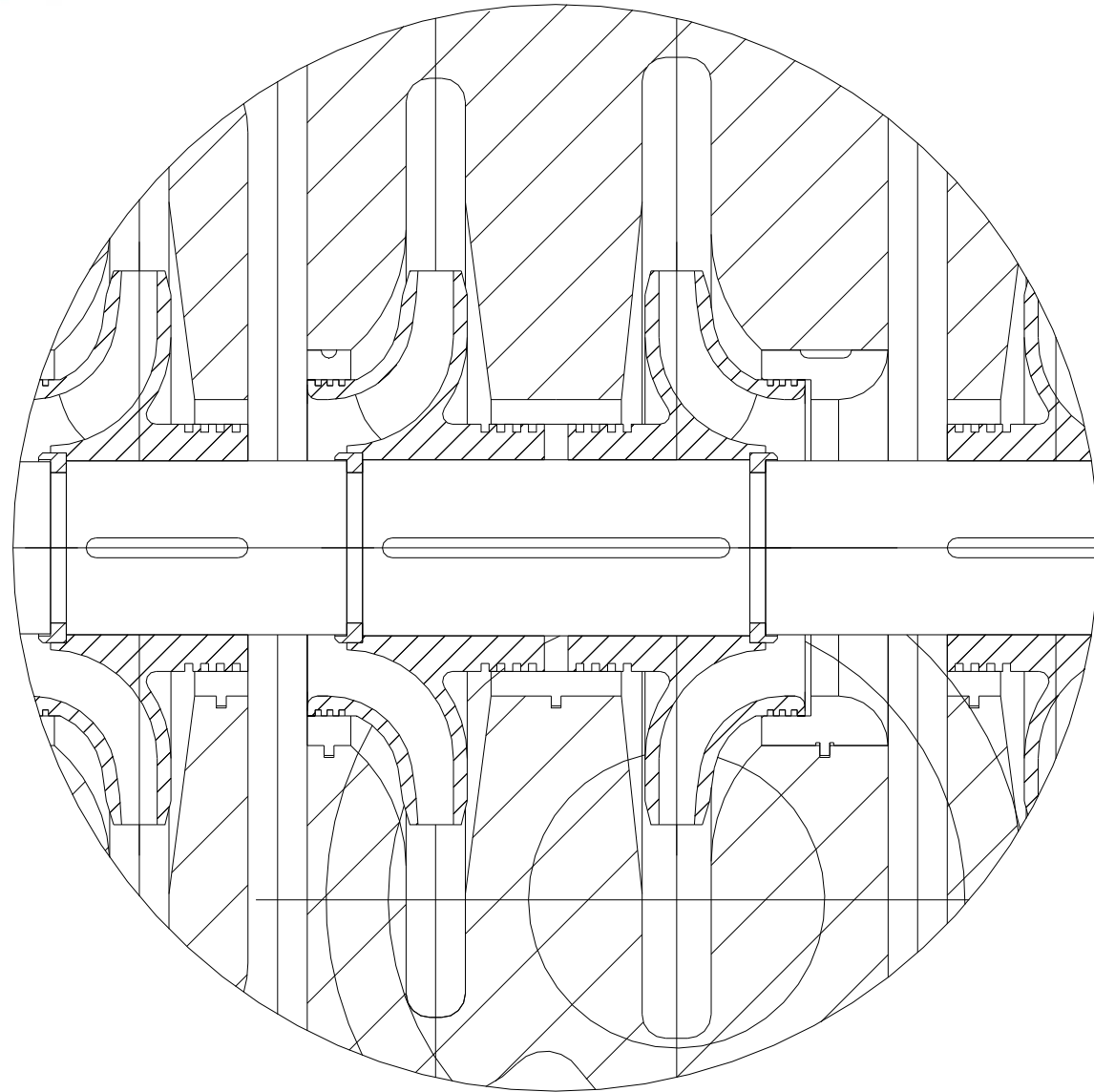
Divided by impeller position:
shaft sleeve positioning, hot pressing



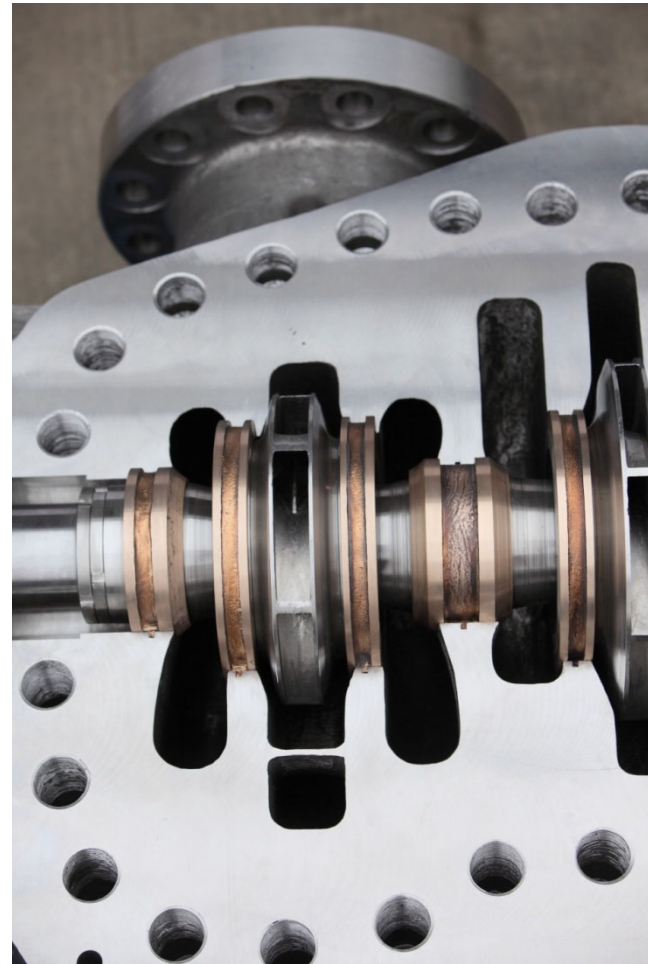
**Drawing of
partial structure
for shaft sleeve
positioning**



**Drawing of
partial structure
for hot pressing**



Divided by cavitation-resistant performance from high to low(same speed):
inducer,
first stage double suction,
single suction.



Axial split casing and volute structure have below advantages:

- 1) 、 The suction and discharge are at the fixed pump frame, no need to disassemble pipeline and motor when repair the pump.**

- 2) 、 Dismounting is very simple, no need to disassemble pump frame and cover when repairing and changing mechanical seal and bearing.**

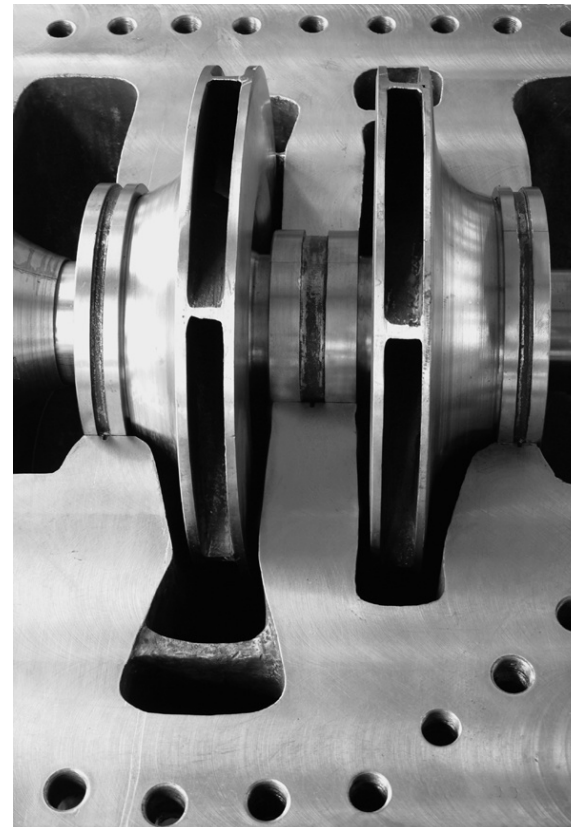
- 3)、 Flow passage is volute, rather than guide vane, so the pump can keep the high hydraulic efficiency, and the high efficiency zone is broad, pump efficiency can reach up to national standard A or above that.**



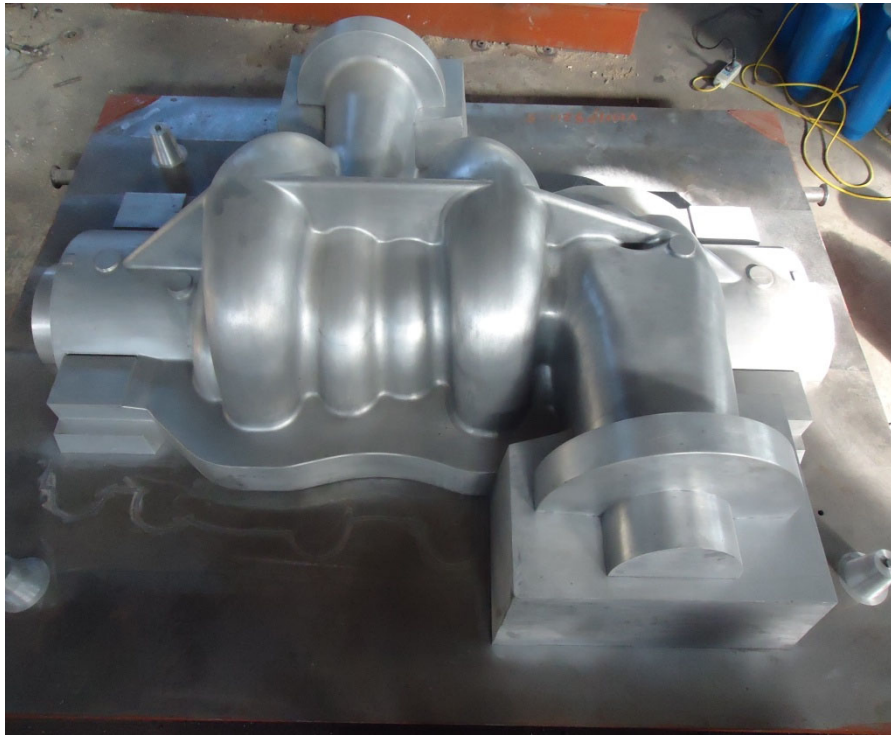
Special impeller and pump arrangement, basically balanced axial force and radial force, greatly reduced load of bearing, prolonged the life of bearing.

1) 、 impeller is installed in form of back-to-back, balanced axial force;

2) 、 volute design is double volute or with structure of 180° inverted delivery chamber balancing the radial force.

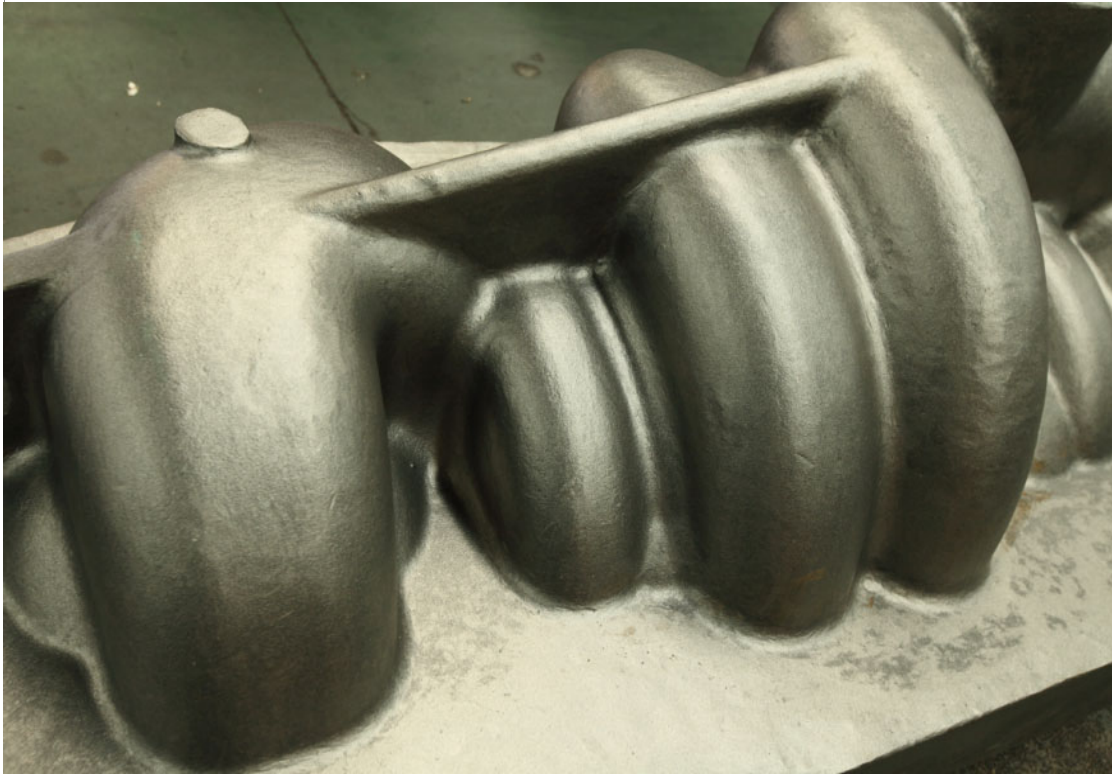


In order to reduce the roughness of foundry and upgrade the measure precision, we used metallic pattern and resin sand to ensure the smooth flow passage, precise measurement and also the high efficiency.



All materials foundry are produced by the branch of CNP. Currently the precision casting is finished with domestic most advanced entire silicon sol craft. Sand casting has stainless steel production line of resin-sand and iron-pattern sand.

We also use the advanced equipment: one set of VOD finery, it can reduce the carbon content to at least 0.003% for casting products. PT、MT、RT testing equipment can greatly ensure the finished products qualified rate.



Parts machining all adopted numerical control, digital display equipment, and designed relative special tools mould to ensure the processing and assembly precision.



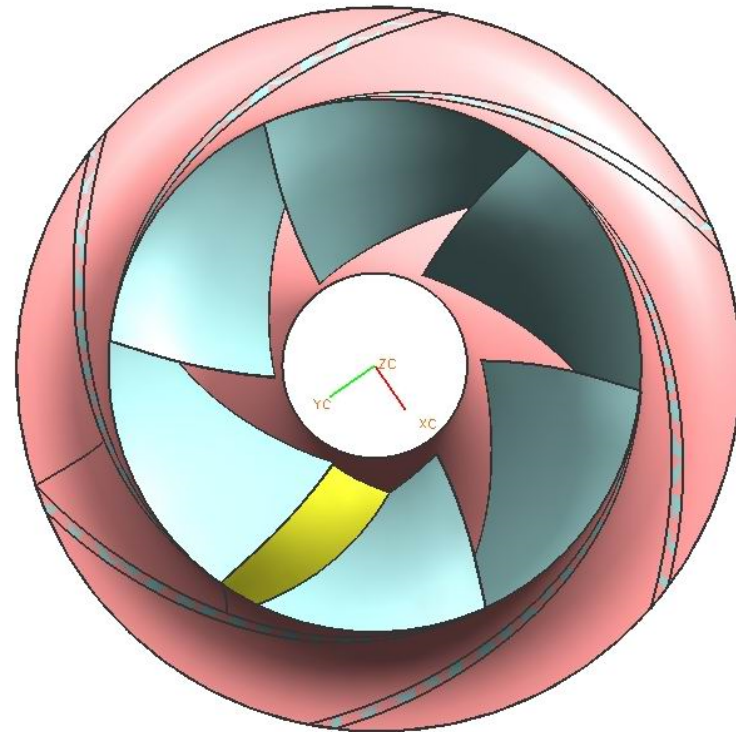
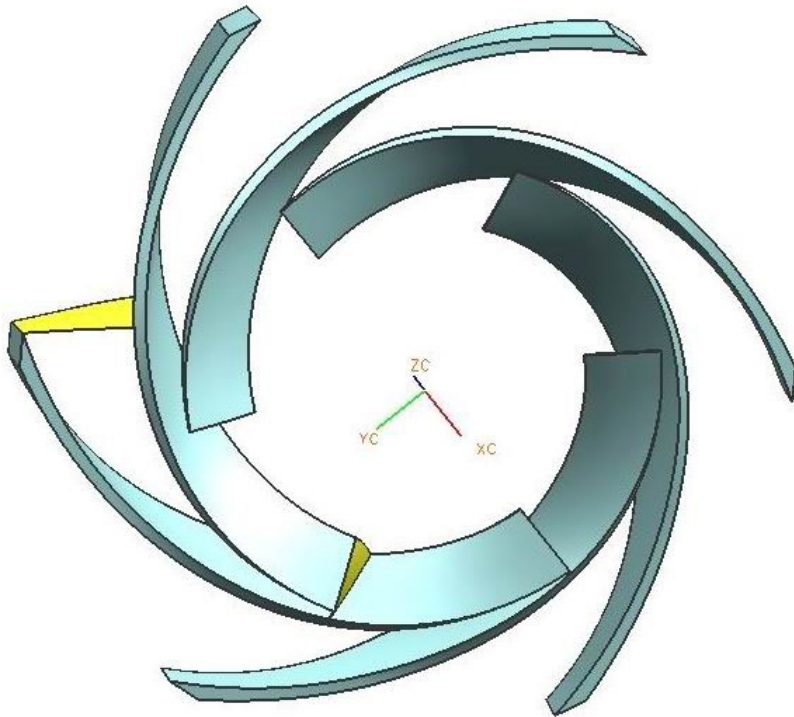
Fully automatic CNC processing equipment



Design for rotor parts:

1) 、 impeller :

a、 Impeller adopted excellent hydraulic design software and combined with foreign excellent hydraulic model design, with CFD analysis of flow field, making pump efficiency higher. This series product has obtained 3 titles of national energy-saving product. The single impeller will have a static balance to guarantee rotor runs smoothly.



b、 Impeller adopted precision casting, ensured the accuracy of flow passage size, reduced the roughness of flow passage to guarantee the pump efficiency.

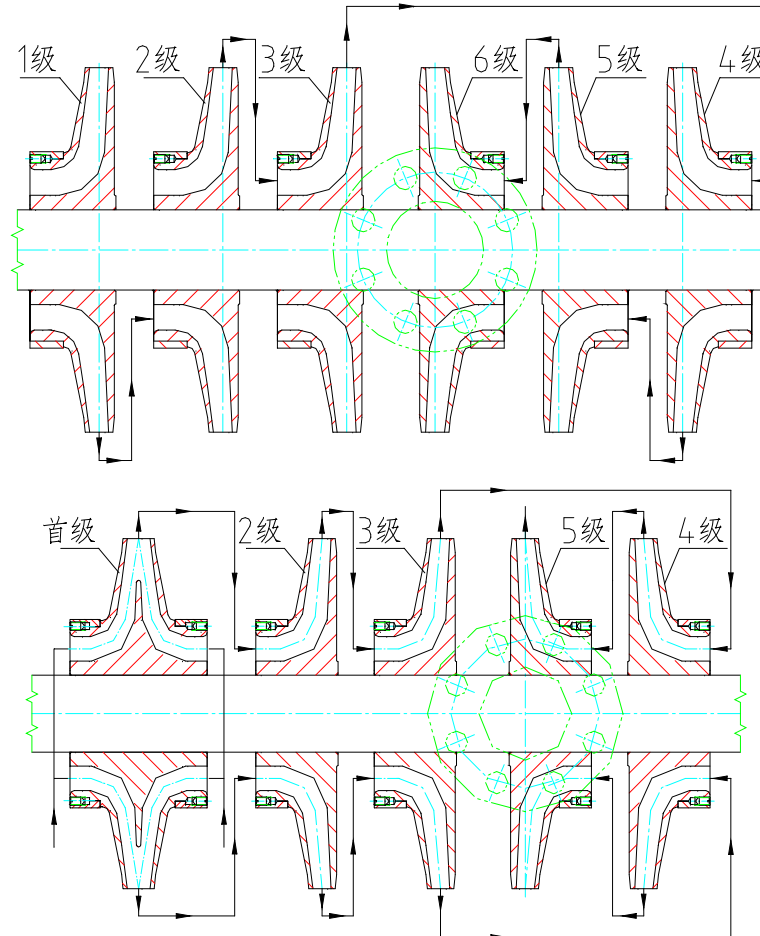


c. Impeller back-to-back structure

Stage will be even number if first stage impeller is single suction.

Stage will be odd number if first stage impeller is double suction.

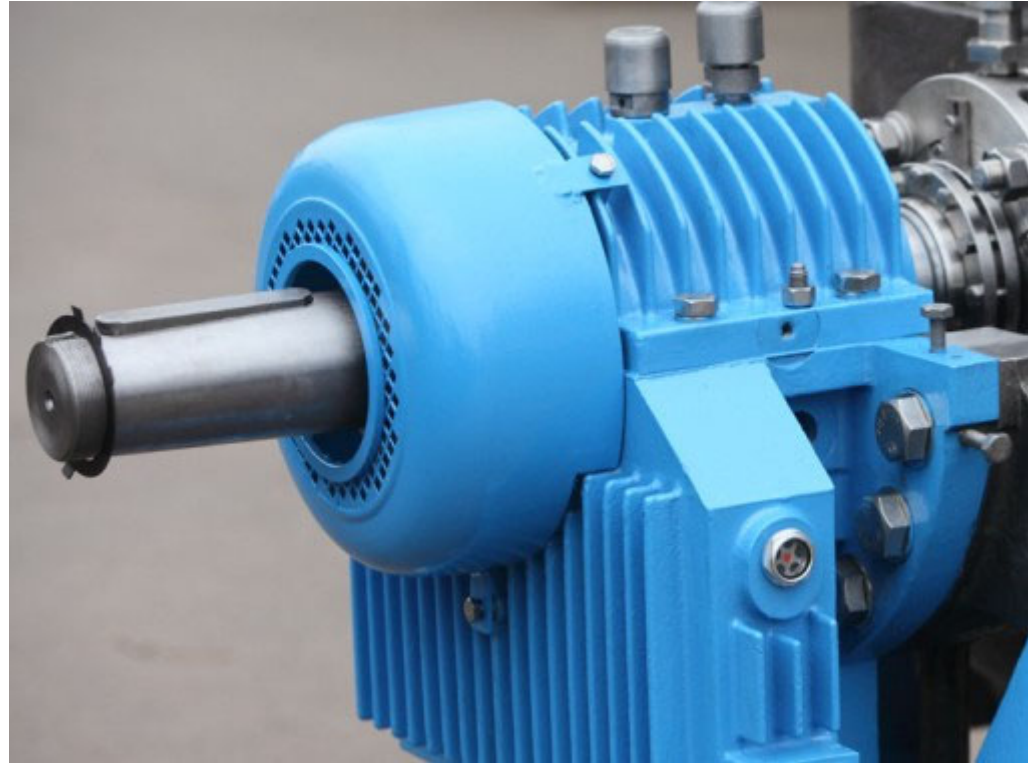
All single suction impeller distribute at the pump shaft back to back, making axial force to be balanced.



2)、 main shaft:

a、 main shaft is one of the most key parts on pump, its quality directly affects the pump reliability . Our main shaft uses 40Cr or 42CrMo high strength material, with the process of heat treatment---rough machining---stress moving---rough polishing--keyway cleaning, ensure the quality meets requirement.

b、 the shaft extension end with taper is convenient to the installation of coupling and easy for maintenance.





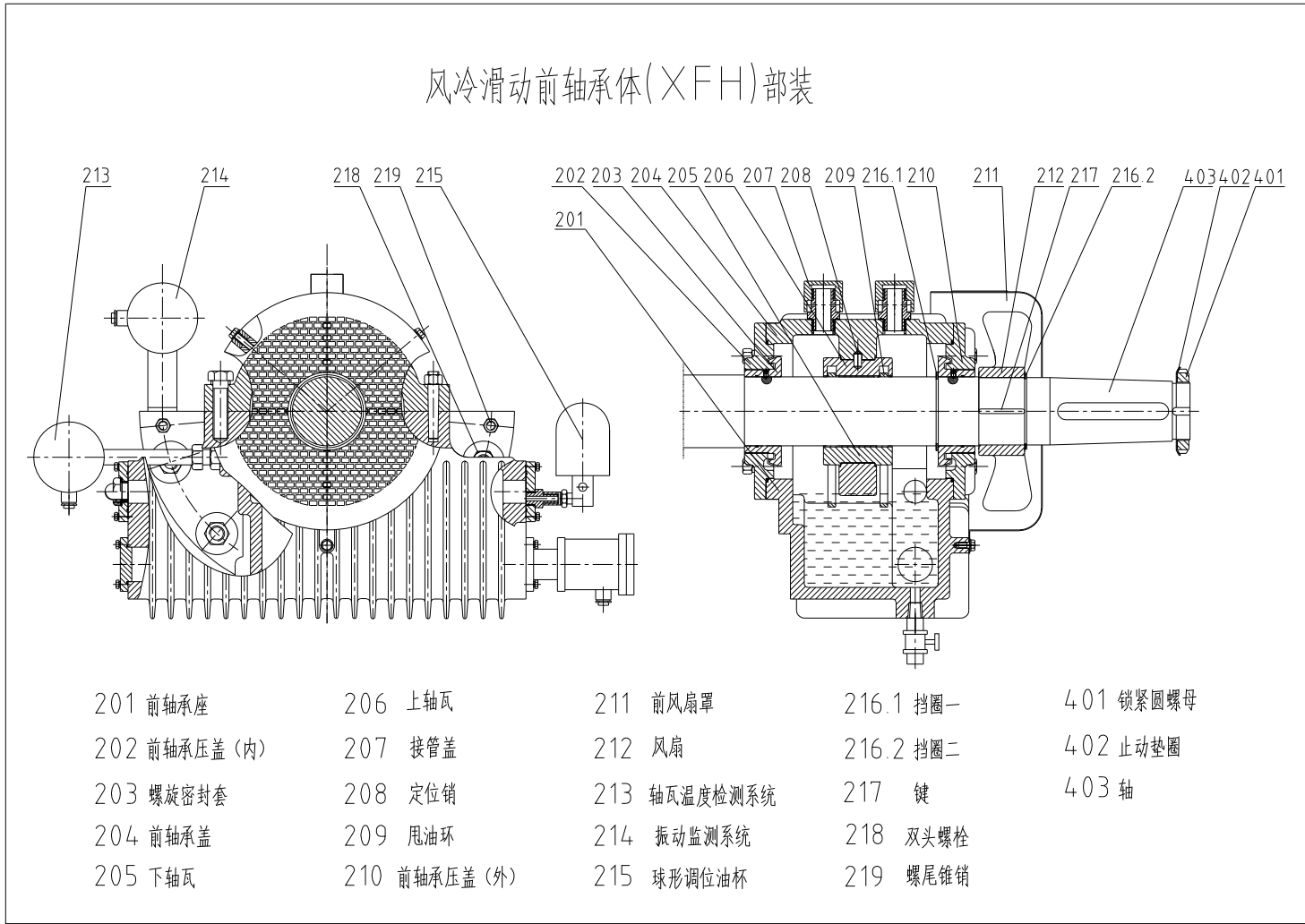


3) 、 Accurate rotor dynamic balance test ensured the smooth running of pump and low noise, low vibration, prolonged the life of mechanical seal and bearing.(API610 G1.6)

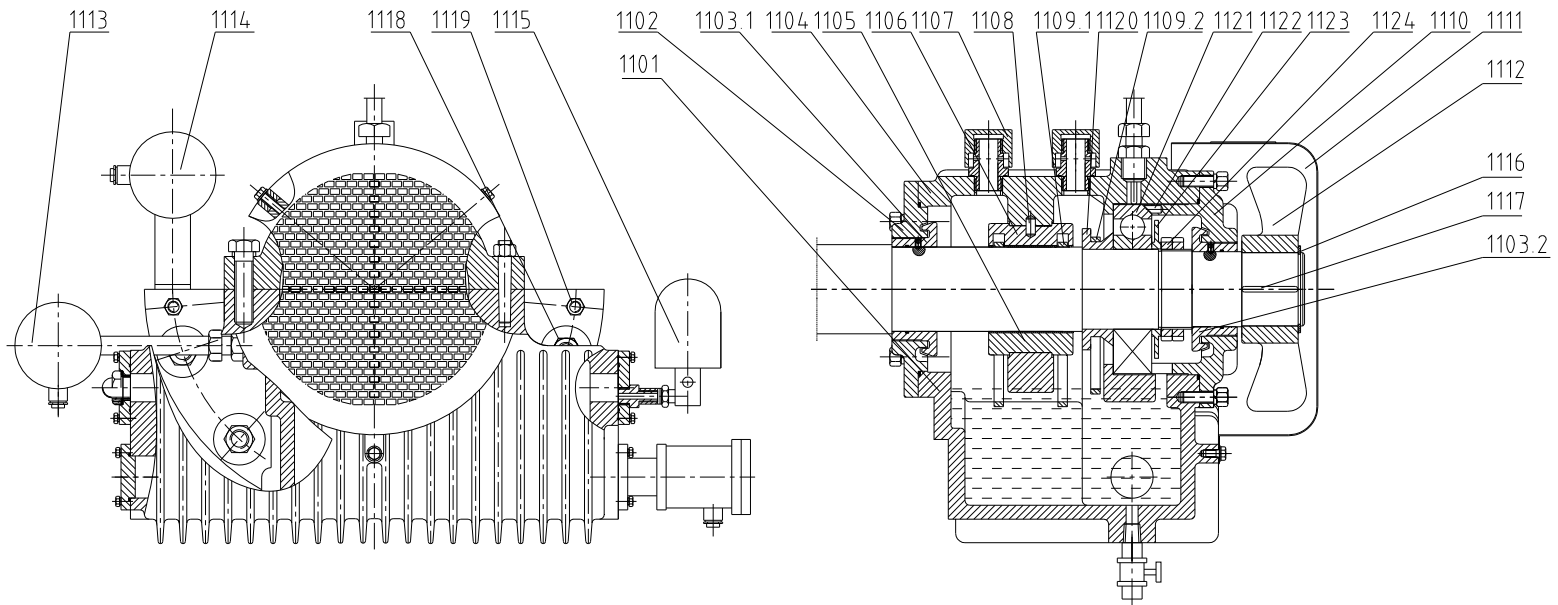


New design of bearing part

风冷滑动前轴承体(XFH)部装

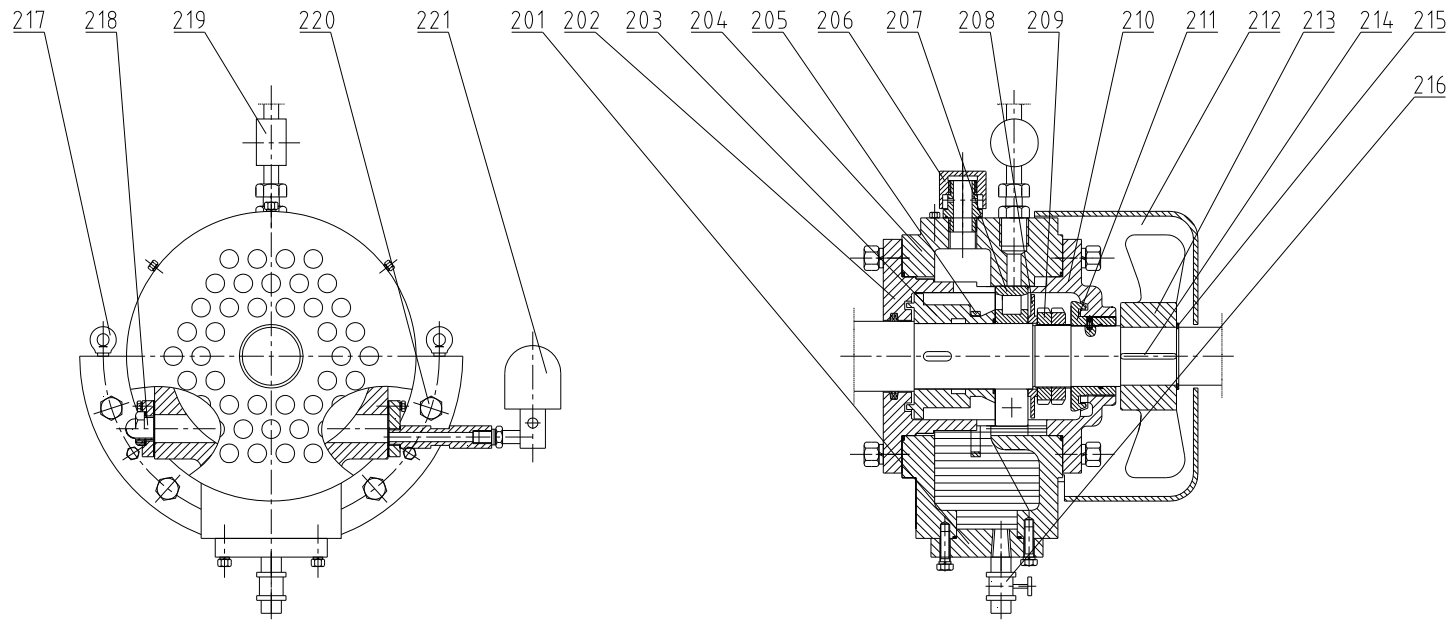


风冷滑动后轴承体(TFH)部装



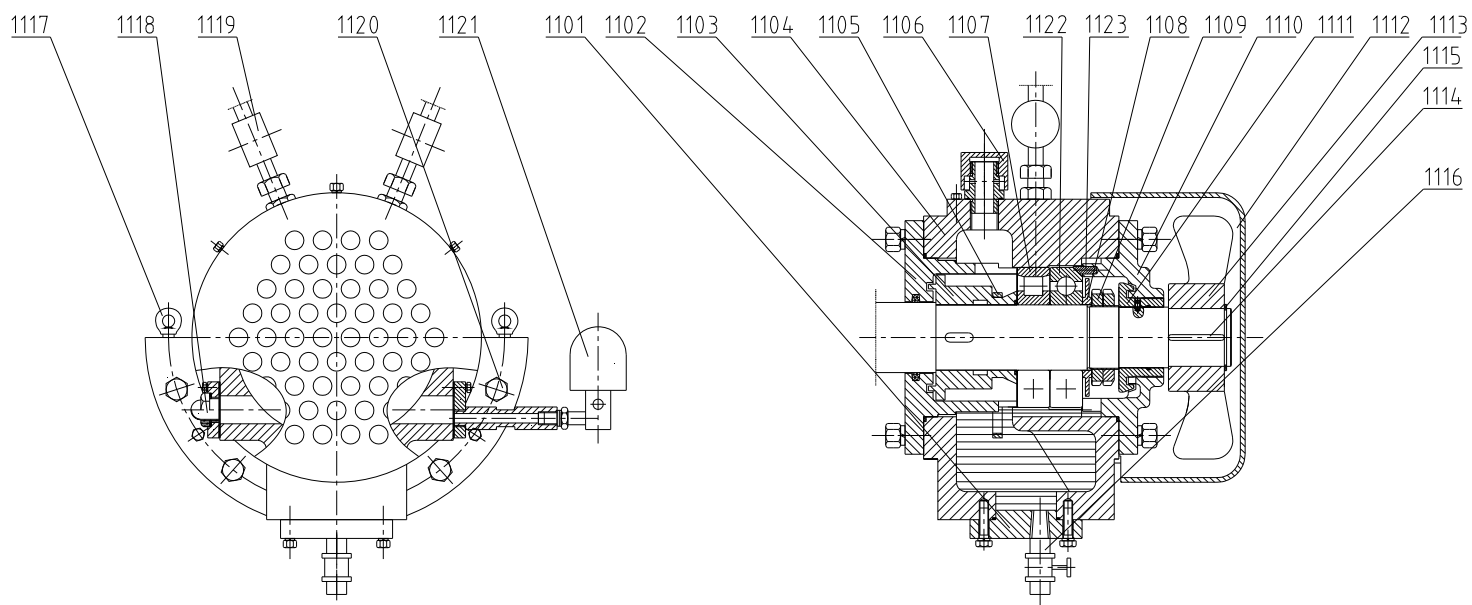
1101 后轴承座	1106 上轴瓦	1110 后轴承压盖(外)	1115 球形调位油杯	1120 甩油套
1102 后轴承压盖(内)	1107 接管盖	1111 后风扇罩	1116 挡圈	1121 止推轴承
1103.1 螺旋密封套一	1108 定位销	1112 风扇	1117 键	1122 防转销
1103.2 螺旋密封套二	1109.1 甩油环一	1113 轴瓦温度检测系统	1118 双头螺栓	1123 轴承挡圈
1104 后轴承盖	1109.2 甩油环二	1114 振动监测系统	1119 螺尾锥销	1124 圆螺母
1105 下轴瓦				

风冷滚动前轴承体(XFY)部装

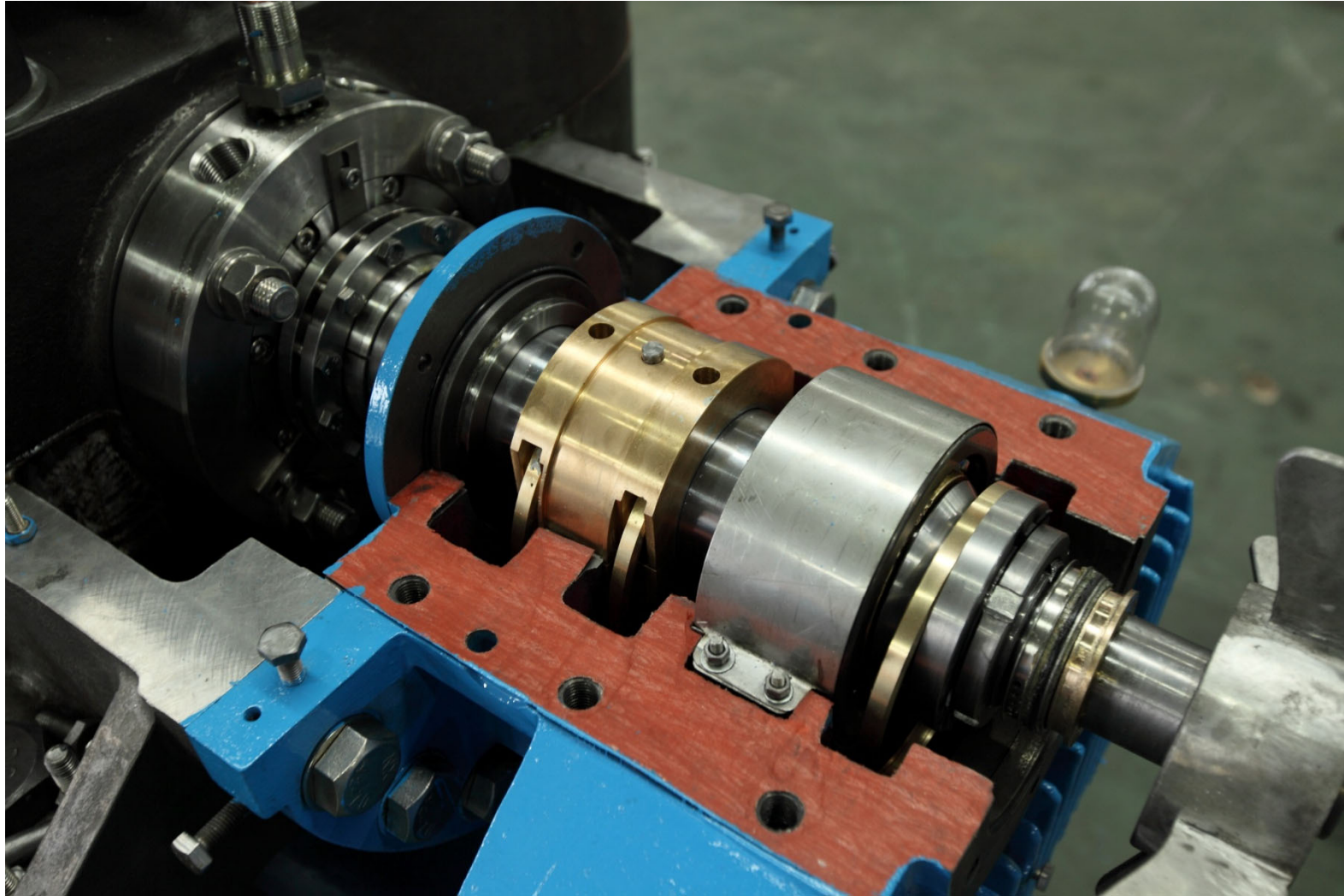


- | | | | | |
|---------------|------------|--------------|----------|------------|
| 201 轴承体密封盖 | 205 甩油环 | 209 圆螺母 | 213 风扇 | 218 油标 |
| 202 前轴承体压盖(内) | 206 接管盖 | 210 前轴承压盖(外) | 214 键 | 215 挡圈 |
| 203 甩油套 | 207 圆柱滚子轴承 | 211 螺旋密封套 | 216 接管 | 219 温度监控探头 |
| 204 前轴承体 | 208 前轴承挡圈 | 212 前风扇罩 | 217 吊环螺钉 | 220 螺栓 |
| | | | | 221 球形调位油杯 |

风冷滚动后轴承体(TFY)部装



- | | | | | |
|----------------|----------------|------------|-------------|-------------|
| 1101 轴承体密封盖 | 1106 接管盖 | 1111 螺旋密封套 | 1116 接管 | 1121 球形调位油杯 |
| 1102 后轴承体压盖(内) | 1107 圆柱滚子轴承 | 1112 后风扇罩 | 1117 吊环螺钉 | 1122 止推轴承 |
| 1103 甩油套 | 1108 后轴承挡圈 | 1113 风扇 | 1118 油标 | 1123 圆柱销 |
| 1104 后轴承体 | 1109 圆螺母 | 1114 键 | 1119 温度监控探头 | |
| 1105 甩油环 | 1110 后轴承体压盖(外) | 1115 挡圈 | 1120 螺栓 | |



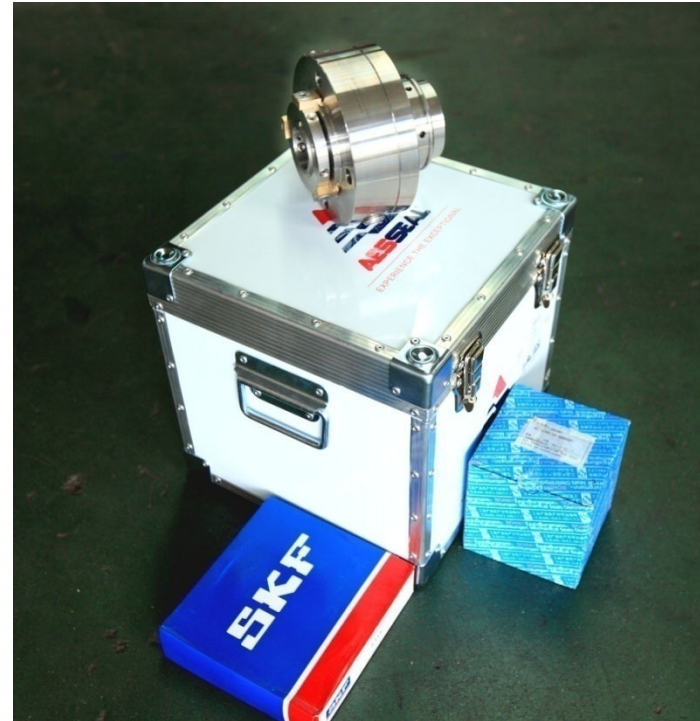
Royal Purple lubricant can reduce the bearing temperature, used for natural cooling and wind cooling bearing, and also can make bearing bush temperature under 70°C, prolong bearing life at least twice.



Perfect sealing design

Mechanical seal is one of the most important part for pump。 The mechanical seal for this series product has special structure and different choices, one is the medium for each user with single rational selection of component and configuration of subsidiary system, such as washing system, rotary liquid separation system. The second is properly choose balance and pressure relief system, floating seal according to outlet pressure.

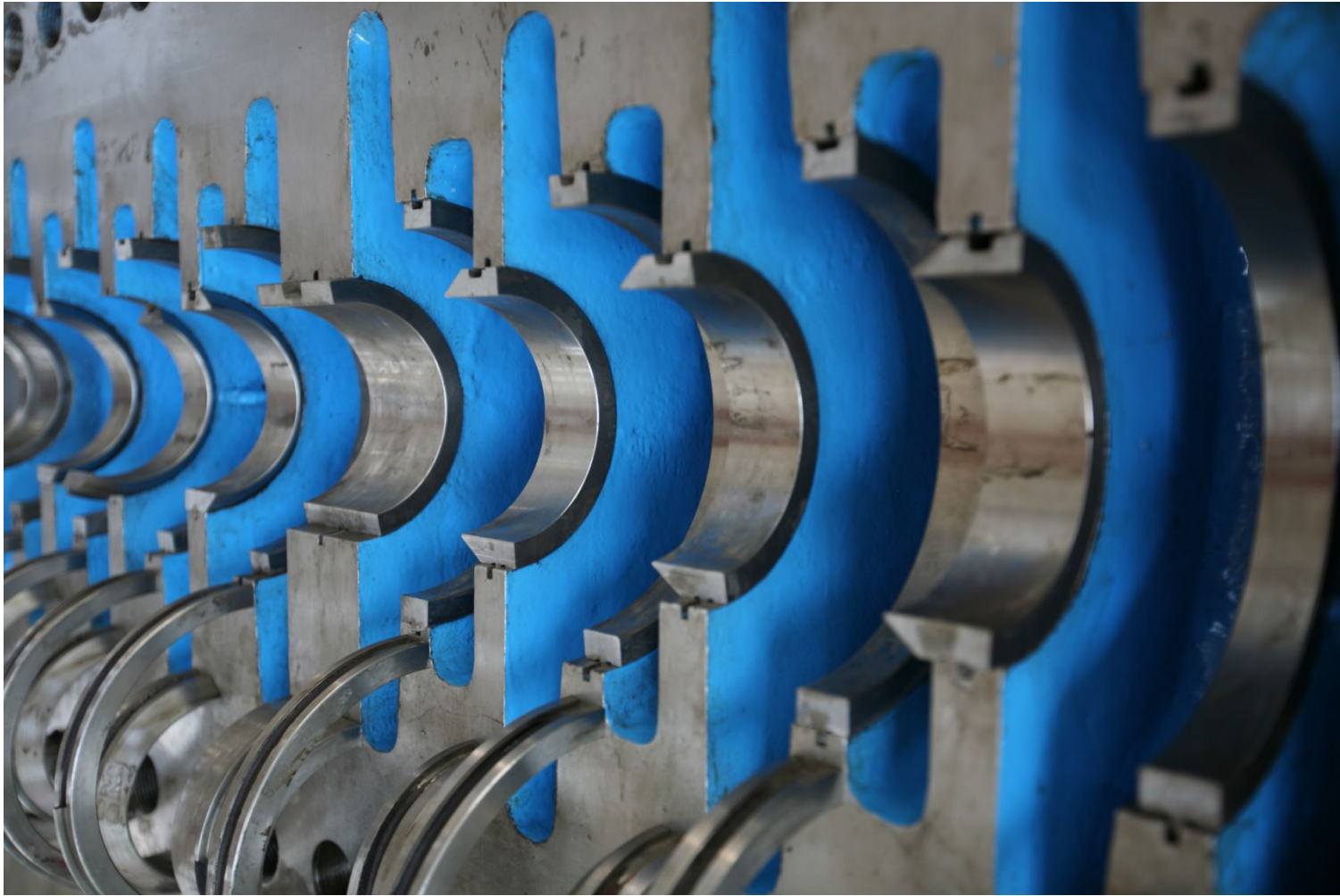
The above advantages can prolong life of mechanical seal. Because the outlet is at the center of pump, mechanical seal bears low pressure and high pressure end bears half of whole head inlet pressure.



Pump surface paint and coating

(1) surface: the standard pump outside surface paint color is RAL5015, no treatment for stainless steel pump surface.

(2) inside surface for flow passage components: there are corrosion protection and wear protection coatings according to pump medium requirement, normally use Interzone 954 white coating; transportation of drinking water will use Interzone 850 white coating; thickness of coating treatment generally to be 0.2mm。 We use rubber coating with thickness about 2mm for transporting medium with lots of sand and particles. The use of coating effectively improve the pump efficiency and life.

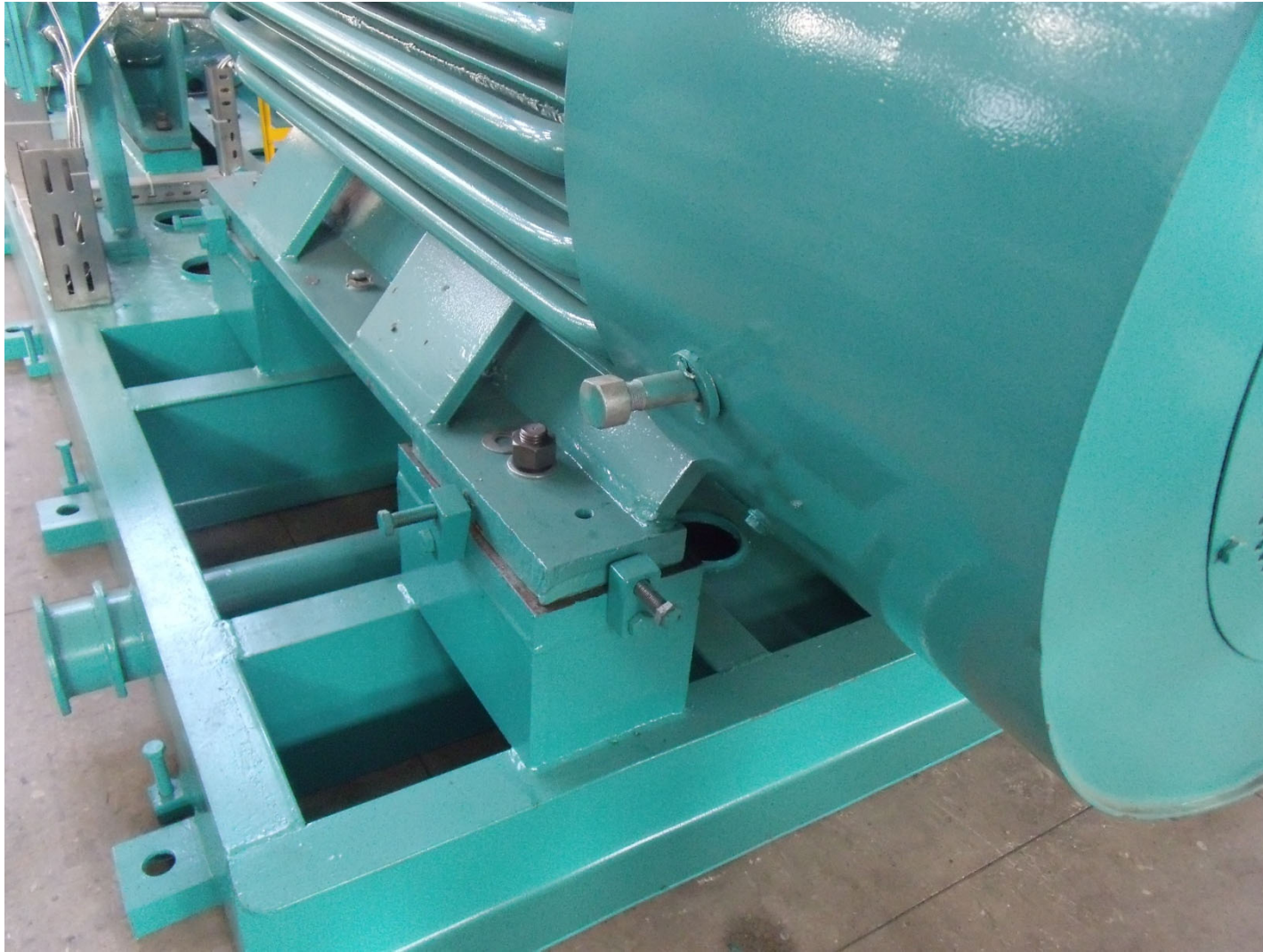


Good overall assembly for pump unit

We think about the overall supply to user at the pump designing stage:

Provide common base with good processing axial force and radial force adjusted equipment also with motor to user, easy to be installed. All base plate is designed according to API 610 standard, baseboard is grouting so that pump unit runs more smoothly and safely.



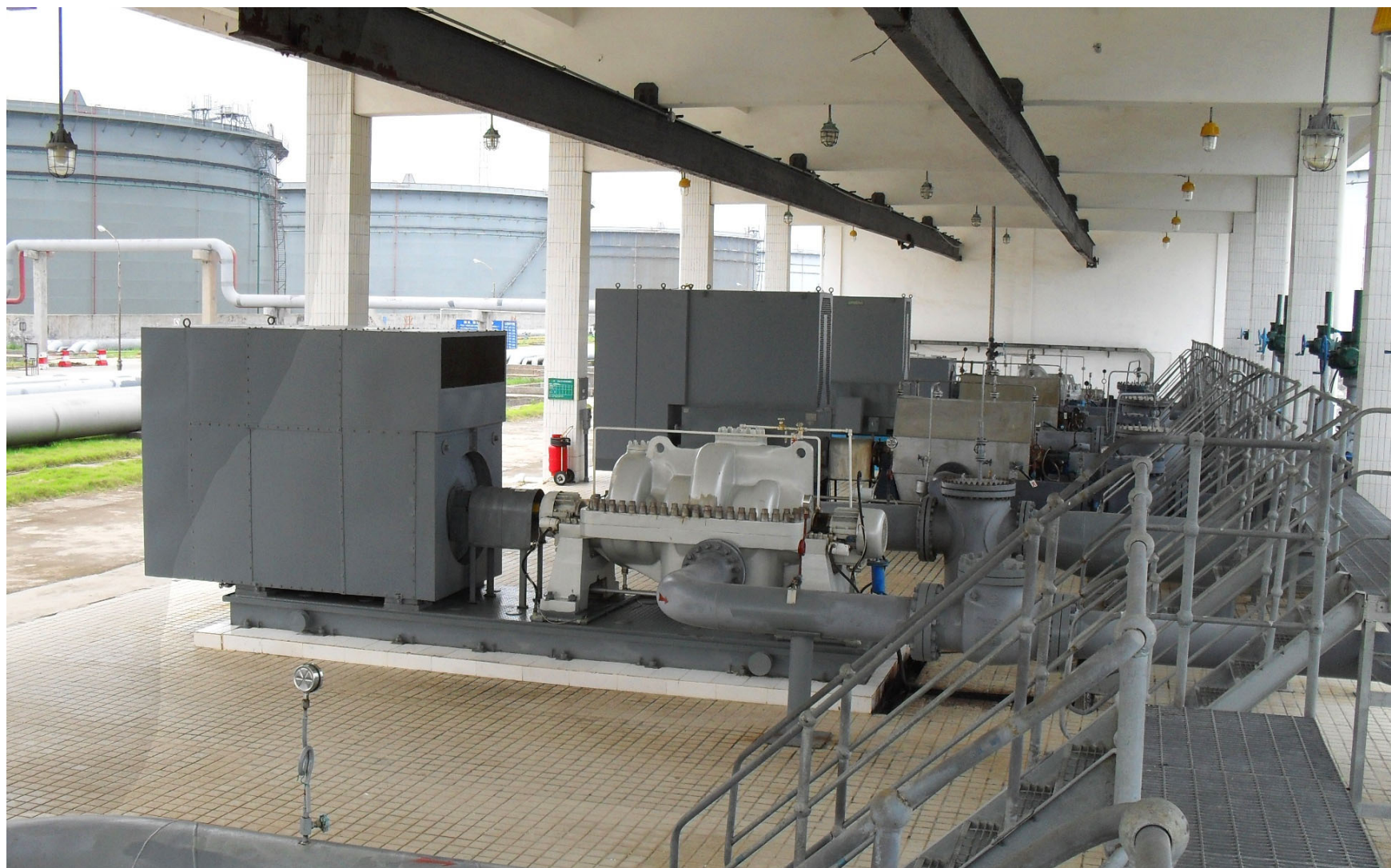


Good versatility and interchangeability

With years of our engineers tireless efforts, we designed ten universal components, such as: bearing housing part(rolling and sliding), sealing part, seal ring part, pump foot, automatic monitoring, etc., enhanced the pump versatility and interchangeability, made the maintenance more convenient and easier.

Pump drive mode:

Pump drive modes are: motor driven(Variable frequency motor drive), diesel driven, turbine driven.





Typical Project

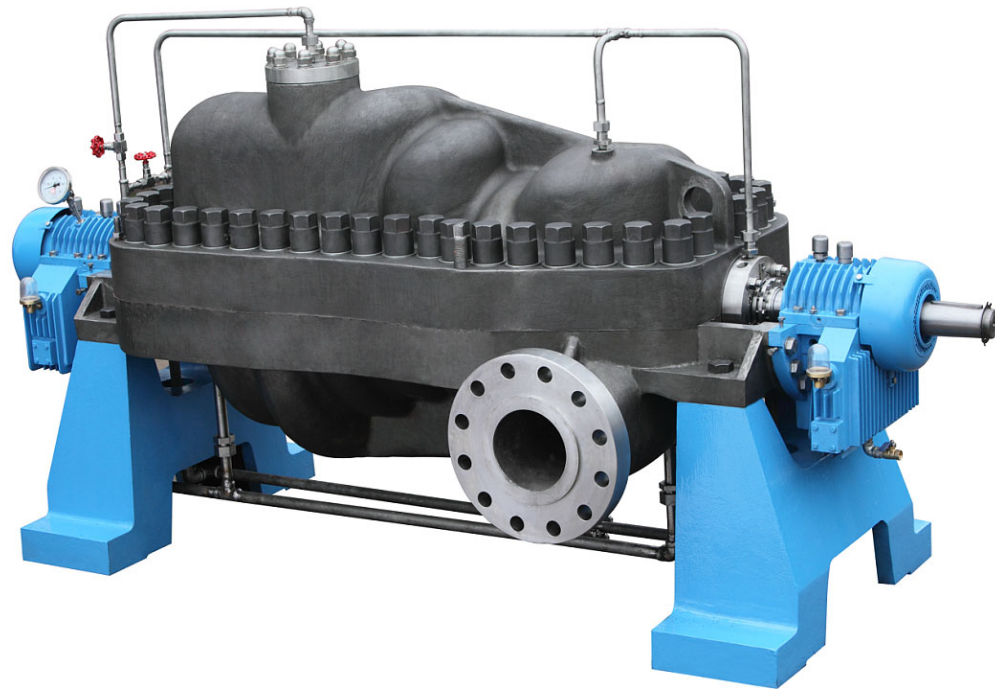
High speed & high head seven stages split casing pump for world's biggest mine group Rio Tinto.

Model: NDS300-110×7

Q = 341 m³/h

H = 1100 m

n = 3500 rpm



The pump design issue and solutions:

1. High speed and high head: it's the highest head pump in China, the pressure-bearing is 15Mpa.
2. Required high materials, pump body material is S.S316, shaft material is imported 17-4PH, the shaft hardness is up to HRC40, can guarantee the shaft strength and hardness meet the requirement of high speed and high pressure.
3. Liquid transferring is complicated: solid particle up to 96mg/l, Chloride up to 75mg/l, Sulphate up to 1820mg/l, pump body material is S.S316, pump body adopts imported ceramic coating ARC855, not only makes surface smooth, reduce resistance caused in liquid flowing, but also with excellent performance of corrosion and wear protection.

Design of shaft component and choice of lubricant method

According to design requirement and previous experience, bearing should choose tilting-pad and mandatory lubrication in such high speed situation. With the technicians' theoretical calculation, we adopted normal bearing design and wind cooling method, used imported Royal Purple lubricant to have lubrication and cooling.

Test showed that the pump efficiency is 75% at rated point, the performance completely meets customer requirement, the bearing temperature and pump vibration is in the specified range of API610.

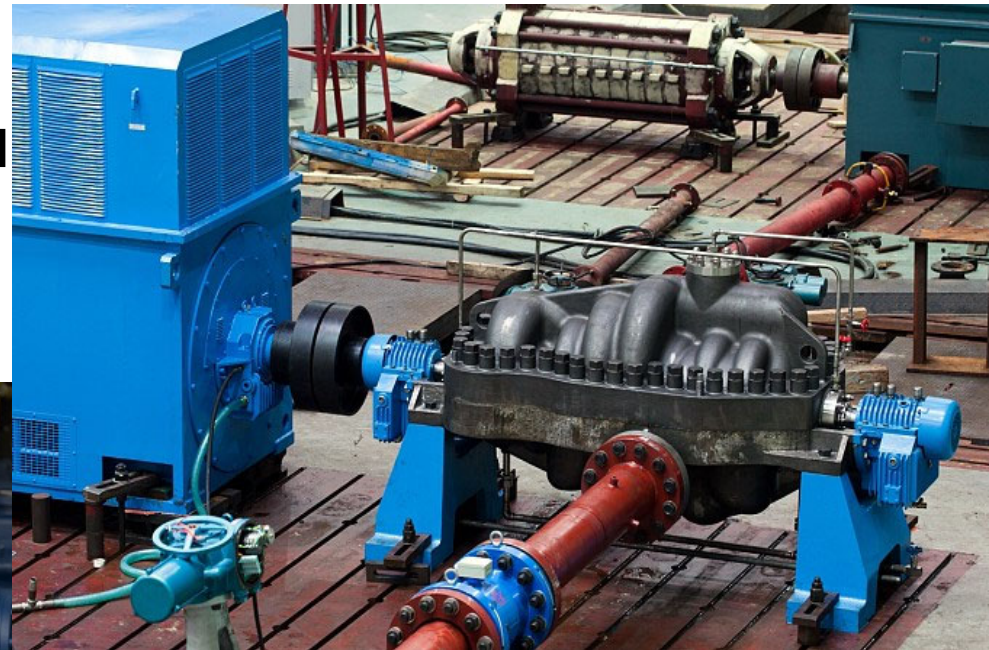
The successful development of this pump shows that multistage split casing pump developed by CNP Changsha reaches the international advanced level, and we forward an important step on road of creating the national brand.

Pump capability test data Speed:3550rpm

No	Q(GPM)	H(ft)	Pa(HP)	Impeller dia	Eff(%)
1	42.48	4585.56	891.98	φ326mm	5.52
2	235.87	4529.49	1000.87		26.98
3	388.04	4466.72	1108.82		39.51
4	635.96	4381.87	1282.84		54.78
5	837.75	4293.25	1456.15		62.43
6	890.37	4266.51	1499.08		64.05
7	1078.85	4159.65	1670.99		67.88
8	1118.32	4133.67	1697.06		68.85
9	1206.13	4072.54	1762.30		70.45
10	1230.54	4052.63	1773.32		71.08
11	1328.98	3955.48	1830.63		72.58
12	1434.55	3844.61	1870.91		74.51
13	1493.20	3734.80	1901.99		74.11
14	1535.05	3661.99	1953.29		72.74
15	1677.08	3448.00	2032.50		71.91
16	1801.35	3190.15	2089.90		69.5

Certified by CNP/TRU20/ TRUFLO

Performance comparison between NDS multistage horizontal split casing pump and D multistage horizontal pump



Performance comparison between NDS multistage horizontal split casing pump and D multistage horizontal pump

plan	Plan I D model	Plan II NDS model
Flow passage structure	Guide vane, no single water-absorbing room	Volute with single water-absorbing room
Axial force balance	Use balance disk to balance axial force, big volume loss and low efficiency.	Impeller uses back-to-back installation to balance axial force, volute casing is 180° inversion or double volute to balance radial force.
efficiency	This pump finish balancing axial force through medium leakage, so its volume loss is big and efficiency is low.	Balance axial force by pump structure, efficiency is higher than D model pump.
Life for bearing	Bearing bears big axial force makes the life short.	Bearing bears the remaining axial force, life is long.

Performance comparison between NDS multistage horizontal split casing pump and D multistage horizontal pump

plan	Plan I D model	Plan II NDS model
Inspection and installation	Outlet turns to upper caused inconvenience to install, piping is not easy to arrange, and not beautiful. Need to disassemble inlet and outlet pipe and pump base, which is very difficult.	Outlet and inlet pipeline is beneath , convenient to install, no need to disassemble outlet and inlet pipeline and pump base.
Pump situation	This product is the old one designed in the sixties and seventies.	Imported foreign technology designed the new product in the nineties, conform to international standard and API610.
Operation status	There is no automatic control design for pump, it uses manual operation and supervision to guarantee equipment safety.	Easy for operation, pump itself has the bearing temperature monitor. vibration monitor and pump leakage monitor these automatic monitor alarm can make it to be remote control.



The Main International Exports

1. Exported to USA, used for drainage of world's most largest mine company(Rio Tinto) NDS300-110×7, Speed is 3550rpm, Head is 1100m, it is the highest speed and head pump in China.



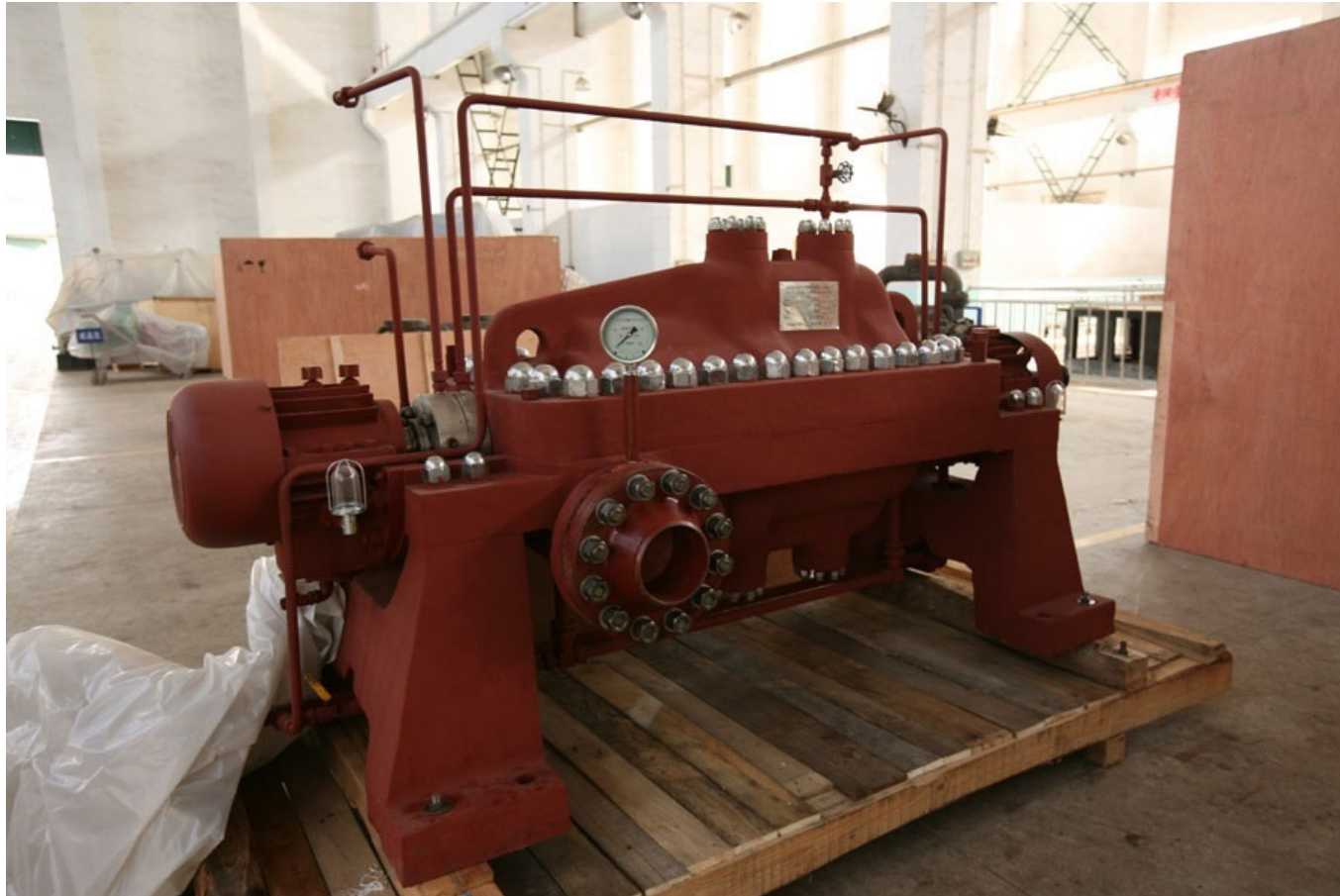
2. Water desalination pump, NDS540-140×5,
Q=540m³/h, H=600m, duplex stainless steel, used for
water desalination project with daily output 13,000 T.



3. High head pump exported to Iran, NDS-102.5×10, is the second high head pump of our company, also one of the most stages pumps, and is the most domestic produced split casing pump, filled the blank in domestic field.



4. Boiler pump exported to Iran NDS300-85×4,
material is 2Cr13, belong to API610 C-6 material;
temperature is 150°C



5. Exported to South Africa waterworks factory NS1000-165×2,
I-2 material in API610



CNP---The Heart of Life



A Reliable National Brand