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山东章鼓 股票代码：002598



空气悬浮轴承 高速离心鼓风机

FOIL BEARING HIGH-SPEED CENTRIFUGAL BLOWER

更安静 | 更节能 | 更高效 | 更智能

QUIETER

MORE ENERGY SAVING

MORE EFFICIENT

MORE INTELLIGENT

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一流的产品品质

Super-quality product

永不停止创新

Never-ending innovation

为社会和用户创造价值

Create value for society and clients

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COMPANY PROFILE

公司简介



山东省章丘鼓风机股份有限公司始建于 1968 年，具有五十多年风机设计、生产、制造的技术和经验，先后建立了两个中日合资企业，并在美国设立了分公司，成为当时国内风机行业第一家在国外建立分公司的企业。公司制定了“拉长主业，上新创新，合资合作，发展大章鼓”的总体发展战略，提出了“做，就做到最好”的工作理念，经过不断发展，目前已成为集罗茨鼓风机、离心鼓风机、工业泵、通风机、工业水处理工程及设备、气力输送成套系统、电气设备、MVR 蒸发浓缩与结晶技术和成套系统的设计、生产、销售于一体的现代化机械加工规模企业。工业园区占地面积 43 万平方米，为企业跨越式发展和与世界各国企业的合资合作提供了广阔的发展空间，公司于 2011 年 7 月 7 日成功在深交所挂牌上市，股票代码：002598，成为公司发展史上又一新的里程碑。

随着国家产业政策及供给侧结构性改革的深入推进，结合自身优势和市场机遇，公司实行相关多元化的经营战略，积极布局了智能制造、环保水处理、新材料开发利用三大产业平台，通过持续加大研发投入，加强外部资源整合，三大产业平台均已实现了较快增长。



Shandong Zhangqiu Blower Co., Ltd. was founded in 1968, with more than 50 years of blower design, production, manufacturing technology and experience, has established two Sino-Japanese joint ventures, and set up a branch in the United States, becoming the first domestic blower industry to establish branches abroad. Overall developing strategy: "Develop main business, pioneer new fields and innovate, cooperate to be a great company". Working concept: "Do the best", after continuous development, it has become a modern mechanical processing scale enterprise integrating the design, production and sales of roots blowers, centrifugal blowers, industrial pumps, ventilators, industrial water treatment projects and equipment, pneumatic conveying systems, electrical equipment, MVR evaporation concentration and crystallization technology and complete systems. The industrial park covers an area of 430,000 square meters, providing a broad development space for enterprises to leapfrog development and joint venture cooperation with enterprises from all over the world, the company was successfully listed on the Shenzhen Stock Exchange on July 7, 2011, stock code: 002598. It has become another new milestone in the company's development history.

With the in-depth promotion of national industrial policy and supply-side structural reform, combined with own advantages and market opportunities, our company implements relevant diversified business strategies and actively lays out three major industrial platforms: intelligent manufacturing, environmentally friendly water treatment and new material development and application. By continuously increasing R&D investment and strengthening the integration of external resources, the three major industrial platforms have achieved rapid growth.

QUALIFIED CERTIFICATES

荣誉历程

汗水成就梦想 荣誉见证辉煌

Dreams will be realized from sweat, Certificates of honor witness the brilliance.



MAIN FACILITY

制造&装备基地

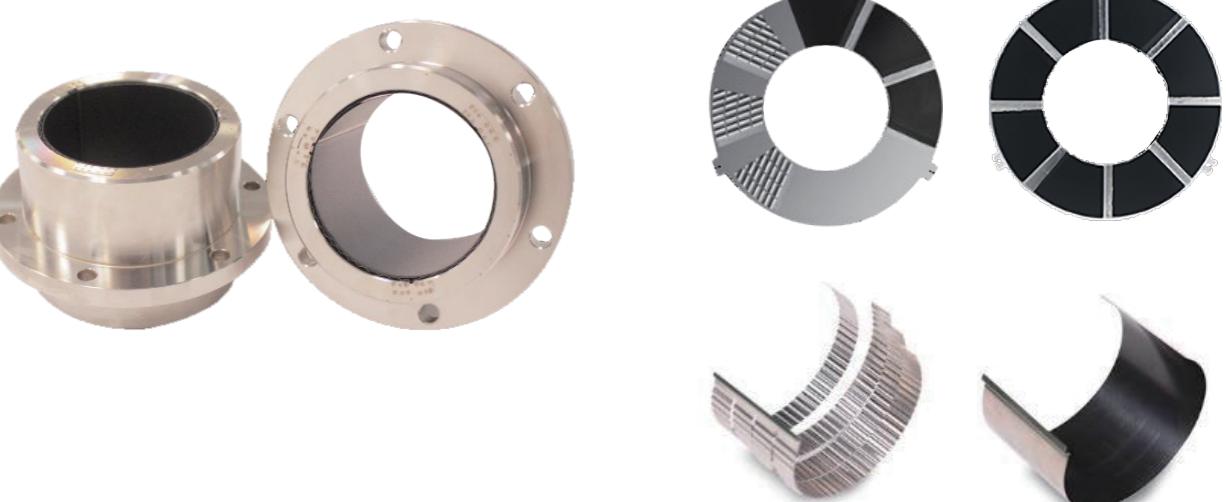
一流的精密制造及装配测试基地
First-class lean manufacturing and testing base

山东省章丘鼓风机股份有限公司建有实验室、研发大楼、加工车间等，拥有国际先进、国内领先的高精度加工设备。
Shandong Zhangqiu Blower Co., Ltd. has built laboratories, R&D buildings, processing workshops, etc., with internationally advanced and China leading high-precision processing equipment.



FOIL BEARING TECHNOLOGY

空气悬浮轴承技术



空气悬浮轴承在启动前转子和轴承之间有物理性的接触，启动时转子和轴承相对运动产生空气压力，转子旋转的时候，转子周围空气的速度能转变成压力能，在转子达到一定的回转速度时空气压力使得转子浮起，并起到润滑作用。空气悬浮轴承技术有效解决了传统的机械支撑传动系统效率低、寿命短、需要定期维护和润滑等问题。

Foil bearing has physical contact between the rotor and the bearing before starting, the relative movement of the rotor and the bearing generates air pressure when starting, when the rotor rotates, the speed of the air around the rotor can be converted into pressure energy, and the air pressure makes the rotor float when the rotor reaches a certain rotation speed and plays a lubricating role. Foil bearing technology effectively solves the problems of low efficiency, short life, and the need for regular maintenance and lubrication of the traditional mechanical support transmission system.

FOIL BEARING HIGH-SPEED CENTRIFUGAL BLOWERS

空气悬浮轴承高速离心鼓风机



空气悬浮轴承高速离心鼓风机是一种高效节能、绿色环保的产品，其机械结构简单、运动部件少、控制鲁棒性好、维护方便。采用车规级无油高可靠动压空气悬浮轴承，运行过程中无摩擦、机械损失小。采用先进的永磁同步电机技术，转速最高可达 95000rpm，仅需 5s 可满转速运行。电机效率高达 97%，达到双一级能效标准。

空气悬浮轴承高速离心鼓风机采用的宽工况高效三元流叶轮，突破了低比转速设计关键技术，效率高。主机的一体化特殊设计，使噪音小于 75dB (A)、震动小于 12μm。其采用无级调节，风机可快速启停，连续启停次数超过 20 万次。

Foil Bearing High-speed Centrifugal Blowers is a high-efficiency, energy-saving, green and environmentally friendly product, its mechanical structure is simple, the moving parts are few, the control robustness is good, and the maintenance is convenient. It adopts automotive-grade oil-free and high-reliability dynamic pressure foil bearing, which has no friction and small mechanical loss during operation. Using advanced permanent magnet synchronous motor technology, the maximum speed can reach 95000rpm, and it only takes 5s to run at full speed. The motor efficiency is as high as 97%, which meets the two-stage energy efficiency standard.

The high-efficiency ternary flow impeller used in the Foil Bearing High-speed Centrifugal Blowers breaks through the key technology of low specific speed design and has high efficiency. The integrated special design of the main engine makes the noise less than 75dB(A) and the vibration less than 12μm. It adopts stepless adjustment, and the blower can start and stop quickly, and the number of continuous starts and stops exceeds 200,000 times.

PERFORMANCE COMPARISON

性能比较

性能比较		罗茨鼓风机	多级离心鼓风机	单级离心鼓风机	空气悬浮鼓风机
轴承	轴承	滚珠轴承	滚珠轴承	可倾瓦轴承	空气箔片轴承
	技术来源	国产	国产	进口 / 国产	国产
	寿命	1-2 年	2-3 年	3-5 年	启停寿命 20 万次
叶轮	机械损失	轴承能耗 2%	轴承能耗 2%	滑动摩擦, 轴承能耗 3%	运行时无摩擦
	形式	铸造二叶或三叶片轮	焊接 / 铸造碳钢或铸铝叶轮	铝合金三元流叶轮	铝合金三元流叶轮
	寿命	5-8 年	10 年	15 年	20 年
高速电机	空气动力学寿命	低	高	较高	高
	电动机形式	低速异步电动机	低速异步电动机	异步交流电机	高速永磁同步电机
	传动形式	皮带或联轴器	联轴器	联轴器	直连
冷却	电机效率	86%	87%	87%	97%
	能否控制转速	不能	不能	能	精准调速
	类型	无调速系统	无调速系统	变频调节	智能化直流调速系统
安装	冷却方式	大量循环水冷却	风冷或水冷	外接水冷却塔	闭式水冷或空冷
	基础	需要	需要	需要	不需要
	润滑油	每班检查, 定期添加, 费用中等	每班检查, 定期添加, 费用中等	每班检查, 定期添加, 费用较高	无需润滑油
维护	易损件	轴承、齿轮	轴承、密封	轴承、齿轮、润滑油泵	过滤网
	费用	中	中	高	低
	运行费用	最高	高	中	低
	整机效率	51%	63%	68%	75%
	整机价格	低	较低	高	低
	售后维保	周期短, 费用低, 故障率高	周期短, 费用较高	维保周期长, 费用很高	维保及时, 自主核心部件, 维护周期短, 费用低

FOIL BEARING HIGH-SPEED CENTRIFUGAL BLOWERS SERIE SELECTION

空气悬浮轴承高速离心鼓风机系列选型

测试条件: 标准大气压, 湿度65%, 气温20°C, 空气密度1.20kg/m³(偏差: ±5%) Air Flow (m³/min): 1atm, 20°C, 65%RH, density=1.2kg/m³, Tolerance=±5%															
型号	出口压力(bar)									功率 kW	重量 kg	出口口径 国际 PN1.0 MPa	尺寸(mm)		
	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2				长	宽	高
	进口流量(m³/min)													进口流量(m³/min)	
ZGK15	24	17	14	13	10	/	/	/	/	15	300	DN150	1300	800	1230
ZGK22	36	29	24	21	18	16	/	/	/	22	310				
ZGK30	49	39	33	28	25	22	/	/	/	30	330				
ZGK37	62	48	41	35	31	28	25	22	19	37	350				
ZGK45	78	62	51	45	39	34	32	28	23	45	550	DN200	1500	1100	1580
ZGK55	94	76	60	54	47	40	38	34	28	55	630				
ZGK75	124	95	76	69	63	55	49	45	37	75	650				
ZGK90	157	120	95	86	79	69	62	56	46	90	830				
ZGK110	190	150	115	104	93	85	72	67	57	110	880	DN300	1500	1100	1580
ZGK132	221	170	136	122	108	99	86	79	67	132	930				
ZGK150	252	190	156	140	122	112	99	90	77	150	1450				
ZGK185	314	230	190	171	155	136	124	112	91	185	1720				
ZGK225	380	290	228	208	183	164	145	132	111	225	2140	DN400	2300	1700	2140
ZGK300	504	378	312	276	243	220	198	181	150	300	2320				

当鼓风机的使用条件与上表不符时, 需进行性能换算, 我公司可根据用户要求进行非标设计, 以满足用户各种工况的具体需要。空气悬浮风机冷却方式有自循环水冷和强制风冷两种形式, 如对冷却方式有特殊要求, 需提前说明。

When the atmospheric conditions and medium are varied, the relative performance conversion calculation will be different, we can re-designed in accordance with the requirement of users to adapt to different working condition. There are two cooling methods for air suspension centrifugal blower: self-circulating water cooling and forced air cooling. If you have special requirements on the cooling mode, please tell us in advance.



AIR FOIL BEARING AERATION TURBO BLOWER

增氧风机

型号	功率 (kW)	出口压力 (kPa)			出口口径 (PN10)	重量 (kg)	外形尺寸 (mm)
		15	25	35			
		进口流量(m³/min)					
ZGZY5.5	5.5	12	8	5	DN150	100	780X780X950
ZGZY7.5	7.5	18	15	10			
ZGZY11	11	26	20	14			
ZGZY15	15	37	29	21			
ZGZY18.5	18.5	45	35	26			
ZGZY22	22	53	41	31			
ZGZY30	30	74	57	42	DN200	170	880X880X1200
ZGZY37	37	92	74	54			
ZGZY45	45	112	85	64			
ZGZY55	55	135	103	78			

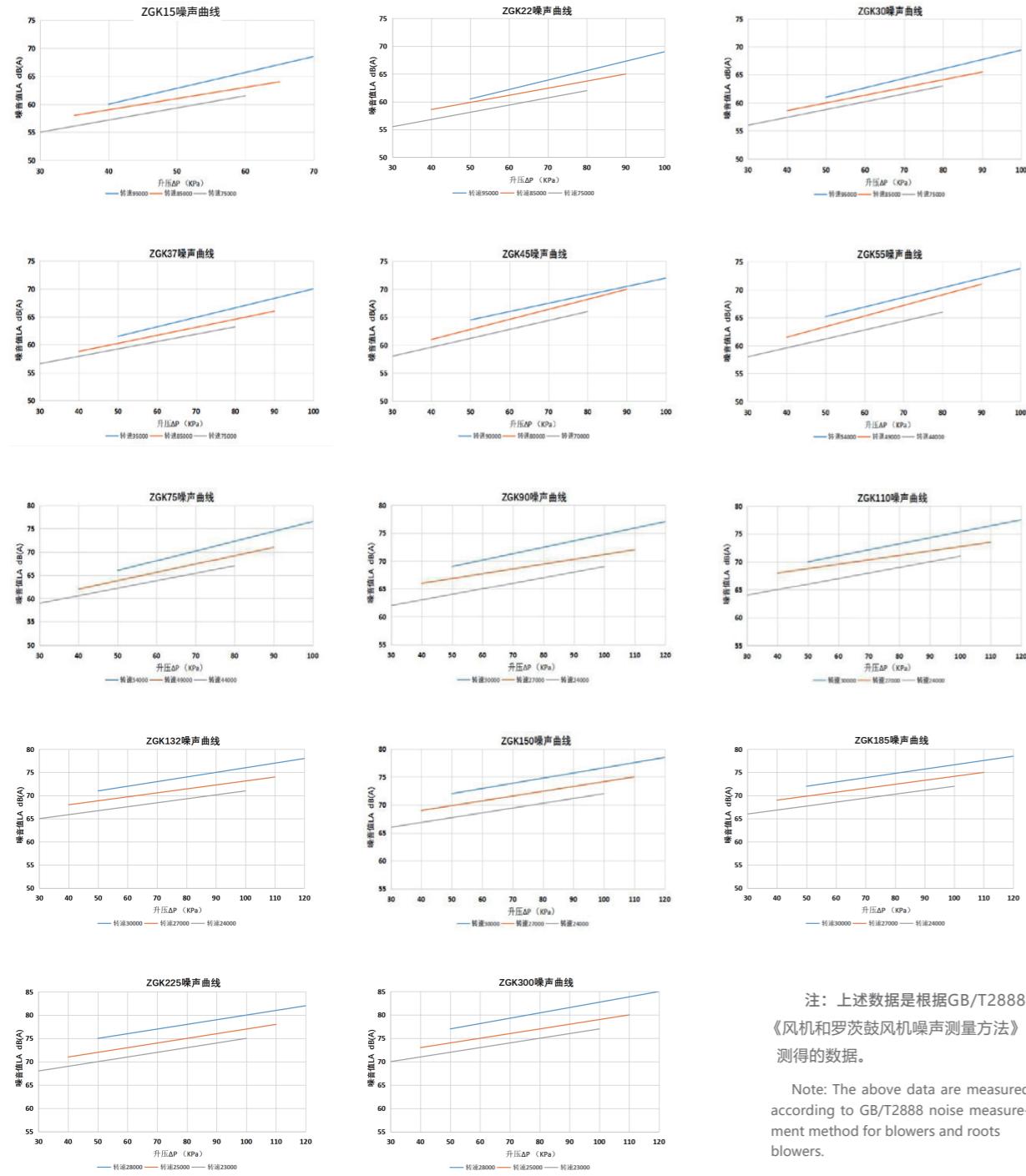
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When the atmospheric conditions and medium are varied, the relative performance conversion calculation will be different, we can re-designed in accordance with the requirement of users to adapt to different working condition.



FOIL BEARING HIGH-SPEED CENTRIFUGAL BLOWERS NOISE LEVEL

空气悬浮轴承高速离心鼓风机噪声值



注：上述数据是根据GB/T2888《风机和罗茨鼓风机噪声测量方法》测得的数据。

Note: The above data are measured according to GB/T2888 noise measurement method for blowers and roots blowers.

CORE TECHNOLOGY

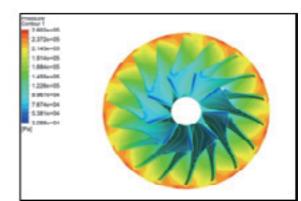
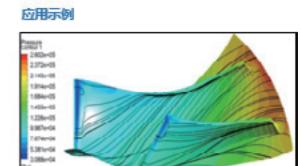
核心技术

宽工况高性能空气动力学设计方法

A high-performance aerodynamic design approach for wide working conditions

研发团队通过研究叶轮及蜗壳流动对效率和工作稳定性的影响规律，提出了改善主机性能的流动控制方法和气动优化设计方法，大大提高了主机的效率。

By studying the influence of impeller and volute flow on efficiency and working stability, the R&D team proposed a flow control method and a pneumatic optimization design method to improve the performance of the main engine, which greatly improved the efficiency of the main engine.

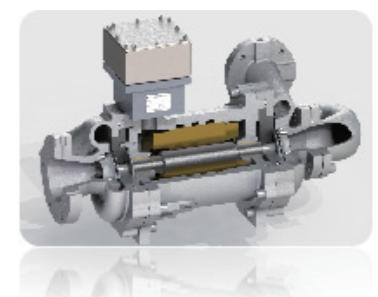


高功率密度永磁同步电机技术

High power density permanent magnet synchronous motor technology

研发团队基于电 - 磁 - 机 - 热多物理场耦合设计技术，自主研发永磁同步电机 (PMSM)；通过研究与控制策略协同的高速永磁电机电磁优化设计技术，解决了转子发热量大、转矩脉动高、电机噪声大的问题，使其具有高可靠性、高耐温性、低风阻损失的优势；攻克了转子结构完整性设计与工艺，开发出高功率密度、低成本、高效率的永磁同步电机。

Based on the thermal multiphysics coupling design technology of electromagnetic machine, the R&D team independently developed a permanent magnet synchronous motor (PMSM); Through the electromagnetic optimization design technology of high-speed permanent magnet motor coordinated with the control strategy, the problems of large rotor heat, high torque ripple and large motor noise are solved, so that it has the advantages of high reliability, high temperature resistance and low wind resistance loss. The design and process of rotor structural integrity were overcome, and a permanent magnet synchronous motor with high power density, low cost and high efficiency was developed.



车规级无油高可靠空气悬浮轴承技术

Automotive grade oil-free and highly reliable Foil bearing technology

组建了“车规级无油高效空气悬浮轴承”联合研发团队，研制出了刚度合适、高阻尼、高抗振性、高可靠性和低损耗的箔片动压空气悬浮轴承，满足车用标准随机振动指标和冲击振动标准。

A joint R&D team of "automotive-grade oil-free and high-efficiency foil bearings" has been set up, and foil dynamic pressure foil bearings with suitable rigidity, high damping, high vibration resistance, high reliability and low loss have been developed to meet the random vibration indicators and shock vibration standards of automotive standards.

高速转子动力学设计方法

High-speed rotordynamic design method

高速转子动力学设计方法是保证转子在高转速下稳定运行的关键技术，与转子结构、轴承刚度等密切关联，同时与电机设计、空气动力学设计、轴承设计高度耦合。

The high-speed rotordynamic design method is a key technology to ensure the stable operation of the rotor at high speed, which is closely related to the rotor structure and bearing stiffness, and is highly coupled with the motor design, aerodynamic design and bearing design.

热管理设计技术

Thermal management design techniques

研发团队将航空发动机二次空气系统热管理设计和优化技术进行了跨界应用，形成了独特优势的设计技术和产品。

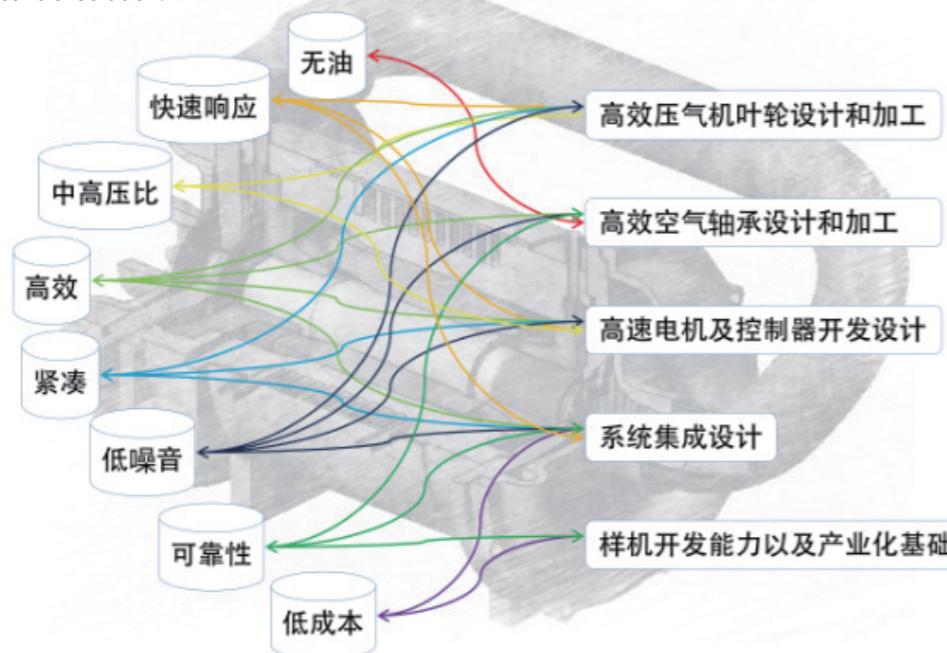
The R&D team has applied the thermal management design and optimization technology of the secondary air system of aero-engines across borders, forming unique design technology and products.

高效驱动控制技术

Efficient drive control technology

研发团队开发了全新高效变流拓扑、高密度电 - 磁 - 机 - 热多物理场集成和电磁兼容技术，解决了开关损耗大、效率低、电磁兼容性能差的问题；开发了高速永磁矢量控制与解耦、延迟补偿技术，提升系统效率与可靠性，解决了高速电机转矩平稳性差的问题，形成先进的高速永磁电机控制解决方案。

The R&D team has developed a new high-efficiency conversion topology, thermal multiphysics integration and electromagnetic compatibility technology of high-density electromagnetic machine, which solves the problems of large switching loss, low efficiency and poor electromagnetic compatibility performance. The high-speed permanent magnet vector control, decoupling and delay compensation technology has been developed to improve the efficiency and reliability of the system, solve the problem of poor torque stability of high-speed motor, and form an advanced high-speed permanent magnet motor control solution.



APPLICATION RANGE 应用范围

适用于污水处理业、石油化工、食品药品、冶金纺织、水泥建材、皮革印染业等。

It is suitable for sewage treatment industry, petrochemical industry, food and drug industry, textile industry, metallurgy industry, cement and construction materials industry, printing and dyeing industry and other industries.



MARKET DISTRIBUTION 市场分布

我们在全国各地共设42个办事处，目前除台湾省外全国33个省份行政区域均有完善的销售和服务网络。能够及时便捷的为您提供售前、售中和售后服务，从中了解您的需求，在满足客户定制化需求同时，不断完善服务及质量体系。

We have 42 offices throughout the country, in addition to Taiwan Province, 33 provinces in the country's administrative regions have a sound sales and service network. We can provide you with pre-sale, in-sale and after-sales service in a timely and convenient manner, understand your needs, and constantly improve the service and quality system while meeting the customized needs of customers.