



Stock Code : 831689

Wei Hai CreditFan Ventilator Co., Ltd

威海克莱特菲尔风机股份有限公司



2019

Make a step forward every day, do better tomorrow
每天前进一步 明天做得更好



— 2 —

- 1 Company introduction
- 2 Main Business Segment
- 3 R&D capability
- 4 Quality Assurance
- 5 Production Capability
- 6 After sale service
- 7 Worldwide Sale Performance



1. Company development history

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- ◆ Founder Mr Sheng caiLiang - Senior Engineer of Ministry of Aviation Industry, Chief editor on Vibration aging standard when worked on Ministry of Aviation Industry. Proceed the vibration aging treatment on reactor internal for China 1st nuclear power station
- ◆ April 1993 – 56 years old Mr Sheng has founded the company in Jinan, the 1st client is Carrier Air-conditioning, to apply air foiled Distortion type axial flow fan
- ◆ October 1995, company move to current location Weihai and renamed Weihai CreditFan ventilator
- ◆ December 2012, Shares transformation
- ◆ Jan 2015, company become a listed company and stock code: 831689



Company Introduction

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- Stock Code : 831689
- Occupied Area: 58,849 m2
- Covered Area: 40,000 m2
- Employee: 360
- Register Capital: 60.40 Million RMB Share holder include : Credit Group, China Nuclear Industry Cooperation, CGNPC, China Railway Capital, SPEC0III, HongTa Venture
- Sep 2001, Founded WeiHai CreditFan
- Dec 2011, Complete shareholding reform
- Jan 2015, listing on stock market



南厂区工业园（兴山路111号）



北厂区工业园（山海路80号）



Corporate Culture

“克莱特”为英文“CREDIT”的译音取“信誉”之意；

Chinese “克莱特” in English means “CREDIT”

- ◎ C customer focus, 以客户体验为中心, 时刻将客户需求放在第一位；
- ◎ R reliance, 诚信, 信任, 信赖, 值得托付, 有责任心；
- ◎ E environment friendly, 环境友好型, 绿色可持续发展；
- ◎ D development, 个人职业生涯和企业经济效益同步发展；
- ◎ I innovation, 创新创造；
- ◎ T team work, 团队合作



Employee Composition

Total employee: 360

Administration : 62

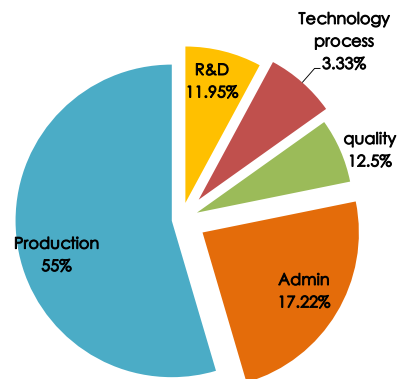
R&D: 43

Technology process: 12

Quality: 30

After-sale Service: 15

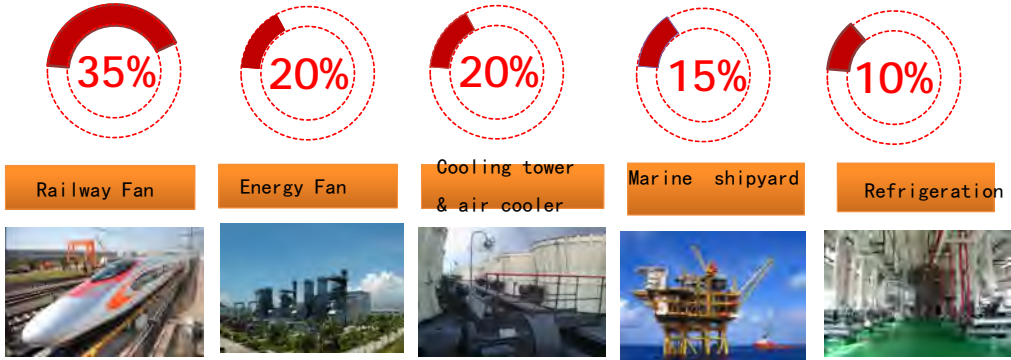
Production: 198





2、 Main Business Segment

Service high-end equipment to enhance core value



2、 Main Business Segment

Application field	Product Range	Typical client
Railway	High speed train, motor train unit, diesel locomotive, metro fan	CRCC, GET, Alstom, Bombardier, EMD
Marine engineering equipment and high-tech ships	Drilling platform, marine fan, shipyard fan	CSIC, CNOOC, CIMC,
Cooling Tower & Air cooler	Cooling tower fan, evaporative fan, air cooler for petrol chemical, power plant air condenser fan	SPX, Kelvion, BAC, YuanHeng, Seagull, Ebara, ShangHai Electric SPX, ICT
Energy	Nuclear power fan, gas turbine, distributed energy, wind power fan, Extra-high pressure fan	GE, Cummins, Siemens, Kelvion
Refrigeration	Refrigeration fan	Moon Group, Ice Berger



Business Segment - Advanced Railway transit equipment

- ◆ 46% of company sale volume is from Railway transit
我司46%市场份额
- ◆ Have 70% of China market volume on railway traction field ;
70%国内机车牵引市场
- ◆ We have followed all R&D development on the railway market
我们完成所有机车市场要求的市场研发机型
- ◆ GET North American locomotive market will increase to 700 unit/year
GET北美市场需量逐渐恢复至每年700台机车量
- ◆ EMD North American market 6000 unit locomotive will be maintenance period, we have cooperated since late 2017.
EMD北美市场6000台机车进入维修换代阶段



IRIS Certification



EN15085 welding certification



CRCC 认证



ARR US certified



Railway Fans

动车组 Electric multiple units	内燃机车 Diesel locomotive	电力机车 Electric locomotive	地铁 Metro
牵引电机冷却风机 Traction motor cooling fan 蓄电池箱冷却风机 Battery charger cooling fan 牵引电机冷却风机 Traction motor cooling fan 变流器冷却风机 Converter cooling fan 牵引变流器冷却风机 Traction converter cooling fan 变流器冷却单元 Converter cooling module 牵引变流器冷却风机 Traction converter cooling fan	牵引电机冷却风机 Traction motor cooling fan 电阻制动冷却风扇 Dynamic brake cooling fan 主发辅助室通风风机 ALTAUX CAB blower with exhaustor 电阻制动冷却风扇 Dynamic brake cooling fan 排尘通风风机 Exhauster blower 散热器冷却风扇 Radiator cooling fan 动力室通风风机 Engine room ventilator 电阻制动冷却风扇 Dynamic brake cooling fan	变流器冷却风机 Converter cooling fan 车体通风风机 Electrical room cooling fan 变流器冷却风机 Converter cooling fan 车体通风风机 Electrical room cooling fan 变流器和辅助逆变器冷却风机 Converter & AFC cooling fan 变流器冷却风机 Converter cooling fan <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 客车 Passenger CAR </div>	变流器冷却风机 Converter cooling fan 外部冷却风机 External cooling fan 变流器冷却风机 Converter cooling fan



Advanced Railway transit equipment

High-end equipment manufacturing field	Product on railway field
Advanced Railway transit equipment	High-speed train: Traction motor fan cooling fan/transformer/converter cooling unit
	Inter Urban railway 200KM: Traction motor fan/converter cooling fan
	Metro: transformer cooling fan/brake cooling fan
	Diesel Locomotive: Traction motor blower/main fan/big fan cooling
	Maintenance: Traction transformer cooling fan motor unit
	Electric Locomotive



Product introduction —— Railway Product

中车集团配套项目

- 中车青岛四方机车车辆股份有限公司**
 - CFR45A高寒防风沙动车组牵引电机风冷项目
 - CFR42H动车组250-350公里动车组牵引电机通风系统国产化项目
 - CFR42H动车组300-350公里动车组牵引电机通风系统国产化项目
 - 时速350公里中国标准动车组牵引电机通风系统项目
- 中车戚墅堰机车有限公司**
 - HXN5内燃机车通风系统项目
 - HXN5B调车内燃机车通风系统项目
 - 出口内燃机车通风系统项目（泰国、意大利、印度、俄罗斯、尼日利亚等）
- 株洲中车时代电气股份有限公司**
 - 下一代地铁牵引逆变器冷却系统项目
 - CFR42系列动车组牵引电机通风系统国产化项目
 - 时速350公里中国标准动车组牵引电机通风系统项目
 - 出口电力机车牵引逆变器冷却系统（南非、马来西亚等）
 - 出口城市轨道交通牵引逆变器通风系统（阿根廷等）
- 中车资阳机车有限公司**
 - 内燃机车散热器风冷项目
 - 内燃机车牵引电机通风系统项目（意大利、印度）
- 成都中车电机有限公司**
 - HXN5B调车内燃机车牵引电机通风系统项目
- 株洲中车电机科技有限公司**
 - 时速350公里中国标准动车组牵引电机通风系统项目
- 中车四方车辆有限公司**
 - 伊拉瓦特动车组牵引电机通风系统项目

国外轨道交通项目

GE Transportation systems

- 丹佛机车牵引电机通风系统项目

ALSTOM Transportation Inc.

- AMSTERDAM地铁风冷项目
- 芬兰AICH地铁风冷项目
- CUAIB地铁风冷项目
- MFM10牵引逆变器冷却系统项目

TELEMA S.P.A.

- F4274项目
- CPTM列车牵引逆变器冷却系统项目
- TGV列车牵引逆变器冷却系统项目

地铁项目

上海阿尔斯通交通电气有限公司

- 牵引逆变器冷却系统项目

上海吉泰电器有限公司

- 列车牵引逆变器冷却系统项目

江苏经纬轨道交通设备有限公司

- 牵引逆变器冷却系统项目

新誉庞巴迪牵引系统有限公司

- 牵引逆变器冷却系统项目

株洲南车奇宏散热技术有限公司

- 列车牵引逆变器冷却系统项目



Business Segment - Cooling Tower & Air cooler

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40% of China cooling tower market, in 2016, SPECO invested in company we started to get into Air Condenser market.



Business Segment - Cooling Tower & Air cooler

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Since 2003, we have started to cooperated with Kelvion (GEA)
Diameter is from 1524mm~4500mm 。 To provide fan include casing,
impeller, motor, protection net, drive belting system



西气东输空冷风机



惠州炼化空冷风机



Cooling Tower & Air cooler fan impeller

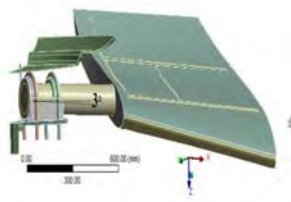
Application: Cooling tower, air cooler & air condenser
 Diameter: 900mm to 12000 mm
 Width: 230mm, 260mm, 300mm, 350mm, 380mm, 530mm, 600mm.
 Blade Quantity 3, 4, 5, 6, 8, 9 etc
 Material: AL, FRP, PAG
 Patent Large axial flow fan with structure of zero bending moment at blade root
 With light, reliable & low noise



Blade profile: total 11 type. 9 type AL, 2 type FRP, 1 type FRP by hand, WFN type FRP & 2 type PAG



Cooling Tower & Air cooler - Ultra low noise fan



超低噪叶轮WFS 产品结构配置:

叶轮直径: 7ft、8ft、9ft、10ft、11ft、12ft

叶片数量: 3叶片、4叶片

轮盘直径: 600、900

上海腾讯金融云项目, 首批样品在客户现场验收。噪音达到57dB, 超过冷却塔最高标准要求60dB。产品与2019年5月已经批量量产





Cooling Tower – Die cast aluminum

– 17 –

In 2015 completed the development, the diameter arrangement is under 1700mm



FRP – Extruded & Vacuum infusion FRP

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10975mm FRP
impeller applied
on Huston USA
Site



FRP – Extruded & Vacuum infusion FRP



8534mm & 9140&9750mm
Impeller applied to
Shanghai Electric SPX



Cooling Tower Impeller - PAG

Diameter arrangement is under 1800mm





Business Segment - Energy & Power

	Product	Typical Client
Energy & Power	Nuclear power fans	CGNPC, China national nuclear cooperation, SNPTC
	Fan for distributed energy fans	GE Hungary, Cummins
	Wind Power Fans	DongFang Electric
	Fan for gas turbine	Harbin Electric , American Electric GE




Fan for Gas Turbine


燃气轮机冷却风机模块
Gas Turbine Cooling fan module




燃气轮机用风机
Fans for gas turbine




燃气轮机用风机
Gas Turbine Ventilation fan




燃气轮机燃料模块通风机
Gas Turbine Module Vent Fan



燃气轮机负荷联轴器通风机
Gas Turbine Load Compartment Vent Fan



润滑油模块通风机
Lube Oil Module Vent Fan



燃气轮机排气罩壳通风机
Gas Turbine Exhaust Enclosure Vent Fan



轮机间通风机
Turbine compartment vent fan





Cooling Mould for Gas Turbine

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Distributed Energy Fans

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分布式能源
Distributed energy resource



航改燃机用冷却风扇
Aero Gas Turbine Ventilation Fans



TM2500 has qualified by GE



Fan for Nuclear power

13 power station in operating, and another 10 power station in processing to operate. Also export to oversea nuclear power staion



Fan for wind power

Wind Power —— started wind power fan since 2009 with GE Haiphong . From 2013 , we have started cooperation with CHINA dong fang ELECTRIC CORPORATION , massive production from 2014 . Recent 2 years we have expanded the cooperation with other wind power client.





Marine engineering equipment and high-tech ships

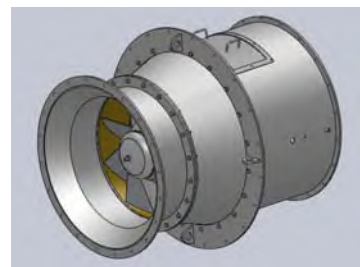
- ◆ Since 2004, we have started the marine business application, in 2006 started provide the product to drilling platform
从2004 年开始在 船用市场上供货，2006年完成了JU2000钻井平台的供货
- ◆ From 2015 – 2018, we have developed ultra low noise fan for K28,K29, K33 Cruise ship
2015年到2018年我们为K28,K29,K33客滚轮提供超静音风机
- ◆ Since2013 , the first large scale container vessel into market we started to provide the fan to large scale container vessel. In 2018, we have delivered fan to 26 vessel of 52500TEU 2018年有26艘52500TEU的集装箱船交付，是从2013年首艘大型集装箱船进入市场交付量最高的一年



Marine engineering equipment and high-tech ships

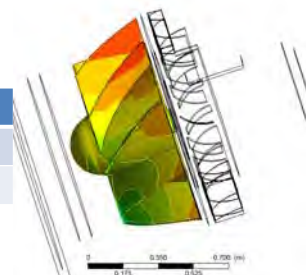
Low noise cross flow series

- 采用子午加速斜流叶轮，风机压力高，噪音低；
- 风机噪音比常规风机低8dB左右，其中CZ-110风机噪音可达89dB，比常规风机低13dB；
- 风机型号可覆盖全系列 Fan type can cover all series



例（招商金陵船厂880P项目）：

风机选型	风机型号	风量 (m ³ /h)	静压 (Pa)	转速 (RPM)	噪音 (dB)
常规风机	CZ-110	40000	650	1160	101
低噪风机	CZ-110	40000	650	890	90





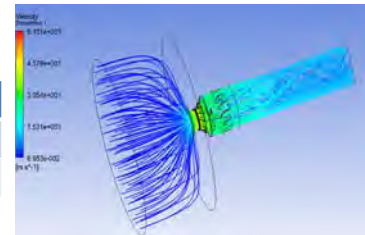
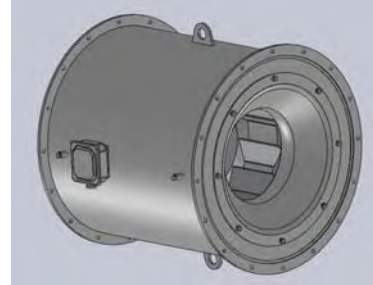
Marine Centrifugal Axial series low noise fan

离心轴流系列

- 采用离心叶轮，适用于小风量，高压力；
- 风机噪音比常规风机低7dB左右
- 风机型号可覆盖全系列。

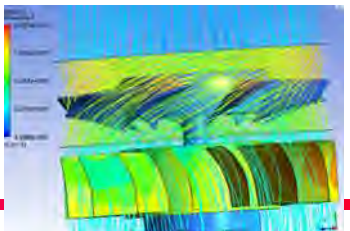
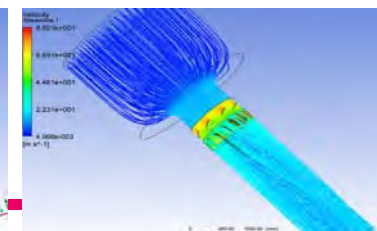
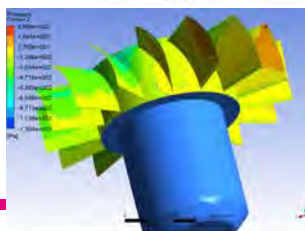
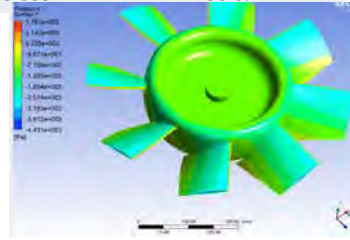
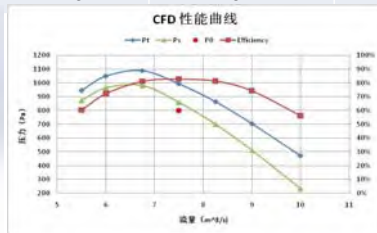
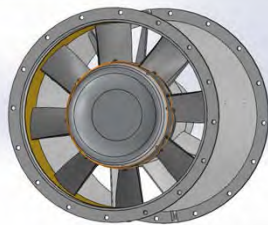
案例案例（招商金陵船厂880P项目）：

风机选型	风机型号	风量 (m ³ /h)	静压 (Pa)	转速RPM)	噪音 (dB)
常规风机	CZ-70	13000	500	1750	94
低噪风机	CZ-70	13000	500	1750	87



High efficiency Marine Fan

Type	Air flow (m ³ /h)	Total pressure (Pa)	Static Pressure (Pa)	Power (kW)	Efficiency on total Pressure
Whole fan	27000	994	861	9.555	83.0%
Impeller	27000	1146	1012	9.555	90.0%





Business Segment – Marine & Shipyard fan

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Business Segment - Refrigeration , HVAC

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We have on refrigeration filed since the company has build, the product is all our own patent technology, main client Yantai Moon Group, Kelvion, Dalian Iceberg



烟台冰轮冷冻机间工程



速冻机房



速冻机房



Business Segment - Refrigeration , HVAC

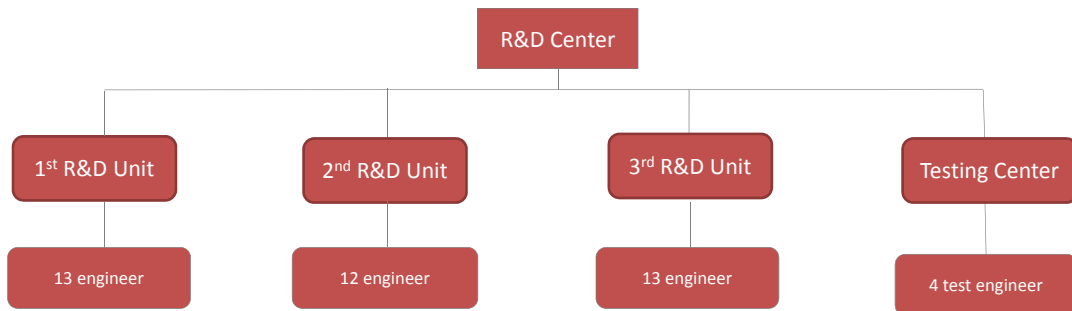


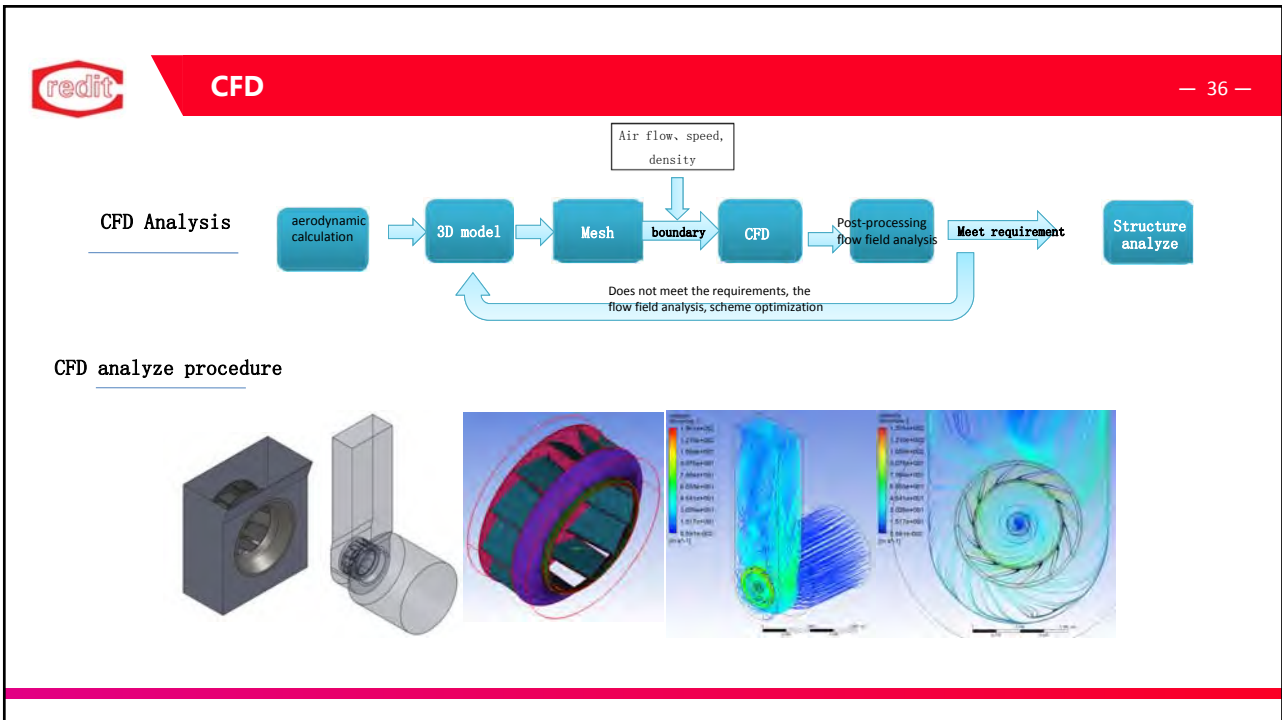
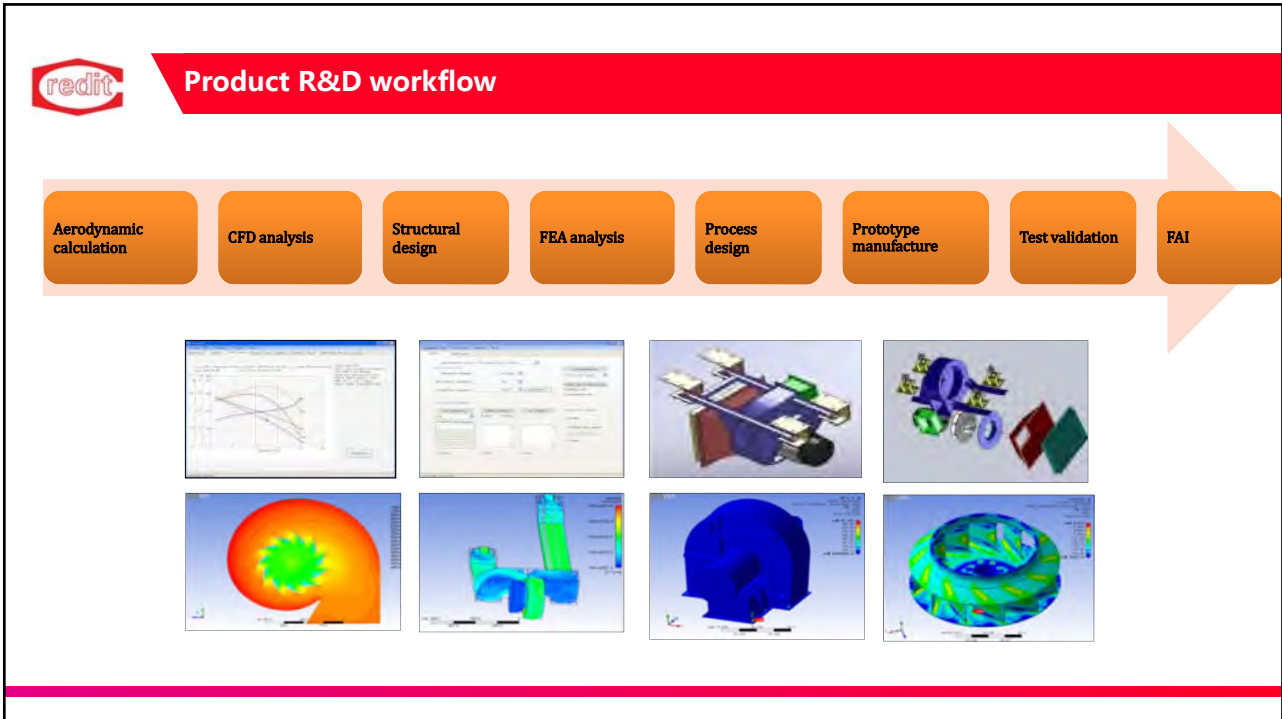
轴流风机

Arrange :
Impeller diameter : 280mm~10400mm ,
Suitable for all kinds of installation characteristics
High efficiency, low noise, light weight,
reliable structure, stable operation



3. R&D organization chart







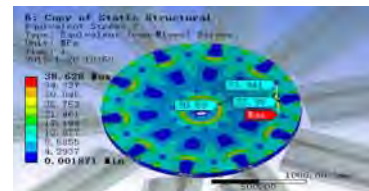
Selection software to support

Big impeller selection software



Strength reliability analysis

- Through FEA to analyze the stress on each parts of the fan also to analyze fatigue reliability. .
- Do strain test for rotating parts ;



FEA strength analyze



Wireless Strain Test



Fatigue test design



Fatigue Analogue Simulation



Key slot Fatigue test



Over speed Test

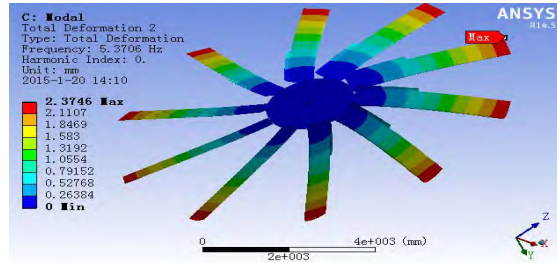
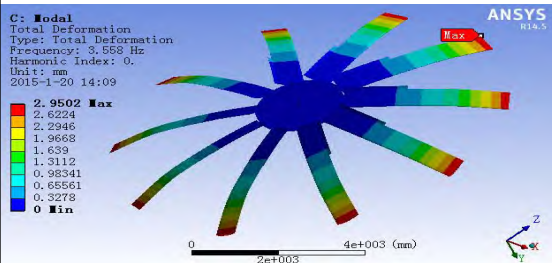


Hub Fatigue Test



Modal analysis avoiding resonance

模态	1	2	3	4	5	6	7	8	9	10
固有频率[Hz]	3.558	5.3706	10.838	21.661	21.992	26.992	33.034	40.967	46.963	52.764
转动基频	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
通过频率	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2
判定(±10%)	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK





Testing Center Introduction

Testing center qualification:

- CNAS credential
- AMCA member

Main testing equipment and arrange:

- Testing chamber, 2*2m
- Testing tube, 0.2~2.2m, 11 sets
- Testing platform, 10m & 5.5m
- Testing Fan arrange, 0.2~1.85m&10m

Testing items for industry and commercial fans:

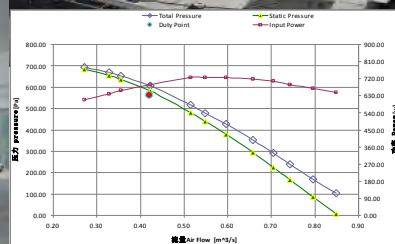
- Fan performance
- Vibration
- Noise
- Fatigue
- Stress
- High temperature test
- Low temperature test



Testing Capability

The chamber testing system

- According to AMCA210-07 design and produced the chamber testing system, get the test data automatically, and draw the performance curve.





Testing Capability

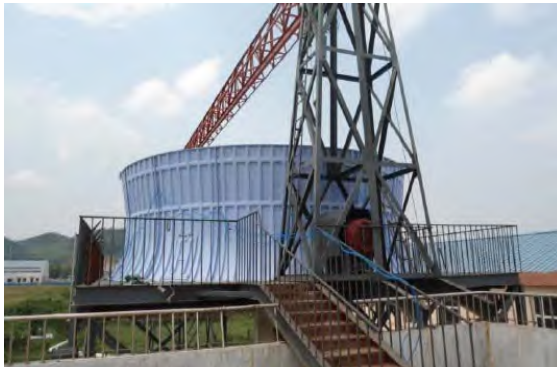
Duct test system

- According to GB/T 1236-2000 to design and product 15 sets of test duct, can test fan diameter range from 200mm to 2000mm



Testing Capability

4m-10m platform for performance testing





Testing Capability

Fatigue Test – for completed fan set

By simulating the product limit environment to conduct the fatigue test, verify product design life



Testing Capability

Fatigue Test- Large Axial Impeller Fatigue Test





Testing Capability

System Test

For some complex system, designated special test plan according to customer requirement



TJL1070-4 Test for GE Oil&Gas project



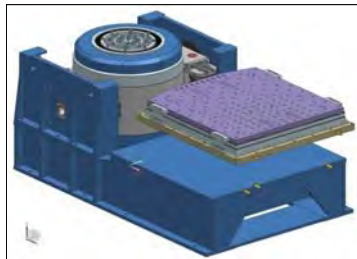
7FA05-A132 Test for GE power and Water



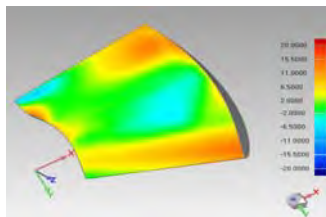
R & D

— 48 —

Vibration and shock , humid, heat triplex test



3D Scan testing





4. Quality assurance - Enterprise Qualification

ISO 9001-2008 'Quality management systems'

ISO 14001-2004 'Environmental management systems'

OHSAS 18001-1999 'Occupational health and safety management system'

Railway — IRIS & AAR in 2010

EN15085 welding system in 2009

CRCC Certification in 2013

Got the CNAS credential in Dec,2013

Product Certification

CE-ATEX,CE,ABS,BV, DNV,GL,KR,CCS, LR, VR, ZY



Quality Assurance - Quality Control

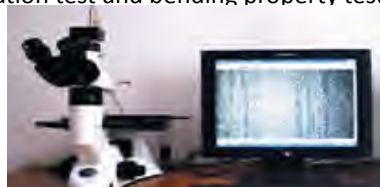
- ◆ Material inspection: macroscopic and microcosmic metallographic test, hardness test and strength test;
- ◆ NDT: X-ray, Magnetic testing (MT), Ultrasonic testing (UT) and Penetration testing (PT)
- ◆ Surface quality inspection: salt mist test, surface roughness, surface cleanliness, paint thickness, glossiness, aberration, adhesion, pencil hardness, shock and vibration test and bending property test.



X-ray inspecting machine



Coordinate measuring machine



Metallographic test



Salt mist testing machine



Strength testing machine



Quality Assurance - Certificate



National industrial production license



ISO9001



14000



18000



IRIS



CRCC



AAR



QS/ATEX



BV



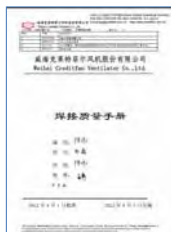
Air cooler safety register certificate





Quality Assurance - Welding quality assurance

According to Welding EN15085


Welding quality inspection has be conducted by qualified VT engineer.





Quality assurance – Marine industry Certificate
— 53 —




ABS




LR




DNV-GL




NK



CCS




BV



nondestructive inspection
— 54 —


Company NDT room and X-Ray room has meet the Radiation Safety Standard .


Qualified NDT : X-Ray Class II 3 people、Ultrasound Class II 3 people、PT class II 5 people、MT class II 3 people.

Company NDT management system has set up according to GE Standard











Quality assurance – Nuclear Power Industry



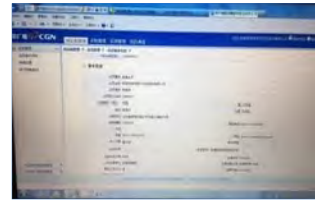
中核合格供方证明



MTU推荐书



陕柴推荐书



中广核工程有限公司供应商资格



5. Production capacity ——laser cutting



Cutting Precision : 0.1mm;
 Cutting thickness : Carbon steel - 16mm,Stainless Steel - 10mm, AL - 8mm
 Cutting Dimension : 1.5*3m



Production capacity ——spinning

— 57 —



High precision spinning equipment imported from Germany, and we have AL welding production line



Production Capacity - Welding

— 58 —

智能化焊接生产线项目介绍

项目简介: 分为叶轮自动生产线、地铁风机部件自动生产线、高铁风机部件自动生产线、GE能源大型风机生产线、轴流风机生产线。其中叶轮和地铁部件实现自动化生产线模式，每条线体由2台搬运机器人、4台焊接机器人、4台焊接变位机、1条数控传送带、1套机器人地轨、1套自动打磨机器人组成。建成后实现年产地铁风机15000套、高铁、普通风机8000套、轴流风机15000套

投产日期: 叶轮自动生产线2017年12月30日前投产使用；地铁风机部件自动生产线2018年3月20日前投产使用，高铁、GE能源、轴流风机生产线2017年9月10日前投产使用。

项目总投资: 1200万元

项目负责人: 孙志皓
承建单位: 沈阳新松机器人、昆山华恒通台面



Package



Production Capability

Capability on single shift: 400 units , with automatic drying equipment

智能化涂装流水线项目介绍

项目简介: 分为智能大型水旋式涂装流水线区域、自动喷粉线区域、小型风机流水线区域、GE能源大型风机喷漆区域。每条生产线均配备自动喷涂机器人，自动恒温烘烤室，在线温度厚度检测、温湿度在线预警监控等功能，投产产能达成大件喷漆线20000件，小件喷漆、喷粉线100000件。

投产日期: GE大型风机喷漆2017年7月30日前投产使用；大型水旋涂装流水线2017年8月20日前投产使用，喷粉线和小型风机涂装线2017年10月30日前投产使用。

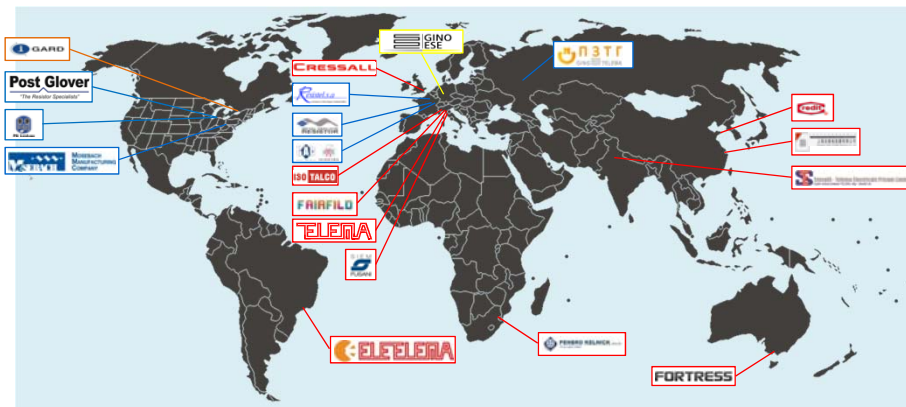
项目总投资: 576万元

项目负责人: 全进贵
承建单位: 昆山资福机电工程有限公司



6. After sale service worldwide

24 Hours worldwide service, below the branch can give us support in North American and Europe, we have warehouse in Erie USA, have done been with GE in Europe and USA for many year





Typical clients



Thank You!