

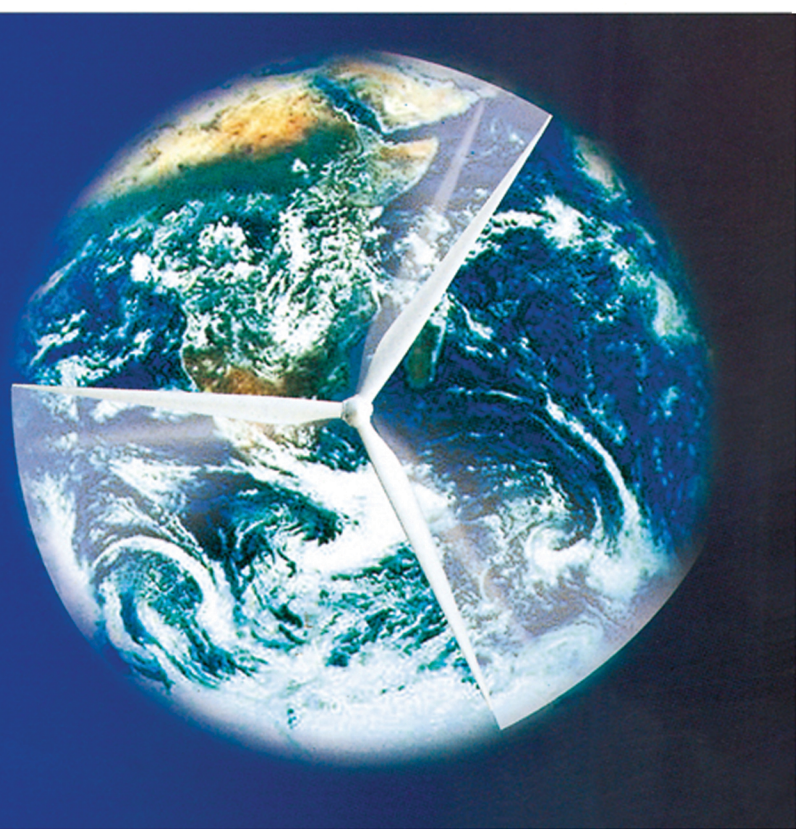


做中国最好的风机

[TO BE THE BEST WIND TURBINE
MANUFACTURER IN CHINA

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山东中车风电有限公司
CRRC WIND POWER(SHANDONG)CO.,LTD.



中车风电 蕴能无限

CRRCWIND ENERGY INFLNITE

公司简介

山东中车风电有限公司是中国中车集团投资打造的国内一流的大型风电装备企业，专业从事风力发电设备及主要零部件的研发、制造与销售，风力发电工程的设计、建设和技术服务，具备年产1500套1.5-6 MW风力发电机组的能力。

公司具备强大的自主研发和创新能力，拥有国家级企业技术研发中心，设有“院士工作站”；配有全功率风电整机试验站、半实物仿真平台、变桨试验台等国际先进的试验和测试设备；自主研发的1.5MW、2MW、3MW风力发电机组均已实现批量装机，运行稳定可靠；6MW海上风力发电机组全面进入研发试制阶段。

公司秉承质量立企的管理理念，将质量管控延伸到研发、制造、供应链、间接供应链、设备运营等环节，实现质量管控产业链全覆盖。

公司建有一支高效的运维服务团队，设有远程集中监控中心和专家诊断系统，具备一流的售前、售中、售后全过程、全方位的服务能力。

山东中车风电有限公司继承了中国中车百年制造基因，以精益求精的民族匠心，锤炼中国最好的风机。



Company profile

Shandong CRRC Wind Turbine Co., Ltd., which is invested by CRRC Corporation Limited. (hereafter "CRRC"), is a first-class large-scale wind power equipment manufacturer in China. The company's business mainly includes the R&D, manufacturing and sale of wind power equipment and its main components; wind power equipment project design, construction and technical service. It has capacity of 1,500 sets output of 1.5MW ~ 6MW onshore and offshore wind turbines every year.

Shandong CRRC Wind Turbine Co., Ltd. has a strong independent R & D and innovation capability, with "academician expert workstation". Company equipped with the international advanced test devices, such as the full power wind turbine test station, semi-physical simulation platform and pitch test platform. The 1.5MW, 2MW, 3MW wind turbines researched independently by company have been installed in quantities, and performed steadily in wind farms. The 6MW offshore wind turbine has been in the stage of research and development.

Under the principle that quality is the basis for enterprise establishment, quality control has extended to the research and development, manufacturing, supply chain, indirect supply chain, equipment operations and other links, and quality control industry chain has been achieved complete coverage.

Company has a highly efficient operation and maintenance services team, with remote centralized monitoring center and expert diagnosis system, which has first-class service capability to pre-sale, sale in the whole process of after-sale.

Shandong CRRC Wind Turbine Co., Ltd. inherited and developed hundred years manufacturing gene of CRRC. Insisting on the policy of keep improving product quality, company will be the best wind turbine manufacturer in China.



战略发展目标

产品：坚持客户利益至上，以成熟可靠技术为支撑，为客户实施定制化设计，实现产品高可靠性和高收益率，提供全方位高品质的风电整体解决方案。

市场：依托高品质产品，坚持稳健诚信的经营理念，全面拓展国内国际市场，年度新增装机容量进入国内风电行业前列。

国际化：依托中国中车国际市场平台，围绕“一带一路”发展战略，联合国内知名开发企业，快速实现国际市场突破，打造一流的国际化风电企业。

海上风电：依托海上风力发电机组生产基地和山东海上风电测试基地建设，立足高可靠性和高收益率的产品，将海上风电打造成公司的支柱产业。

Strategic development goals

Products: Adhere to customer interests first, supported by the mature and reliable technology, customized designs for clients, company intends to create a full range, high quality integrated solution of wind power and achieve the high reliability and high yield of products.

Market: Based on the high quality product, and the stable and faithful business tactics, company intends to expand the domestic and foreign market. The goal of annual newly installed capability is to be top of the domestic wind power industry.

International: Relying on the platform of CRRC international market, focusing on the development strategy of “Belt and Road”, cooperating with the domestic well-known development companies, international market breakthrough is realized rapidly, which make the company into the international wind power enterprise.

Offshore wind turbine: Supporting by construction of offshore wind turbine base and Shandong offshore wind turbine test base, based on high reliability and high yield of the product, the offshore wind turbine will be company's pillar industry



百年制造基因

中国中车是中国铁路产品的缔造者，从无到有，从弱到强，直至引领世界，100多年以来，设备制造需要具备的各项指标已刻骨铭心，深入基因。山东中车风电继承了中国中车的制造基因，并将其带入新的征程。

1881年

共和国铁路产品的摇篮

- ① 新中国第一台蒸汽机车“八一号”
- ② 中国第一辆客车——“鑫舆龙车”

20世纪初
工人运动发源地
党组织创建基地

- ① “二七工人运动发源地”
- ② 山东省第一个企业党支部和第一个产业工会的诞生地

1949—1985年
铁路大提速主力军

- ① 中国第一列时速200公里的高速电动铁路客车组
- ② 国产首列时速350公里“和谐号”CRH3动车组

2006年
现代化轨道装备研发制造基地

- ① 中国首列时速300至350公里高速动车组
- ② 创每小时487.3公里的“世界铁路运营试验最高速”

2009年至今
新能源、新产业、新高度

山东中车风电有限公司成立，从事风电整机设备的研发与生产制造

研发实力

公司拥有一支150余人组成、专业涵盖齐全的风电研发队伍，近年来，公司积极与Aerodyn、Garrad Hassan、Fraunhofer、RISO、中国电科院等国内外一流的研究机构合作，在技术引进、消化、吸收再创新的基础上，形成了公司1.5MW/2.0MW/3.0MW陆上风电整机系列化产品，以及即将研制完成的6MW海上风电产品。公司拥有先进的风电机组和风电场半实物仿真平台、变桨系统动态加载测试平台以及整机全功率试验平台，完善的产品研发和测试手段，可确保产品的先进性和可靠性，为客户提供高品质的产品和服务。

公司建有院士工作站、专家顾问室、并与国内外科研机构及咨询机构开展了广泛的合作，对风电产业的前沿技术及行业发展难题进行深入的研究及技术开发。

R&D strength

CRRC Wind Power (Shandong) CO.,Ltd. has a professional R&D team with more than 150 people. In recent years, company cooperated with Aerodyn, Garrad Hassan, Fraunhofer, RISO, CRPRI (China Electric Power Research Institute) and other domestic and foreign first-class institutes. Base on the introduction, digestion, absorption and innovation, company has developed series of 1.5MW/2.0MW/3.0MW production, as well as the upcoming 6MW offshore production. We have advanced semi-physical simulation platform for wind turbine and wind farm, dynamical pitch system test platform and full power test platform for drive train. We can provide high quality products and service to our customers with the above methods, which can ensure the progressiveness and reliability of our products.

The company has academican workstation, expert consultant office, and carry out extensive cooperation with domestic and foreign research and consulting institutions, which research and develop cutting-edge technology and industry development problems of wind power industry.

国家认定
企业技术中心

国家发展改革委 科技部
财政部 海关总署 国家税务总局

院士专家工作站

济南市科学技术协会 济南市发展和改革委员会
济南市经济和信息化委员会 济南市科学技术局
济南市国有资产监督管理委员会

NO.4

协同研发平台

Collaborative R & D platform

由于风电制造与高铁制造的高度相似，公司传承高铁制造的基因，将高可靠性、高安全性的制造理念和经验引入风电装备制造业中。

Wind power manufacturing shared a high degree of homology to high-speed rail manufacturing. Shandong CRRC Wind Turbine Co., Ltd. inherited and developed advanced high-speed rail manufacturing gene, and brought the high reliability, high safety concept and experience into wind turbine equipment manufacturing industry.



试验测试能力

山东中车风电有限公司试验站是国内首批具备风电整机及零部件专业测试能力试验基地。试验站拥有一支专业的研发测试团队，坚持严谨细致的检验测试标准，致力成为国际先进、国内一流的风力发电机组测试基地。

Test capability

Test station in Shandong CRRC Wind Turbine Co., Ltd. is the first test base with the professional test ability of wind turbine and components. The professional R & D test team adhere to inspection and testing standard that is preciseness and meticulousness, domestic first-class test base of wind turbines.

>> 全功率试验站介绍 Full power test station

全功率试验站设备先进、功能齐全，为国内首家具备低电压穿越检测能力的测试平台，具备大功率机组的并网试验、超速试验、安全链测试、加载试验、120%过载试验、功率因数调节、谐波测试等试验能力，保证所有机组合格出厂；测试平台配备有容量达3兆瓦的电压跌落发生器，具备厂区内低电压穿越测试能力，被中国电科院指定为第三方测试平台，已为多家变流器和整机厂家提供低电压穿越测试服务。

Full power test station has advanced equipment and complete functions, which is the first one in China can do furniture low voltage ride through, with the capability of high power unit grid test, overspeed test, safety chain test, loading test, 120% overload test, power factor regulation, harmonic testing, all wind turbines were qualified before leaving the factory. Test platform equipped with 3 MW of voltage sag generator, and low voltage ride through test ability, which was designated as the third-party testing platform by China Electric Power Research Institute, and has provided low voltage ride through testing service to many converters and wind turbine manufacturers.



>> 半实物仿真平台介绍

Semi-physical simulation platform

公司与全球知名的风能研究机构Fraunhofer联合开发的风电机组/风电场仿真测试平台，实现了对风电机组和风电场的数字化仿真模拟，填补了国内在该领域的空白，对产品的研发和验证起到了重要作用。

风电机组仿真测试平台侧重于单机控制系统的仿真验证，包括对主控、变桨、变流器系统的联合仿真测试，该平台实现了IEC标准风况的精确模拟，实现对特定风场风电机组控制系统的定制开发，包括发电量提升、智能降载、风速预测、环境自适应等先进控制方法的实际应用。

风电场仿真测试平台，可实现对特定风场的地形、机组湍流和尾流模拟，为风电场微观选址和场级控制优化提供了数字化基础，可显著提高风电场的整体收益。

Wind turbine / wind farm simulation test platform developed by company and Fraunhofer that is the well-known global wind energy research institute, realized digital simulation of wind turbine and wind farm, and has made up for the vacancy of domestic field, has played a critical role in development and validation of products.

Wind turbine simulation test platform focused on single machine control system simulation, including the simulation of main control, pitch and converter and the accurate simulation of IEC standard wind conditions is realized. The platform can develop customized wind turbine control system, consisting of advanced control methods like power upgrade, intelligent down load, wind speed forecasting, environment adaptation etc.

Wind farm simulation test platform can simulate particular wind farm terrain, turbulent flow and wake of wind turbine, which is the digital basis for wind farm micro siting and field level optimization that can improve the overall income of wind farm significantly.

>> 变桨试验台介绍

Pitch test bench

变桨系统加载试验台能够模拟风机正常的运行状态以及各种工况，可以满足变桨系统试验中静态测试、动态测试、后备电源测试、故障测试、电网适应性测试、连续运行测试的所有要求，在工厂即可完成变桨系统的所有调试工作，减少变桨系统的故障率，提高变桨系统质量，有效的缩短风场并网调试时间，提高240h验收成功率。

Pitch test bench can simulate normal operation state and all kinds of working conditions, static test, dynamic test, backup power supply test, fault testing, power grid test, continuous operation test that contained by pitch system test can be realized. All debugging effort of pitch system can be completed in the factory, which will reduce failure ratio and improve the quality of the pitch system, shorten the wind farm debugging time, boost the success rate of 240h acceptance..



产品优势及产品系列

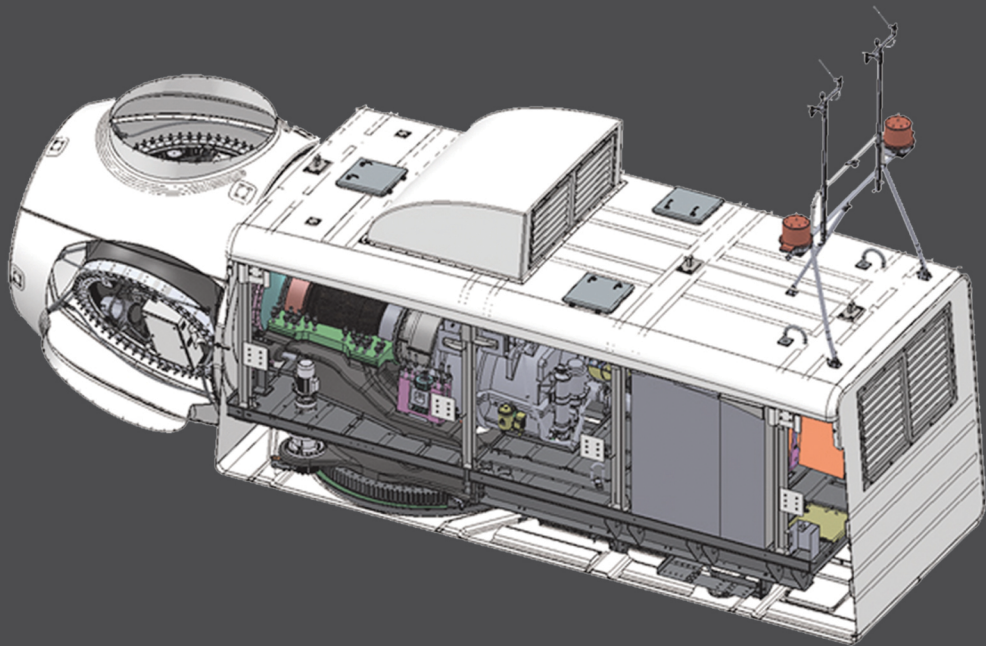
Advantages and series products

>> 1.5MW系列机组产品的优势

CWT1500 advantages

采用传动链加阻和塔架加速度反馈技术，可有效减少传动链载荷冲击，降低塔架振动；采用增益调度的PI调节变桨控制技术，可尽最大能力提高机组发电量；采用软启动偏航系统，可减少了对机械部件的冲击，延长机组寿命。通过了TüV-A级设计认证、中国电科院的功率特性测试、电网适应性测试、电能质量测试和低电压穿越测试，机组成熟的平台化设计，可有效提高产品可靠性。

Drive train damper and tower acceleration feedback technology can decrease the load impact on drive train and reduce tower vibration. Gain scheduling PI regulation pitch control technology can get as much as energy capture. Soft-start yaw system can cut down the mechanical impact, which can increase the lifetime of wind turbine. 1.5MW wind burbine has been and certified by TüA-A design cerification,power characteristics test,power grid adaptability test,electric can test quality and low voltage ride through test of China Electric Power Research institute.mature platform design can greatly improve product reliability.



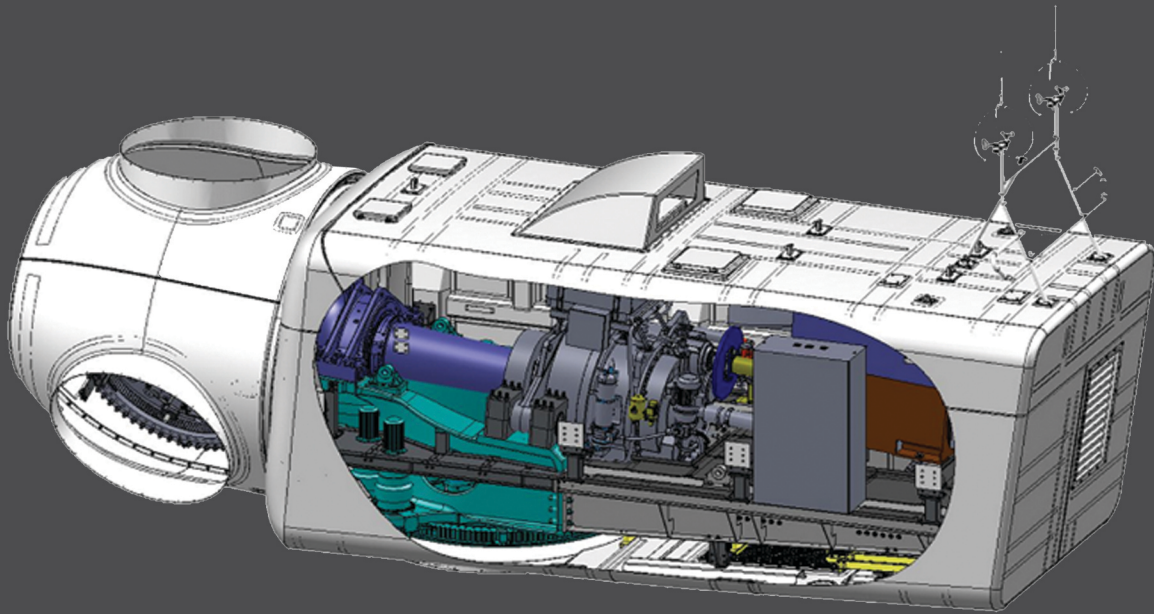
CWT1500机型参数表

型式	双馈异步变速恒频			
型号	CWT1500-D77	CWT1500-D83	CWT1500-D87	CWT1500-D93
机组形式	四点支撑、双馈异步、变速变桨			
风轮直径 m	77	83	87	93
扫风面积 m²	4655	5343	5872	6793
轮毂高度 m	70/80	70/80	70/80	80/90
额定功率 kW	1500			
风轮转速范围 rpm	11.7-20.7	11.0-19.5	10.0-19.0	10.0-19.0
风轮额定转速 rpm	18.5	17.4	17.4	15.5
切入风速 m/s	3	3	3	3
切出风速（10min）m/s	25	25	25	22
切出风速（3s）m/s	35	35	35	35
极端风速（3s）m/s	70	52.5	52.5	52.5
额定风速 m/s	11.3	10.9	10.1	9.3
环境	运行温度范围：-30～+40℃ 生存温度范围：-40～+50℃			
设计寿命 y	20			
机舱尺寸 m	长×宽×高：8.8×3.6×3.65			
风轮重量 t	28.4	29	30.5	33.2
机舱重量 t	60	60	60	60
双馈异步发电机				
级数	4			
转速范围 rpm	1097～1945			
额定电压 V	690			
额定功率 kW	1567			
冷却方式	空空冷却			
变流器				
型式	双馈式			
齿轮箱				
型式	一级行星两级平行轴			
传动比	93.78	99.74	99.74	111.9
变桨系统				
型式	独立电驱动变桨			
偏航系统				
型式	电机-减速机驱动			
驱动电动机	3/4			
偏航制动数	4			
主控系统				
控制器	Beckhoff PLC			
通讯方式	EtherCAT/CANopen/PROFIBUS-DP			

>> 2.0MW系列机组产品的优势
CWT2000 advantages

采用传动链加阻及塔顶加速度反馈技术，独特的机舱底盘设计，重量轻，吸振能力强，采用增益调度PI的变桨控制技术，采用三点支撑方式，无功补偿能力强，完善的逃生装置。通过了中国电科院的电网适应性测试和低电压穿越测，机组成熟的平台化设计，可有效提高产品可靠性。

2.0 MW wind turbine used the technology of chain drive resistance, tower acceleration feedback and PI pitch control. The unique design of nacelle chassis is light-weight and strong absorbern. 2.0MW wind turbine has passed power characteristics test and low voltage ride through test of China Electric Power Research Institute. Based on the platform,mature platform design can greatly improve product reliability.



CWT2000机型参数表

型式	双馈异步变速恒频				
型号	CWT2000-D93	CWT2000-D103	CWT2000-D110	CWT2000-D116	CWT2000-D122
机组形式	三点支撑、双馈异步、变速变桨				
类别	GL IIIA	GL IIIB	GL IIIB	GL IIIB	GL S
风轮直径 m	93	103	110	116	122
扫风面积 m²	6779	8226	9499	10563	11715
轮毂高度 m	70/80	70/80	80/90	90	90
额定功率 kW	2000				
风轮转速范围 rpm	8.86-17.09	8.86-17.09	8.15-14.64	8.66-15.38	8.66-15.73
风轮额定转速 rpm	15.5	15.5	12.97	13.78	13.78
切入风速 m/s	3	3	3	3	3
切出风速（10min）m/s	25	25	25	20	20
切出风速（3s）m/s	30	30	30	30	30
极端风速（3s）m/s	52.5	52.5	52.5	52.5	52.5
额定转速 rpm	15.5	15.5	12.97	13.78	13.78
环境	运行温度范围：-30~+40℃		生存温度范围：-40~+50℃		
设计寿命 y	20			20	20
机舱尺寸 m	长×宽×高：10.6×4.16×4.78			10.6×4.16×4.43	10.8×4.25×4.24
风轮重量 t	45	48.4	53.9	55	67
机舱重量 t	80	80	80	80	80
双馈异步发电机					
级数	4		4	4	4
转速范围 rpm	950~2050		650~1350	950~2050	950~2050
额定电压 V	690			690	690
额定功率 kW	2155			2154	2155
冷却方式	空空冷却				
变流器					
型式	双馈式			双馈式	双馈式
齿轮箱					
型式	一级行星两级平行轴			一级行星两级平行轴	一级行星两级平行轴
传动比	112.9	112.9	92.5	127	129
变桨系统					
型式	独立电驱动变桨			独立电驱动变桨	独立电驱动变桨
偏航系统					
型式	电机-减速机驱动			电机-减速机驱动	电机-减速机驱动
驱动电动机	2004-5-6				
偏航制动数	5			5	5
主控系统					
控制器	Beckhoff PLC			Beckhoff PLC	Beckhoff PLC
通讯方式	CANopen/ PROFIBUS-DP			CANopen/ PROFIBUS-DP	CANopen/ PROFIBUS-DP

>> 2MW中速传动技术介绍
CWT2000 advantages

中速传动技术——兼顾直驱机组的发电性能和双馈机组的成本优势，同时具备强大的发电能力，保证了开发商开发超低风速项目的利益需求。

先进机组平台概念——两级行星齿轮箱+中速永磁发电机+全功率变流器的概念，保证机组可靠性、发电性能和机组成本为综合最优。

主轴系双轴承结构——确保齿轮箱不承受额外载荷只传递扭矩，进而在寿命期内可靠稳定运行。

齿轮箱与发电机集成结构——免除运行中的高速端频繁对中问题，使得传动结构紧凑可靠。

永磁同步发电机+全功率变流器——保证机组的电能品质和高低电压穿越性能。

大叶轮直径系列——比同类机组具有更大的叶轮直径，机型机组的叶轮直径为122m，可使单机在年均风速 6m/s的风区(标准威布尔分布、标准空气密度)具有不少于 2300小时的等效发电小时数（按 0.7折减）。

Medium speed transmission technology——Taking into account the power generation performance of direct-drive wind turbine and cost advantages of double-fed induction generator and with strong generating capacity, which the benefit of the customers in developing low wind speed projects can be obtained.

Advanced unit platform——Two-stage planetary gear box + medium speed permanent magnet generator + full power converter, which ensure the reliability, power generation performance and the cost is optimal design.

Structure of the main shaft is double bearing—— The gear box can not bear the extra load and only transfer torque, and run stably in the life time.

Gear box and generator integrated structure——The frequent centering problem of high speed end in the operation is solved, which makes the transmission structure compact and reliable.

Permanent magnet synchronous generator + full power converter——Power quality, the high and low voltage ride through performance can be guaranteed.

Big rotor diameter series——This series has larger diameter than similar wind turbines. The rotor diameter is 122m that makes single wind turbine has not less than 2300 equivalent power generation hours(0.7 reduction factor) with the wind zone of annual average wind speed 6 m/s (standard Weibull distribution, standard air density).

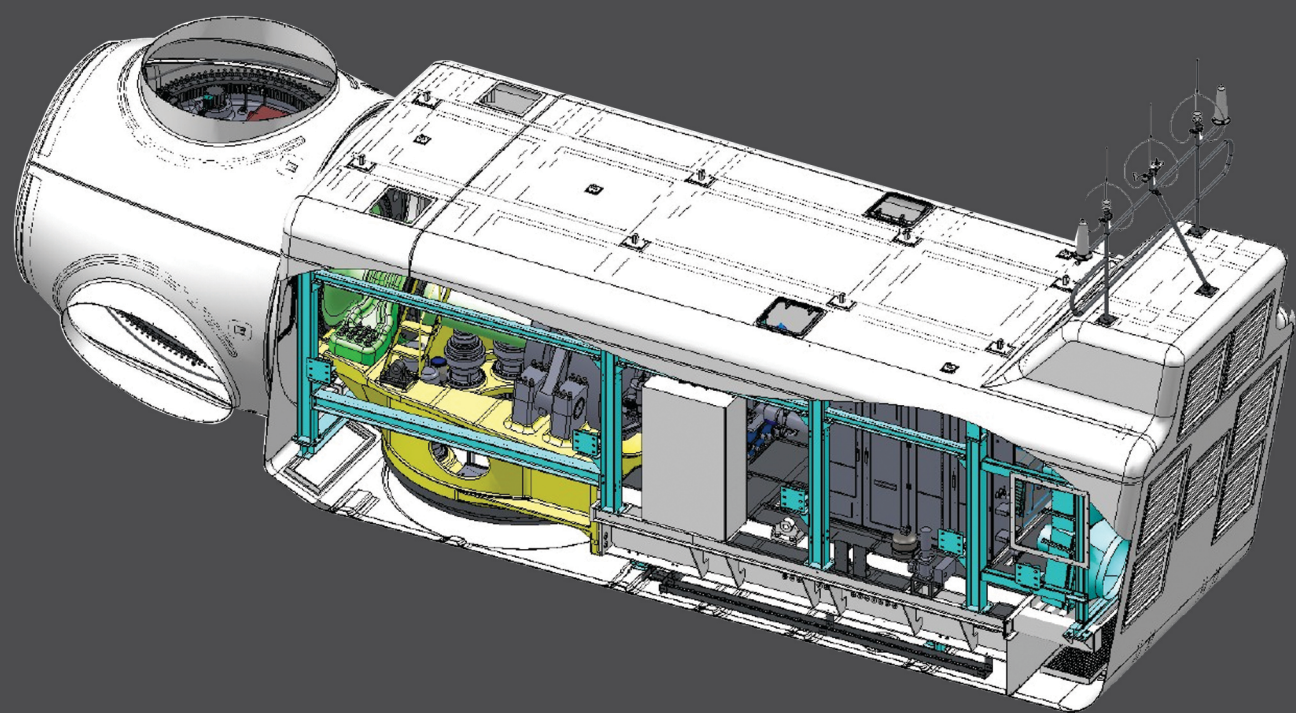
TP2.0系列机组技术参数表

型式	中速永磁		
型号	TP2.0-110	TP2.0-116	TP2.0-122
机组形式	永磁同步 变桨变速		
类型	IECIIb	IECIIIb	S(平均风速 6m/s)
风轮直径 m	109.6	115.6	121.6
扫风面积 m²	9434	10495	11610
轮毂高度 m	90m/120m 或定制		
额定功率 kW	2000	2000	2000
风轮转速范围 rpm	7~14.5	7~13.5	7~12.6
风轮额定转速 rpm	14.5	13.5	12.6
切入风速 m/s	3 m/s	3 m/s	3 m/s
切出风速（10min）m/s	25	22 m/s	22 m/s
切出风速（3s）m/s	35	30	30
极端风速（3s）m/s	59.5	52.5	45.5
额定风速 m/s	9.4	9.1	8.6
环境	运行温度范围：-35 至+40 °C 生存温度范围：-40 至+50 °C		
设计寿命 y	20	20	20
机舱尺寸 m	9.34×4.396×4.244 (移去顶盖 9.34×4.396×3.538)		
风轮重量 t	~63.2	~63.2	~67.7
机舱重量 t	~83	~83	~83
永磁同步发电机			
转速范围 rpm	267~552	267~514	267~480
额定电压 V	710	710	710
额定功率 kW	2150	2150	2150
冷却方式	空水混合冷却	空水混合冷却	空水混合冷却
变流器			
型式	全功率变流	全功率变流	全功率变流
齿轮箱			
型式	两级行星齿轮	两级行星齿轮	两级行星齿轮
传动比	38.1	38.1	38.1
变桨系统			
型式	独立液压变桨	独立液压变桨	独立液压变桨
偏航系统			
型式	电机-减速机驱动	电机-减速机驱动	电机-减速机驱动
驱动电机数	6	6	6
偏航制动数	6	6	6
主控系统			
控制器	Bachmann PLC	Bachmann PLC	Bachmann PLC
通讯方式	EtherCAT/CANopen	EtherCAT/CANopen	EtherCAT/CANopen

>> 3.0MW系列机组产品的优势
CWT3000 advantages

采用传动链加阻及塔顶加速度反馈技术，采用增益调度PI的变桨控制技术，齿轮箱、发电机、变流器均采用液体冷却方案，变流器采用断路器配合接触器并网方案，机组具有较强的无功补偿功能，具有恒功率因数控制、恒无功功率控制和恒电压控制三种模式，变桨系统采用PLC+伺服控制器控制，后备电源采用超级电容，通过了中国电科院低电压穿越测试。

3.0 MW wind turbine used the technology of chain drive resistance, tower acceleration feedback and PI pitch control. Liquid cooling scheme was used in gear box, generator and converter. With circuit breaker with contactor grid connected programme of converter, 3.0MW wind turbine has a strong non power compensation function. There are three control modes that are constant power factor, constant reactive power and constant voltage. Pitch control system uses PLC servo controller control. Super capacitor is adopted in backup power supply. The wind turbine has been tested and certified by TUV-A design cerification



CWT3000机型参数表

型式	双馈异步变速恒频	
型号	CWT3000-D104	CWT3000-D122
机组形式	三点支撑、双馈异步、变速变桨	
类型	IEC IIA	GL IIIB
风轮直径 m	104	122
扫风面积 m²	8461	11669
轮毂高度 m	90/100	90/100
额定功率 kW	3000	
风轮转速范围 rpm	8.34-15.73	7.74-14.51
风轮额定转速 rpm	14.3	12.9
切入风速 m/s	3	3
切出风速（10min）m/s	25	25
切出风速（3s）m/s	30	30
极端风速（3s）m/s	52.5	52.5
额定风速 m/s	14.3	12.9
环境	运行温度范围：-30~+40℃ 生存温度范围：-40~+50℃	
设计寿命 y	20	
机舱尺寸 m	长×宽×高：13.2×4.5×5.55	
风轮重量 t	62	73
机舱重量 t	120	120
双馈异步发电机		
级数	6	
转速范围 rpm	620~1380	
额定电压 V	690	
额定功率 kW	3200	
冷却方式	空空冷却	
变流器		
型式	双馈式	
齿轮箱		
型式	两级行星一级平行轴	
传动比	84	93
变桨系统		
型式	独立电驱动变桨	
偏航系统		
型式	电机-减速机驱动	
驱动电动机	4	
偏航制动数	5	
主控系统		
控制器	Beckhoff PLC	
通讯方式	EtherCAT/CANopen/PROFIBUS-DP	

>> 6.0MW系列机组产品的优势
CWT6000 advantages

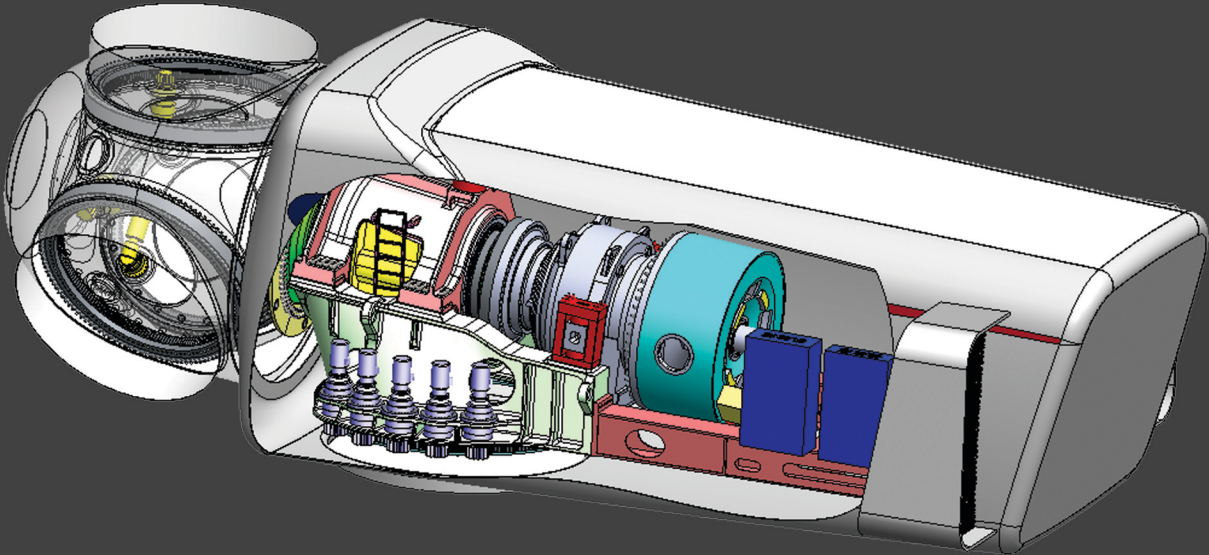
采用性能可靠的传动链结构——两点支撑+齿轮箱+中速永磁发电机组。关键部件的控制采用双冗余设计，使用时可以兼容或互换性使用。机组设计了正常状态和带故状态两种运行模式对外发电。

机组采用新型的故障诊断系统，通过传感器、监控电路或视频监控系统等功能可以判断故障，使机组可以实现“带故运行”，提高机组的年可利用率。

先进的故障限值机制，机组遇到其他传感系统瘫痪时，而发电机主发电系统良好时，通过观测利用其他变量如，测试转速、角加速度、电功率等的方法对失效传感器进行估计，控制机组运行，提高年发电小时数。

The transmission chain structure of wind turbine is that two support + gear box + medium-speed permanent magnet generator. Key parts control adopts double redundancy design, which can be used for compatibility. Two operation modes normal status and fault status is designed to generate electricity. Fault diagnosis system consists of sensor, amonitoring circuit and video monitoring that can determine fault. “Operating with fault”can be realized that will improve the annual availability of wind turbine.

Advanced fault limit mechanism is designed in the situation that other sensing system is brokendown, and main generator generating system runs well, through observing of the other variables such as, test speed, angular acceleration, electrical power, to estimate failure sensor. Based on this design wind turbine will be controled.



CWT6000机型参数表

型式	双馈异步变速恒频
型号	CWT6000-D170
机组形式	三点支撑、双馈异步、变速变桨
类型	GL IIIA
风轮直径m	170
扫风面积m²	22565
轮毂高度m	110
额定功率kW	6000
风轮转速范围 rpm	4.0~12.0
风轮额定转速 rpm	10.1
切入风速 m/s	3
切出风速（10min）m/s	25
切出风速（3s）m/s	30
极端风速（3s）m/s	52.5
额定风速 m/s	10.5
额定转速 rpm	10.1
环境	运行温度范围：-30~+40℃ 生存温度范围：-40~+50℃
设计寿命 y	25
机舱尺寸 m	长×宽×高：15×6.0×6.0
风轮重量 t	170
机舱重量 t	320
级数	18
转速范围rpm	240~385
额定电压V	3150
额定功率kW	6500
冷却方式	空空冷却
变流器	
型式	全功率
齿轮箱	
型式	两级行星
传动比	35
变桨系统	
型式	独立电驱动变桨
偏航系统	
型式	电机-减速机驱动
驱动电动机	8+2（备用）
偏航制动数	10
主控系统	
控制器	Mita
通讯方式	CANopen/PROFIBUS-DP



全过程质量控制

Product quality control

>> 型式认证

Type Certification

公司研发制造的CWT系列风力发电机组在国内率先通过了中国电科院的低电压穿越能力、电能质量、功率调节、电网适应性等功能性认证测试，并取得了相关的资质证书，完全满足了现行并网条件的要求。

CWT type wind turbines manufactured by CNR have obtained the China Electric Power Research Institute certification, including low voltage ride through capability, power quality, power conditioning, power grids and other functional suitability certification testing, and obtained qualification certificates, met requirements of the grid condition fully.



>> 体系认证

System certification

公司建有科学完善的管理体系，通过了德国TüV-SUD质量管理体系认证审核、中国质量认证中心（CQC）环境和职业健康安全管理体系认证审核，并取得了相应的证书。

Scientific management system of company has been certified by German TÜV-SUD quality management system and China Quality Certification Center (CQC) environmental and occupational health and safety management system, and obtained corresponding certificate.



>> 设计认证

Design certification

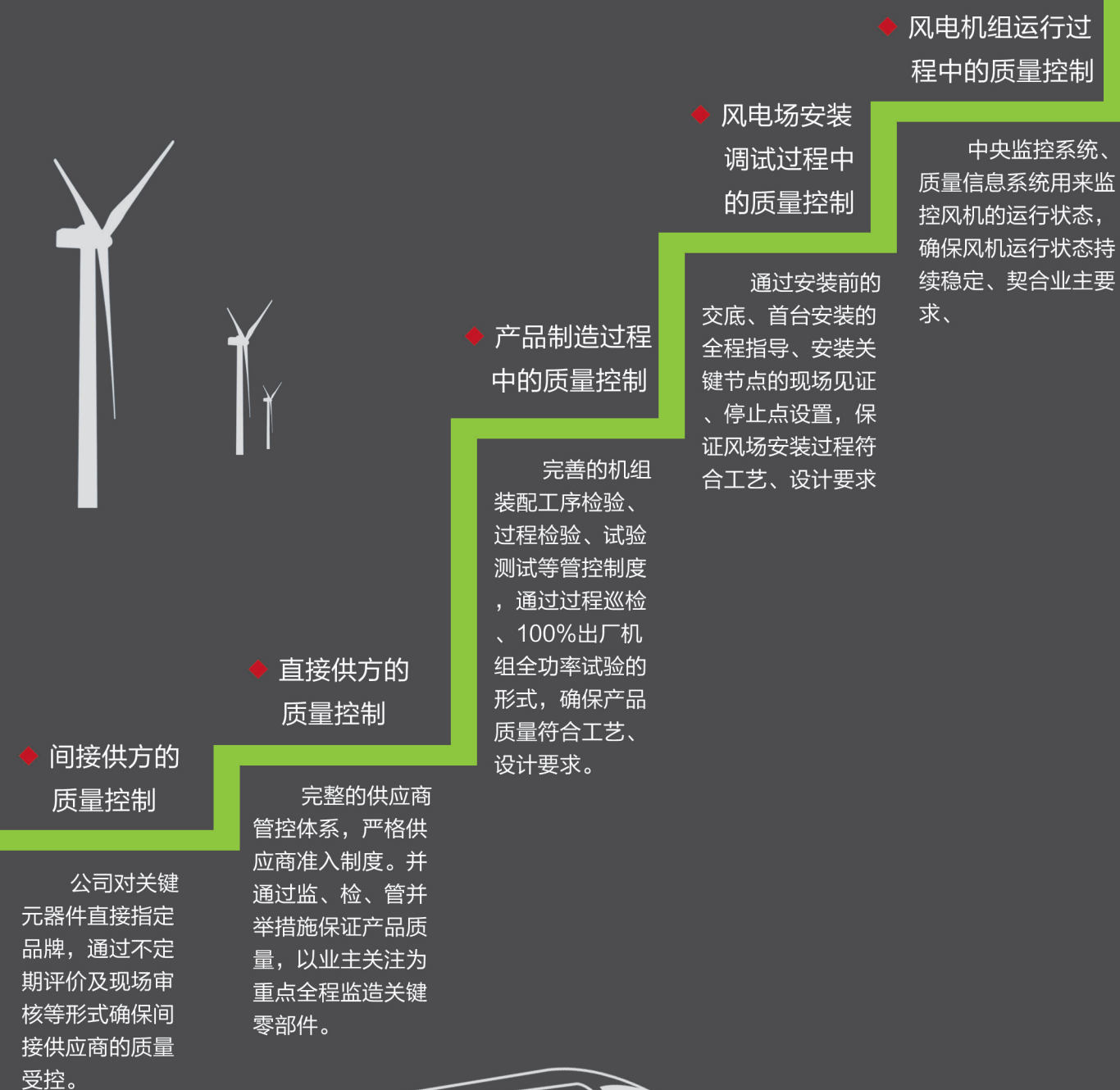
公司设计研发的《CWT系列风力发电机组》先后通过了TüV-A级设计认证（为国内首家通过A级设计认证的机型）及中国船级社、鉴衡认证中心等国内外权威认证机构的认证。

CWT type wind turbines designed and developed by company have been certified by German TÜV-A design (the first domestic model has obtained the certification), China Classification Society(CCS) and China General Certification Center(CGC).



>> 全过程质量控制

Product quality control



Operation status of the wind turbine is monitored by quality control central monitoring system and quality information system that ensure operating stability and meet requirements of the owners.

Quality control in wind farm installation and debugging process is assured by installation disclosure, installation instructions of the first one, installation of key nodes stoppage point setting, which ensure installation process meet technique and design requirements.

Quality control in product manufacturing process includes the unit assembly process inspection, process inspection and other control institution. All wind turbines are tested by full power test that meet technique and design requirements.

Supplier management control system ensure the quality of products by supervision and inspection. Key components are supervised in the whole process.

According to the company's requirements key components are specific. Irregular evaluation and implement the audit can ensure the quality control of indirect suppliers.

全生命周期服务

Full life cycle operation and maintenance services

>> 运维服务

山东中车风电有限公司以“打造服务品牌，保证顾客满意”为服务宗旨，以远程集中监控中心及快速响应机制为依托，建立了涵盖风电场前期咨询、风资源评估、风电机组安装调试、风电场运行维护及风电场代维服务等全方位、全过程的运维服务体系，并在风场200公里区域内布设中心服务网点，向客户郑重承诺1小时反应，2小时运维人员到场，限时解决问题，确保风电机组可靠运行。

>> 运维承诺

质保期内，服务人员驻现场提供7×24小时全天候服务；
故障响应时间：典型故障4小时内解决，重大故障24小时内解决或提出解决方案；
备件供应：常规备件24小时内到场，大部件7天内到场；
24小时客户服务专线全时接听，受理客户服务质量、机组运行情况、备件供应等方面的诉求和建议。

>> Service Commitment

Adhering to service tenet“building service brand, keeping customers satisfied”, based on remote monitoring center and rapid response mechanism, Shandong CRRC Wind Turbine Co., Ltd. established operation and maintenance service system containing preliminary consultation of wind farm, wind resource assessment, wind turbine installation and commissioning, O&M of wind farm. There will be service bases in 200km wind farm areas. Company promises to our custom: feedback in 1 hour, O&M staffs arrive at the scene in 2 hours, solve the problem in limited time, ensure that wind turbine operates reliably.

>> Operation and maintenance services

The warranty period, service personnel stationed in the scene to provide 7 × 24-hour service;
Fault response time: 4 hours typical faults resolved, resolve or propose a solution within 24 hours major failure;
Supply of spare parts: General spare parts within 24 hours to the scene, a large part to the scene within 7 days;
24 hours online service, which can accept complains and suggestions from customers in aspects of service quality, turbine running conditions and spare parts supplement.





智慧发电 更多一点

Increasing The Electricity Generating Intelligently
Increasing Power Generation Intelligently