



太原重工股份有限公司

TAIYUAN HEAVY INDUSTRY CO., LTD

太原重工新能源装备有限公司

TAIYUAN HEAVY INDUSTRY NEW ENERGY EQUIPMENT CO., LTD



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Introduction

公司简介



太原重工是中国重型机械行业第一家上市公司，始建于1950年，是新中国自行设计建造的第一座重型机械制造企业，占地面积370万平方米，资产总额187亿元，员工8000余人，年销售额超百亿元，属中国特大型重点骨干企业，被誉为“国之瑰宝”和“国民经济的开路先锋”。

太原重工股份有限公司作为山西省唯一一家风电整机装备及核心部件研发、设计与生产的企业。目前，自主研发设计制造的2.0MW, 3.0MW, 5.0MW系列风力发电机组已成功并网发电且运行稳定，正在研发设计的6.0~10.0MW风电机组也取得了突破性进展。

Taiyuan Heavy Industry (TYHI) is the first listed company in Chinese heavy-duty machinery industry. It set up in 1950 with a total area of 3.7 million square meters, 8000 employees and annual sales volume of RMB 10 billion. As national key enterprise, Taiyuan Heavy Industry is praised as “national treasure” and “Trailbreaker of national economy”. As the only one company in Shanxi Province that expert in wind power equipment R&D, design and production, Taiyuan Heavy Industry Co. Ltd (TYHI) started to produce key machine parts of wind power generating equipment for both domestic and international companies since 2003, including all kinds of ambient temperature and low temperature wind electric principal axis, all kinds of drive shafts, gears, main frames of wind electric gear box, thus it accumulated rich experience of wind power key machine parts production.

Qualification

资质证书



Process Equipment

装备能力



1. 太重拥有一支专业的研发团队，在风电专业设置上，形成机械结构、电气控制、液压控制、载荷计算、微观选址、风机基础、塔筒优化等多领域跨专业协作。
2. 太重拥有齐全的研发手段，主要运用NX-NASTRAN、ANSYS、MSC.Marc, ADAMS, UG和SolidWorks以及Bladed, Wt等专业软件进行计算及仿真制造。
3. 太重目前已投入使用的产品有双馈型1.5MW、2.0MW风力发电机组及全功率高速永磁型3.0MW、5.0MW、6.0MW风力发电机组，适用于高温、低温、内陆、沿海、潮间带、海上、高海拔、低风速等不同的风资源地区，并可根据风电场风资源情况匹配不同的风轮直径和轮毂高度。
4. 在生产制造上，太重拥有冶炼、铸造、锻造、热处理、焊接、机加工、电控成套、总装调试、检测计量和包装运输等配套齐全的风力发电关键部件的制造、装配、检测等综合能力。
5. 我们在提供优质产品的同时，还承接风电场建设，形成了前期微观选址，中期机组研发、后期安装指导和现场调试等技术服务优势，为客户提供全方位的配套服务。
6. 太重已全面开展大功率风电机组总体设计，轻量化高可靠性，主控控制策略及远程监控，叶片独自变桨，海上机组防腐，增速齿轮箱可靠性等核心技术的研发。

1. TYHI has a professional R & D team, with metallurgy, mine, chemical, power generation, transportation, construction, new energy, aerospace and other professional; wind power in professional settings, forming multi field of mechanical structure, electrical control, hydraulic control, load calculation, micro siting, fan base, tower optimization inter professional collaboration.
2. TYHI with the complete development means, the main use of NX-NASTRAN, ANSYS, MSC.Marc, ADAMS, UG and SolidWorks as well as Bladed, Ansys, WT and other professional software for calculation and Simulation of manufacturing.
3. TYHI has been put into use products are doubly fed 1.5MW, 2.0MW wind turbine generator and full power semi direct drive permanent magnet type 3.0MW, 5.0MW, 6.0MW wind turbine, suitable for high temperature, low temperature, inland, coastal, marine, intertidal zone, high altitude, Low wind speed and different wind resource area, and can match different diameter of the wind wheel and hub height wind resources according to wind farms.
4. In manufacturing, TYHI with wind turbine key components of smelting, casting, forging, heat treatment, welding, machining, complete sets of electric control, assembly debugging, measuring and packing complete manufacturing, assembly, testing and other comprehensive ability.
5. We provide quality products at the same time, also the wind farm construction, the formation of the micro siting, R & D, the late mid unit installation and debugging technology service advantage, provide a full range of supporting services for customers.
6. TYHI has been fully carried out large power wind turbine design, lightweight and high reliability, the master control and remote monitoring, the blade pitch, offshore units alone antisepsis, gear box reliability is the core technology research and development.

Wind resource development

资源开发

作为山西省装备制造龙头企业，我公司一直坚持创新驱动，积极推进公司转型，尤其是风电资源开发领域：我公司积极投资开发的风资源，以此来带动我公司风机的销售，并且我公司开发的风资源能优先列入国家能源局核准计划，并优先核准。

截止目前，公司现有储备风资源194.1万千瓦，其中投产10万千瓦，核准在建15万千瓦，列入国家能源局年度核准计划39万千瓦，正在开展测风，可研等前期工作130.1万千瓦，成为集设备制造，风资源开发，EPC总承包，风场运营为一体的综合性风电产业服务商，为山西省风电产业的发展和转型发展做出了重要贡献。

As the leading enterprise of equipment manufacturing in Shanxi Province, TZ has always adhered to the innovation drive, and actively promoted the transformation of the company, especially in the field of wind power resources development.

TZ actively invest in the development of wind resources, in order to drive my company's fan sales, and TZ's development of wind resources will be included in the national energy board approval plan, and priority approval.

At present, the company reserves of 1 million 940 thousand kilowatts of wind resources, the production of 100 thousand kilowatts, approved the construction of 150 thousand kilowatts, included in the National Energy Board approved the annual plan of 390 thousand kilowatts, wind is being carried out, feasibility studies and other preparatory work of 1 million 301 thousand kilowatts, a set of equipment manufacturing, wind resource development, EPC general contracting, comprehensive management for the integration of wind field the service provider of the wind power industry, has made an important contribution to the development and transformation of the development of wind power industry in Shanxi province.



Operation and maintenance of wind farm

风场运维

太原重工拥有一支实践性强, 并接受过专业培训的技术和服务队伍, 拥有一套规范的运营工作体系和配套管理制度, 已建成投运风场无论从发电量到售后服务都得到业主的一致肯定。

TZ has a strong practicality operation and maintenance of wind farm team, and received professional training and technical service team, has a standardized operation system and supporting management system has been put into operation in terms of wind power output to customer service service have been unanimously endorsed by the owners.



Existing production bases

现有生产基地

1、太原公司本部基地: 风电设备分公司办公楼及装配生产车间, 厂房占地面积 8000 平米, 年生产 200 台套风电整机。

2.内蒙察右中旗基地: 2011 年在乌兰察布市成立太重 (察右中旗) 新能源实业有限公司, 项目投资 3.6 亿元建成综合一体化生产基地, 总占地面积约 296820 m², 年生产风电机组整机 600 台。

3.太原市高新技术开发区基地: 2015 年 12 月成立太原重工新能源装备有限公司, 占地 409.9 亩, 总投资 20 亿元, 并列入 2017 年省重点工程, 建设智能化离散性制造基地, 目前基地正在建设中, 预计 2017 年底一期具备投产能力。一期建设完成后, 年产风电机组 500 台, 全部建成投产后年生产主机 1000 台。

1. Taiyuan company's base: wind power equipment, branch office building and assembly production workshop, workshop covers an area of 8000 square meters, produced 200 sets of wind power units.

2.Inner Mongolia chayouzhongqi base: founded in 2011, is too heavy in Wulanchabu city (chayouzhongqi) new energy industrial limited company, project investment 360 million yuan to build an integrated production base, covers an area of about 296820 square meters, the annual production of wind turbine 600 units.

3.Base of Taiyuan high tech Development Zone: founded in December 2015, Taiyuan heavy industry new energy equipment Co., Ltd., covers an area of 409.9 acres, a total investment of 2 billion yuan, and key projects included in the province in 2017, the construction of intelligent discrete manufacturing base, the base is under construction, is expected by the end of 2017 a period with production capacity. After the completion of the first phase construction, an annual output of 500 units of wind turbines will be completed and put into operation, and the production will be 1000 units after the next year.

Characteristics and Parameters

产品特性与参数

太原重工股份有限公司生产的TZ1500, TZ2000、TZ2500、TZ3000, TZ5000、TZ6000、系列风力发电机组是三叶片式, 上风向, 水平轴的并网型风电机组, 有以下主要特征: 变速恒频、独立电动变桨, 自动偏航。单机容量1500KW, 2000KW, 3000KW, 5000KW, 根据不同的风资源条件以及用户需要, 可以选择不同的轮毂高度, 电气系统来满足风电场的具体要求。

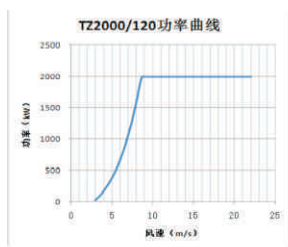
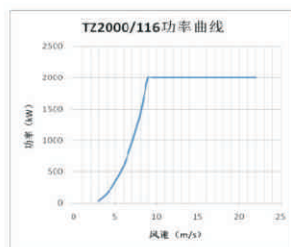
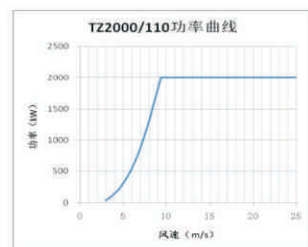
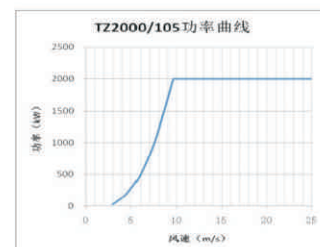
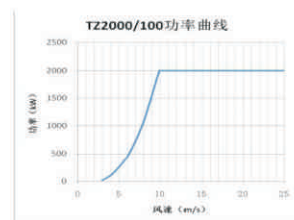
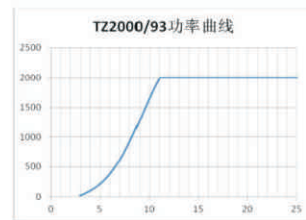
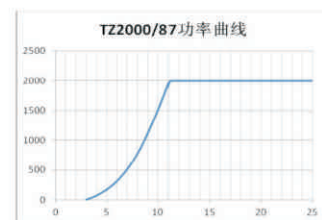
Taiyuan heavy industry Limited by Share Ltd production of TZ1500, TZ2000, TZ2500, TZ3000, TZ5000, TZ6000 series of wind turbine is a grid-connected wind turbine leaf type, wind, horizontal axis, has the following main characteristics: variable speed constant frequency, independent of electric pitch, yaw automatically. The capacity of 1500KW, 2000KW, 2500KW, 3000KW, 5000KW, 6000KW, according to the different wind resource conditions and user needs, can choose different hub height, electrical system to meet the specific requirements of wind farm.

TZ 风电机组各机型年等效利用小时数达到2000h时, 分别对应的年平均风速如下表:
When the annual equivalent utilization hours of each type of TZ wind turbines reach 2000h, the corresponding annual mean wind speed is as follows:
空气密度(The air density fand)1.225kg/m³ · 尔形状参数(Weibull shape parameter)k=2,
综合折减系数(synthetical reduction coefficient)75%

机型 Model	年平均风速 Annual mean wind speed	等效功率 Equivalent power	等效发电小时 Equivalent generation hour	等效功率 Equivalent power
TZ1500/77	6.48	343	2003.12	342.4657534
TZ1500/82	6.14	343	2003.12	
TZ1500/87	5.97	343	2003.12	
TZ1500/93	5.69	343	2003.12	
TZ1500/100	5.36	343	2003.12	
TZ2000/87	6.52	457	2001.66	456.6210046
TZ2000/93	6.18	457	2001.66	
TZ2000/100	5.88	457	2001.66	
TZ2000/103	5.74	457	2001.66	
TZ2000/105	5.63	457.5	2003.9	
TZ2000/110	5.47	458	2006.7	
TZ2000/113	5.41	457	2001.66	
TZ2000/116	5.35	457	2001.66	
TZ2000/120	5.14	457	2001.66	570.776
TZ2500/113	5.79	572	2006.26	
TZ2500/122	5.47	571.2	2001.45	684.9315068
TZ3000/104	6.55	685	2000.2	
TZ3000/113	6.22	687	2006.04	
TZ3000/120	6.05	686	2003.12	1141.552511
TZ5000/128	6.75	1142	2000.784	
TZ5000/154	5.91	1142	2000.784	1369.863
TZ6000/154	6.44	1371.4	2002.2	

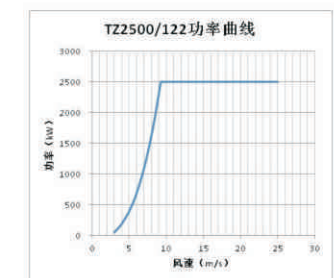
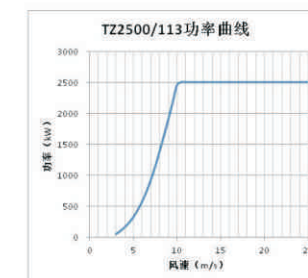
TZ2000 Wind Turbine

序号 NO.	产品型号 Production Type		TZ2000 /87	TZ2000 /93	TZ2000 /100	TZ2000 /105	TZ2000 /110	TZ2000 /116	TZ2000 /120
1	额定功率 Rated power	kW	2000	2000	2000	2000	2000	2000	2000
2	风轮直径 Rotor Diameter	m	87	93	100	105	110	116	120
3	切入风速 Cut-in wind speed	m/s	3	3	3	3	3	3	3
4	额定风速 Rated wind speed	m/s	11.2	11.1	9.9	9.7	9.1	9.0	8.7
5	切出风速（10分钟平均值） Cut-out wind speed(average in 10 minutes)	m/s	25	25	25	25	25	22	22
6	极端(生存)风速(3s最大值) Extreme(survival)wind speed (Maximum in 3 seconds)	m/s	59.5	52.5	52.5	52.5	52.5	52.5	52.5
7	生存环境温度 Survival environmental temperature	℃	常温型: -20~+50 低温型: -40~+50 Normal temperature:-20~+50 Low temperature:-40~+50						
8	运行环境温度 Operation environmental temperature	℃	常温型: -10~+40 低温型: -30~+40 Normal temperature:-10~+40 Low temperature:-30~+40						
9	设计寿命 Designing life	年 year	20	20	20	20	20	20	20
10	设备平均可利用率 Average availability of equipment		≥97%	≥97%	≥97%	≥97%	≥97%	≥97%	≥97%
11	预期寿命 Expected lifetime	年 year	20	20	20	20	20	20	20
12	适合安装风区 Suitable wind region for installation		IEC II	IEC III	IEC III	IEC S	IEC III	IEC S	IEC S



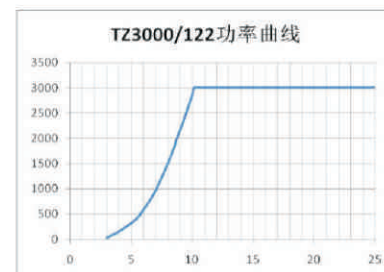
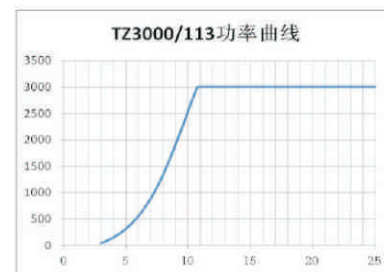
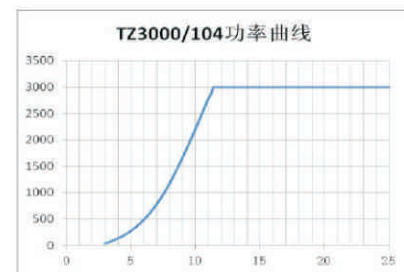
TZ2500 Wind Turbine

序号 NO.	产品型号 Production Type		TZ2500/113	TZ2500/122
1	额定功率 Rated power	kW	2500	2500
2	风轮直径 Rotor Diameter	m	113	122
3	切入风速 Cut-in wind speed	m/s	3	3
4	额定风速 Rated wind speed	m/s	10.1	9.3
5	切出风速（10分钟平均值） Cut-out wind speed(average in 10 minutes)	m/s	25	22
6	极端(生存)风速(3s最大值) Extreme(survival)wind speed (Maximum in 3 seconds)	m/s	52.5	52.5
7	生存环境温度 Survival environmental temperature	℃	常温型: -20~+50 低温型: -40~+50 Normal temperature:-20~+50 Low temperature:-40~+50	
8	运行环境温度 Operation environmental temperature	℃	常温型: -10~+40 低温型: -30~+40 Normal temperature:-10~+40 Low temperature:-30~+40	
9	设计寿命 Designing life	年 year	20	20
10	设备平均可利用率 Average availability of equipment		≥97%	≥97%
11	预期寿命 Expected lifetime	年 year	20	20
12	适合安装风区 Suitable wind region for installation		IEC III	IEC III



TZ3000 Wind Turbine

序号 NO.	产品型号 Production Type		TZ3000/104	TZ3000/113	TZ3000/122
1	额定功率 Rated power	kW	3000	3000	3000
2	风轮直径 Rotor Diameter	m	104	113	122
3	切入风速 Cut-in wind speed	m/s	3	3	3
4	额定风速 Rated wind speed	m/s	11.5	10.8	10.2
5	切出风速（10分钟平均值） Cut-out wind speed(average in 10 minutes)	m/s	25	22	22
6	极端(生存)风速(3s最大值) Extreme(survival)wind speed (Maximum in 3 seconds)	m/s	59.5	52.5	52.5
7	生存环境温度 Survival environmental temperature	℃	常温型: -20~+50 低温型: -40~+50 Normal temperature:-20~+50 Low temperature:-40~+50		
8	运行环境温度 Operation environmental temperature	℃	常温型: -10~+40 低温型: -30~+40 Normal temperature:-10~+40 Low temperature:-30~+40		
9	设计寿命 Designing life	年 year	20	20	20
10	设备平均可利用率 Average availability of equipment		≥97%	≥97%	≥97%
11	预期寿命 Expected lifetime	年 year	20	20	20
12	适合安装风区 Suitable wind region for installation		IEC II	IEC III	IEC III



TZ5000 Wind Turbine

序号 NO.	产品型号 Production Type		TZ5000/128	TZ5000/154
1	额定功率 Rated power	kW	5000	5000
2	风轮直径 Rotor Diameter	m	128	154
3	切入风速 Cut-in wind speed	m/s	3	3
4	额定风速 Rated wind speed	m/s	12	10
5	切出风速（10分钟平均值） Cut-out wind speed(average in 10 minutes)	m/s	25	25
6	极端(生存)风速(3s最大值) Extreme(survival)wind speed (Maximum in 3 seconds)	m/s	70	59.5
7	生存环境温度 Survival environmental temperature	℃	常温型: -20~+50 低温型: -40~+50 Normal temperature:-20~+50 Low temperature:-40~+50	
8	运行环境温度 Operation environmental temperature	℃	常温型: -10~+40 低温型: -30~+40 Normal temperature:-10~+40 Low temperature:-30~+40	
9	设计寿命 Designing life	年 year	20	20
10	设备平均可利用率 Average availability of equipment		≥97%	≥97%
11	预期寿命 Expected lifetime	年 year	20	20
12	适合安装风区 Suitable wind region for installation		IEC I	IEC II

