



Wind Solutions Ltd.

Renewable Energy The Future Alternative

***Wind Resource
Free energy
“0” pollution***

***HS-1.5Mw70-II
HS-1.5Mw77-III***

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Variable Speed Constant Frequency for Double-Fed Asynchronous Wind Turbine Generator System (WTGS)

HS-1.5Mw Series is WTGS industrially produced by HSCK upon MW big scale wind turbine R&D results from National Project, which owns fully self-determined property right. It integrates all kinds of characteristics of current world popular generator types. We insist on unceasing improvement on technology and good after service. "Ensure reliability and high efficiency" is our aim.

HS-1.5Mw70-II and **HS-1.5Mw77-III** are specially designed for low and middle wind speed. IEC II / IEC III wind turbine, rated power: 1.5Mw, rotor diameter: 70mm and 77mm, rated wind speed: 12.5M/s, 11.5M/s. It's your best choice for high power output, sufficient spare parts and convenient maintenance.

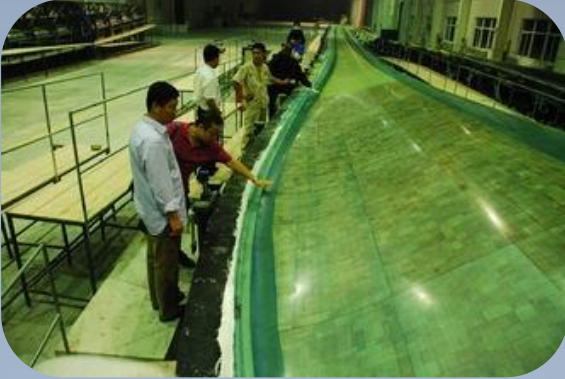
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WIND BLADE



The wind blades are produced by vacuum forming technology. In the world's, the production of large-scale wind generator, the vacuum forming technology is the most advanced technology, our company developed and mass production in the wind blades, the wind blades have been successfully mastered the vacuum forming technology.

Compared with the hand-coating method, the wind blade tensile strength increased 13.8%, modulus increased 20.8%, including plastic dropped 6.91 percent (data compared with 750W or more), not only improve productivity, and greatly enhanced the stability of the manufacturing quality of the wind blade.



The wind blade performance test was to evaluate the important parameters of product quality.

Based on the German Lloyd Outline Standards and product testing requirements, we have a full set of design of manufacturing and procurement of laboratory equipment. The main equipment data acquisition equipment, vibration fatigue test equipment, Dynamic Signal Analyzer, bolts and other sets of tensile test equipment.



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Variable Speed Constant Frequency WTGS's advantage is that it can sufficiently take wind power to generate more electricity. This is also the characteristic that HS-1.5Mw Series Double-Fed Asynchronous WTGS has.

When asynchronous generator rotor works within the certain upper and lower range of synchronous speed, WTGS can run under the state of electricity generation: both ends feedback electricity – generator stator winding directly feeds electricity to grid; when rotor speed is lower than synchronous speed, rotor absorbs electric energy from grid through transducer to proceed AC excitation; when rotor speed is higher than synchronous speed, electric energy is transmitted to grid after rotor winding current adjusted and controlled by transducer. Rotor power flows to both directions, and leads to decouple control of active power and reactive power of generator.



HS-1.5Mw Series WTGS adopts pitch type driven by three blades separate generator. It's safe and reliable for simple structure, and is convenient for maintenance.

HS-1.5Mw Series WTGS's yaw system adopts preload damping device; high speed brake adopts active type to simplify whole machine structure and promote operation dependability.



General Parts

Rotor

It consists of three glass fiber reinforced epoxy resin blades, cast steel hub, pitch bearing, three separated electro motion pitch structure with its distribution box for power adjustment and brake. It is manufactured by our company with German technology, German mold and GL Certification.

Gearbox and Bearing System

It lubricates compulsively. The gearbox, consisting of I plant teeth and II parallel teeth, transmits rotor torque to the generator through main axis and bearing connected to hub and through high speed coupling.

Generator and Converter

Reinforced Air-cooled Double-Fed Generator's rotor connects to grid through four quadrants bidirectional power current transducer, to operate variable speed constant frequency adjustable power factor. There are three choices for customers: Alstom, ABB and Self-R&D.

Yaw System

It consists of return support with ring gear and motor. Located on the top of nacelle, rawinsonde monitors the wind direction, after its information treated by central control system, it sends out instruction, and yaw structure changes wind turbine direction subsequently.

Control System

It adopts CMP (Multi-processor) controller so that wind turbine can operate functions of self-adjustment, grid monitoring, safeguarding, shut down when there's a fault, running datum collecting and processing, limit-exceeding alarm, display and printing.

Lightning Prevention and Earthing

From blade tip, hub, nacelle foundation, tower, to base earthing net, they all have the good electric connection to satisfy requirement of relevant international lightning prevention and over-voltage protection.

Tower

Height 63m/78m, steel conic profile, corrosion protection treatment on inner and outer surfaces, connected by bolt with base or with pre-burying base ring.





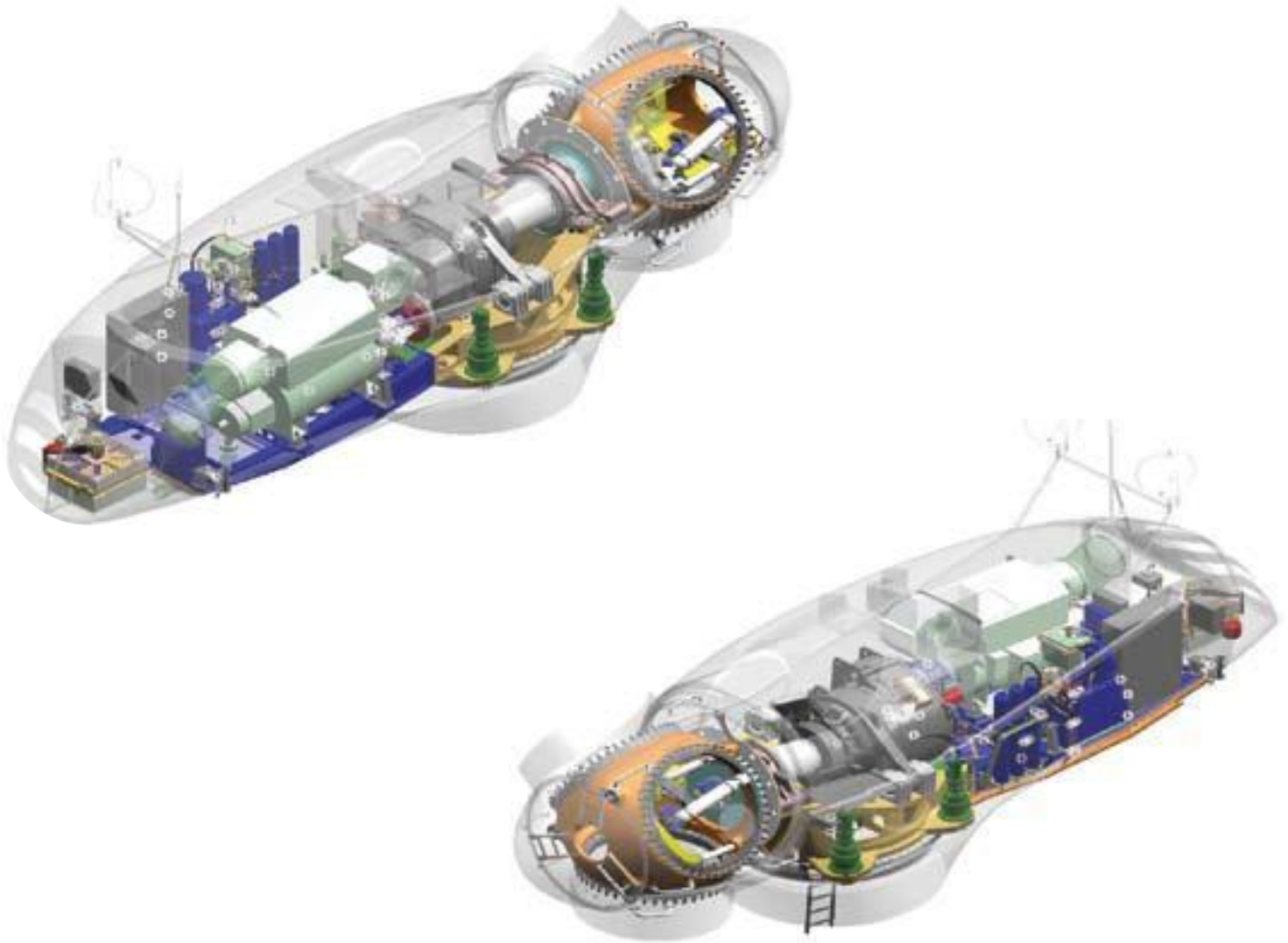
Technical Data

Model	HS-1.5Mw70-II	HS-1.5Mw77-III	HS-1.5Mw70-II Power Curved	
Number of blades	3	3	Wind Speed (m/s)	Power (Kw)
Blade length	34.5	37.5	4	39
Rotor speed	10-20rpm	11-18rpm	5	101
Rotor Diameter	70m	77m	6	203
Sweep Area	3904	4657	7	345
Cut-in Speed	4m/s	3m/s	8	521
Cut-out Speed	25m/s	21m/s	9	748
Power Regulation	Pitch	Pitch	10	1028
Rated Wind Speed	12.5m/s	11.5m/s	11	1301
Survival Speed	59.5m/s	52.5m/s	12	1475
Weight	27t	30t	12.5	1500
Gearbox			13	1500
Type	Combined Planetary and Spur Gear		14	1500
Gear Ratio	1:90	1:100	15-25	1500
Weight	16t	16t		
Generator				
Type	Air-Air-Cooler Double-Fed Asynchronous Generator		HS-1.5Mw77-III Power Curved	
Power	1500Kw	1500Kw	Wind Speed (m/s)	Power (Kw)
Voltage	690V	690V	3	20.6
Speed	1110-1810rpm	1110-1810rpm	4	71.5
Converter	Bidirectional Four Quadrants IGBT Converter		5	151.9
Endsoure class	IP55	IP55	6	270.5
Weight	6.8t	6.8t	7	436.1
Yaw system			8	645.6
Yaw bearing	Externally Gear Four Point Bearing		9	937.9
Brake	Preload Damping Brake		10	1279.9
Yaw Driven	Four Induction Motors		11	1486.7
Speed	0.6"/s	0.6"/s	11.5	1500.4
Control System			12	1500.4
Type	Microprocessor	Microprocessor	13	1500.4
Function	Start Up, Shut Down, Protect, Communicate, Record, Alarm		14	1500.4
Method	Local Monitor, Central Control		15-25	1500.4
Grid Connection			Compute upon air density of 1225Kg/m3, IT ≤ 10% (for the design of power curve)	
Grid Voltage	Step-up Voltage 690/10KV or 35KV			
Grid Frequency	50Hz	50Hz		
Power Factor	-0.96 ~ +0.96			
Hub Height	65m	80m		
Tower Height	85t	110t		
Total Weight	165t	205t		



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