



东方电气
DONGFANG ELECTRIC

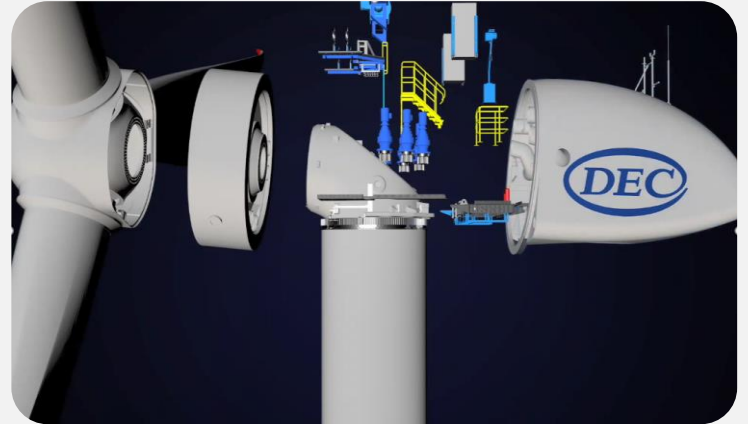
DEC 4~6MW Large Capacity WTG

Dongfang Electric Wind Power Co., Ltd.

2020.11

Features & Advantages of DEC Direct-drive Technology

- Gearless, outer rotor PMG, no excitation loss, proven technology;
- Simpler and more compact mechanical structure, shorter drive chain, low operating speed, no high-speed components;
- Matured control strategy enables the WTG capturing more wind energy with optimal C_p value, better efficiency especially in low wind speed condition;
- Lower O&M costs;



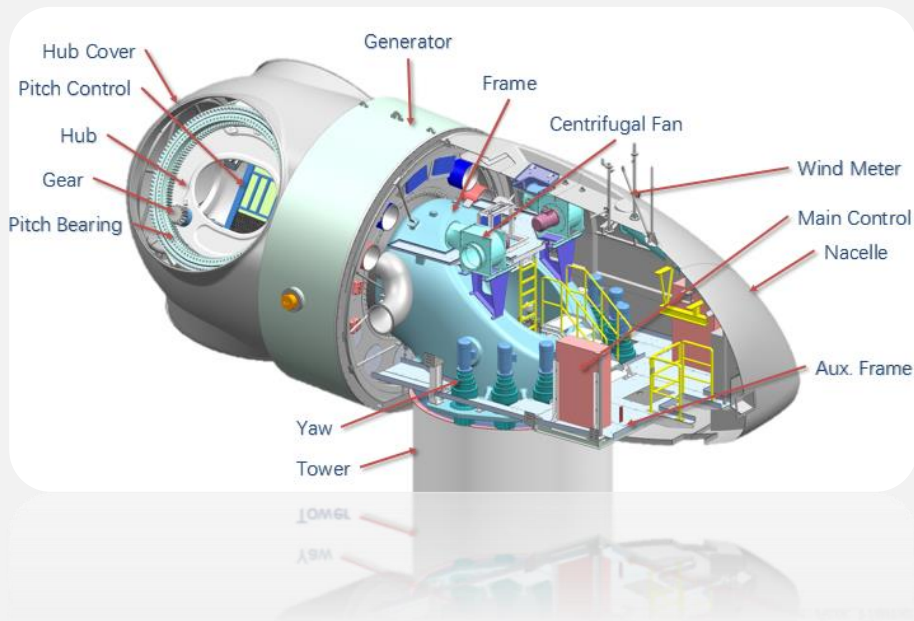
DEC 4.X—Top 3 Best Onshore Turbine of 2019 Globally



TOP TEN TURBINES 3.5MW+

Model	IEC class	Power rating	Drive	Hub height	Rotor diameter	Noteworthy
Vestas V150-5.6MW EnVentus (Denmark)	S (up to 8m/s)	5.6MW	MSG-PMG	TS to 125m, LDST to 166m	150m	Groundbreaking next-generation modular platform propels medium-speed geared technology into the onshore-volume mainstream. V162-5.6MW variant to launch in 2020
Enercon E-138 EP3 (Germany)	S (based on IIB)	3.5MW	DD-EESG	80m-160m (5 options)	138.25m	Main EP3 model; radical technology transformation – novel three-module design with segmented 690V “form-coils” generator; huge head-mass reduction
Dongfang D4200-155 (China)	IIIA	4.2MW	DD-PMG	90m-145m, site-specific	155m	Key model in 4MW platform series; 223W/m ² ; prototype operating since early 2019, plus five pre-series units; in-house outer-rotor PMG and blades
Goldwind GW155-4.5MW (China)	S (based on IIB)	4.5MW	DD-PMG	90m, 110m, 140m	155m	Prototype installed in June 2019; 238W/m ² ; Goldwind claims 3,350 full load hours at 7.5m/s mean wind speed; builds on proven 4S platform; around 700 orders
Nordex N149/5.X (Germany)	S	5MW plus	HSG-DFIG	TS 105-125m, CSH 164m	149m	Enhancement of N149/4.0-4.5MW first seen in 2018 with site-specific flexible power ratings; N149/5.X launched in March 2019; N155/4.5 and N163/5.X in development
Siemens-Gamesa SG 5.0-145 (Spain/Ger)	IIB	4.5-5.0MW	HSG-DFIG	90m, 127m, site-specific	145m	Second enhancement of SG 4.2-145 (2017) and SG 4.5-145 (4.2-4.8MW); in-house designed 71m blade; 2.2GW order intake in 2019; SG 5.8-155 and SG 5.8-170 announced
Ming Yang MYSE4.0-156 (China)	S	4.0MW	MSG-PMG	n/a	156m	Prototype installed in 2019; 209W/m ² ; around 325 units planned for giant (6GW) Chinese project; major evolution and scaling-up of original SDC technology
GE 5.3-158 Cypress (US)	S	5.3MW	HSG-DFIG	101m, 121m, 151m, 161m	158m	Prototype installed in March 2019, following initial 4.8MW unit; advanced segmented C&GFRE blades with varying tip lengths; many technical details still under wraps
Vestas V150-4.2MW (Denmark)	IIIB/S	4.0-4.2MW	HSG-IG	LDST, site-specific	150m	The largest and probably the last development of 3MW platform introduced in 2010; according to Wood Mackenzie the most-ordered turbine of 2019 – 4,771MW
Vestas V136-3.45MW (Denmark)	IIB, IIIA	3.45MW	HSG-IG	82-166m, site-specific	136m	Part of Vestas 4MW platform; ongoing enhancement to V136-3.45MW mean it is now also available for medium-wind IEC IIB; order intake in 2019 of more than 3.2GW

4.XMW Direct-drive Series



World leading design concept

- Direct Drive + PMG + Full Power Converter
- Compact structure, shorter drive chain, higher reliability
- Less rotating parts, lower rotating speed and less spare parts lead to higher reliability, relatively lower O&M cost
- Customized for Medium and High Wind Speed Area
- Applicable for 7.5m/s~8.5m/s wind condition
- **720+** Units by November,2020

4.XMW Direct-drive Series

	D4000-148	D4200-155	D4500-155
WTG Type	Direct-drive permanent magnet		
Rated Power	4.0MW	4.2MW	4.5MW
Rotor Diameter	148m	155m	155m
Cut-in Wind Speed	2.5m/s	2.5m/s	2.5m/s
Rated Wind Speed (Steady)	10.25m/s	10.3m/s	10.5m/s
Cut-out Wind Speed	20m/s	25m/s	25m/s
Survival Wind Speed (3S)	52.5 or 59.5m/s	63m/s	63m/s
Hub Height	93.5m~145m or site specific		

5.5~6.0 MW Direct-drive Series



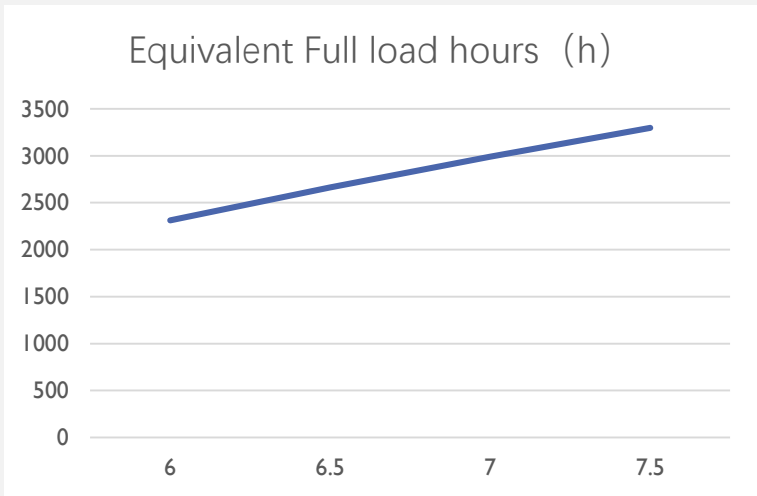
World leading design concept

- Direct Drive + PMG + Full Power Converter
- Bigger Rotor: 164/172m
- Larger Capacity: 5.5~6MW
- Compact structure, shorter drive chain, higher reliability
- Less rotating parts, lower rotating speed and less spare parts lead to higher reliability, relatively lower O&M cost
- Customized for Medium and High Wind Speed Area
- Applicable for 5.5m/s~9+ m/s wind condition

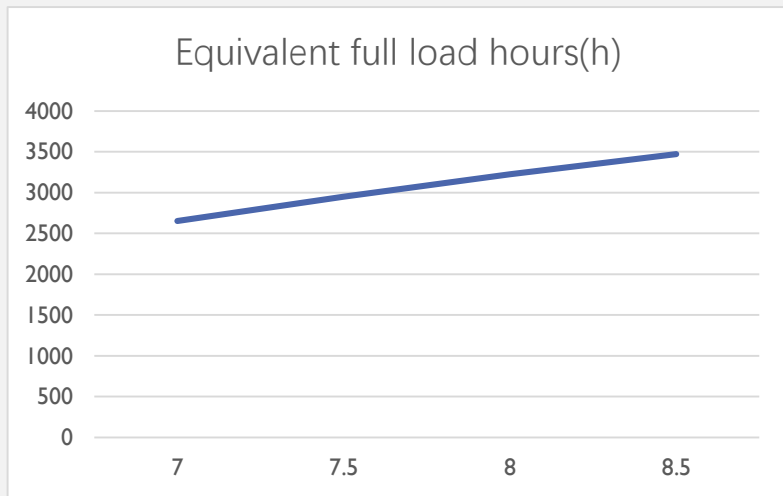
5.5~6.0 MW Direct-drive Series

	D5500-172	D6000-164
WTG Type	Direct-drive permanent magnet	Direct-drive permanent magnet
Rated Power	5.5~5.8MW	6.0 MW
Rotor Diameter	172m	164m
Cut-in Wind Speed	3m/s	3m/s
Rated Wind Speed (Steady)	11m/s	12m/s
Cut-out Wind Speed	22m/s	22m/s
Survival Wind Speed (3S)	59.5m/s	59.5m/s
Hub Height	100m~160+m or site specific	100m~160+m or site specific

5.5~6.0 MW Direct-drive Series



D5500-172 DD WTG



D6000-164 DD WTG

THANK YOU!

