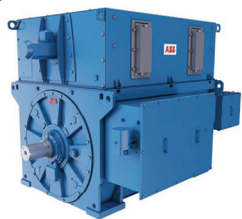


ABB GENERATORS

ABB HAS DELIVERED OVER 35,000 GENERATORS FOR WIND TURBINES DURING THE PAST 30 YEARS, CORRESPONDING TO ABOUT 30 GW OF POWER.



DOUBLY-FED GENERATORS

- ★ Mainstream DF concept allows for a small generator size
- ★ Small converter (1/3 Pn) allows for high system efficiency at nominal speed
- ★ System satisfies basic grid code requirements
- ★ ABB has delivered DFIG generator designs since 1997



HIGH SPEED PERMANENT MAGNET GENERATORS

- ★ Full converter concept enables small size and high efficiency at all speeds
- ★ All generated power goes through converter to offer full variable speed operation and advanced grid code compliance
- ★ ABB has delivered HS PMG designs since 2003



MEDIUM SPEED PERMANENT MAGNET GENERATORS (MS PMG)

- ★ Compact, slower speed solution offering highest efficiency with low maintenance
- ★ ABB produced first MS PMG Multibrid-type design with the turbine main bearing and PM generator in single-stage gearbox in 2000



DIRECT DRIVE GENERATORS

- ★ Turbine and generator integrated to form compact and structurally integrated unit
- ★ Design allows free access to all parts for easy installation and maintenance
- ★ Minimum wear, reduced maintenance requirements, lower life cycle costs and a long lifetime



HIGH SPEED INDUCTION GENERATORS

- ★ FC concept can be realized with asynchronous squirrel cage induction generators (SQIG)
- ★ SQIGs offer robust conventional technology with good efficiency and small size
- ★ ABB has been the leader in converter duty applications for over 30 years

