Service note
Replacement doubly-fed generators for wind power

To ensure availability, most wind turbine builders source important components like generators from a number of vendors. ABB replacement generators are built to customer specifications and are fully interchangeable with the original units – no matter whether the original was from ABB or another manufacturer. Reliable ABB replacement generators boost the overall performance of the turbine and ensure continuous power production with the highest efficiency.

Repair or replacement?

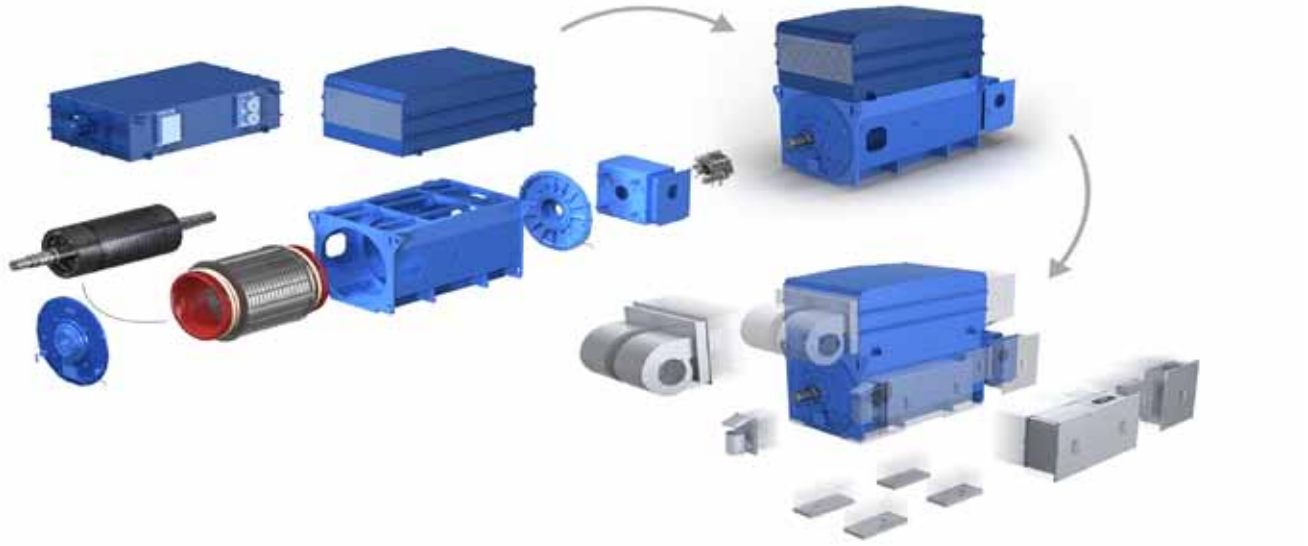
Repairing an existing generator may look like a cheaper option than purchasing a replacement unit. An analysis of the relative costs and benefits over the long term, however, show that replacement is actually a more cost-effective solution.

ABB's replacement generators use advanced materials for the main components, for example, providing higher efficiency. This can boost the overall performance of the turbine. By contrast, rewinding the existing unit results in a further reduction in efficiency and only rarely restores the generator to its original – by now outdated - performance level.

Replacement generators for doubly-fed concept

ABB's new standard doubly-fed (DF) generator platforms are designed to fit most turbine types. The majority of DF turbines are rated from 1.5 to 2 MW.

The DF generator is a wound rotor asynchronous machine, where the rotor windings are connected to a small converter via slip rings and brushes. The generator feeds power both from the directly connected stator (approx 2/3 of nominal power) and the rotor (1/3). Grid codes require a reactive power feed from the generator, which leads to high currents and temperatures. In addition, the use of a converter causes high voltage peaks.



Technical advantages

The generator must operate reliably for more than 20 years, even after sudden high overspeeds during gusts. The main components are the rotor and slip ring unit.

The winding-end support is one of the most important aspects of the rotor. It must be strong enough to secure a long lifetime even after sudden high overspeeds, but it must also allow for efficient cooling when maximum reactive power is produced. In addition, the use of a converter sets great demands on the rotor winding insulation in terms of high voltage peaks. The new ABB carbon-fiber winding-end support rings can withstand overspeeds up to 3000 rpm and the increased insulation level (2.5 kV) offers high voltage peak integrity and thus provides an easy match with most of the converters used in turbines.

The generator needs a reliable slip ring unit to feed power from the rotor via a converter. This involves high currents and high temperatures, so efficient cooling is a must. Other factors in designing a reliable unit are the correct material selection between the slip ring and the brushes, efficient dust removal and easy servicing. In fact, optimized airflow is one of the most important factors for the reliable functioning of the unit. ABB's proven slip ring unit is based on more than half a century of in-house expertise.

Earthing brushes do not fully prevent the formation of bearing currents. The higher speed designs now used in power electronics mean that previously used methods are no longer sufficient. ABB therefore uses a special end shield with a new type of insulation in its DF generators. Our robust solution allows the use of standard bearings, which are easily available.

Life cycle management

ABB's global presence through its worldwide organization and network of selected partners provides systematic life cycle management with services that maximize production, availability, reliability and performance.

The local authorized service network with over 5,000 field service engineers in more than 100 countries ensures efficient response to service needs, wherever customers and their turbines are located.

Unrivalled experience in wind power applications

ABB has been making motors and generators for demanding applications since 1889. Over the last 30 years it has supplied 30 000 generators to the world's leading wind turbine manufacturers, making it the largest global supplier of wind power generators. Leading wind turbine manufacturers rely on ABB's proven technology for all drive train types.

ABB has built up application-specific expertise and optimized its direct drive, medium and high speed generators for wind power. Tried and tested products together with local support make ABB the ideal partner for turbine users looking for a reliable source of replacement generators. ABB replacement generators will ensure that your turbines achieve the maximum possible availability and production.

For more information please contact:
www.abb.com/motors&generators

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