

TECHNOLOGY OFFER

MACHINE AND PLANT CONSTRUCTION

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ADJUSTABLE SLATS FOR WIND TURBINES

Slat optimizes airflow at the main rotor (UOL128)

THE PROBLEM

In Germany, wind power currently has the highest ecological and economic potential of all renewable energy resources employed. One limitation of its use ensues from the necessity to adjust to steadily changing wind conditions. Short-term turbulences have an impact on the efficiency of a wind turbine generator, because the huge mass of the rotor blades does not permit the usual rotor blade adjustment machinery to react fast enough. In order to prevent a stall, the rotor blades work with a lower pitch angle than would be theoretically possible, given a constant wind strength. In addition, turbulences subject the mechanical components, especially the transmissions and bearings, to a lot of strain. The necessary maintenance and repair work produces high costs, particularly in the offshore sector.

THE SOLUTION

Researchers at the University of Oldenburg have developed a slat for wind turbine generators which is mounted parallel to the main rotor blade and is considerably smaller in its size and mass than the main blade. The core piece of the invention is the adjustable pitch of the slat. The slat's pitch as well as its distance to the main blade can be swiftly adjusted to actual wind variations by means of a control unit or adaptive mechanics, thus assuring an optimal airflow at the site of the main rotor. The slat adjustment unit is able to consider the position of the main blade, the actual rotor rotation speed, and the actual wind speed. A purely mechanical adaptive pitch adjustment is also in a state of planning.

In order to achieve a higher spatial adaptation to inconsistent wind conditions the length of the slat is divisible in separately controllable segments, a feature which markedly increases the efficiency of the entire wind turbine generator.

At present, fully developed theoretical calculations are available. The further development takes place in the scope of a research project focusing on the subject of intelligent rotors (smart blades). A wind tunnel is also available for further experiments.

ADVANCES AND APPLICATIONS

- Prevention of sudden load impacts on the mechanical parts of the generator
- operation of the main blades in a higher pitch angle
- Individual control of each slat
- Longer service life and less wear of mechanical parts due to lower loads
- Less standstills due to lesser susceptibility and thus lower operation costs
- Increased efficiency due to higher pitch angles of the main rotor

FIELD OF APPLICATION

Offshore and onshore wind farms

KEYWORDS

Smart blades, intelligent rotor blades,
wind turbine generators

PROPERTY RIGHTS

DE application
DE 10 2010 027003 A1

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AN INVENTION OF

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