Advanced integrated product development of variable rotor systems for future wind turbine generations

(Acronym: HIT rotor systems)

Project description

Manufacturers of wind turbines are faced with the challenge of having to meet global market requirements quickly and concretely even more in the future in order to be able to offer competitive wind turbines. This requires a wide range of variants with individually adaptable properties, that takes into account the legal and political framework conditions, customer requirements and optimum economic utilization. However, a large number of variants results in very high costs, especially in the area of wind turbines rotors. In the future, wind turbine manufacturers will need new processes and methods to achieve a significant improvement of the previous design practice. In particular, new strategies for a model-based design and a design of rotor systems across variants are needed.

The aim of the project is to develop and validate highly integrated design and layout methods for variable rotor systems and their demonstration on the basis of a real rotor development. The main focus will be on the key component that is the rotor blade which allows a cross system coupling between hub and blade bearing. This should make it possible to react faster with greater efficiency and flexibility to the market requirements in the future.

Using numerical simulation techniques, the BIK institute will support the above mentioned design and lay out methods through the development of new and innovative production processes and their simulations. The focus is specifically laid on the spar cap and transition between rotor blade and rotor hub. With the necessary materials and processes, these two components are investigated and digitally mapped in a numerical simulation. Along with this, their behaviour to achievable geometries of the rotor blade surface is determined simulatively and validated experimentally. The goal is to complete the triangle between the structural design, aeroelastic design and quantitative determination of design and manufacturing parameters

Project partner

Nordex Energy SE & Co. KG

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

© Aljoscha Sander

Institute for Integrated Product Development
University of Bremen

Prof. Dr.-Ing. Klaus-Dieter Thoben
Badgasteiner Straße 1
D-28359 Bremen

Fon.: +49 421 218-50005

Administation (Prof. Thoben):
Fon.: +49 421 218-50006
Fax: +49 421 218-50007

Suppored by:

Bundesministerium für Wirtschaft und Klimaschutz

on basis of a decision by German Bundestag