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Development of an innovative rotor blade for wind turbines with integrated lightning protection

Novelty:

The development concerns an effective lightning protection for a newly designed rotor blade for wind turbines in the small and medium capacity range to capture and conduct the electricity/ surge of the direct flash discharge. The improvement of the safety properties of rotor blades allows wind turbines to get closer to developed and to public areas. The development makes the permanent operation of wind turbines at those places more efficient and secure.

Project objectives:

- Optimisation of the blade geometry,
- Wind turbine with three blades of the 5 kW class,
- Length of the rotor blades up to 5 m,
- Integrated lightning protection with air-termination stud,
- Time saving in production up to 50 percent,
- Mass reduction by using lightweight construction up to 20 percent, Preparation for certification.

Innovation:

- Development, testing and market launch of a new process for lightning protection
- Improvement of the safety-related properties of rotor blades and their permanent, quiet operation
- The use of the effective lightning protection system allows wind turbines to get closer to developed and public areas and to work there more efficient and secure.

Gefördert durch:
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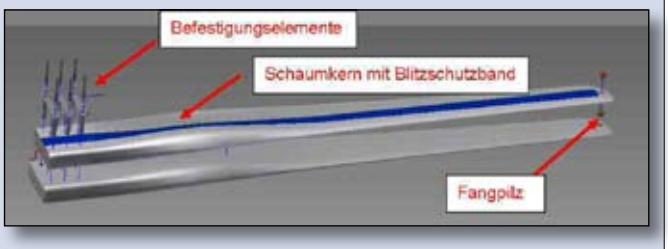

Technical risks:

- Novelty of the product, insufficient modelling of individual components.
- Use of lightweight construction with fibre-reinforced plastics for weight-reduction.
- Consideration of mechanical, aerodynamic and strength-related requirements by implementation of lightning protection measures into the rotor blade.
- Development of rules and standards.

The project was funded by the BMWi – Zentrales Innovationsprogramm Mittelstand ZIM, which provides support for developing innovation in medium-sized companies in Germany. It was developed within the ZIM NEMO network "LeiFak" lightweight construction with fibre-reinforced plastics of the TGF Schmalkalden/ Dermbach GmbH as an important innovation.

Team of inventors:

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- Dr.-Ing. Michael Naß, CE-LAB GmbH, Ilmenau
- Prof. Dr.-Ing. Thomas Link, FH Nordhausen

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