ReliaBlade 2

Publieke samenvatting / Public summary

Aanleiding

Wind turbine rotor blades are rapidly increasing in size and a fast succession of new blade models is entering the market. There are issues however with the durability of large rotor blades and new failure mechanisms are being observed. This is an industry wide issue, with major implications for blade manufacturers and windfarm operators. Advancementsin modelling, condition monitoring techniques and data analytics, often related to Industry 4.0, allow the creation of a digital twin of the rotor blade. The challenge is to characterise the failure mechanisms accurately in the structural model, estimate the remaining useful life, and use this information effectively in the operation and maintenance of offshore windfarms. The project described in this proposal builds upon the developments of the ReliaBlade 1 projects run in Germany and Denmark and leverages a multinational collaboration with leading research institutes and industry from Germany, the UK, Denmark and Greece to improve the reliability of wind turbine blades.

Doelstelling

The objective of the project is to improve the reliability of wind turbine rotor blades by monitoring the structural health of the blades throughout the lifetime. A digital twin framework is developed, fed by measurements from blade-mounted sensors, to get an updated understanding of the structural state and remaining useful life of the blade. This will reduce the chances of blade failure, as inspections and preventive repairs can be planned before catastrophic blade failure occurs

Projectinformatie / Project information

Projectnummer / Project number
HER+23-03534832
Subsidiebedrag / Grant amount
€ 5.796.927,00

Algemene informatie / General information

Penvoerder / Secretariat
Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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Korte omschrijving

The project is split in 4 work packages. The first work package, WP2, is starting on the material and coupon scale by characterising and predicting thick adhesive bondline failure and delaminations. In WP3, measurements are conducted at various scales: a torsion box as sub-component of the blade, a full-scale blade and three operational turbines. These experiments will be used for validation of the digital twin models that are developed in WP4. Finally, in WP5, maintenance decision support tools are developed to support the operator in planning inspections and repair of rotor blades using the information from the digital twin. The project consortium comprises knowledge institutes, a wind turbine and blade manufacturer, sensor technology providers and an offshore wind farm operator, representing different positions across the value chain to mature the digital twin innovation.

Resultaat

The main result of this project will be a structural digital twin framework for probabilistic remaining useful-life-prediction of WTG rotor blades in operation. The validation of the methodology is performed using the data captured from the experiments in the lab and the field. A transition towards a preventive maintenance regime can be made by windfarm operators using the decision support tools that are developed in this project.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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