

X-Twin: Bladelife Structural surveillance

Publieke samenvatting / Public summary

Aanleiding

Wind turbine blade inspections are essential for detecting blade defects early in order to conduct optimized turbine maintenance. Those inspections however, are labour intensive and expensive endeavors. This has led to a rapid adoption of drone inspections utilizing visual sensors. These drones are however unable to completely replace the current standard as they are unable to detect sub-surface defects within turbine blade materials. Therefore, wind turbine blades still need to be inspected every year by rope-access crews in order to detect sub-surface defects. These inspections result in significant lost revenue due to turbine downtimes, labour and vessel costs and expose technicians to dangerous conditions. To make the detection of sub-surface defects using drones possible, SpectX is currently developing an aerial inspection system capable of making X-ray images of wind turbine blades. These X-ray images are then analyzed using AI image processing for rapid defect detection. SpectX has been collaborating with TNO to integrate detected defects into an advanced Digital Twin model capable of predicting remaining blade lifetimes using real-time wind turbine data.

Doelstelling

In this project SpectX will develop aerial mission plans for inspecting the TIADE research turbine, and it will collect data on this turbine to train their AI models. As part of this project TNO will create approaches that allow the digital twin system to identify priority areas for inspection and methods to validate that all relevant defects have been found. TNO and SpectX will collaborate to develop

Projectinformatie / Project information

Projectnummer / Project number

EKOOELEK24-03731712

Subsidiebedrag / Grant amount

€ 499.781,00

Algemene informatie / General information

Penvoerder / Secretariat

SpectX B.V.

Volg Topsector Energie op X / Follow Topsector Energie on X

@TSEnergie

communication protocols and standards that allow the digital twin to direct the drones to targeted areas. SpectX will develop systems that can convert the targeted inspection instructions into mission flight paths and improve AI defect detection and classification. The whole system will then be demonstrated on the TIADE research turbine. Additionally SpectX will further develop their defect detection software to work on new generation wind turbine material. GE joins the consortium to provide expert knowledge on wind turbine blade defects and provide access to the TIADE turbine.

Korte omschrijving

While the SpectX system is capable of replacing the need for rope access inspections; the inspections remain a time-consuming process especially when compared to aerial visual inspections. In order to reduce inspection times, the consortium will develop a targeted inspection strategy utilizing the predictive capabilities of the digital twin. The digital twin will predict potential blade problem areas based on various data sources (SCADA) and instruct the drones to inspect those areas, the drones then feed the inspection data into the digital twin to assess whether the suspected defects have been found and the inspection can be concluded. This reduces inspection times and creates a feedback loop with which the digital twin can continuously improve its predictive capabilities.

Resultaat

Following completion of this project the TNO digital Twin and SpectX inspection system can collaborate to conduct targeted wind turbine blade internal defect inspections. This will reduce inspection times thereby reducing down-time, vessel and manpower costs per inspection while ensuring inspection effectiveness. This will offer a cost effective approach for inspecting wind turbines of all sizes including the latest generation turbines such as the Haliade X with turbine blade lengths exceeding 100 meters. With the innovation of the consortium sustainable wind energy will become more cost efficient due to effective inspection and maintenance strategies, all while keeping costs and

risk to a minimum.

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

Voor meer informatie over de Topsector Energie, ga naar www.topsectorenergie.nl.

Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar www.rvo.nl/tse.