Case Study

BLADEcontrol Delivers Timely Monitoring on Blade Structural Health

Customer challenge

EDF power solutions (EDF), a leader in the generation of low-carbon electricity and builder, owner and operator of T&D lines globally, was interested in advancing their wind blade monitoring capabilities for potential blade damage in their fleet of Senvion MM92 turbines.

Scheduling crane usage can be costly and disruptive to operations, so having a more proactive and discrete blade monitoring solution would allow them to identify potential cracks. Most importantly, EDF would be able to monitor the progression and rate of crack propagation and severity so that maintenance and crane servicing could be scheduled at the appropriate time for maximum implementation and savings.

Solution/trial overview

BLADEcontrol is a condition monitoring system using dual-axis accelerometers in the turbine blades to detect changes in vibrational response correlated with common damages and structural health issues. BLADEcontrol was installed, beginning in April 2024, to provide high-resolution vibration data throughout a trial that described the structural health of MM92 turbine blades. The BLADEcontrol system was installed by EDF power solutions.

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A specific H-Crack (see Figure 1) damage near CoG, previously identified with aerial imagery, was able to be confirmed at the onset of the trial by using BLADEcontrol’s advanced condition monitoring system. At the onset, a negligible crack growth was detected and over the ensuing months, the BLADEcontrol system was used to detect any progression of the crack and accurately measure the natural frequencies associated with this damage

Proactive monitoring, prioritized repair

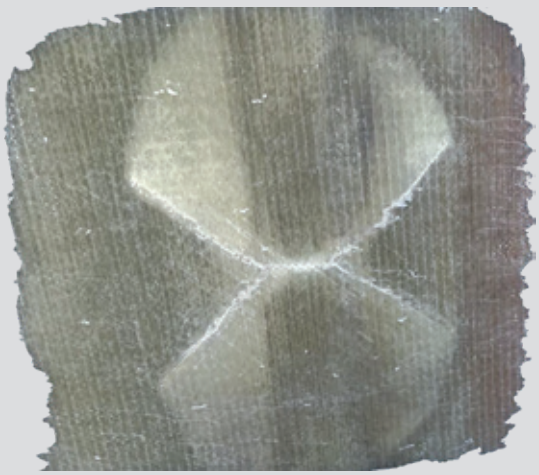

Figure 1: Image of H-Crack near CoG.

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type. The data is processed in both the time and frequency domains to discover Eigenfrequency trends and perform Signal Energy Analyses.

With ongoing monitoring and reporting over a one-year period from April 2024 to April 2025, BLADEcontrol was able to keep the EDF power solutions team informed so they could continuously assess the state of the crack and then carefully plan maintenance at a time that fit their optimal schedule.

> *Once the repair was scheduled and completed, the signal energy returned to normal levels and the natural frequencies aligned with the expected peaks associated with an undamaged LM45.3m blade (see Figure 2).*

Benefits

The ability of BLADEcontrol to detect damage at the onset while simultaneously tracking the rate of crack progression allowed EDF power solutions to reduce unplanned downtime, maximize uptime and streamline operations to enhance profitability. Additionally, post repair data clearly shows a 4X reduction in signal energy on the affected blade, confirming the repair was done properly and resulted in the expected outcome.

> *Weidmuller BLADEControl is a robust system design with solid enclosures, high-quality components with built-in protection systems, and comprehensive documentation. Though the wired sensors required specialized in-blade labor during installation, the outcome was a system that produced high fidelity data coupled with high data availability throughout the trial period. The mature data visualization platform for data monitoring and alerting allowed EDF power solutions to follow the damage evolution throughout the blade repair campaign.*

Phil Gauthier, EDF power solutions,
Sr. Manager, Wind Technology Strategy

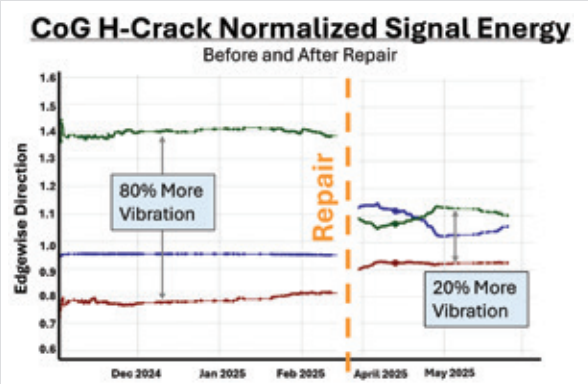

Fig. The Normalized Signal Energy bandwidth decreased almost 4x after the H-crack repair.

Figure 2: The normalized signal energy displayed on our WebVis Dashboard returned to typical levels after the H-crack was repaired in March 2025.

Project Overview

Project	Detect spar cap damage and monitor damage growth in California
Customer	EDF power solutions
Solution	BLADEcontrol condition monitoring system with WebVis
Scope	Condition monitoring of wind turbine blades

Project Teams

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