When Nobody Knew: How Continuous wind turbine blade health monitoring, Windrover, detected hidden blade damage in Just 21 days

Wind turbine blade damage rarely appears overnight. In most cases, it develops gradually and remains unnoticed until a scheduled inspection identifies the issue or until it has already progressed into a costly repair.

While periodic drone and rope inspections remain an essential part of blade maintenance, they only provide a snapshot of the asset's condition. What happens between inspections often remains unknown.

This real-world case demonstrates how Werover's continuous AI-powered acoustic monitoring, Windrover, identified a critical blade defect that had gone completely unnoticed at the time of installation, allowing the operator to intervene before the damage progressed further.

The Challenge

When the monitoring system was installed, the operator had no indication that any turbine required immediate attention.

There were:

- no active alarms,
- no ongoing blade repair activities,
- no maintenance requests related to structural blade damage,
- and no visible signs suggesting a critical issue.

From an operational perspective, the fleet appeared healthy.

Continuous Monitoring

Following installation, the monitoring system continuously analysed the acoustic behaviour of every blade around the clock.

Only **21 days** later, the Windrover detected an abnormal acoustic signature indicating a **CAT4–CAT5 structural anomaly**, triggering an immediate recommendation for further inspection.

Independent Validation

Based on the alert, the operator arranged a drone inspection.

The inspection confirmed severe bonding line damage in a critical structural region of the blade. The turbine was immediately taken out of operation and repaired during the same maintenance visit.

More Than Early Detection

The value of continuous monitoring extended beyond identifying hidden damage.

Because maintenance teams were already mobilised, the operator combined additional planned maintenance activities into the same intervention. This reduced unnecessary site visits, avoided additional mobilisation costs, and improved maintenance efficiency across the fleet.

A Shift Towards Predictive Maintenance

This case highlights an important evolution in blade maintenance strategies.

Periodic inspections remain indispensable, but they cannot provide continuous visibility into blade condition. AI-powered acoustic monitoring complements existing inspection methods by continuously monitoring structural behaviour, identifying anomalies as they emerge, and enabling operators to prioritise inspections based on actual blade health rather than fixed inspection intervals.

Conclusion

This case illustrates how continuous blade health monitoring can reveal structural defects that would otherwise remain undetected between scheduled inspections.

Rather than replacing conventional inspections, AI-powered acoustic monitoring provides an additional layer of continuous intelligence helping operators detect hidden damage earlier, validate findings through targeted inspections, and make maintenance decisions based on real-time blade condition.

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