

Case study

Delivering foundations for the future



Use existing drivetrain CMS



Future-proofed wind assets



Live data with 12 month view

Background

Our client is a worldwide owner of renewable power and climate transition assets, with a large ownership interest in wind farms.

Challenge

Multiple foundation issues

Based on gaps found (figure 1) under the bearing plate on one of the foundations, the client identified damage to the anchor foundations of one turbine. They also suspected risk of further damage to other foundations on the site.

Turbines offline with no root cause

The turbine was shut down until repairs were made due to the extent of the damage identified. And since there was no clear root cause, the client knew they required a monitoring strategy to warn them of future damage to the site's foundations.

Need for a proactive strategy

To develop a proactive monitoring strategy and prevent future production loss, they turned to ONYX.

Solution

Diagnosing the Root Cause

Firstly, our engineering team conducted a visual inspection of the client's farm, selecting two turbines to test – the turbine with confirmed faults, and another control turbine presumed to be healthy.



Figure 1: Gap in bearing plate

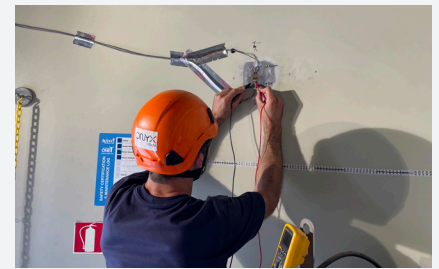


Figure 2: Strain gauges

ONYX engineers installed strain gauges (figure 2) and inclinometers on the two turbines. In addition to this, our team collaborated with the client's site team to install ecoCMS, our advanced sensing solution, across a total of five turbines to acquire a comparative data set.

At a mere fraction of the total cost of the project, ecoCMS is a cost-friendly solution that transforms your wind farm into a powerful data platform. Once a repair contractor visited to fix the known damaged foundation, ecoCMS data identified that there were anchor tension issues on a number of turbines.



Utilising drivetrain CMS for foundations will **revolutionise the industry's approach** to monitoring, delivering rich understanding of an entire fleet with very little additional cost. Extending the **life of foundations longer** and making the case for partial and full repowering even clearer.



Ian Powell

Principal Engineer - Structures, ONYX Insight

Analysing the data, our team **clearly identified** the indicators of the foundation damage (and the indicator to identify if anchor tension degraded again), before needing to shut down the turbine.

In addition to this, engineers correlated the rotational stiffness from the two turbines with the ecoCMS data, providing the client with **stiffness estimates for all turbines** monitored by ecoCMS. This allows comparison with OEM stiffness requirements, even when on turbines where stiffness monitoring did not occur.

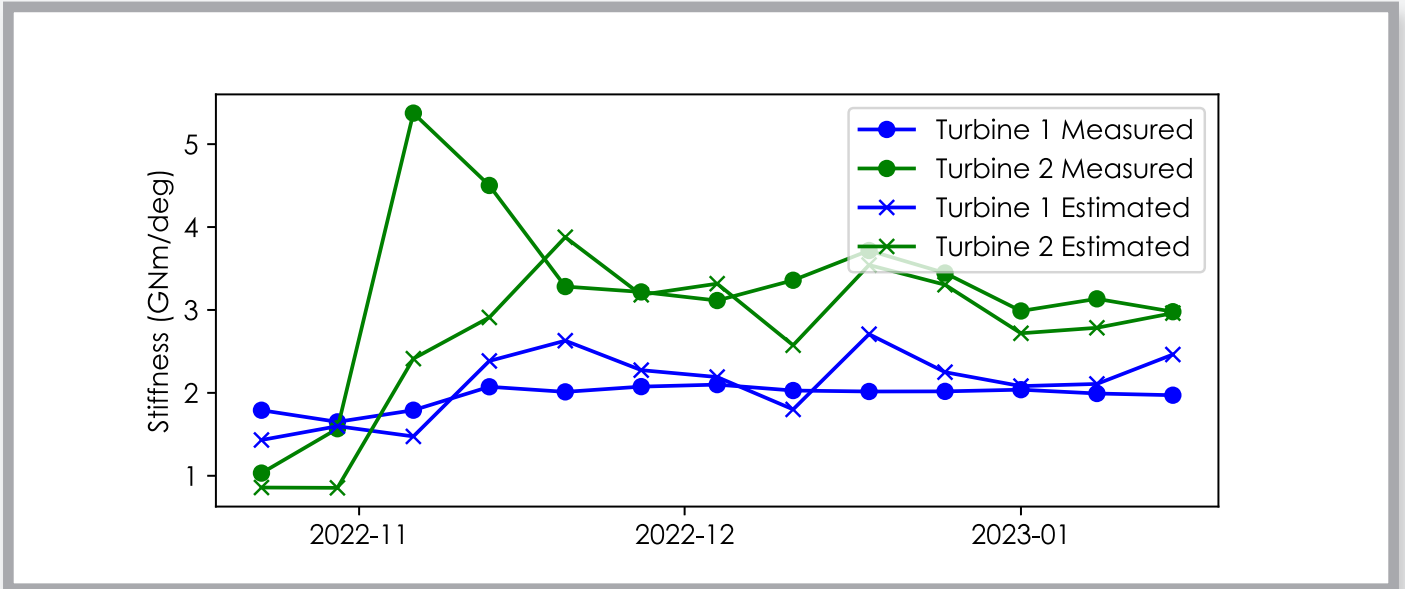


Figure 3: Stiffness of 2x Turbines with ecoCMS and Strain Gauging

A Foundation for the Future

Our client can now call upon data-driven insights for current and future maintenance. No longer will downtime lead to lost revenue as a result of issues not being identified prior to foundation failure. Projections will also inform planning and budgeting to schedule possible future repairs, while still generating value.

The client can now account for external loads that could affect their turbines' foundations, including environmental factors such as harsh wind loads and cliff erosion. Since the project, ONYX has continued to provide the client with ongoing decision-making support for foundation maintenance.

Most Valuable Insights

Get more out of your drivetrain CMS

Leverage existing drivetrain CMS for ongoing foundation monitoring.

Future-proof wind assets

Ongoing health monitoring and consultancy, illustrating trends and de-risking the possibility of future foundation issues.

Pinpoint your intensive testing on known issues

By elevating your understanding to the entire fleet it enables owner/operators to focus value resource on foundations of concern.



[Learn more](#)