ecoPITCH by ONYX Insight
Unique and Innovative technology for online pitch bearing monitoring

Objective

Pitch bearings, which connect a wind turbine's blades to the rotating hub, experience many cycles of high load in operation. Pitch bearing failures are a significant and very costly problem in the wind industry, with many complex failure modes and a high cost of repair, often leading to prolonged periods of downtime. In the most extreme cases, a pitch bearing failure can lead to the loss of a blade – an occurrence that has major safety implications and must be avoided.

The strong need for effective pitch bearing fault detection and prediction? led ONYX to develop ecoPITCH in 2021– a unique and innovative solution for online monitoring of pitch bearings, enabling wind farm owners to detect problems early and deliver significant O&M cost savings. ecoPITCH is a revolutionary and unique system in the market for pitch bearing failure detection. An evolution of ONYX's advanced technology for drivetrain condition monitoring, ecoCMS, already installed in over 7.000 wind turbines around the world.

Description

Due to the lack of effective monitoring, pitch bearing faults are often detected too late. For example failures may be identified by technicians hearing abnormal noises during pitching, or detected by a high occurrence of pitch motors tripping out due to high current demand. These methods pose two major problems: (1) the fault is too far progressed by this time, requiring the turbine to be stopped for many months while replacement parts are procured, and (2) the fault may not be detected at all and a catastrophic failure may occur.

ONYX's ecoPITCH system is a pioneering online, permanent sensor solution which is installed inside the hub, with a package of multiple sensors attached to each pitch bearing. Installations on many turbine types have demonstrated the high performance and effectiveness of the system, and full-scale commercial projects are now taking place, delivering real world benefits for ONYX's customers.

Innovative elements

Detecting faults in large bearings with occasional, low speed rotation is a notoriously difficult technical challenge in condition monitoring. For example, pitch bearings do not undergo many cycles of rotation, but only rotate a fraction of one cycle. Therefore, conventional signal processing methods cannot be used – instead, new methods were developed to trigger data acquisition based on operational events, then combine multiple sensor data to identify the pitch bearing faults. ONYX's previous experience in temporary instrumentation campaigns for pitch bearings was invaluable in refining these analytical methods.

Market perspective

Before the launch of the ecoPITCH system, there was no accepted solution in the market for pitch bearing monitoring, so wind farm owners were effectively blind to any issues in their pitch bearings. ecoPITCH is now revolutionising the way that pitch bearings are operated and maintained. The solution unlocks cost savings through earlier detection of pitch bearing faults and pro-active planning of bearing replacements, leading to a reduction in LCOE.