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Gear and Bearing Diagnostics Using Torque Oscillation Data

A new technology uses torque transducers to measure torsional vibrations for more accurate detection and diagnosis of gear and bearing faults, enabling precise preventative maintenance in rotary mechanical systems.

In the wind energy industry, gearbox failures are among the most costly and the most frequent, adding significantly to the operation and maintenance costs over the life cycle of the turbine. Despite significant improvements in the understanding of gear loads and dynamics, even to the point of establishing international standards for design and specifications of wind turbine gearboxes, these components generally fall short of reaching their 20-year design life. In a significant number of gearbox failures, the primary bearing on the low speed shaft experiences faults in its operation such as misalignment and movement on the mounts.

Researchers at Purdue University have developed a technique that allows for detection of gear and bearing faults using a torque transducer. Current technology uses accelerometers to measure translational vibrations in a system, a technique that is vulnerable to error from exterior vibrations. This technology uses a torque transducer to measure torsional vibrations, which are more directly related to the health of a system than translational vibrations that are more commonly used. This technology could be applied to any rotary mechanical system involving gears and/or bearings to detect and diagnose faults and more precisely perform preventative maintenance.

Advantages:

-More accurate measure of system health

Potential Applications:

-Detect and diagnosis faults in rotary mechanical systems

-Preventative maintenance for rotary mechanical systems

Technology ID

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Category

Energy & Power Systems/Power Generation
Robotics & Automation/Perception & Sensing
Robotics & Automation/Automation & Control

Authors

Douglas Adams
Christopher Bruns
Keith Calhoun
Kamran Gul
Nathanael Yoder
Joseph Yutzy

Further information

Aaron Taggart
adtaggart@prf.org

View online

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