

## HOW CAN PITCH BEARING FAILURES BE PREDICTED?

### PROBLEM

Pitch bearings on wind turbines are subjected to demanding operating conditions and can be very costly to replace.

### SOLUTION

Using data from existing sensors on the turbine to assess pitch bearing health and predict failures ahead of time.

### RESULTS

Failures can be predicted with over 90% accuracy up to six months in advance, saving upwards of \$150,000 through optimized repair scheduling.

### COMMON PITCH BEARING FAILURE MODES



Modern wind turbines vary the pitch angle of each blade to optimize energy capture, requiring a pitch bearing at the base of each blade. These bearings are subjected to demanding operating conditions and can be very costly to replace, as a large crane is usually required. Predicting such failures in advance can result in much lower crane costs.

### PAST APPROACHES FOR EVALUATING PITCH BEARING HEALTH

The most common way of diagnosing pitch bearing health is by taking samples of grease from the bearings and analyzing them. The amount and size of the wear particles in the grease can provide some insights into the health of the bearing. However, obtaining samples is both time-consuming and expensive, as the turbine needs to be taken offline and technicians need to enter the hub to pull samples. There can also be ambiguity in the interpretation of the grease analysis results.

### A NEW SOLUTION FOR DETECTING PITCH BEARING FAILURES

At SparkCognition, we apply our unique combination of deep energy domain expertise with the latest in data analytics to detect pitch bearing issues remotely, using data from existing sensors on the turbine. These signals can include commanded pitch position, actual pitch position, pitch motor current and temperature (for electric pitch systems), pitch system pressures (for hydraulic pitch systems), turbine fault history, and other relevant signals.

### BENEFITS

The pitch bearing health algorithms run on SparkCognition Renewable Suite's cloud computing platform 24 hours a day, with no input required from analysts. The algorithms use only existing signals from the turbine, so no additional hardware is required. The data required for the algorithms is continually sent to the platform with no need to take the turbine offline and physically climb the turbine. When Renewable Suite detects a turbine with a faulty pitch bearing, it automatically notifies users so that the damage can be confirmed. Failures can be predicted with over 90% accuracy up to six months in advance. This allows project owners to get long lead time replacement pitch bearings on order, and, most importantly, ensures that all damaged pitch bearings are replaced with a single crane callout. By minimizing turbine downtime and avoiding multiple crane callouts, owners can save \$150,000 or more each time multiple pitch bearings are simultaneously repaired.

### ABOUT SPARKCOGNITION

SparkCognition's award-winning AI solutions allow organizations to predict future outcomes, optimize processes, and prevent cyberattacks. We partner with the world's industry leaders to analyze, optimize, and learn from data, augment human intelligence, drive profitable growth, and achieve operational excellence. Our patented AI, machine learning, and natural language technologies lead the industry in innovation and accelerate digital transformation. Our solutions allow organizations to solve critical challenges—prevent unexpected downtime, maximize asset performance, optimize prices, and ensure worker safety while avoiding zero-day cyberattacks on essential IT and OT infrastructure. To learn more about how SparkCognition's AI solutions can unlock the power in your data, visit [www.sparkcognition.com](http://www.sparkcognition.com).