



MSc Assignment

Modelling and designing a scale down testing procedure to evaluate and screen lubricants for wind blade bearing applications

Approach

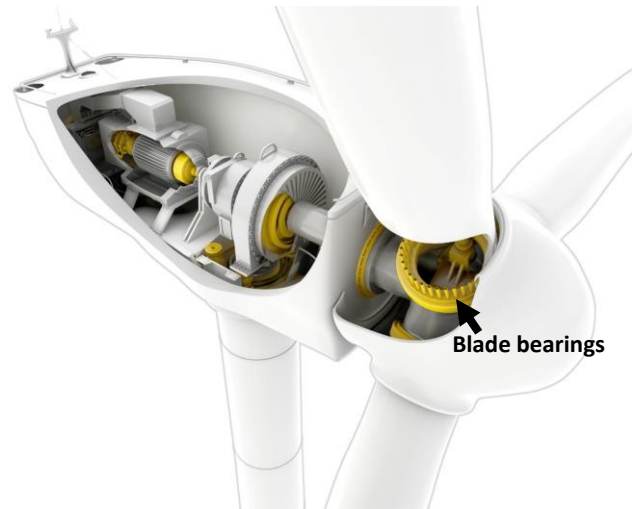
To harness more energy from wind, the span of wind turbine blades is made wider, and the blade structures become bigger and longer. Wind turbine blades are attached to the main shaft rotor through blade bearings to allow active control of the blade attack angle (only within a few degrees of rotation) to maximise torque for a given wind speed.

During operation, the blade bearings will experience bending load and vibrations due to possible ununiform wind speed density. In addition, when the wind speed is low or too high for safe operation, the rotor is held still with a brake, which depending on the wind speed can also induce vibration loading to the blade bearings. These varying vibration loads bring challenges to lubrication of blade bearings and fields experience reveal

that many blade bearings failures are associated with lack of lubrication performance in vibrating load.

Depending on the span and size of the blades, blade bearings may have 3 to 6 meters diameter. Testing and screening lubrication performance with the real size bearings will be time consuming and costly. Therefore, is desirable to scale down the testing procedure simulating the right tribological conditions.

This thesis work will attempt to study the detail tribological phenomena that may happen in a blade bearing and to create a model to design and validate a scale down testing procedure to evaluate and screen lubricants for blade bearing applications.



Research group & Company

The **Surface Technology and Tribology** (STT) group will organize the research with a focus on surfaces and interfaces in an engineering context, as well as degradation mechanisms occurring at these surfaces and interfaces. The researcher will closely collaborate with Shell in Amsterdam.

We offer:

- Work in a challenging, international and multidisciplinary environment.
- Work with all kinds of state of the art equipment

Tasks:

- Literature survey
- Designing experimental test procedures
- Developing a model
- Analyzing and discussing the obtained results
- Writing a scientific report

Contact:

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