Towards gearbox fault diagnosis based on data fusion of multi physical measurements

A. Krumins[1], E. Bergseth[1*], U. Olofsson[1]

[1]Department of Machine Design KTH, SE 100 44 Stockholm Sweden

Condition monitoring plays an important role in the transmission life cycle, saving resources and time. Recently condition monitoring, using machine learning has shifted from reactive to proactive action, predicting minor faults before they become significant.

The efficiency of gearbox health monitoring methods may be improved by using information coming from independent measurement techniques such as temperature, rotational speed, and torque. A dedicated test bench for gearbox fault diagnosis is available at KTH Machine Design (FZG test rig). The test bench is equipped with these measurement techniques and in situ form measurement equipment to detect surface damage mechanisms. Previously performed pitting tests for two gear materials and two gear surface treatments were used in this study. Two different machine learning models, Decision Tree and Support Vector Machine, were selected and trained in this study to generate new indicators. After comparing with the results from the previously performed pitting tests tooth profile measurements, it was concluded that the new indicators could indicate the change in gearbox operation before the first pitting initiation is detected, using tooth profile measurement.

Keywords: Gear, surface fatigue, condition monitoring, machine learning

[*]Corresponding author: bergseth@kth.se