Fault Detection, Diagnosis and Prognosis
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Background

Engine durability test time reduction is at the corner

Research Outcome

Has a fault occurred?
Where did it occur and how large?
How will it progress in the future?

Fault Detection
Fault Diagnosis
Fault Prognosis

Approach

Data Recording: Vibro-Acoustic signals are a good indicator of rotary machines’ operating conditions. A fault in the machinery will generate different vibration and sound signatures.

Signal Processing: Vibro-Acoustic signals via the use of Wavelets

Artificial Neural Networks: Computing systems consisting of layers of interconnected nodes, or neurons, that process information and make predictions based on patterns in the input data.

Framework

Increased
Reliability
Quality

Decreased
Production Cost
Maintenance

Background noise filtration is an important step to eliminate any confusion in the results.

Wavelet analysis is able to analyze the measurements both in time and frequency domains.

PCA is able to detect any changes in the time and frequency domains produced by wavelet analysis.

Measurements collection → Background Noise Filtration → Wavelet Analysis → PCA Analysis → Health Indicator construction → Fault Signature Classifier → AI Model

Results

Health Indicator: measure or metric that is able to track and evaluate the health status of the machinery.

AI Model: Uses Artificial Neural Networks first to determine what type of fault is present in addition to severity, and second to predict how much time is left before failure in that faulty (or degradation) state.