Different Signal Processing Techniques for Predicting the Condition of Journal Bearings

ABSTRACT

• Journal bearings are used to support shafts.
• Vibration condition monitoring is to detect, diagnose and prognoses faults [1].
• Show the differences between the time domain, frequency domain and time-frequency analysis (STFT) of Journal bearing vibration signal.

THEORETICAL BACKGROUND

• Time–frequency analysis is short-time Fourier Transform (STFT) investigates waveform signals in both time and frequency domain at same time [2].

\[ STFT(t', w) = \int \{ f(t) \cdot W(t - t') \} \cdot e^{-j2\pi w t} dt \]

Window should be narrow enough to make sure that the portion of the signal falling within the window is stationary.

Results and Discussion

• The time domain and frequency domain of journal bearings at high speed, high radial load and low viscosity oil

Tests Rig Facility

• Time-frequency STFT presentation

Conclusion

• Time-frequency not only presents the frequency content of the signal but also shows when it occurs.
• STFT Narrow window means good time resolution, poor frequency resolution.
• STFT wide window means good frequency resolution, poor time resolution.

References