

Documents

Sawalhi, N., Ganeriwala, S.

A systematic processing of a gearbox vibration signal with defective rolling element bearing

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Abstract

This paper provides a detailed signal processing and analysis of a vibration signal measured from a gearbox driven by a three phase motor, which is controlled by a variable frequency drive (VFD). The vibration signal being processed was obtained from a test rig with a faulty bearing, thus the signal represents a rich content of different types of signals. The processing starts by a visual examination of the time domain signal with the tachometer overlaid. Time-frequency analysis was then performed using Morlet wavelets to examine the signals for time varying events and to give more insight into the signal content. Speed fluctuations were next estimated based on information from the tachometer and compared to the ones obtained from the signal itself. Since detailed information gears is often not available in industrial settings, order tracking and harmonics/sidebands cursors were used to deduce this information from the data. Finally, bearing diagnosis was performed on the residual signal obtained by removing the discrete components. The signal was enhanced by whitening the signal, removing the transfer path effect using minimum entropy deconvolution (MED).

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