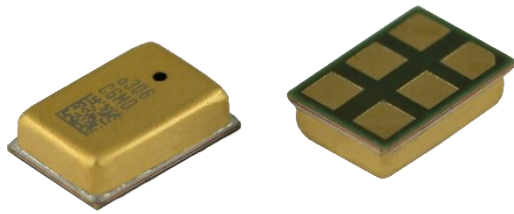


V2S Vibration Sensor: Predictive maintenance application overview.



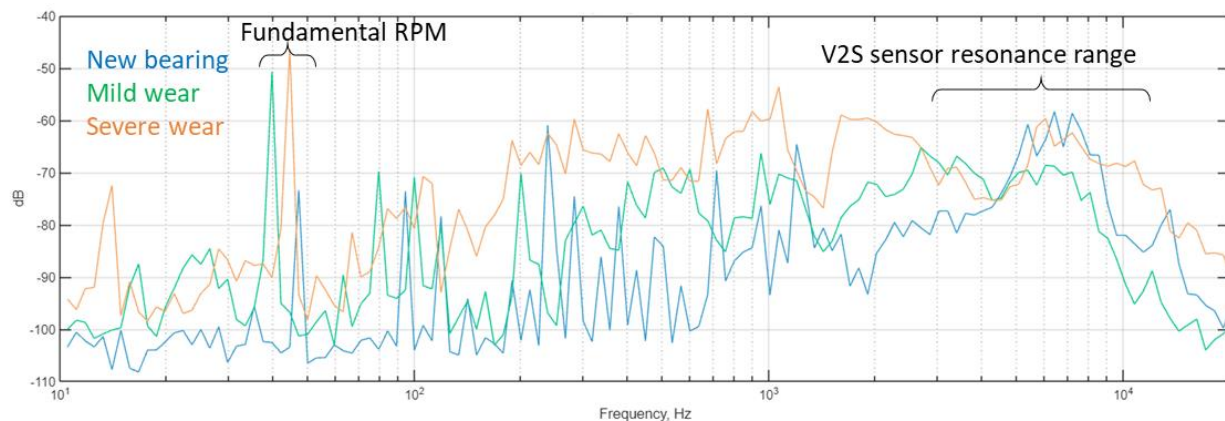
Nikolay Skovorodnikov, Senior Manager, Applications Engineering

Abstract

V2S vibration sensor is a unique device with small size, low noise and wide frequency range. This document covers usecase category for V2S sensor: predictive maintenance in industrial applications.

V2S vibration sensor is a high performance, wide bandwidth 1-axis accelerometer. Beyond audio applications in consumer electronics and automobiles, V2S sensor can bring value to industrial applications. Its small size, wide bandwidth and low noise floor allow collecting useful diagnostic data for any moving machinery. Main use case is preventive maintenance for rotating machines. Examples include engines, pumps and turbines. Highly sensitive to any change in vibration, V2S sensor can help predict early stages of bearing wear or misalignment. Failures are detected in advance and costly repairs avoided.

Accurate analysis of vibrational signature for industrial preventive maintenance requires expertise specific to each machine, however, the general approach remains consistent across applications. Consider a V2S sensor mechanically coupled to the housing of a machine with rotating element inside. For example, it can be an engine output shaft in a ball bearing. Ideally, there should be no movement perpendicular to the axis of the shaft and V2S sensor is not expected to show any signal above the noise floor. However, due to weight imbalances and imperfect alignment there is certain repetitive vibration pattern with each revolution of the shaft. Such signal would look like fundamental frequency with a particular set of harmonics in the output spectrum of V2S sensor. If additional wear of the bearing occurs, vibration patterns will change, and the harmonic signature of the signal will also change even if RPM is the same. Low noise and wide bandwidth of V2S sensor are very beneficial in this application. In cases of severe wear of the bearing, random vibration signals will appear as the shaft experiences random movement or bouncing. This would manifest itself in elevated noise registered by the vibration sensor.



V2S sensor used for preventive maintenance: vibration spectrum at different bearing wear levels. Fundamental frequency (approximately 2500RPM). Mild wear shows change in harmonics and some noise increase. Severe wear shows a lot more vibration overall and significant broadband noise increase. 1/12th octave integrated spectrum. Note: elevated noise around 7kHz is due to sensor self-resonance.