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NO VIBRATION – NO PROBLEM: OR IS THERE?

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ABSTRACT

Most vibration data plots, including: Timebase, Orbit, Polar, and Bode, present dynamic vibration data. For seismic transducers, this dynamic data is inertially referenced to ground. For the case of the shaft relative proximity probe, the dynamic vibration occurs about a –dc gap voltage, with the –dc gap voltage being proportional to the average distance from the probe tip to the target (shaft). These data plots display dynamic vibration data, but do not show changes in the average shaft radial position, an important response characteristic of the rotor system.

When a rotor system with hydrodynamic bearings changes speed or load, the stiffness and damping characteristics of the bearings are also modified. As a result, changes in the average radial position of the shaft will also be observed. Primary and secondary machinery malfunctions such as misalignment, fluid-induced instability, and rubs, to name a few, can produce significant changes in the rotor's radial position within the bearings and / or seals. These changes in radial shaft position can be directly observed via the average shaft centerline data plot. Correlation of shaft average centerline data with other vibration and process data provides a much more complete understanding of the total response of the rotor system. Hence, it is important to recognize that changes in shaft radial position are just as important an indicator of machinery health as changes in the dynamic motion (vibration) of the rotor and must not be overlooked during the analysis.

Keywords: shaft centerline, orbit, quadrature stiffness, asymmetry, balance resonance