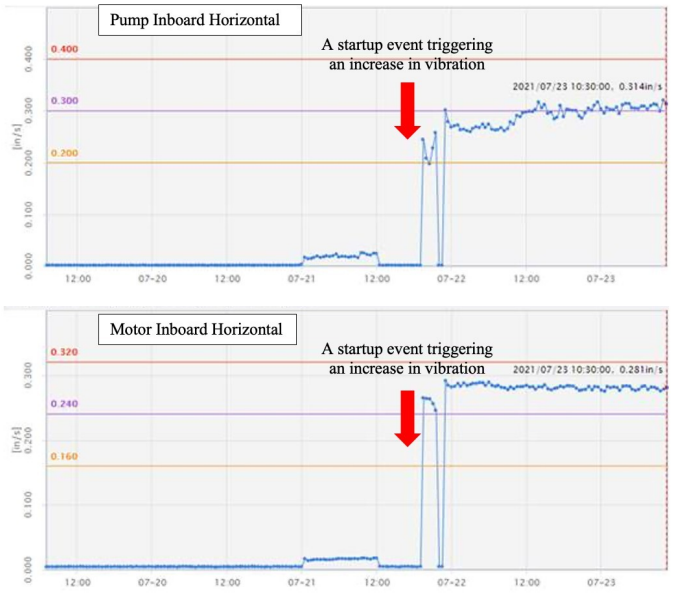
Condition Monitoring Uncovers Misalignment Issues

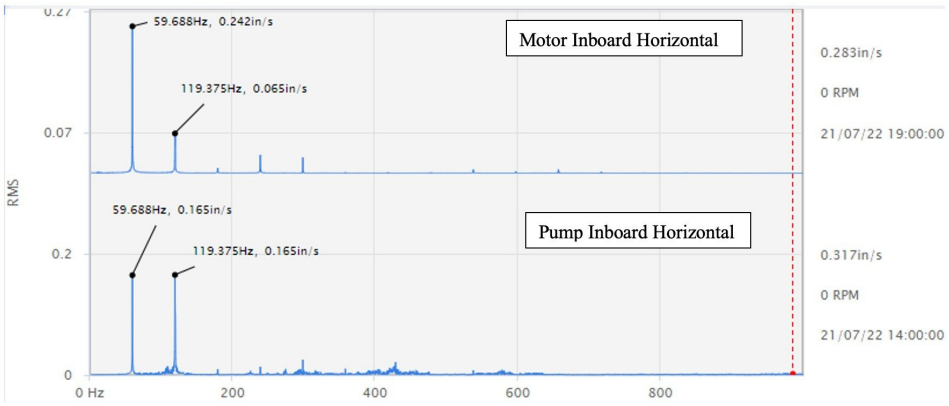


Hydro, Inc. is currently supporting a major refinery by providing remote condition monitoring on their critical rotating equipment. Centaur, Hydro's condition monitoring solution, continuously collects real-time vibration and surface temperature levels on the customer's pumps and drive trains. With these sensors, Hydro can work directly with the local technicians to utilize and take action upon the data to optimize rotating equipment maintenance strategies.

Alarm thresholds are chosen based on API standards. Hydro's monitoring software is programmed to automatically report any alarm or emergent issue to Hydro's engineering team and to the engineering team of the refinery. The graphs showcase a startup event with elevated vibration amplitude levels above the alarm 2 thresholds (>0.300 ips RMS) at the pump inboard and motor inboard sensor locations in the horizontal direction.



In this case, Hydro's engineering team suspected that the elevated vibration amplitude levels were a result of a misalignment condition. Misalignment occurs when the centerlines of the coupled shafts do not coincide, creating high radial forces across the coupling. In addition, misalignment is indicated by excessive amplitude levels of 1x RPM and 2x RPM response. The FFT Spectrum graphs below displays a dominant excitation frequency at 1x RPM (59.688Hz) and 2x RPM (119.37Hz) for both the pump inboard and motor inboard sensor locations.



Phase analysis has been performed on the pump inboard and motor inboard sensor locations to allow Hydro's engineers to further confirm the diagnosis of misalignment. Misalignment is characterized by a phase difference of 180˚ ±30˚ between the coupled components. Referencing the phase difference chart, the phase difference between the pump inboard and motor inboard sensor locations is 195˚, within range of the 180˚ ±30˚ phase rule.

Following the analysis, Hydro's engineering team notified the customer of the apparent issue and recommended that the machine train be inspected and realigned at the earliest convenience. Hydro will reassess the vibration amplitude levels of the machine train once the alignment has been complete.

