Non-intrusive Monitoring of Electrically Driven Assets

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Electric submersible pumps (ESPs) are production systems driven by an electrical source, i.e. an electric motor. Catastrophic failures in such systems could be avoided if system degradation could be tracked and adverse conditions detected. The authors present new findings from a non-intrusive technology that has led to the development of Veros ForeSight™, a new solution in mechanical asset condition and performance monitoring. ForeSight is sensorless and is installed top-side on the motor-side conductors of a variable frequency drive (VFD). No mechanical sensors are required on the driven load or the motor. Monitoring is carried out using only the voltages and currents of the electric motor, as measured by potential and current transformers found in the relays of motor switches. ForeSight is insensitive to power quality and process load variations. Furthermore, it does not require a priori knowledge of asset models or any detailed design parameters; they are adaptively estimated in real-time. ForeSight software uses high frequency electrical measurements, signal processing and machine learning algorithms to arrive at metrics used to detect mechanical problems. The source of information for mechanical faults is the air gap flux variations. Depending on the mechanical fault, the radial, axial and azimuthal (or torsional) variations in the motor air gap field distort the motor currents. Electrical faults are detected by adaptive system impedance models. The authors will present an overview of ForeSight and some field case studies. The presenters are seeking ESP field installations for the ForeSight system.