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Pump Rotor System Monitoring Based on Advanced Measurements and Analysis Techniques

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ABSTRACT

The purpose of this research is to develop a condition monitoring and fault diagnosis system for centrifugal pumps based on vibration measurement. An enhanced test-rig was built in the lab and equipped with the necessary high-quality sensors and equipment in order to examine and compare the efficacy of the monitoring methods. In addition, experimental study has been conducted to investigate condition monitoring system. Multiple tests have been presented to find a set of consistent parameters for fault diagnosis at this stage based on vibration signal data with healthy case as baseline measurements only.

The parameter of interest, e.g. vibration, was measured for different flow rates with a constant pump speed of 2900 rpm. The flow rate was adjusted by the throttling valve in the discharge line stage by stage; visual observation of the flow through the transparent steel pipe was maintained. A test run consisted of recording at least 8 sets of data which covered a flow rate range from 350 l/min to 0 l/min. The data records from each test were processed in Matlab, the performance of the pump with the healthy condition has been achieved by developing a condition monitoring system, moreover faults of pump components will be detected and diagnosis in future work.

Keywords: Condition Monitoring System: Vibration, Acoustic, Pump faults