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Pump Rotor System Monitoring Based on Advanced Measurements and Analysis Techniques

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ABSTRACT

- To develop a condition monitoring and fault diagnosis system for centrifugal pumps.
- To investigate condition monitoring system, 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.
- To find reliable symptoms of a fault in a centrifugal pumps.

BACKGROUND

Machine condition monitoring is an important part of condition based maintenance which is becoming recognized as the most efficient strategy for carrying out maintenance in a wide variety of industries.



TEST FACILITIES

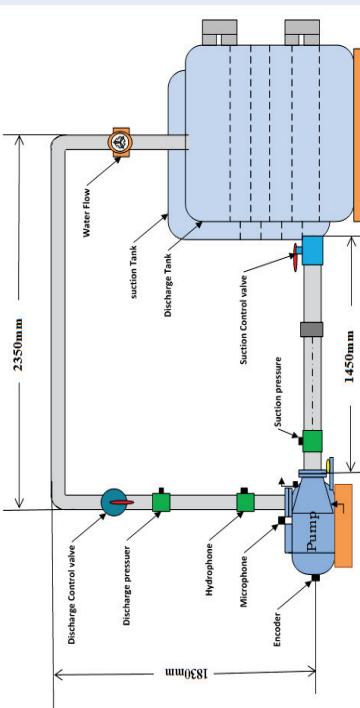
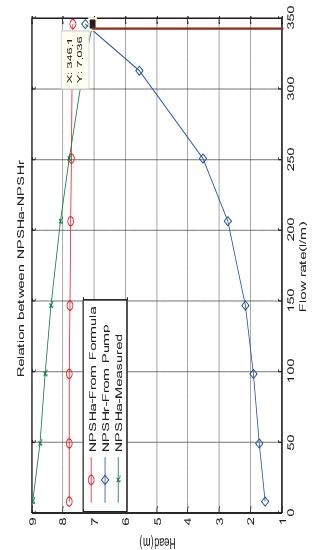


Figure 1 Schematic diagram of test rig

PUMP PERFORMANCE CALIBRATION

- According to ISO 35555, the predicted characteristics between the Net Positive Suction Head Available (NPSHA) and Net Positive Suction Head Required (NPSHR) for this system are obtained by throttling the valve in the discharge line progressively while the pump speed is at 2900rpm and the valve in the suction line is fully open (100%). As shown in figure 2.



RELATION BETWEEN THE PUMP FLOW RATE AND PUMP HEAD

As the pump flow rate increases the developed head decreases. At flow rates above 300 l/min, lowering the resistance to flow (the developed head) will produce only a small increase in flow.

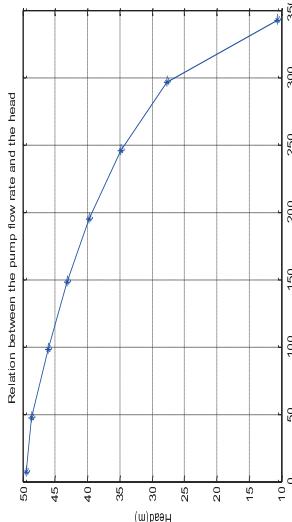
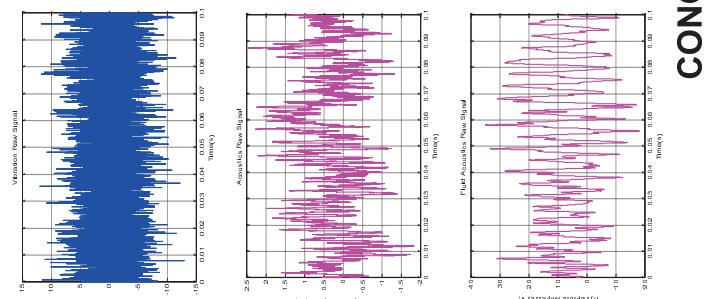


Figure 3 Head- Flow Rate Pump Curve

RESULTS



CONCLUSION

- Specific techniques can be used to identify and rectify faults of pumps such as vibration analysis techniques.
- This research has been established a condition monitoring system for centrifugal pump based on vibration measurements, in order to analysis the performance of the pump with the healthy condition and.
- The initial result has been presented in the healthy condition case, the relationship between flow rate and the pump head was obtained.

FUTURE WORK

- Introduce more specific faults into a pump such as bearing faults.
- Establish theoretical understanding of the experimental behaviour by develop a mathematical model to study the vibration signal for both healthy and faulty condition.