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NTEK SYSTEM

USE CASE

Condensate pumps

SV500 by NTEK SYSTEM | ESA-based condition monitoring & predictive maintenance

OVERVIEW

Condensate pumps are key plant auxiliaries that send water condensed in the condenser to the feedwater system. In this scenario SV500 measures and analyzes the three-phase voltage and current signals of the pump drive motors with PTs and CTs in the electrical room to diagnose the condition of the pumps and motors without attaching sensors to the pump itself.

PROBLEM

If a pump in the feedwater system stops, power plant operation is affected immediately.

- **Failures that lead to a plant trip** - Cases have been reported in which a feedwater pump stopped during operation, cutting the water supply and tripping the plant. In NETL analysis in the US, 15% of coal-fired forced outage causes were attributed to balance of plant (BOP) equipment.
- **Gaps between inspection intervals** - Between periodic inspections there is little means of checking the condition of running pumps and motors.

EXPECTED OUTCOMES

Abnormalities in feedwater system pumps can be identified early so maintenance can be planned.

- **Early detection of potential failures** - Detects potential failures early to minimize unexpected incidents and risk.
- **Optimized maintenance schedules** - Diagnostic data helps predict and optimize maintenance schedules.
- **Lower cost and downtime** - Higher operating efficiency helps reduce energy consumption, maintenance cost and downtime.

TARGET EQUIPMENT

Condensate pumps | Pump drive motors | VFD

SOLUTION

SV500 uses ESA to analyze the electrical signals of condensate pump drive motors and diagnose pump flow abnormalities and motor and drive faults.

- **Pump flow abnormality detection** - Detects cavitation, flow turbulence and blade and vane damage in the pump.
- **Motor and drive diagnosis** - Detects mechanical unbalance, bearing problems, broken rotor bars, static and dynamic eccentricity, shaft misalignment, winding insulation degradation and load-related problems.
- **VFD operation diagnosis** - For pumps driven by a VFD, SV500 analyzes voltage, current and frequency signals on the VFD secondary (output) side at 8 kHz to predict and diagnose potential faults.
- **Power quality monitoring** - Analyzes voltage sag/swell, total harmonic distortion (THD) and voltage and current imbalance in real time to identify equipment impact and abnormal conditions caused by poor power quality at an early stage.
- **Adaptive thresholds** - Machine learning learns the normal state of each asset and judges condition with thresholds that adapt to load. Criteria matched to each asset and load condition are applied instead of fixed thresholds.
- **Web dashboard and data integration** - The equipment web server dashboard shows status per diagnostic parameter in real time, so condition can be checked without a site visit, and data can be integrated with upper-level systems over Modbus RTU, Modbus TCP, MQTT and RESTful API.

SUMMARY

SV500 measures the voltage and current signals of condensate pump drive motors in the electrical room, analyzes them with ESA and, with adaptive thresholds learned per asset, detects abnormalities in pumps and motors such as cavitation, bearing problems and rotor faults early.

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