

Wireless Application Note

Measuring Vibration and Temperature Monitoring of FD / ID Fan

Industry: Plant Utility

Product: 1. Wireless Transmitters

2. AI-enabled Paperless Recorder and SMARTDAC+ Data Acquisition & Control System

Background

Vibration is the best indicator of overall mechanical condition and the earliest indicator of defect development. Monitoring machine vibration and using the information you obtain saves money and is part of condition monitoring based maintenance.

Induced draft fan used in steam boilers to draw out and remove flue gases from combustion chambers, by creating a vacuum of negative air pressure.

Forced draft Fan draws air from the atmosphere and forces it into the furnace through a preheater. These fans are located at the inlet of the boiler to push

high pressure fresh air into combustion chamber, where it mixes with the fuel for proper fuel combustion.

Even the smallest layer of dust can produce a significant ID & FD fan imbalance which in turn can cause an increase in mechanical vibration. Excessive vibration may lead to metal fatigue, damage to shaft bearings, loosening of fasteners and other fan components, mechanical breakdown and ultimately costly plant shut downs. This means not only will maintenance and operation costs increase, but the ID & FD fans durability will decrease.



Customer Challenge

Vibration sensors are connected to the control room using signal cable. Similarly, the thermocouple sensors are connected using compensating cable to the control room. Maintenance cost was high due to tracing and repairing of cable faults. As many times, cable were laid underground, it was time consuming, resulting in loss of production or loss of measurement.

Readings were available at the central control room only, whereas customer prefer to access the readings at different locations.

Hardware cost goes higher in DCS with increase in measurement points.

Solution

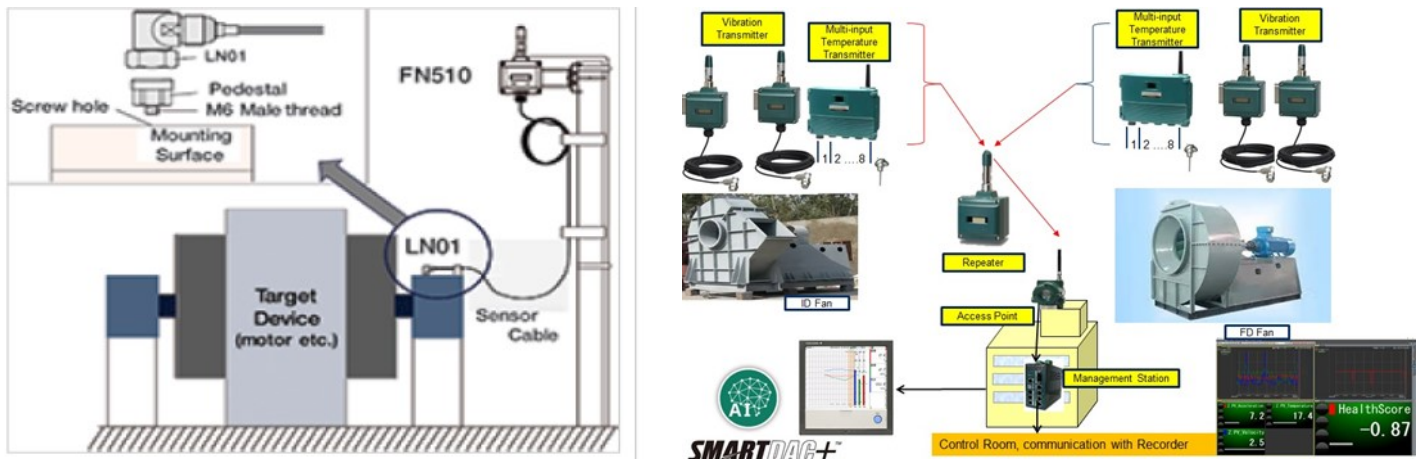
Using Yokogawa's ISA100.11a Wireless Solution, vibration at ID & FD fans are measured using Piezoelectric Accelerometer LN01. The vibration (velocity or acceleration) signal is transmitted using FN310/110. The temperature sensors are connected to Multi-Input Temperature Transmitter YTMX.

The ISA100 wireless signal from the field is connected to wireless access-point and management station, at the control room. Using MODBUS communication, wireless management station is connected to SMARTDAC+ and DCS.

The process values is viewed using Yokogawa Data Logger Recorder and in the existing DCS. These process values can be viewed from multiple locations in the plant.

Centralized Smart Real time Monitoring, logging and Predictive future Analysis System using SMARTDAC+.

Wireless Schematic Diagram



Customer Benefits

- Reduced maintenance cost by eliminating the need of wiring carrying vibration signal and thermocouple cable from field to control room. Thus eliminating chance for cable fault, increasing plant availability.
- Reduced hardware (analog inputs, thermocouple input cards etc.) at DCS. Reduced loading and increased availability.
- Readings are available in DCS and as well in Recorder. Unified monitoring system for all rotating equipment in the field. Process values can be viewed from multiple locations in the plant over Internet explorer etc.
- To prevent and overcome problem due to excessive vibration, condition can be predicted using AI algorithm in SMARTDAC+. The AI algorithm continuously tracks for anomalies and monitors changes from the established vibration design of the system, which is achieved through recordkeeping of a machine’s vibration history and over time predict problems before serious issue arise.
- Internal battery sustains ISA100.11a operation without external power, which makes ideal for SMART temporary installation for measurements. Wireless battery life span can be predicted and displayed in the system.
- Real time Monitoring and Logging , which track load change. Accumulated data is useful database for future IloT solution.

Summary

Reliable ISA100.11a wireless solution improves the plant efficiency. Along with, AI based SMARTDAC+, it provides complete solution for condition based monitoring, thus increasing the plant availability. The modular solution can be expanded to include more process or functionality based on users requirement.

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