Pitting Initiation deTection System - PITS

SUMMARY

A new monitoring device (Fig. 1) to detect pitting corrosion and stress corrosion cracking in the early condensate regime of steam has been developed. The device continuously monitors for and detects adverse steam conditions for a component, allowing operators to take mitigative action. The device can be used in steam condensing environments (e.g. turbine rotors in geothermal or nuclear plants) as well as in liquid environments (e.g. condensors and feedwater heaters). This device was successfully tested at a geothermal facility under condensing steam conditions. The device has been named Pitting Initiation deTection System or "PITS."

Figure 1. Photograph of PITS

SYSTEM/PRODUCT DESCRIPTION & CAPABILITIES

The device consists of three modules:

1) Monitoring Probes

The probes are used to measure, on a continuous basis, corrosion potential (CP) and electrochemical noise (ECN) in the environment. Several types of probes are available. These probes are designed to be mounted conveniently to turbines, piping, pressure vessels and wellheads. Each probe contains two sample and one reference electrodes with their active surface exposed to the steam whose properties are being measured. Remote or self-contained PITS probes are built around a standard NPT threaded pipe caps allowing them to be mounted almost anywhere. Also, if required, custom probes can be economically designed and manufactured for special conditions such as environments with very high pressures and/or temperatures, hard to fit locations, or the presence of severe electrical noise.

2) Data Handling Module

Measurements taken by the probe are collected, analyzed and stored in the data handling module. The module consists of data acquisition and data storage electronics, a processor, a display unit, and communication devices (Ethernet, RS-232, and modem connections) for remote access. The system has been built around commercially available hardware modified to suit the needs of on-line corrosion detection. This module is housed in a small rugged industrial-strength case which can be mounted in convenient locations near turbines, wellheads, or piping.

3) Analysis/Reporting Module

The heart of the system is a module that measures the corrosion potential and detects pitting events. This module reports and stores these values. The current status of the system is displayed and based on a pre-determined levels for CP and/or PiC rate (time rate of "Pitting Charge") it establishes if adverse steam conditions are being encountered. The system can be customized to display and/or send signals to a desired location to provide the condition of the steam.

APPLICATIONS AND BENEFITS

This device is specially useful for those environments where the chemistry of the condensate or the solution can change without notice. PITS can be used to:

- ⇒ Detect conditions which can cause severe corrosion and/or pitting on a component in various process systems hence allowing operators to take corrective/ mitigative action.
- ⇒ Measure steam corrosivity continuously to allow for well-usage management in geothermal fields.
- ⇒ Measure varying steam/condensate conditions to allow better control of cycle-chemistry in boilers.

CONTACT INFORMATION

For information regarding applications and pricing, please contact us at 510-594-0300:

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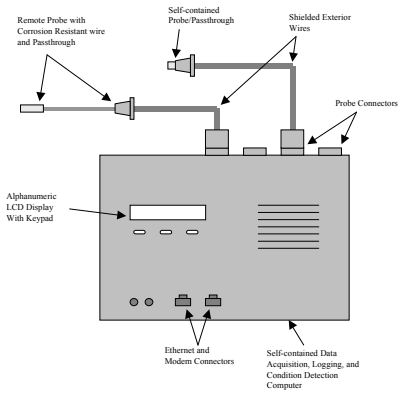

Figure 2. Schematic of the PITS.

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