

Remote Mount Display & Interface capability enables optimal separator measurement

Product

Rosemount 3051S Pressure Transmitters with Direct Mount 1199 FFW Seals and Remote Mount LCD Display & Interface

Industry

Power, Co-Generation

Application

Level measurement on coalescer filter separator

Problem

Level switch failure on separator caused catastrophic turbine damage

Solution

Multiple 3051S transmitters with direct mount seals provide reliable, redundant measurement & control



PROBLEM

A coalescer filter separator in a co-generation facility is used to separate liquid from natural gas prior to entering the gas turbine. During the primary stage of separation, large particulate and liquid are removed by gravitational force and upward gas drag force. Complete separation is achieved as the process passes through the coalescing filter, which pulls away any remaining liquid to the outside of the filter. From there, the liquid drains down to the lower collection chamber. Because liquid in the separator is atypical, a high level switch provides indication and monitoring of level within the separator. In the event of a high level condition, the separator would be drained to prevent natural gas with liquid content from entering the gas turbine. Liquid within the turbine could cause severe turbine damage.

In this particular facility, the coalescer filter separator is at the end of the gas transmission line. Low areas

within the transmission line had been gathering oil and water. Consequently, gas carried to this co-generation facility contained abnormal amounts of oil and water. In addition, the existing level switch failed to indicate the rising level in the separator. Eventually, the level exceeded separator capacity and wet natural gas entered the turbine, resulting in catastrophic turbine damage and production loss. Estimated costs to the co-generation facility exceeded \$15 million, causing the engineers on site to reevaluate the existing instrumentation and identify a more robust solution.

SOLUTION

The facility turned to Emerson Process Management for a solution that would provide optimal control of the level in the separator and redundancy for safety.

Rosemount 3051S

The solution had to provide:

- An **extremely reliable** measurement.
- A **highly accurate** measurement.
- **At-grade indication** and **ease of access** for technicians.

After significant evaluation, an instrumentation solution was proposed:

- Three 3051S pressure transmitters with direct mount flush flanged seals installed at the very bottom of the separator to measure level in the collection chamber. A redundancy voting scheme (2 out of 3 must agree) would be utilized as an added safety precaution.
- One 3051S differential pressure transmitter with dual flush flanged seals installed across the filter to identify clogging (rising differential pressure indicates the filter is clogging.)
- Three 3051S pressure transmitters with direct mount seals installed several feet from the bottom of the separator to measure the level of the coalescing filter (2 out of 3 must agree voting scheme).

Remote mount LCD display and interface on all seven transmitters for local indication at grade and ease-of-use for instrument technicians.

Redundancy for Added Safety

Because of the critical nature of this measurement and the need to prevent future occurrences of turbine damage, redundant transmitters were used on all level measurements. If two out of three transmitter outputs do not agree, separator level would be checked immediately and any necessary action taken.

An Extremely Reliable Measurement

The 316L SST hermetically sealed SuperModule protects the 3051S electronics from moisture and field contaminant effects providing superior reliability in the harshest environments.

High Accuracy with Remote Mount Indication

To bring the transmitter to grade level, remote seal capillaries were considered. Instrument Toolkit™ performance calculations provided proof that capillary did not meet the performance requirements of this application indicating a perfect opportunity to use the 3051S remote mount capabilities.

The new 3051S remote mount LCD display & interface capability allowed the customer to:

- Eliminate the capillary runs.
- Bring local indication at grade.
- Access all transmitter functions at grade.

The Optimal Solution

Direct mount FFW seals with 3051S Ultra performance and remote mount LCD display & interface provided the optimal solution. Separator level is now being properly controlled and future occurrences of turbine damage due to level excursions are highly unlikely.



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