Refinery Improves Safety and Reduces Maintenance Cost in Blowdown Drum

RESULTS

- Accurate on-line monitoring
- Eliminated expensive maintenance associated with mechanical tank gauges
- Level measurement unaffected by density
- Rapid level changes detected and tracked

APPLICATION

Blowdown drum level measurement

Application Characteristics: Mixtures of fluids lead to changing density and changing dielectric; rapid level changes and turbulence during fill process

CUSTOMER

Refinery

CHALLENGE

If there is a malfunction in the refinery process, gases and liquids are evacuated to the blowdown drum through safety valves and piping. In this case, the tank is filled uncontrolled through a Ø 42 in. (1.1 m) pipe connected horizontally to the tank. Gases and liquids transported to the tank are typically light and heavy hydrocarbons, occasionally containing considerable amounts of water.

A safety study made by the third party inspection authority, SAQ, and the refinery determined the highest allowed level in the tank. The study was based on an API Standard and resulted in a maximum filling height of 9.8 ft (3 m) in normal operation. This is to ensure that there is enough space left for emergency situations. The liquids are analyzed at the 4.6 ft (1.4 m) level to decide where to pump them. At 6.5 ft (2 m), the liquids are pumped to other storage tanks. When the level gets down to 3.3 ft (1 m), the pump stops. The gases in the tank are transported through a Ø 20 in. (0.5 m) pipe from the top of the tank to the flare.

Critical Factors

It is important to have reliable level measurement as part of this alarm system. If the blowdown drum is overfilled, the liquids will flow into the gas outlet pipe which can cause the safety valves in the inlet pipe to malfunction. If the level is too low, it can result in pump failure.

The blowdown drum is 28 ft (8.5 m) high but the required measuring range is approximately 9.8 ft (3 m). The tank can be filled to a maximum of 9.8 ft (3 m).

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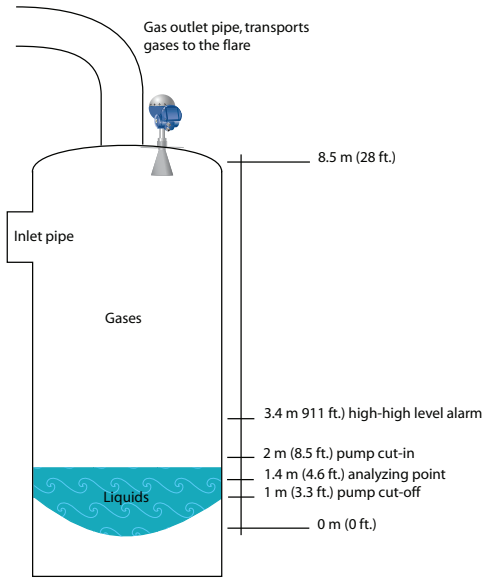
Large density differences and solid contents make level measurement difficult. Before installing the Rosemount 5600 Radar Level Transmitter, the refinery had a mechanical tank gauge in a stand-pipe (bridle) outside the tank.

SOLUTION

The change to the 5600 improved the reliability and accuracy, and avoided expensive maintenance. Another advantage is that radar measurement is not affected by density. Before the 5600 was installed, the error span could be more than 20 in. (500 mm) because of density differences between the product in the bridle and the tank.

A Rosemount 5600 was installed on the existing 2-in. (50 mm) nozzle on the tank roof. A 6-in. (150 mm) cone antenna located under the tank roof was used, and special arrangements were made to fit the nozzle.

The 5600 transmitter provides a reliable level measurement independent of fluid properties. The 4-20 analog signal representing the level is sent to the control system and is used as part of the pump control scheme to ensure that the pump does not run dry. The signal is also used to alert the operator to run the analysis of the liquid. Limit values are set in the DCS system for low level alarm, pump cut-off, analysis of product, pump cut-in and high level alarm.



The blowdown drum at the refinery serves as an accumulator for the refinery process. The Rosemount 5600 measures level and communicates the measurement to the DCS.

RESOURCES

Rosemount 5600

http://www.emersonprocess.com/rosemount/products/level/m5600.html

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