Guided Wave Radar Improves Reliability of Desalter Interface Measurement While Reducing Maintenance Costs

RESULTS

- Improved efficiency of desalter
- Reduced maintenance costs
- Significantly decreased process downtime

With the use of Guided Wave Radar, maintenance and associated downtime was eliminated.

APPLICATION

Crude Desalter Interface Level Control

Application Characteristics: Crude oil on water with 6 inch (150 mm) emulsion layer in a vessel with a 10 KV electrostatic grid. Crude oil density varies with supply.

CUSTOMER

A North American refinery

CHALLENGE

Raw crude coming into a refinery contains varying degrees of salt contaminants. If the salt contaminants are not removed, they can cause significant corrosion of downstream process equipment as the oil is heated to high temperatures in the refining processes. These contaminants are removed in a desalter where the crude and water are separated.

This refinery receives their crude oil from a variety of sources. Every time the oil supply source changes, they have to make adjustments to the interface level instrumentation in the desalter to accommodate for the varying salt content and crude gravity.When operators do not have confidence in the interface reading they will operate the desalter at a lower interface level to prevent tripping the unit. This reduces the efficiency of the desalter, increases downtime, and decreases throughput.

To remove the salts, emulsifying chemicals and water are mixed with the oil to wash the salts out of the oil. This emulsified oil water mixture then needs to be separated quickly and efficiently. A desalter separates crude oil from water using an electro-static grid operating at about 10KV. The grid causes the dispersed water droplets and salts to coalesce and drop to the bottom of the vessel. This electro-static field operates at maximum efficiency when the water and oil interface is maintained at a level just below the electrostatic grid. A reliable interface measurement just below the composite electrodes allows the desalter to run at optimal efficiency without the risk of water getting into the grid.

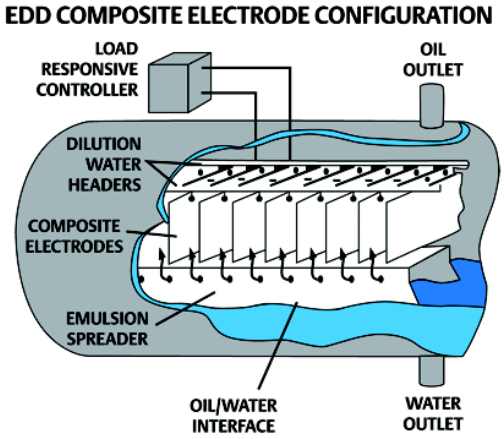

Diagram showing internal parts of a desalter. The water level must be kept below the electrodes.

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This application is a challenging interface measurement. The oil and water layers both have changing properties. The properties of the oil, especially the API gravity, change with different crude supplies. The water density will change with the amount of contaminants. In addition, the presence of the emulsion, or rag layer, creates an indistinct interface between the fluids.

Displacer/Float technology was previously used to measure the interface level, however, every time the oil density changed the displacer had to be re-spanned, which increased maintenance time and costs. If the torque tube required recalibration, the desalter had to be taken out of service.

SOLUTION

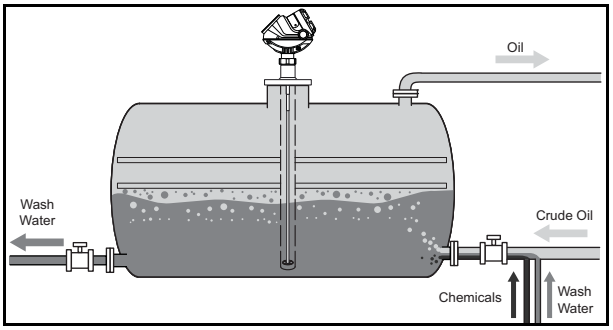
Rosemount Guided Wave Radar for level and interface with a flexible probe was installed in a 6" stilling well with slots. The still pipe minimizes the effect of the emulsion layer and protects the probe from interference from the electrical grid.

The instrumentation team for this company had been using Rosemount Guided Wave Radar level transmitters on a variety of applications within the refinery. They were pleased with the advantages that it provides. Of particular interest was its immunity to density changes caused by the varying levels of salt in the supply crude.

To verify that the interface level was correct, operators were able to manually check for the presence of oil or water by using a series of taps on the side of the vessel. The interface reading from the Rosemount Guided Wave Radar corresponded between the correct oil and water taps. In addition, the control shows a stable trend line and they are able to control within 3 to 4% of the set point.

The unit has been running for over a year without incident. Efficient operation of the desalting unit can minimize corrosion and fouling in downstream process units. Additionally, controlling the percentage of water in oil can reduce the potential of over pressuring the distillation columns.

With reliable interface level control, the desalter was able to operate more efficiently with reduced water and salt carryover to the crude unit, and also prevented oil from going out with the water into the sewer system. The need for maintenance and adjustment of the previous level devices and the associated downtime was eliminated.



The GWR is installed in a slotted stilling well in the desalter. The interface measurement is below the electrostatic grids.

RESOURCES

Rosemount Guided Wave Radar Products

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

Emerson Process Management
Rosemount Division
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1-800-999-9307
T (International) (952) 906-8888
F (952) 949-7001
www.rosemount.com

Emerson Process Management
Blegistrasse 23
P.O. Box 1046
CH 6341 Baar
Switzerland
Tel +41 (0) 41 768 6111
Fax +41 (0) 41 768 6300

Emerson Process Management
Emerson Process Management Asia Pacific
Private Limited
1 Pandan Crescent
Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
Enquiries@AP.EmersonProcess.com

Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone
Dubai UAE
Tel +971 4 811 8100
Fax +971 4 886 5465

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