Implementation of Advanced Guided Wave Radar(GWR) on Offshore-Vessel Maximizes Efficiency and Reliability

RESULTS

- Increased safety of platform operations
- Shutdowns due to incorrect level were eliminated
- Increased production due to more uptime

After an extensive test period with multiple units, it was decided that the Rosemount 5300 was a more reliable device and better suited for the widely varying process conditions of the FPSO.

APPLICATION

Level measurements on this Floating, Production, Storage and Off loading (FPSO) vessel were needed on a variety of applications including medium pressure, low pressure and high pressure gas compression scrubbers, glycol contactor suction scrubber and glycol contactor. All were installed in chambers.

APPLICATION CHARACTERISTICS

Product composition properties varied as well as the pressures and temperatures. There was occasional foaming, emulsions, and condensing vapors. Dirty fluids tended to coat surfaces.

CUSTOMER

A BP FPSO off the west coast of Africa

CHALLENGE

The original guided wave radars were installed in chambers. One of the key considerations for instruments on this FPSO was that they should be able to perform well during the frequent start-up and shut down conditions, upset conditions, as well as during normal operations. The changing process conditions and the presence of foam and vapor as well as dirty sticky fluids made this a very difficult level application.

Compounding the challenge was the limited capabilities of the original radars both in terms of detecting low dielectric hydrocarbons and compatibility issues with the existing plant FOUNDATION Fieldbus network. With this site located 160 km (75 miles) off the shores of western Africa, local vendor support was difficult to obtain. This led to high maintenance costs, unplanned shut-downs and lost production.

This unreliability was caused in part due to the product's limited calibration scope to handle dielectric constants other than air and water. The vendor required that coaxial probes be used for these applications in order to increase the strength of the surface signal.

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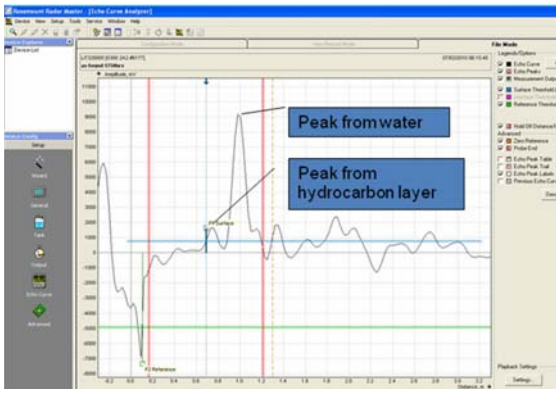
Coaxial probes provide a stronger signal to the surface and block out any stray targets due to obstacles and disturbances near the probe. However, coaxial probes, which are simply a probe within a small pipe, are very susceptible to the buildup of sticky solid materials entrained within the production fluid which leads to false level measurements.

With these processes, light hydrocarbon vapors are often present. At times, they condense on the water surface; at other times, they vaporize. The GWR was not able to distinguish the presence of the light hydrocarbon layer on top of the water and simply measured the water level measurement. Because these level measurements are used for shutdown trips, the top level measurement was needed.

These level measurements resulted in a number of spurious trips due to plugged coaxial probes that caused a significant amount of unplanned shut downs leading to a loss of production.

The required coaxial probes created areas where material buildup could occur, resulting in bridging between the probe and the coaxial sheath. This in turn caused false level targets which triggered alarms and created trips. The general instability of the level measurement and the trips resulted in unsafe conditions.



This echo curve is from a contactor suction scrubber bottom. It shows a layer of hydrocarbon that has condensed on the water surface. The Rosemount 5300 is able to detect the top of the hydrocarbon surface.

SOLUTION

The Rosemount 5300 Guided Wave Radar (GWR) was proposed as an alternative to the existing installed GWR units. A test trial was run to determine if it was a better solution. The first step in this application was the need to match up to the chamber requirements. This was easily met. BP instrument and process engineers worked together with Emerson to produce revised datasheets for the GWR units with process data for normal running, process upset and startup/shutdown conditions. Six existing GWR units were replaced with Rosemount 5300 GWRs.

With the use of digital signal technology, the Rosemount 5300 is able to send and receive a cleaner, stronger signal than the installed GWR. This allows the use of single lead probes. The use of single lead probes significantly increases the tolerance of the GWR to solids buildup and coating and eliminates trips due to false targets.

The sensitivity of the Rosemount 5300 allows it to distinguish between a hydrocarbon layer and water whereas the installed unit could not tell the difference between the fluids. As the hydrocarbon layer builds up, the 5300 can track it and report its presence as well as the water level. This increases the accuracy of the level reading and allows the scrubber to operate more efficiently. The ease of obtaining echo curves from the Rosemount unit was a key to understanding the extent of the hydrocarbon layer buildup.

After an extensive test period with multiple units, it was decided that the Rosemount 5300 was a more reliable device and better suited for the widely varying process conditions of the FPSO. The more accurate and reliable level readings increased the safety of the platform operations. Shutdowns due to level measurements were eliminated, which in turn led to increased production. Reduced shutdowns and increased production has have resulted in significant savings.

RESOURCES

Emerson Process Management Oil and Gas Industry

http://www.emersonprocess.com/solutions/oilgas/

Rosemount 5300 Series

http://www2.emersonprocess.com/en-US/brands/rosemount/Level/Guided-Wave-Radar/5300-Series/Pages/index.aspx

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