White Paper / **Oil & Gas Separators**

ACCURATE LEVEL MEASUREMENT LEADS TO IMPROVED CONTROL FOR 3-PHASE SEPARATORS

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A production separator employs a three-phase process to remove the oil from the water and gas. Flowline conditions and other processing variables can upset or destabilize this process making the accurate measurement of the oil and water interface in the separator challenging.

In today's oil & gas industry, production companies continuously search for better ways to reduce capital expenditures (CAPEX) by reducing the overall foot print on new well pads. One way to reduce this footprint is to process fluids from multiple wells through production separators, move produced fluids to central facilities and minimize the number of production storage tanks on each pad.

A production separator employs a three-phase process to remove the oil from the water and gas. Flowline conditions and other processing variables can upset or destabilize this process making the accurate measurement of the oil and water interface in the separator challenging. During a recent customer trial, Electrolab proved that living with these type of process upsets is unnecessary. Electrolab's Model 2100 Digital Level Sensor provides a stable, secure, and reliable way to measure level and use this information as the basis for separator control.

To ensure efficient, cost-effective operation, operators require an accurate level measurement of the water interface in the production separator. The goal of this measurement is to prevent water carry over with the oil, reduce oil carry under with the water and maximize oil production. Some level measurement technologies prove better at meeting this goal than others.

Currently, Electrolab is working with a customer in New Mexico using the Model 2100 Digital Level Sensor in an 8' X 20' production separator to monitor the water and oil level in the water bucket of the separator. The production separator operates under pressures between 50 to 125 PSI and temperatures up to 125 degrees F. Previously, the customer used a Guided Wave Radar (GWR) sensor in the separator to measure the water and oil levels and found it difficult to accurately measure the water interface. Even with redundant devices, multiple process upsets occurred and the customer was unable to achieve more than one week of uninterrupted service using the GWR sensor.

"Wonderful Results. The Electrolab DLS showed a perfect trend of water carry over and saved us from a lot of process upsets."

— BC, Sr. Facilities Engineer

Customer Testimonial

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Before committing to the Electrolab solution, the customer decided to compare the Electrolab and GWR level sensing technologies side-by-side. The customer installed Electrolab's Model 2100 DLS in a second entry flange on the separator after taking a manual gauge measurement of both the total level and the interface level during the installation. The installer calculated and entered the level offset into the Model 2100 DLS. The customer left the guided wave radar in control of the process and trended the levels for both the Model 2100 DLS and the GWR.

After two weeks in service showing reliable level measurements, the customer switched the water level control to the Model 2100 DLS interface level reading. After 3 weeks of service using the Model 2100 DLS interface levels as the basis for control, the customer reviewed the data and reported zero control upsets, near zero water carry over in the oil and significantly reduced oil content with the produced water. The customer felt with further refinements to their process, they could achieve even better performance by installing the Model 2100 DLS sensor in other process vessels in the train on the pad. The graph below shows level readings for the two technologies over a 24-hour period.

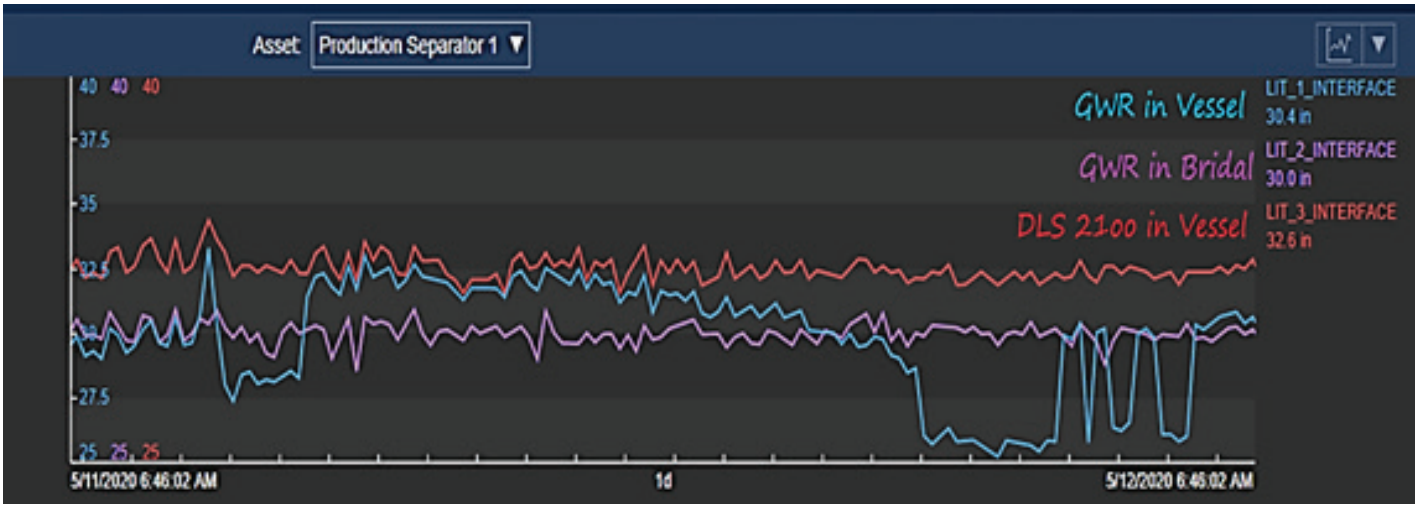

Figure 1: Production Separator Perfomance Analytics

The blue line shows the guided wave radar sensor reacting to changing conditions in the production separator, leading to erratic level readings. The red line shows stability of level readings from the Model 2100 DLS. In this example, if the controller used data from the GWR sensor, the control for the separator water bucket would have driven a control action sending more water into the oil bucket, contaminating the flow line, and leading to process upset.

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As in all separators, this site saw changes in the thickness of the emulsion level. More water came as a percentage of the total flow. This changed the dielectric constant of the interface. Radar reflects differently off material with different dielectric constants. This changed the behavior of the GWR measurement, although the total level and true interface did not change. This false reading threw off control, leading to exaggerated process upsets and contaminated flows.

Electrolab's Model 2100 DLS provides an accurate total level, water interface level, and temperature to provide reliable process measurement—allowing operators to maximize production and minimize operation costs.

Unlike guided wave radar technology, the DLS 2100 is not susceptible to inaccurate measurement due to foaming, emulsion or splashing that may occur in the production separator. The design of the magnetic floats used in the Model 2100 DLS ensure direct, in-fluid measurement at the oil/water interface allowing for accurate level measurement under pressures up to 250 psi.

To learn more about how Electrolab Level Sensors can be used in separator applications, contact our sales team at insidesales@electrolabcontrols.com

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