Real-Time Wireless Transmission of High-Resolution Well Test Data Helps Petrobras Save Rig Time

Enabling Signature quartz gauges with Muzic wireless telemetry allowed real-time delivery of presalt downhole test data, offshore Brazil

**CHALLENGE**
Quickly acquire real-time well test data in deepwater environment while ensuring high data resolution and accuracy.

**SOLUTION**
Enable Signature* quartz gauges with Muzic* wireless telemetry to provide flow and shut-in data to monitor operations and allow well test and reservoir engineers to adjust the test program in real time.

**RESULTS**
Saved rig time by visualizing downhole data during flow periods and eliminating the need to rig up a conventional surface readout system (SRO).

Conventional test methods posed challenge in deepwater environment

Downhole test operations provide important information about well deliverability and reservoir characteristics, which can be especially critical in high-cost, high-risk environments such as deep water. In many well test operations, downhole data is recovered using a conventional SRO system that is run on electric line and deployed during the buildup period. SRO systems require operators to rig up and test the wellhead pressure equipment, run the electric line latch system in hole, download the data, and retrieve the latch system. These steps consume considerable rig time—up to 12 hours of nonvalue-added time in certain operations. The electric line SRO system is available only during static well periods and is unavailable during flow periods. Further, conventional systems pose safety risks involving equipment handling, high pressures, and cables across valves.

Identifying an opportunity for Petrobras to optimize its deepwater well test operations, Schlumberger proposed using a real-time communication solution on a well in the presalt Santos basin, located more than 150 mi [250 km] offshore Brazil. Water depth exceeded 6,500 ft [1,981 m], and the depth of the target zone was greater than 11,000 ft [3,353 m].

The deepwater well’s productivity index was monitored in real time and transmitted wirelessly for interpretation.
**CASE STUDY:** Enabling Signature gauges with Muzic telemetry allowed wireless delivery of test data, offshore Brazil

**Gauges enabled by wireless real-time communication**
Partnering with Schlumberger, Petrobras chose to deploy wirelessly enabled Signature gauges on the presalt well test in the Santos basin, achieving excellent results compared with conventional practices. This solution allowed Petrobras to interact with downhole equipment, manage wellbore events, and refine the test in real time.

Repeaters were run in the downhole test string to ensure communication with redundancy. In this well, running the wireless system took less than 6 h of rig time compared with 20-24 h when using a standard wireline system.

**Optimized deepwater well test saved rig time and costs**
Signature quartz gauges ran continuously for 568 h—longer than 3 weeks—to provide data crucial to optimizing well test operations in real time. Petrobras reservoir engineers were able to:
- observe perforating guns’ affect on pressure and confirm dynamic underbalance
- compute productivity when the well was flowing
- validate that sufficient data was acquired during the initial and main buildup periods to end them sooner
- eliminate the need for a wireline run
- establish reservoir pressure after the initial postperforating flow period.

The wirelessly transmitted data measured using Signature quartz gauges allowed Petrobras reservoir engineers to obtain insights into reservoir parameters during the well test operation. Petrobras also validated that sufficient downhole data was acquired before pulling the downhole test string out of hole.

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**Real-time pressure and temperature data transmitted for the test’s duration match the memory gauge data that were not available until after the end of the test. Inserts show the details of the detonation of the TCP guns and the pressure transient test sequence.**

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**www.slb.com/Signature**

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