

Optimize Critical Well Testing Operations in Real Time

Case study: Chevron uses Schlumberger technology in record Jack well test

Challenge

Conduct an extended well test in the deepest water (7,000 ft) and the highest pressure (25,000 psi) yet in the US Gulf of Mexico with real-time surface readout of bottomhole pressure and temperature.

Solution

A semipermanently deployed WellWatcher* real-time reservoir and production monitoring system.

Result

Reliable, uninterrupted real-time bottomhole data acquisition for 48.5 days from all three down-hole gauges while monitoring sustained flow rate of 6,000 bbl/d of oil; minimized rig time spent to achieve well test objectives.

Deep water, high pressure

Chevron planned an extended well test in the deepwater Jack No. 2 well in the Gulf of Mexico. Reliable, uninterrupted real-time data had to be obtained in 7,000 ft of water and a total depth of 27,500 ft, plus very high pressure of 25,000 psi. Reservoir uncertainties and extremely high daily rig spread rates required maximum efficiency.

Chevron used Schlumberger for surface-readout measurement equipment because of past experience with challenging extended well tests in high-pressure reservoirs. Risk-reduction concerns led the operator to specify a semipermanent installation of WellWatcher gauges rather than wireline-run equipment for downhole pressure monitoring.

Robust gauge system

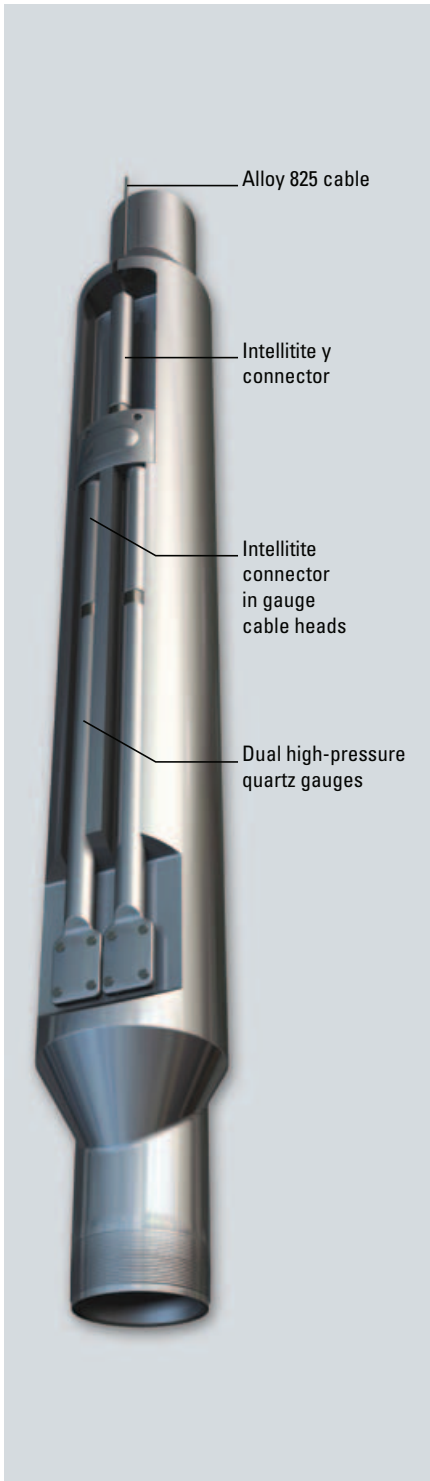
With the drillstem test string, Schlumberger ran a reliable WellWatcher permanent gauge system consisting of three quartz pressure and temperature gauges—rated for 25,000-psi and 425 degF—deployed using one dual and one single solid gauge mandrel and welded Intellitite* electrical dry-mate connectors. The proven reliability of the welded connector technology used in this system was considered a key advantage over wireline-deployed gauge options to acquire this data.



The Jack well is in 7,000 ft of water.



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Depiction of typical dual gauge mandrel carrying two of three high-pressure quartz gauges in the test string.

The electrical signal was routed through the SenTREE* high-pressure subsea well control system on the seafloor. At the surface, the pressure and temperature information was monitored by Chevron and Schlumberger personnel in real time during well test operations. This real-time surface readout was critical to the safety and efficiency of this well test.

Uninterrupted data stream

The Schlumberger gauge system transmitted critical downhole annulus and flow-stream bottomhole pressure and temperature information uninterrupted for 48.5 days. The well test averaged 6,000 bbl/d of oil.

The system facilitated onsite transient analysis of the downhole flowing and buildup data, allowed engineered execution of the well test, maximized well test flow rates while minimizing the risk of excessive drawdowns, minimized the rig time required to fulfill the objectives, and supplied invaluable assistance to drillstem test specialists.

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