Case study: Exploration well drilling, Mexico

First Lucida rotary steerable deployment drills exploratory well, no stuck pipe events, saves two drilling runs

A customer in the Gulf of Mexico aimed to drill a shallow water, 6½-in. hole size exploratory well. Specifically, the customer required a reliable, cost-effective drilling solution through a Mesozoic formation from a measured depth of 22,047 ft to 22,703 ft (6720 m to 6920 m) for the entire 6½-in. hole section interval.

The drilling solution would have to minimize drilling time to 100 hours per run in 656 ft (200 m) intervals. The solution would also have to maintain vertical control and minimize vibration while running managed pressure drilling (MPD) through the formation, which had an expected static temperature of 177°C (351°F) and hydrostatic pressure of 18,400 psi .

The operator wanted to minimize the high probability of stuck pipe incidents—a common experience in previous wells.

The customer asked the Baker Hughes Integrated Well Services (IWS) team to develop a directional drilling solution that would reliably drill through this high-pressure/high-temperature (HP/HT) section of the reservoir, without stuck pipe events and with no equipment failures.

Aligning on the well plan

The Baker Hughes IWS team managed the full scope of the project. A Project Management Team (PMT) was assembled to collaborate with the operator and identify specific challenges and project goals.

Project planning began three months in advance of deployment. After reviewing the specifics of the planned well, the IWS team recommended the **Lucida™ advanced rotary steerable service (RSS)** to drill the 6½-in. hole section in three runs.

Lucida incorporates modern electronics and robust design features to provide advanced directional drilling and control. The service leverages market-leading continuous proportional steering, rotary steerable technology with multiple sensors for detailed answers while drilling. Near-bit inclination and azimuthal gamma ray provide survey-quality data that enable timely decision making and precise, automated trajectory control to enhance reservoir navigation and wellbore quality.

Lucida also ensures greater drillstring stability and extended drilling time with real-time downhole dynamics packages that measure conventional VSS data, weight on bit, torsion on bit, and bending moment.

Drawing on decades of experience from Baker Hughes drilling experts, Lucida offers an integrated, application-specific bottomhole assembly and customized **Dynamus™ extended-life drill bits** to ensure reliable, repeatable, and predictable drilling performance.

Designing the solution

IWS worked closely with other Baker Hughes product lines, including drill bits, drilling services, drilling fluids, and reservoir services to ensure a fully integrated service plan that minimized operational risks, costs, and time.

The plan included a thorough risk assessment and fit-for-purpose

Challenges

- Avoid stuck pipe events encountered in previous wells
- Eliminate tool failures to deliver expected field performance and avoid NPT

Results

- Drilled the 6 ½-in. hole section in a single run, avoiding two additional runs and saving an average of 84 hours per trip
- Drilled 951 ft (290 m) in a single trip with the same BHA—45% longer than the 656 ft (200 m) planned runs with three BHAs
- Drilled the section with no tool incidents or stuck pipe events
- Delivered a high-quality wellbore to enhance the performance of subsequent operations, including completions, logging, and tripping

application planning. The IWS team also implemented lessons learned and best practices from other regions where the Lucida service was deployed.

The well design included a mud cooler, drilling fluid, and parameters management to reduce drilling mud temperature from an expected 172°C (342°F) to an actual maximum static temperature of 163.6°C (326°F).

The Lucida advanced RSS and MWD/LWD HT technology implementation was supported by 50% remote operations, with full-time remote support from Brazil. This remote support also combined multi-disciplinary teams from North America, the global support team from Germany, and Latin America's Remote Operations Services team. The collaborative team support from different regions helped IWS deliver the project with a singular goal of full customer satisfaction.

Executing with predictable performance

The IWS team worked closely with the operator's field crews to ensure that the Lucida service exceeded expectations in the HP/HT well. In one run, the service drilled 951 ft (290 m) in 155.9 hours, which was 45% longer than the 656 ft (200 m) planned for this run. It also saved two additional runs, for an average savings of 84 hours of trip time per run.

The Lucida service achieved an average rate of penetration of 6.1 ft/hr (1.9 m/hr), 212.4 hours of circulation time, and 285.5 hours of BRT. This far surpassed the plan of 80 hours of circulation time and 100 drilling hours for each run.

The service operated with no tool incidents and no stuck pipe events, even at the highest recorded circulating temperature of 156°C (313°F).

The Baker Hughes IWS team delivered this well with superior reliability compared to prior wells, by mitigating risks of nonproductive time and maintaining a mindset of excellent service delivery.

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