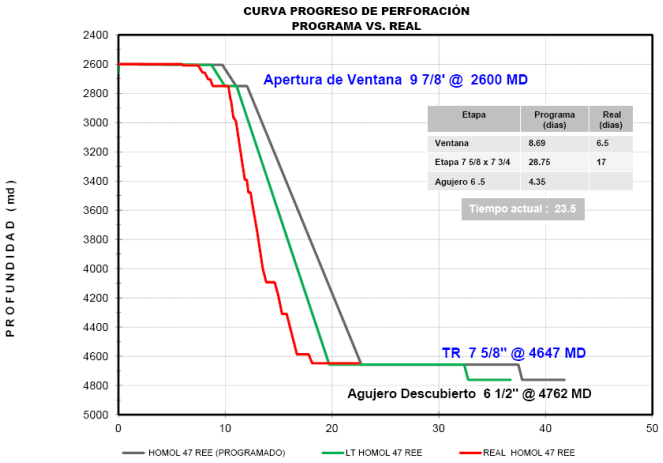
Magnus RSS, MPD Techniques Combined to Mitigate Ballooning Effect, Reduced Drilling Time by 25%, Eliminated NPT



Days vs. Depth plot: Actual time vs. plan where the green line is the previous technical limit, the black line is the planned drilling time per the drilling program, and the red line is the actual drilling time as delivered by Weatherford.

Objectives

- Drill an 8 1/2-in. cased-hole sidetrack directional hole from 9 7/8-in. casing in an offshore well with a history of ballooning effect, losses, stuck pipe, and wellbore instability.
- Maintain constant bottomhole pressure (CBHP) to minimize the downhole pressure fluctuation.

Our Approach

- With a depleted reservoir in the Upper Cretaceous Breccia formation, Homol is a complex field to drill. In order to reach the reservoir, the operator needed to drill through a high-pressure zone with formations that have shown plastic properties that exhibit a ballooning effect during drilling activities. This effect often confuses field personnel who interpret the surface signs as a gas kick and wait for flow checks, stabilizing flow return, and unnecessary mud weight-up schedules, contributing to significant nonproductive time (NPT).
- After a rigorous collaboration with the operator to develop a drilling engineering process—including detailed offset well analysis to deliver a comprehensive risk assessment and mitigation plan—Weatherford recommend a dual approach: use managed pressure drilling (MPD) techniques to keep the downhole pressure constant (which aids in mitigating wellbore instability across the Middle and Lower Miocene formations) while deploying a push-the-bit Magnus® rotary steerable system (RSS) to mitigate against stuck pipe issues and achieve directional objectives.

LOCATION
Homol Field, Mexico

WELL TYPE
Offshore

FORMATION
Middle and Lower Miocene

HOLE SIZE AND ANGLE
8-1/2 in. at 20.66° inclination

CASING SIZE AND TYPE
Cased-hole sidetrack out of 9-7/8 in.

MEASURED DEPTH
15,396 ft (4,693 m)

PRODUCTS/SERVICES
- Magnus RSS
- Managed Pressure Drilling

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Our Approach (continued)

- To comply with the programmed targets and minimize wellbore tortuosity, real-time directional sensors were included in the bottomhole assembly (BHA). These near-bit sensors accurately measure the inclination tendency while drilling, allowing the directional driller to monitor and make timely steering corrections to avoid a micro-dogleg, which is a typical consequence of aggressive directional work.
- The CENTRO™ Well Construction Optimization Platform aggregated real-time data during execution and was monitored by the Weatherford Real-Time Operations Centre (RTOC). Due to the tight equivalent circulating density (ECD) threshold to avoid the ballooning effect, RTOC engineers closely monitored ECD values in real time from the borehole annular pressure (BAP) sensor to identify possible hole cleaning issues, packoff or losses.

Value to Customer

- The 8 1/2-in. sidetracked hole section was completed in one run.
- By combining the Magnus RSS with MPD to maintain the CBHP, the operator mitigated the ballooning effect while maintaining constant surface backpressure (SBP). The well was drilled while minimizing the downhole pressure fluctuation to mitigate against wellbore instability until reaching the Lower Paleocene formation. The engineers took care to maintain an ECD of 2.04 gr/cm^3 while drilling and an equivalent mud weight (EMW) of 1.99 gr/cm^3 during connections in order to reduce the ballooning effect observed in offset wells.
- By eliminating the ballooning effect, losses, wellbore instability, and stuck pipe were effectively mitigated, and the operator experienced reduced NPT.
- When compared with similar offset well data, the Weatherford solution reduced the drilling time by 25% while increasing the ROP from 60.3 ft/hr (18.4 m/hr) to 81.4 ft/hr (24.83 m/hr).

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