

Magnus[®] Rotary Steerable System Achieves First Batch Drilling in Gulf of Thailand, 8.5-in. Sections Drilled to TD in Single Run Across 6 Consecutive Wells

Objectives

- Batch drill an 8 1/2-in. section to total depth (TD) in a single bit run, with a planned maximum dogleg severity (DLS) of 0.9°/30 ft (10 m) for highly challenging 3D well profiles. The well plan required an inclination increase up to 62° and a left azimuthal turn from 115° to 234°. The section length was targeted around 4,019 ft (1,225 m).
- Acquire real-time and recorded logging-while-drilling (LWD) data while minimizing nonproductive time (NPT).

Our Approach

- In collaboration with the operator, Weatherford initiated a comprehensive pre-drilling planning and risk mitigation engineering process comprising four key phases: design, execution, evaluation, and optimization. This process included a thorough risk assessment, optimization of the bottomhole assembly (BHA) and drilling parameters based on historical data, and the engagement of the Middle East Real-Time Operations Center (RTOC) to ensure seamless execution.
- The Weatherford drilling engineering team proposed the use of the Magnus 675 rotary steerable system (RSS) paired with advanced LWD technologies. The decision to deploy the Magnus RSS, as opposed to the traditional positive displacement motor (PDM) system used in offset wells, addressed issues of BHA hangup that previously hindered casing landings.
- The project incorporated LWD tools to gather real-time and recorded data, including parameters such as temperature, bore and annular pressure, vibration, equivalent circulating density (ECD), gamma ray, near-bit gamma ray responses, and resistivity. These tools were essential in providing continuous monitoring and data acquisition.
- Upon deployment, the Magnus RSS drilled from the shoe, maintaining a low DLS of less than 2°/30 ft (10 m) while building the required inclination. When the tangent angle was achieved, the system transitioned to autopilot mode, effectively minimizing wellbore tortuosity.
- A detailed hydraulic analysis enabled the team to optimize directional performance within the required flow rates, ensuring that the parameters remained within tool specifications. Real-time comparison of actual data with the modeled data allowed for effective management of ECD.
- The drilling team managed drilling parameters in real time to optimize the rate of penetration (ROP). This proactive optimization extended the bit life run from the shoe to section TD, facilitating smoother wellbore conditions and mitigating BHA hangup challenges associated with traditional PDM-based BHAs. The result was a more efficient and stable drilling process, which improved the casing run.



The Magnus RSS uses steering on and off to optimize the consumption and maintain trajectory.

LOCATION

Gulf of Thailand

WELL TYPE

Offshore, S-shape(3D)

HOLE SIZE AND ANGLE

8 1/2-in section, build from low angle up to 62° inclination (3D)

MAXIMUM TEMPERATURE

249°F (137°C)

DEPTH

8,350 to 12,369 ft (2,546 to 3,771 m)

PRODUCTS/SERVICES

- Magnus RSS 675
- HEL[™] hostile-environment-logging measurement-while-drilling system
- BAP[™] bore and annular pressure sensor
- HAGR[™] high-temperature azimuthal gamma ray tool
- TVM[™] true vibration measurement system
- IDS[™] integrated directional sonde



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Value to Customer

- The first deployment of the Magnus RSS in the Gulf of Thailand successfully executed batch drilling operations, overcoming the challenges of a complex well design. The operation delivered exceptional wellbore quality with no completion issues.
- The Magnus RSS enabled drilling from a 9 5/8-in. shoe to section TD in one bit run, continuing across six consecutive wells, totaling 22,730 ft (6,928 m).
- The Weatherford solution achieved the operator's expectation, encountering no well control or stuck pipe issues. Bit dullness exhibited less of wear and tear (0-0, 0-1) and, in addition to extending the run length, the Weatherford team met all directional objectives.
- The LWD technologies delivered 100% of the required data in real time and recorded modes without NPT or issues with any of the BHA components.
- This operation set new records for the Magnus 675 RSS:
 - Drilling hours: 187
 - Circulating hours: 296
 - Operating hours: 382
- Weatherford achieved the operator's target KPIs, with a maximum on-bottom drilling time (OBT) ROP of 262 ft/hr (80 m/hr) and an average IADC ROP of 124 ft/hr (38 m/hr).



The Magnus RSS uses proportional steering control along with autopilot mode to optimize wellbore quality and minimize downlink time.

