Magnus® Rotary Steerable System

Drills 17 1/2-in. Hole Section in a Single Run, Saves 6.2 Hours of Rig Time, With No NPT

Objectives

- Improve drilling time compared with offset wells.
- Maintain a vertical well trajectory.
- Eliminate nonproductive time (NPT) related to tool failures and service quality issues.

Our Approach

- The Weatherford drilling engineering team conducted a thorough review of the scope of work (SOW), including well trajectory, bit sizes, and the drilling fluid program. As part of this process, the team analyzed data from offset wells and conducted a risk assessment to identify drilling hazards as well as best practices. Their analyses alerted the team to develop steps to counter potential downhole problems:
  - Monitor drilling dynamics and mitigate downhole stick-slip problems using a true vibration monitor (TVM) in the measurement-while-drilling (MWD) string.
  - Develop connection and tripping procedures as well as mud programs to mitigate unstable formations, swelling, caving, and caverns.
  - Optimize the bottomhole assembly (BHA), hydraulics, torque and drag, and shock-and-vibration regimes using Weatherford engineering protocols.
  - Manage the hole-cleaning program.
- The team deployed the Magnus RSS along with the HEL™ MWD system and a polycrystalline diamond compact (PDC) drill bit. Successfully drilling from 154 to 1,654 ft (47 to 504 m) measured depth (MD), the RSS adjusted the steering bias to use only the force required to maintain a vertical trajectory.
- The RSS reached the desired section depth at 1,654 ft (504 m) MD without NPT in only 89.7 hours instead of the expected 96 hours.

Value to Customer

- The Magnus RSS maintained a vertical trajectory and finished drilling the 17 1/2-in. section 6.2 hours faster than planned as a result of three factors:
  - The Weatherford team designed the BHA specific to the Magnus RSS with an undergauged collar stabilizer.
  - Wiper trips were performed in 590 ft (180 m) intervals to ensure a smooth wellbore.
  - The Magnus RSS performed well despite minimal drilling rig capabilities of 110 rpm maximum speed, 2,800 L/min maximum flow rate, and 140 bar maximum pressure.
- By developing appropriate measures in response to unique well conditions, the Weatherford team was able to drill to target depth in just one run, with zero NPT.

The Magnus RSS 1100 drilled the 17 1/2-in. hole section of an onshore, vertical well faster than planned.

LOCATION
Poland

WELL TYPE
Onshore, exploratory, vertical

FORMATION
Carpathian Flysch

HOLE SIZE AND MAXIMUM INCLINATION
17-1/2 in., 0.96°

CASING SIZES AND TYPES
- 18 5/8-in. conductor to 154 ft (47 m) MD
- 13 3/8-in. casing at 1,654 ft (504 m) MD

TEMPERATURE
126°F (52°C)

SECTION DEPTH
From 154 to 1,654 ft (47 to 504 m)

PRODUCTS/SERVICES
- Magnus RSS
- HEL MWD system

Weatherford®

