

MPD Semiautomatic System with Coriolis Flowmeter Detects and Controls Influx, Saves \$85,000

Objectives

- Provide early detection and response to fluid loss or influx events while drilling and casing a challenging high-pressure formation.
- Maintain and manage equivalent circulating density (ECD) and equivalent static density (ESD) to mitigate formation-pressure hazards while drilling, stripping drillpipe, and running and cementing casing.
- Eliminate non-productive time (NPT) and stuck pipe incidents.

Our Approach

- Weatherford engineers developed an MPD drilling proposal using offset well data from the customer and a Weatherford database. The team evaluated different scenarios, operative windows, connections, hole-cleaning indicators, and performed surge and swab analysis using different parameters.
- The team proposed a semiautomatic MPD package using a SafeShield® 7100 series rotating control device (RCD) to perform managed-pressure drilling and cementing, a PressurePro® set-point choke to provide surface backpressure (SBP), a Coriolis flow out measurement (CFM) skid to proactively manage ECD and ESD, and a dedicated mud-gas separator to respond to formation fluid influxes.
- At the wellsite, the Weatherford crew installed the MPD system. The crew aligned drilling returns to the PressurePro choke as sidetracking operations began, and the MPD operation maintained an ECD of 15.53 lb/gal (1,861 kg/m³) using oil-based mud.
- The MPD crew detected an influx based on increased CFM readings and standpipe pressure increases. The PressurePro setpoint electric choke managed the influx by raising SBP to 700 psi (4.83 MPa), with an ECD of 16.61 lb/gal (1,994 kg/m³). Total influx was calculated at 5.66 bbl (0.9 m³).
- The operator reached total depth (TD) without incident, then suppressed any swab effects while tripping out of the hole by applying SBP from TD to landing point. The operator then ran 5-in. casing, followed by managed pressure cementing. All operations were performed flawlessly, with no problems.

Value to Customer

- Weatherford MPD services and equipment provided early kick-detection and SBP capabilities, which enabled the operator to safely drill to TD, then run and cement casing within a narrow operating window.
- The closed-loop system with PressurePro set-point choke and CFM managed EDC and ESD to mitigate pressure hazards while drilling and casing the well.
- The MPD system enabled the customer to drill ahead despite a fluid influx. Through early detection and rapid response, the MPD crew also avoided stuck pipe incidents. In total, the MPD services saved an estimated \$85,000 in NPT costs.



MPD equipment installed with a Coriolis flowmeter (gray equipment) and semiautomatic choke enabled the operator to safely drill ahead and avoid NPT despite an influx of formation fluid.

LOCATION

Neuquén, Argentina

WELL TYPE

Horizontal sidetrack, shale oil producer

FORMATIONS

Vaca Muerta and Quintuco

HOLE SIZE AND ANGLE

6-3/4 in., 93°

CASING SIZE AND TYPE

9 5/8-in., 32.3 lb/ft H40 guide casing
7 5/8-in., 26 lb/ft P110 intermediate casing
5-in., 21.4 lb/ft P110 production casing

TEMPERATURE

221°F (105°C)

ESTIMATED PORE PRESSURE

8,040 psi at 9,331 ft TVD
(1,988 kg/m³ at 2,844 m TVD)

TOTAL DEPTH

20,532 ft (6,258 m) MD

PRODUCTS/SERVICES

Managed Pressure Drilling
• SafeShield Model 7100 RCD
• PressurePro set-point choke
• Flow out measurement skid
• Mud gas separator

