Weatherford®

REAL RESULTS

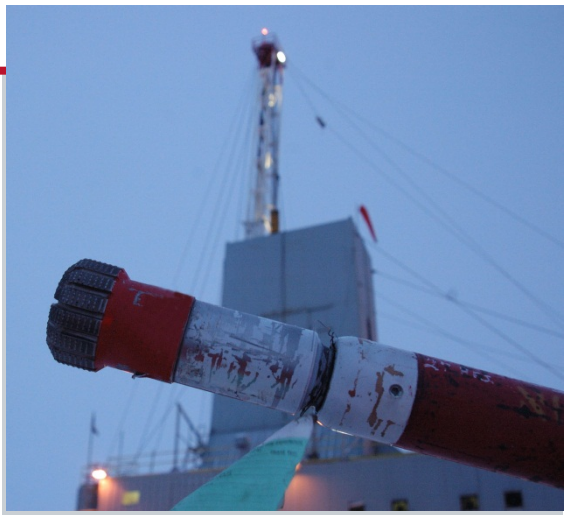
e-CTD® Motor and ClearCut™ MP Mill Drill Out Multiple Frac Sleeves and Balls in One Trip, Save 8 Hours of Rig Time and $23,000

Objectives

- Mill out these items and associated debris following a 15-stage fracturing operation: 14 frac sleeves with aluminum seats ranging from 1.75- to 3.37-in. inner diameter (ID) and 9.2-in. port pockets; 14 ceramic balls of varying sizes; and one 3-in. ID production sleeve.
- Drill out all sleeves and ports to 3.72 in. ID.

Our Approach

- Weatherford ran a milling bottomhole assembly (BHA) that included the 2 7/8-in. e-CTD motor and 3.72-in. ClearCut MP (CCMP) mill. The e-CTD motor pumped continuously throughout the operation and delivered the power necessary to minimize stalling and to maximize rate of penetration. The CCMP mill remained centralized while milling and provided the optimal bit length to prevent the tool from falling into the large ID of the port pocket. As a result, this tool milled out the correct part of each frac sleeve and avoided damage. Additionally, the CCMP mill produced small, uniform pieces of debris that could be easily removed.
- The milling BHA removed all items from the wellbore in one trip without the need to interrupt the operation to change motors. The milling time per sleeve ranged from 5 to 22 minutes.
- After each 600 ft (182 m) of milling, the team performed a wiper trip to a depth of 1,900 ft (579 m) down the vertical section of the wellbore for efficient cleanout. Although this extended the circulation time of the motor, it continued to perform without failures or interruptions. The team also pumped a 20-lb (9-kg) gel sweep downhole after milling each port.
- To lift debris to the surface easily, the crew pumped 8.3 ppg of fresh water downhole at a rate of 2.5 to 2.8 bbm, which resulted in an annular velocity of 199 to 227 ft/min (60 to 69 m/min). Because the job site lacked adequate storage and disposal space at the surface, the crew recycled all pumped fluid.
- Because this was a low-pressure well, the team performed nitrogen unloading once the milling operation was complete. This post-milling operation displaced the water and gel fluids in the wellbore and lightened the hydrostatic pressure placed on the reservoir to enable the free flow of hydrocarbons to the surface.



In combination with the CCMP mill, the e-CTD motor (shown above) drilled out 14 frac sleeves and 14 balls in one 3-hour trip. Because the motor did not have to be changed mid-operation, the operator saved significant rig time and costs.

Location
Queensland, Australia

Well Type
Onshore, horizontal, gas

Production Casing
4-1/2 in., 11.6# N-80

Tubing ID
4 in.

Maximum Wellbore Deviation
73°

Bottomhole Temperature
140°F (60°C)

Bottomhole Pressure
1,406 psi (9.69 MPa)

Measured Depth
6,145 ft (1,872 m)

Total Volume Depth
5,214 ft (1,589 m)

Products/Services
- 2 7/8-in. e-CTD motor
- Motorhead assembly with 3.72-in. CCMP concave, long-style mill
- Slip-type coil connector
- 2 7/8-in. dual-acting Maximus jar
- 2 7/8-in. heavy duty (HD) disconnect

Weatherford
Greg Smith
Business Unit Manager –Thru Tubing, Australasia
greg.smith@ap.weatherford.com
+61 487799966

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Value to Client

- The milling operation met the operator's requirements to drill out the frac sleeves and ports at 3.72-in. ID and was completed in approximately 3 hours.
- By avoiding the need to pull out of the hole during the milling operation to change motors, which would have taken 8 hours, Weatherford saved the operator approximately US $23,000 in equipment costs. This includes US $7,700 (AUD$10,000) for changing BHA tools and US $15,400 (AUD$20,000) for additional deployments of the coiled-tubing unit.
- By recycling the pumped fluid, the team provided an environmentally friendly alternative to injecting the fluid into storage and disposal wells.
- The crew removed all milling-related debris and fluids from the wellbore that could disrupt production flow.
- Fracturing operations using ball-drop-activated systems are less common in Australia compared to the plug-and-perf method. The ease, speed, and cost effectiveness of this milling operation demonstrates that fracturing with ball-drop-activated sleeve systems is a viable alternative to the plug-and-perf method, especially in horizontal wellbores.

