

Successful Casing Drilling and Multistage Cementing Technology Trial, Middle East

Customized BHA integrating Direct XCD casing bit remedies losses without incident

CHALLENGE

Drill through formation to shut off lost circulation zones; eliminate NPT and risk associated with conventional casing runs.

SOLUTION

Run an integrated BHA with diverter valve tool, packer, multistage inflation packer collar, and Direct XCD* drillable alloy casing bit.

RESULTS

Successfully isolated water-sensitive shale and eliminated losses without incident, saving 7 h off of plan.

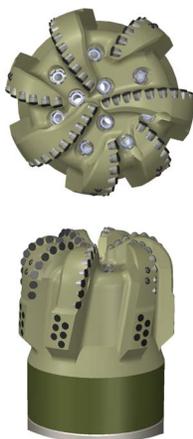


Casing drill to mitigate risk and NPT

To mitigate mud losses in a field in the Middle East, casing drilling services were contracted. The operator sought to drill with 9 $\frac{3}{8}$ -in casing to isolate water-sensitive shale and to shut off lost circulation zones within the troubled formation. This would entail drilling to approximately 2,490-ft TVD.

Other objectives for implementing nonretrievable casing while drilling included

- drilling through the formation's loss zone and performing second-stage cementing
- testing the use of the technology to drill with 13 $\frac{3}{8}$ -in casing and eliminate a casing string
- eliminating stuck pipe, wiper trips, and unnecessary BHA pipe handling
- removing drillpipe tripping, reaming, and casing running time, as well as risk associated with conventional casing running operations.



The Direct XCD bit design included high cutter density and optimal nozzle configuration to mitigate potential mud losses.

Integrate multiple technologies to ensure accomplishment of drilling objectives

By using a 12-in Direct XCD bit and 9 $\frac{3}{8}$ -in casing as part of the project's trial initiative, the operator aimed to mitigate issues related to losses in the troubled formation. To ensure isolation, a diverter valve (DV) tool and packer were incorporated into the casing drilling string. In addition, a multistage inflation packer collar was used in a casing drilling application.

The 13 $\frac{3}{8}$ -in casing was set as a surface casing conductor at 1,500 ft. Casing drilling operations were planned using the Direct XCD bit (7-bladed with 16-mm premium PDC cutters), which was recently designed based on proven SHARC* high-abrasion-resistance PDC drill bit from Smith Bits, a Schlumberger company. The seven blades were designed for higher cutter density, with optimized nozzle configuration considering potential lost circulation.

Save 7 hours off of plan with no incidents

The casing drilling operation went as planned, with no safety incidents, no vibration or bit whirl, and no borehole instability. Losses encountered during conventional drilling to 1,994 ft slowly healed during casing drilling; at TD no mud losses occurred, and there were no losses while cementing.

Average ROP was 58 ft/h, with penetration breaks reaching 140 ft/h. The casing was successfully pressure tested to 2,000 psi above the DV tool, above the float collar, and 10 ft above the shoe. The Direct XCD bit drill shoe was drilled out in 45 min using an 8 $\frac{1}{2}$ -in PDC bit. The entire operation saved 7 h off of plan.

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Bits and Drilling Technology