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ReSOLVE Instrumented Intervention Service Removes Debris and Opens Valve to Save BHP 7 Days of Rig Time

Monitored debris collection and confirmed valve shifting to replace time-consuming coiled tubing operations with just two wireline runs, Gulf of Mexico

CHALLENGE

Efficiently access and apply pressure to shift a downhole barrier valve beneath proppant debris.

SOLUTION

- Remove the accumulated debris by deploying ReSOLVE* instrumented wireline intervention service's active debris removal tool with a custom slim bailer to negotiate the restriction above the valve.
- Use ReSOLVE service's linear actuator tool to shift the now-accessible valve with precisely controlled and measured displacement and force.

RESULTS

Saved 7 days of rig time in two wireline runs:

- Run 1: Collected 20.8 lbm of debris with the active debris removal tool
- Run 2: Opened downhole barrier valve by applying 15,000 lbf with the linear actuator tool.

Conduct intervention to excavate and open barrier valve

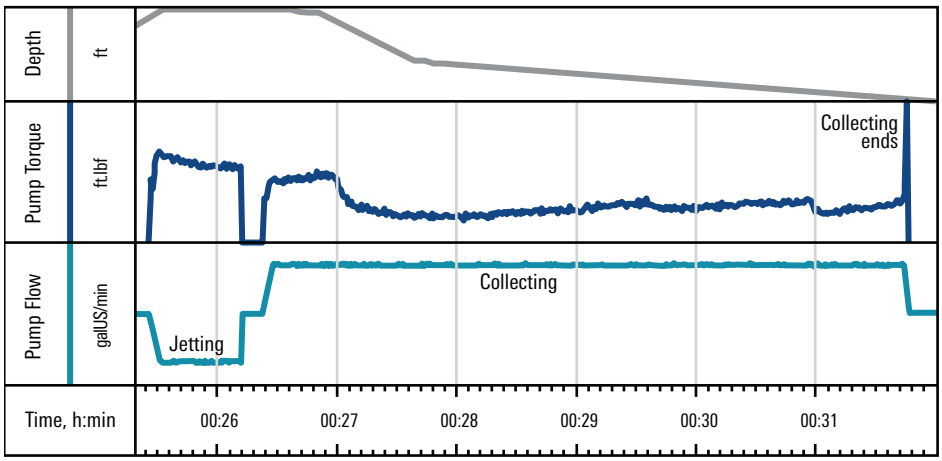
BHP Petroleum needed to open a downhole barrier valve in one of its Gulf of Mexico intervention projects, but the valve could not be directly accessed by the shifting tool because it was buried in proppant debris. Conventional coiled tubing intervention operations would be operationally complex and impose a large footprint on the rig.

Monitor and measure with a streamlined, smart intervention

BHP's completion team collaborated with Schlumberger to devise a more efficient wireline solution. ReSOLVE instrumented wireline intervention service deploys a modular family of intervention tools that provide real-time monitoring, dynamic tool control, and verified downhole actuation to deliver success in well intervention operations. Sensors incorporated in the ReSOLVE service tools enable the engineer to monitor tool activity and the progress of downhole operations while responsively controlling the tool for optimal performance.

The latest member of the ReSOLVE service tools is the active debris removal tool for efficiently vacuuming wellbore debris. The tool's powerful downhole pump generates localized circulation of the debris-laden wellbore fluid. The debris is collected and trapped in a bailer through a combination of gravity separation and filtration. Because a 2.7-in restriction at the top of the valve prevented access by the tool's 3⅛-in bailer, Schlumberger designed a 2⅜-in bailer with velocity tubes. Three types of 2⅜-in bottom noses were also made to find the best fit to the wellbore profile.

The ReSOLVE service's high-force linear actuator tool would be used to open the valve. The tool is anchored with innovative low-stress anchor grips that minimize any tubing imprint while maximizing traction. Once anchoring is confirmed to the surface, the linear actuator can be extended and retracted multiple times to apply a large, controlled force of up to 40,000 lbf. Both the displacement and applied force are continuously measured to validate completion of the operation.



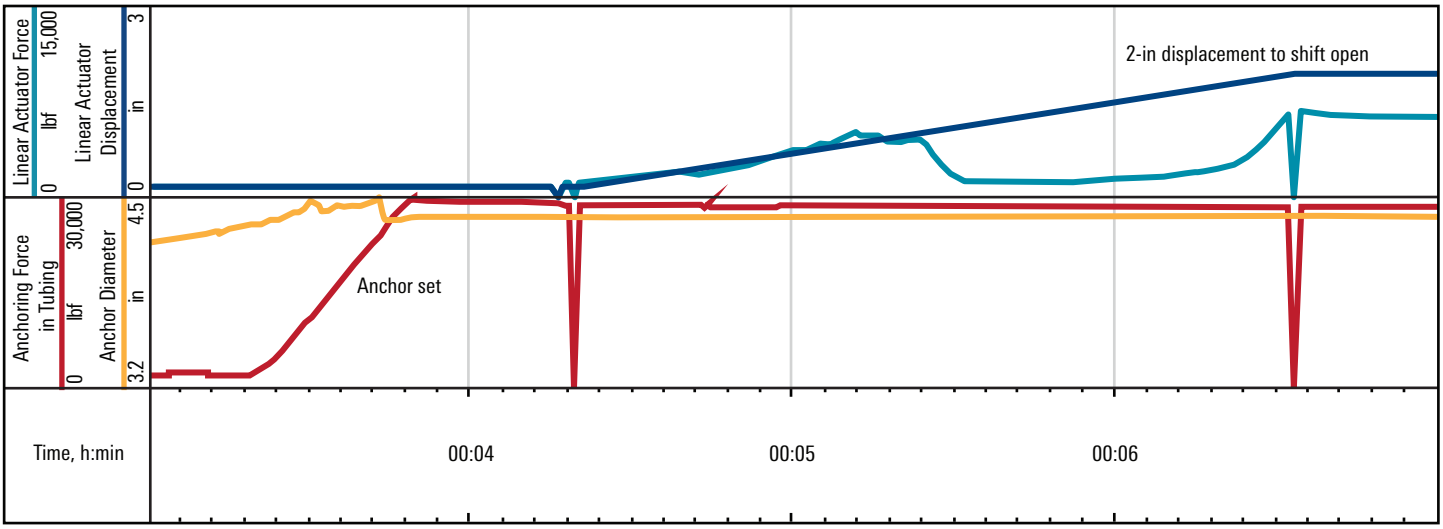
Real-time monitoring of ReSOLVE service's debris removal tool shows the precise control applied to the downhole debris collection.

Collected 20.8 lbm of debris for access to open the valve in only 28 hours

The first wireline run of ReSOLVE service's active debris removal tool was configured with 20 ft of the 2⅜-in bailer and 45 ft of the 3⅛-in bailer and a muleshoe bottom nose. This configuration optimized the debris return volume while fitting the limited rig-up height. During the operation, debris collection was monitored in real time with precise control of the pump speed. A tagging depth change of 2 ft was observed downhole after the debris removal tool collected 20.8 lbf of 18/40 proppant.

The second wireline run deployed ReSOLVE service's linear actuator to easily access the valve and latch to the profile without any obstruction. A maximum force of 15,000 lbf was applied and the 2-in valve shift downhole was observed in real time, which exactly matched the results of the system integration test.

The two wireline runs of ReSOLVE service were completed in less than 28 hours, which saved BHP 7 days of rig time in comparison with an intervention on coiled tubing.



Real-time monitoring verified the progress of the linear actuator tool in successfully shifting the valve by 2 in with a maximum force of 15,000 lbf.

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