

Case study: Texas, United States

Versa-Drive milling service milled 86 frac plugs in one run, saved USD \$100,000

A customer in the Midland Basin had drilled and completed a well with 86 composite frac plugs in 5½-in., 20 lb/ft casing at a total vertical depth of 9,300 ft (2834 m). The proprietary plugs were spaced evenly throughout the wellbore, going as deep as measured depth (MD) of 22,954 ft (6996 m). Using conventional technology, milling out 86 plugs—17 more than the customer’s standard operation—typically required conducting a second trip to replace motor and mill. The customer sought a more streamlined operation and contacted Baker Hughes for a solution.

To reach TD in a smooth, single-trip run, Baker Hughes recommended the **Versa-Drive™ plug milling service** with a bottomhole assembly (BHA) featuring a 2 7/8-in. **Navi-Drill™ X-treme™ air drill mud motor** and **Vanguard™ plug bit**. With self-sharpening steel teeth and increased tooth count, the Vanguard plug bit increases rates of penetration in plug milling applications. Its design also includes a high-aspect-ratio

seal to extend bit life when exposed to high revolutions per minute. To prevent bearing wear and to reduce the risk of leaving cones in the well, the bit features proprietary bearing technology with larger ball bearings. The X-treme motor has exceptional power and is extremely durable and reliable in harsh operating conditions. To enhance safety, improve efficiency, and increase the certainty of success, the **CIRCA™ Real-Time (RT) modeling software** was used.

The Versa-Drive BHA successfully milled all 86 composite frac plugs in one run. The average milling time was 8 minutes per plug with a flow rate ranging from 4.00 to 4.25 bpm over the entire 81.25-hour operation.

By using Baker Hughes the Versa-Drive plug milling service with the Vanguard plug bit, the customer saved 24 hours of operational time, equating to approximately USD \$100,000. The single-trip run was completed safely, experiencing zero health, safety, and environmental (HSE) issues.

Challenges

Remove 86 composite frac plugs from well with MD of 22,954 ft (6996 m)

Results

- Milled all plugs in a single trip with one BHA
- Saved 24 hours rig time
- Reduced costs by an estimated USD \$100,000
- Encountered zero HSE issues