

Thru-Tubing plug-milling solution drilled 65 Gen 4.0 composite plugs in one run

An operator in the Permian Basin wanted a plug-milling solution to deliver production in a plug-and-perf style, unconventional oil well completed with 5-1/2-in., 20 lb/ft casing. Baker Hughes, a GE company (BHGE), suggested setting its **Gen 4.0 composite frac plugs** in the well to isolate and hydraulically fracture all the zones of interest. Sixty-five plugs were installed at regular intervals at depths ranging from 10,128 ft to 19,728 ft (3087 m to 6013 m).

The BHGE plugs were selected because of their outstanding drillout characteristics. They provide small-sized cuttings and exceptional drill-out times while causing minimal wear to cutting structures.

BHGE deployed a high-performance Thru-Tubing milling bottomhole assembly comprising a 4.625-in. **OD Vanguard™ VG3-DO drill bit** driven by a 3.375-in. **OD Navi-Drill™ VIP series workover motor**.

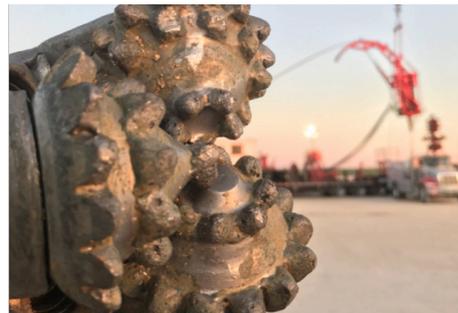
The Vanguard VG-3DO bit is designed specifically for challenging plug-milling operations. Key features include self-sharpening steel teeth with increased tooth count for improved ROP, a high-aspect ratio seal to maintain bit life when exposed to workover motors' high rpm, and proprietary

bearing technology featuring larger ball bearings to prevent bearing wear and the risk of cone loss in the well.

The durable Navi-Drill VIP workover motor is capable of generating exceptional power for extended milling operations without loss of performance.

All 65 Gen 4.0 composite frac plugs were drilled out in a single run. Average milling time per plug was 11 minutes. Plug debris was uniform in size and small enough to easily be circulated out of the hole.

Total milling time for the well was 33.5 hours, while circulation time was 80 hours. The average pump rate throughout the job was 3.9 bbl/min.



The 4.625-in. BHGE Vanguard-3DO bit provided exceptional drill-out performance with minimal tooth wear after drilling 65 Gen 4.0 composite frac plugs in a single run.

Challenges

- Drill 65 composite frac plugs in a single trip in 9,500 ft lateral with (>19,000 ft TD) with 20-5/8-in. coiled tubing

Results

- Drilled 65 Gen 4.0 composite frac plugs in a single trip
- Saved approximately 10 hours of operating time for an estimated savings of \$30,000 USD
- Produced small, uniform plug cuttings
- Averaged 11 minutes/plug drilling time

bhge.com

Copyright 2018 Baker Hughes, a GE company, LLC ("BHGE"). All rights reserved. The information contained in this document is company confidential and proprietary property of BHGE and its affiliates. It is to be used only for the benefit of BHGE and may not be distributed, transmitted, reproduced, altered, or used for any purpose without the express written consent of BHGE.

Baker Hughes reserves the right to make changes in specifications and features shown herein, or discontinue the product described at any time without notice or obligation. Contact your BHGE representative for the most current information. The Baker Hughes logo, Vanguard, and Navi-Drill are trademarks of Baker Hughes, a GE company, LLC. GE and the GE Monogram are trademarks of the General Electric Company.

67366