

# PROVEN ENGINEERING EQUATES TO 48% REDUCTION IN CYCLE TIME: WOLFCAMP DELAWARE BASIN MULTI-RIG DRILLING PROGRAM CASE STUDY

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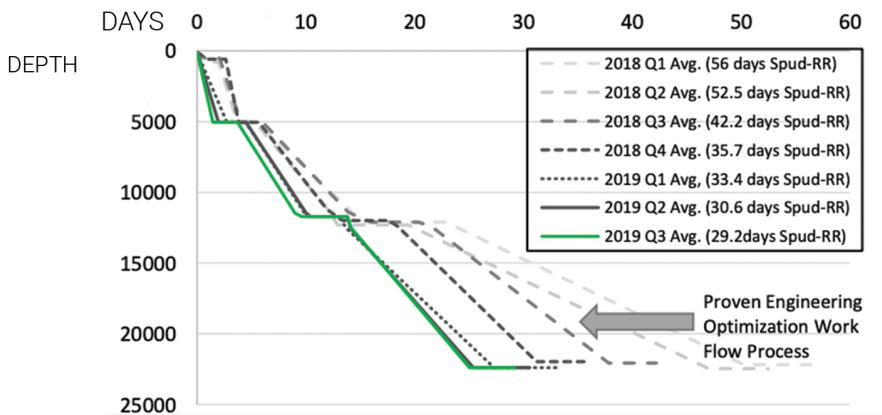
## OVERVIEW

A well-established publicly traded operator in the Delaware Basin (Permian Basin) with continuous drilling operations faced numerous engineering challenges with pressure from investors to reduce cycle time and cut cost of a multi-rig program. Failure to meet objectives would result in lost faith in the drilling operations team and increased feelings of stress and inadequacy of employees. In Q1 of 2018 H&J was hired and tasked with teaming up to reevaluate and ultimately re-engineer all aspects of the drilling operations.

The acreage position is uniquely positioned in one of the most challenging parts of the Delaware Basin. Some of the obstacles to achieving desired performance were water and H<sub>2</sub>S flows, weak depleted zones, consistent 30-70% chert encounters, an unstable reactive clay zone, pore pressures requiring underbalanced drilling, faulting, and unpredictable carbonate debris flows.

Many project management and engineering challenges had to be addressed simultaneously and promptly, including root-cause analysis of previous failures, well construction redesign, on-site personnel training, service provider evaluation and changes, and innovative advances in execution. Over the next two years H&J utilized the iterative E<sup>2</sup> Program to research, design, execute, and redesign. Some of the solutions included redesign of BHA's, (bits, motors, stabilizer area, stabilizer placement, motor selection, etc.), geo-steering to stay in the best drilling rock, physics based drilling parameter selection (utilizing MSE, real time downhole vibration data, drilling parameter step test, etc.), changes to well construction (elimination of casing string and liner replaced with long string), increased sim-ops, implemented wellbore strengthening material in drilling fluids.

With the guidance of H&J's E<sup>2</sup> program a methodical engineering workflow process took shape. The operator achieved on average a 12% reduction in days each quarter for 2 years straight. This led to increased lateral ft/day by 154%, a decrease in flat time by 65% and an overall 27-day reduction in cycle time in less than 2 years' time. Trust increased in the drilling engineering and operations team ability to execute and outpace peers.



**154%**

LATERAL FOOTAGE PER DAY INCREASE.

**65%**

FLAT TIME DECREASE.

**27**

DAYS REDUCED IN WELL CYCLE TIME.

## AT A GLANCE

### CHALLENGES

- Low ROP, lack of directional control, and run length in lateral
- Excessive flat time associated with well design and inefficiencies
- Non-productive time caused by well integrity and instability

### SOLUTIONS

- Physics-based detailed redesign of lateral BHAs.
- Integrated the use of performance based geo-steering.
- Use of MSE, vibrations data, and parameter "step-tests".
- Eliminated string of casing.
- Eliminated use of liner.
- Conducted thorough team-response to increasing safe sim-ops.
- Implemented use of wellbore strengthening material.
- Changes to intermediate casing shoe depth and angle depending on target.

### RESULTS

- Lateral footage per day increase by 154%
- Flat time decreased by 65%
- 27-day reduction in well cycle time
- Renewed faith in drilling department

"WITH H&J I CAN DELEGATE A LOT TO THEM, AND THEY'LL GET IT DONE... I CAN TRUST THEM TO GET IT DONE SAFELY AND EFFICIENTLY"  
VP of Operations – H&J Client