

Engineered Completion Design Increases Reservoir Contact and Productivity in the Wolfcamp Shale

Mangrove stimulation design uses log measurements to intelligently place perforation clusters in optimal intervals of high-pressure shale play

CHALLENGE

Meet production targets for horizontal wells drilled into the Wolfcamp Shale, where economic production is challenging.

SOLUTION

Integrate ThruBit* logging services data with Mangrove* engineered stimulation design in the Petrel* platform to design an optimal completion.

RESULTS

- Successfully implemented the stimulation design for the operator’s first horizontal Wolfcamp well.
- Increased 90-day cumulative oil production by 39% compared with the best offset well.
- Implemented ThruBit services and engineered completion workflow in 12 additional wells.
- Saved an average of 1.5 days (36 hours) per well on coiled tubing cleaning operations.
- Increased successful stages by 33% where >75% of the designed sand volume was pumped.

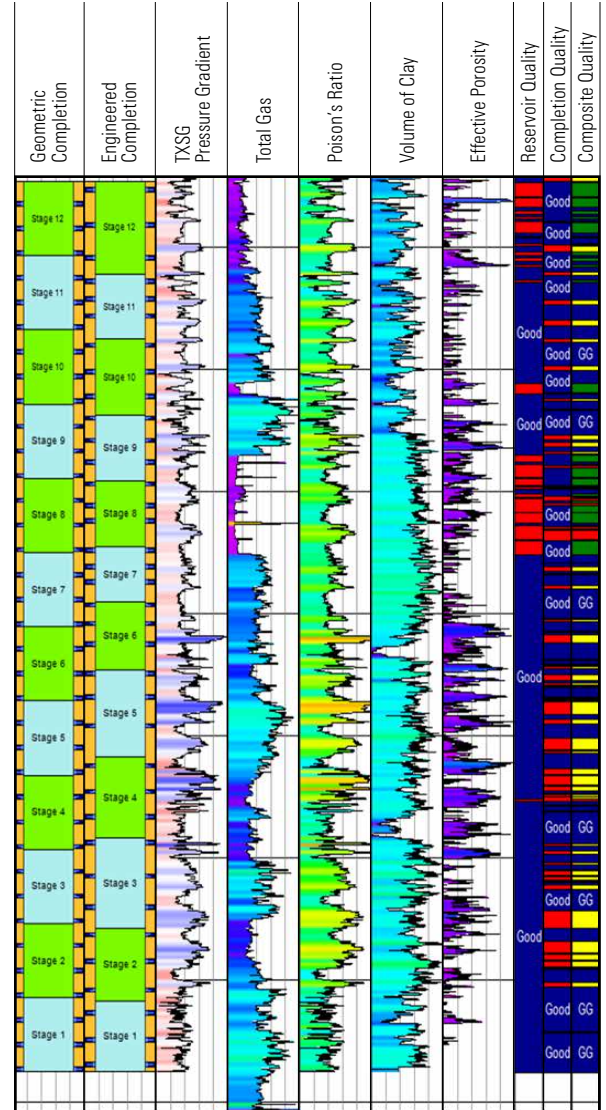


Geometric completion designs proved ineffective in heterogeneous rock

The liquids-rich Wolfcamp shale play in the Permian basin has high production potential. However, its heterogeneous rock properties, high pressure, and high clay content have led to ineffective stimulation treatments. After geometric completion designs yielded limited success, Clayton Williams Energy, Inc. partnered with Schlumberger to create a tailored completion strategy based on the mechanical properties of the rock.

Comprehensive log measurements enhanced completion strategy

Because of the laminated, heterogeneous nature of the shale, log measurements are critical for effective stimulation treatments. Petrophysical and mechanical rock properties were measured along the lateral; using ThruBit logging services; to acquire a full suite of wireline logs through the bit. The data — which included porosity, resistivity, Poisson’s ratio, and Young’s modulus — were used to calculate in situ stress. Mangrove stimulation design was then used to select the optimal perforation intervals based on the computed stresses.

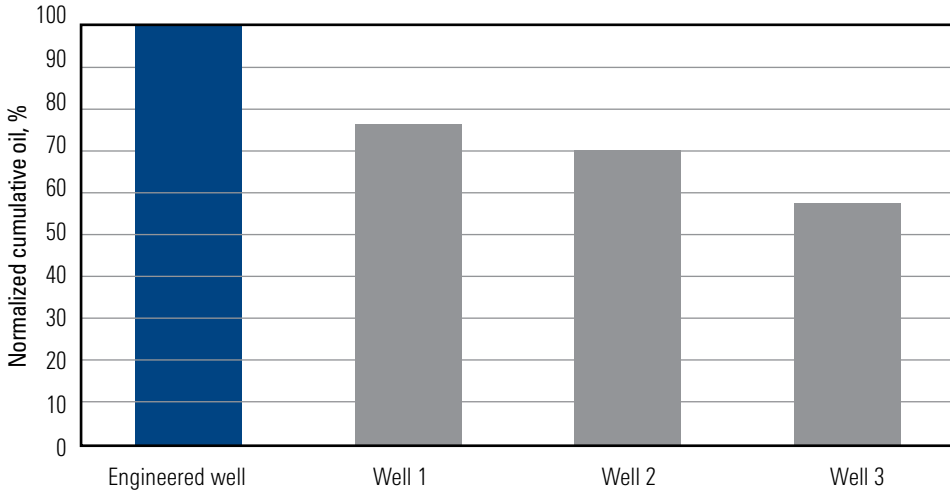


Track 1 shows uniformly spaced stages, which are typical of geometric completion designs. Mangrove stimulation design, however, selected stages (shown in Track 2) with similarly stressed rock, based on reservoir, completion, and composite quality.

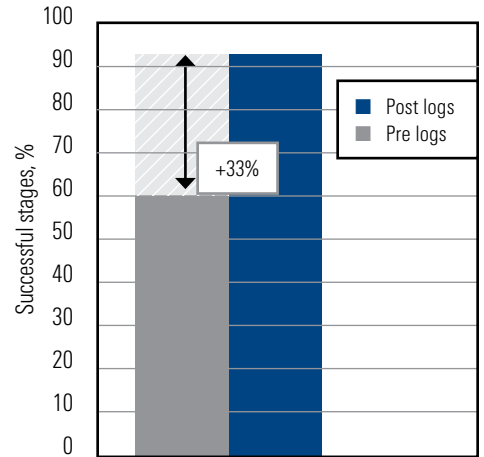
CASE STUDY: Clayton Williams increases reservoir contact, productivity with engineered completion design

Oil production increased 39% compared with best offset well production

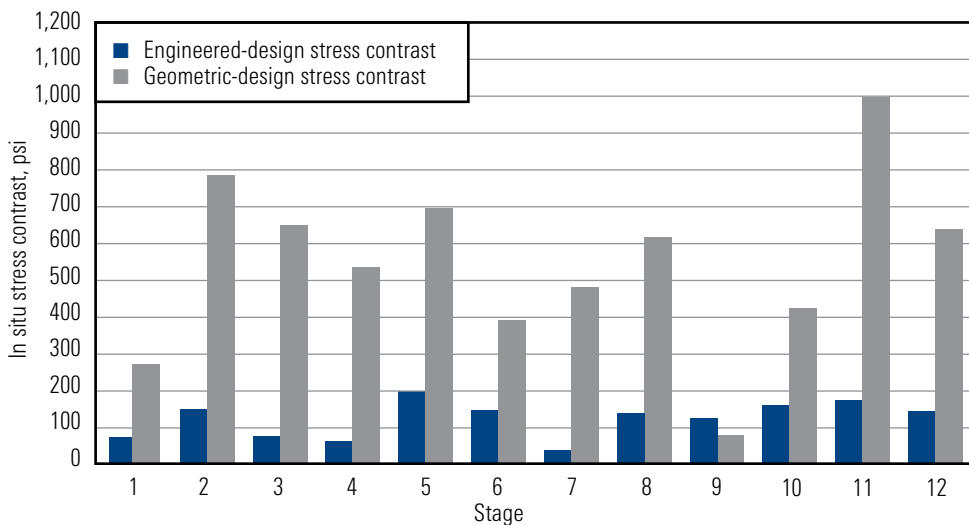
Within the first 90 days, Clayton Williams measured substantially higher production compared with other horizontal wells in the field. The engineered completion workflow has helped the customer with significant deduction in completion costs and increased time savings. Upon observing the benefits of the engineered completion design, the operator requested the combination of ThruBit services and Mangrove stimulation design for twelve additional wells.



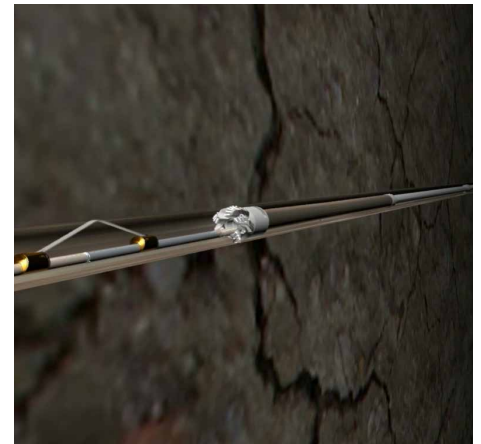
Cumulative oil production normalized to engineered well over 90 days.



An increase of 33% in in successful stages where >75% of the designed sand volume was pumped.



The in situ stress comparison measured at each stage shows more uniform pressure distribution (smaller contrasts) across the perforation clusters that were selected using Mangrove stimulation design.



ThruBit services provides the needed logging measurements for stimulation design in horizontal wells using an efficient low-risk deployment system. The services feature small-diameter logging tools that are deployed through a specially designed bit that is placed near total depth after conditioning the well. The logs are then recorded in memory as the drillstring is tripped out of the well with tools in tow.

slb.com/Mangrove



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