Case study: Permian Basin, North America

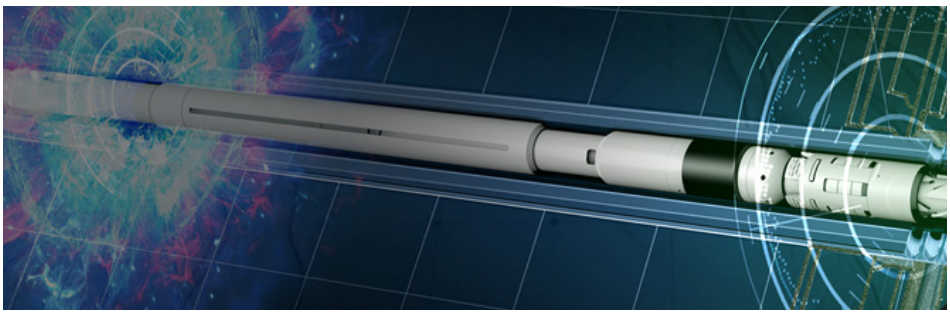
OptiStriker system enabled targeted stimulation of 10 zones in a single trip

A Permian Basin operator drilled a horizontal well and completed the toe section of the well with a traditional plug-and-perf completion method. The well was then flow tested, showing an elevated water cut that was higher than desired for the economics of the well. It was believed that excessive frac height achieved during the original hydraulic fracture treatment had breached into a nearby water zone. The operator reached out to Baker Hughes for alternative completion methods, as it was imperative that the completion method enabled controlled frac height growth at economical costs.

After analyzing the well conditions, the Baker Hughes team determined that the **OptiStriker™ straddle packer system** was the ideal solution. The OptiStriker system is the first of its kind, using two mechanically resettable packers to isolate individual clusters and precisely deliver controlled treatment volumes in unconventional wells. The system's resettable packers—which can be run on coiled tubing or a workover rig—would allow the operator to stimulate five zones, using 10 stages, in a single trip.

The operator first deployed a plug to isolate the toe section of the lateral, and perforated all zones which were to be stimulated. The OptiStriker straddle packer system was then deployed on a workover rig to straddle each individual zone and perform an acid treatment, in order to assist with breakdown for the frac stages to come. Once all zones were acidized, each zone was then re-straddled and a proppant-laden hydraulic fracture treatment was performed. Compared to a typical packer and plug method, the OptiStriker system saved 20 trips, reducing NPT and costs by more than 50%, as well as greatly decreasing HSE risks. After the treatment, the system was retrieved from the well and no post-frac operations were needed. The well began producing immediately, avoiding NPT and excess costs.

Efficiently deploying the system on a workover rig allowed the operator to significantly reduce the fluid volumes needed to hydraulically fracture these stages by 75%, as compared to a traditional plug-and-perf completion. Due to the reduced fluid volume from surface, the fracture treatment could



Challenges

- Needed to control fracture growth to avoid breaching into nearby water zone
- Required cost-effective solution with minimum NPT

Results

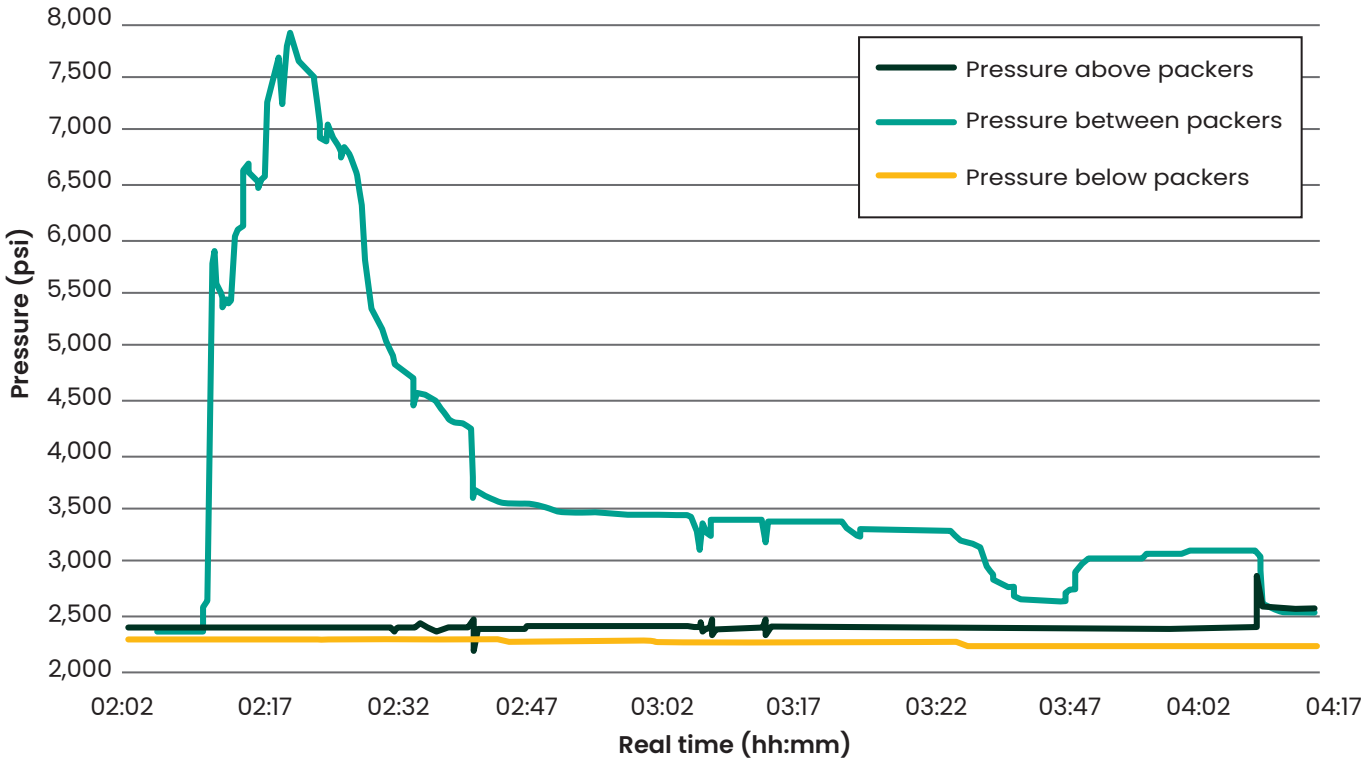
- Enabled targeted stimulation of 10 stages in a horizontal wellbore
- Completed treatments in a single trip, with zero NPT
- Reduced operational time and costs by 50%, saving 20 trips compared to packer and plug methods
- Decreased fluid volume by 75%, compared to traditional plug-and-perf methods

also be customized on the fly to be more responsive to the formation's feedback, thus providing increased control. The OptiStriker system delivered an added benefit of requiring less fluid overall, since the well didn't have to be killed after every stage, which saved additional dollars in flowback and disposal costs.

Rapid depth correlation was achieved by performing a Baker Hughes mechanical casing collar locator service, which ensured the packers were set at the correct depths every time. This not only improved the overally operational efficieny, but also delivered greater reliability that the packers were securely in place.

The OptiStriker system is also designed to run pressure and temperature memory gauges throughout the BHA. For this specific job, the gauges were placed above, between, and below the packers for monitoring and diagnostic purposes. Post-job data analysis allowed the operator to confirm isolation during the fracturing of each stage, while also having a better understanding of how the formation is reacting to the fracturing treatment; paving the way for future applications.

Operational Summary	
Total stages	10
Max frac rate	16 bpm
Total acid	70 bbls
Total proppant	44,000 lbs
Average bottomhole treating pressure	7,910 psi
Average time between stages	35 min



Sample of downhole pressure gauge data during a fracturing stage

Baker Hughes

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