Straddle set saves on fluids

Flow rates and efficiency at a Canadian open hole fracturing operation were improved by combining an upgraded inflatable straddle system with an innovative valve designed to save on fracture fluids and time. Jennifer Pallanich hears how.

Developed by TAM International with an eye to speeding up unconventional reservoir fracture jobs, the PosiFrac Straddle system consists essentially of two proprietary inflatable packers combined with the Insta-Set valve TAM launched in 2013 after three years of development. This allows operators to inject fracture fluids into the formation in a precise, controlled manner.

Straddle tools that seal on either side of a zone of interest are not new to the industry, but most use rubber cups. “These inflatable packers are similar to a steel-belted radial tyre in construction, and they inflate when hydraulic pressure is applied,” explains TAM International business
TIME SAVER: Developer TAM reports running its Insta-Set valve with the PosiFrac Straddle system enabled a Canadian operator to complete fracture work in about half the time it would take with a standard collet choke.

The company drew inspiration in the guys in the industry needed. “Like all good ideas, it came from the guys who are operating in the area and were doing sand fracturing types of jobs, in response to a customer’s request to eliminate some of the pumping.”

Before the new valve came along, the PosiFrac Straddle system was limited by the time-consuming requirement to drop a ball for each stage to be treated, recalls TAM’s global product line manager, David Freeman. “You basically had to displace the workstring for each stage. The Insta-Set valve actually allows us the luxury of doing multiple sets without dropping balls each time.”

The resulting time and fluid savings translates to significant economies, Freeman adds. “We knew that the best way to optimise the process was to not drop balls every set and not displace the workstring volume every set, making it a more seamless operation similar to the auto piston-setting system we use for acid stimulation.”

The company drew inspiration from its auto piston system, which lacked the flow volume required, and went back to the drawing board. Brainstorming in September 2011 focused on how safety valves are made and how balls rotate. Testing followed at Tejas Research & Engineering in The Woodlands, Texas, in March 2013, with the first field deployment following in Canada in June this year.

The non-ball-drop system can be set and re-set multiple times as it is moved up the well. “We see it as an improved setting mechanism for multiple applications, not just sand fracturing,” Freeman says, citing acid fracking and acid stimulation as other potential uses of the technology.

“We see a pent up demand [for] something new for the optimisation of production and fracture operations.”

David Gray, TAM International

“Where [customers] previously had a plug and perf completion, they can add perforations, and we can isolate those new zones and re-frack and re-stimulate,” Freeman adds. “We can isolate individual clusters of the original completion and re-frack or re-stimulate. We can run through restrictions where there are cased hole completions with frac sleeves.”
A changing cycle
The cycle for unconventional has become — create the wellbore, complete the well, then optimise after production levels off, notes Gray. "We see a pent up demand. They need something new for the optimisation of production and fracturing operations."

With an estimated 30% of frac zones thought to be under-performing globally, Gray says he expects to see quite a bit of interest in deploying the tool for optimisation efforts after production levels drop off in both conventional and unconventional wells.

“If they re-frack, they can increase production, which increases the value of the well,” he explains. “We can go in and frack these under-performing zones and also open up new zones. If they were originally fracked at 1000-foot spacing, we can go in at a tighter spacing to stimulate an area that was originally not stimulated in that well.”

Freeman says the straddle tool allows the operator to “absolutely optimise and fine-tune” a re-frack. “Going off logs or other information, he can pinpoint the location within his wellbore that he can re-frack or re-stimulate, from a 10-foot section to a 20-foot section to a 30-foot section, and treat those independently of anything else.”

Case history
The Insta-Set dual-purpose rotatable ball-valve can divert and isolate fluid, providing an unrestricted flow area for stimulation fluids. Closing the ball valve isolates the internal tubing volume and keeps the packer inflation ports open, eliminating the need to circulate a ball down for each set.

Once the straddle packers are inflated and anchored, string weight cycles the valve to set/stimulation, shifting down the control tube extension. This positions the inflation ports between seal sets, locking the inflation volume within the elements. The downward movement of the workstring simultaneously opens the ball valve, exposing an internal flow area greater than the packer tube below the tool.

When the Insta-Set valve/PosiFrac Straddle combination was deployed in Canada, TAM reports that it was able to complete the fracture work in about half the time it would take with a standard collet choke. A significant amount of hydraulic fluid was also saved by eliminating the need to circulate a ball to seat between stages to set the packer, and the system’s large internal diameter can increase flow rates, further reducing the time to complete the fracture work at each interval, the company adds.

Kavanagh points to improvements in operational time, revenue and HSE with the system, hailing the new valve as a “game-changer” in the way it enables operators to plan out their wells and bring them online faster. Introducing the Insta-Set valve, he says, has...
helped bring what used to take about three to five days down to the two to three-day range.
To date, the new valve/straddle system combo has been deployed more than two dozen times, mostly in open hole applications in Saskatchewan and Manitoba in Canada.

**Current specs**
The Insta-Set valve is available in 5 1/4 inch OD with a workstring pressure of 5000 psi, which means it can be used in a 6 1/8 inch ID or larger open hole. TAM is looking into adapting the tools for higher flow rates and additional hole sizes.

“We’re researching the market now, and interfacing with customers to see what they want to do with their re-frack strategies,” Freeman says. “We see the market shifting from an extensive effort to just getting a completion in the ground to looking much further forward to what kind of completion they want so they can optimise, re-stimulate or re-fracture later to get more production from the well.”

Kavanagh sees a big future for the Insta-Set valve. “We’re just scratching the surface on the capabilities with it. We’re looking to move into different markets.”

The combined system is not yet applicable in situations where high-pressure capabilities and high flow rates are needed to frack the rock, Gray notes.

As designed, the system can handle up to 9.5 barrels per minute with proppant or up to 20 barrels per minute with acid or clean fluid, he adds. “We’re working to increase it. For now, the prime target is shallower shales that are less consolidated, such as the Canadian Bakken play.” All re-frack operations are possible as they require lower pressures and injection rates, he adds.

TAM is now working to upgrade its system to accommodate a bigger slice of the expanding re-frack market. “The tools will change in size and will grow in flow capability,” Kavanagh predicts.

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David Freeman, TAM International