Focus Turns To Refracturing For Better Well Performance

Crude oil prices remain the primary topic for many in the oil industry. Everywhere one looks, people are talking about reduced rig counts, reorganization, cutbacks and even layoffs. Indeed, companies across the country are being forced to make adjustments in a rapidly changing market, and in some cases this means having to make some tough decisions.

With so much changing so quickly, operators are looking for ways to maintain their operations while the price of oil stabilizes. The fact is, even in these downtimes, there are many projects that must go on, and folks are moving forward cautiously, and are relying on optimization and technology to make the most of their investments.

This was never more apparent than at the Society of Petroleum Engineers’ Hydraulic Fracturing Technology Conference (HFTC) in The Woodlands, Texas. This annual event has been growing like crazy the past several years. In fact, attendance and enthusiasm has been so high the last couple years that HFTC exhibits have spilled out of the exhibit hall and into the main lobby to accommodate everyone.

The success of this event in years past could be correlated with the success of the North American market. This year, one might have expected a lower turnout. However, quite the opposite occurred. Attendance at this year’s HFTC was very similar to years past. One reason may be that with prices falling, operators are focused on using technology and best practices, and optimizing jobs to maximize their returns on investment. The 2015 HFTC technical sessions offered opportunities to learn about all three.

With the dramatic reduction in drilling in the lower-48 states, refracturing wells has become an extremely popular topic. In “Refracturing on Horizontal Wells in the Eagle Ford Shale in South Texas—One Operator’s Perspective (SPE 173333),” Pioneer Natural Resources outlined a refrac pilot program in the Eagle Ford Shale. Pioneer observed that as production accumulated in the Eagle Ford, pressure around the horizontal wellbore declined. Refracturing those wells can improve performance, if done effectively.

Pioneer initiated a refracturing workflow that included a reservoir study using surveillance data combined with microseismic data to identify the low-pressure areas along the lateral. Pioneer also spent time identifying wells within the drilling schedule that offset older, primary wells with high production. Finally, Pioneer designed a single fracturing job with multiple substages and diverting agents. Pioneer says that as it conducts more of these types of tests, it will adjust its techniques to maximize the production increase from these wells.

When creating an effective fracture treatment in tight zones, it is important for an operator to maximize the fractured surface area. This typically is accomplished using slickwater to extend the fracture length and place proppant in the desired area. In SPE Paper 17369, “Revolutionary Particle Fluid System Unlocks Fractured Reservoir Potential,” Baker Hughes questioned the effectiveness of conventional cross-linked gel and slickwater, asserting that they often failed to achieve the designed conductive area, and that sometimes this could be connected to nonoptimal proppant transport.

The authors reported that in laboratory tests, conventional fluids provided good proppant suspension; however, they seldom performed as expected under downhole conditions. Additionally, cross-linked fluids can be difficult to clean up, and slickwater will have issues with proppant settling.

Baker Hughes highlighted the development of what it calls a nontraditional fracturing fluid system and an application technique that is showing dramatic improvement in proppant transport. The fluid system incorporates specifically engineered gel particle domains to improve proppant suspension. When applied, the retained proppant pack conductivity for this fluid was reported to be near 100 percent. This technology may prove to be very useful in unconventional environments requiring high fractured surface area.

In SPE 173380, Statoil introduced a new carbon dioxide-hybrid fracturing design that aimed to reduce the need for freshwater. In a paper titled, “Use of a CO2-Hybrid Fracturing Design to Enhance Production from Unpropped Fracture Networks,” the Statoil research team showcased a process that begins by injecting pure CO2 as the pad, with the hope of flowing through the tight cracks and generating a complex fracture network. The CO2 injection is followed by a gelled fluid designed to generate wellbore connectivity. Using the CO2 pad creates less width and may reduce stress shadowing, which is a common problem in unconventional reservoirs. If used properly, this design could take advantage of the discrete fracture network and reduce gel damage.

As industry moves forward, it will be critical for operators and engineers to stay on top of new technology and best practices to produce new wells effectively and enhance production from older wells. With every change comes opportunity for developing new processes and technology. I am eager to see how our industry moves forward in the coming months and years.