

Latest Startups Aim To Revolutionize Industry With Advanced Technology

By Colter Cookson

For a new upstream service and supply company to do well, it needs to differentiate itself from the companies its customers already use.

Many of the newest startups say they will achieve that goal by combining exceptional service with products and business models that significantly reduce customers' costs. These products and services include affordable pump components, locally sourced proppants, and tools that enable operators to analyze every completion during field development. Other startups offer leasing software that automates error-prone calculations, advanced chemistries that penetrate far into the formation, remote monitoring affordable enough for stripper wells, and managed pressure drilling equipment that is easy to use and maintain.

The executives behind these startups say they are after more than money.

Completion Quality Control

What if operators could map every development well's completion to determine whether it is performing as expected or should be changed to match varying geology? According to Reveal Energy Services, that now is a technical and economic possibility with a pressure gauge on a monitor well. Using technology licensed from Statoil Technology Invest,

the startup applies the recorded pressure response in the monitor well to calculate a fracture map of the newly created fractures in the treatment well.

Reveal Energy Services says it uses the pressure data to:

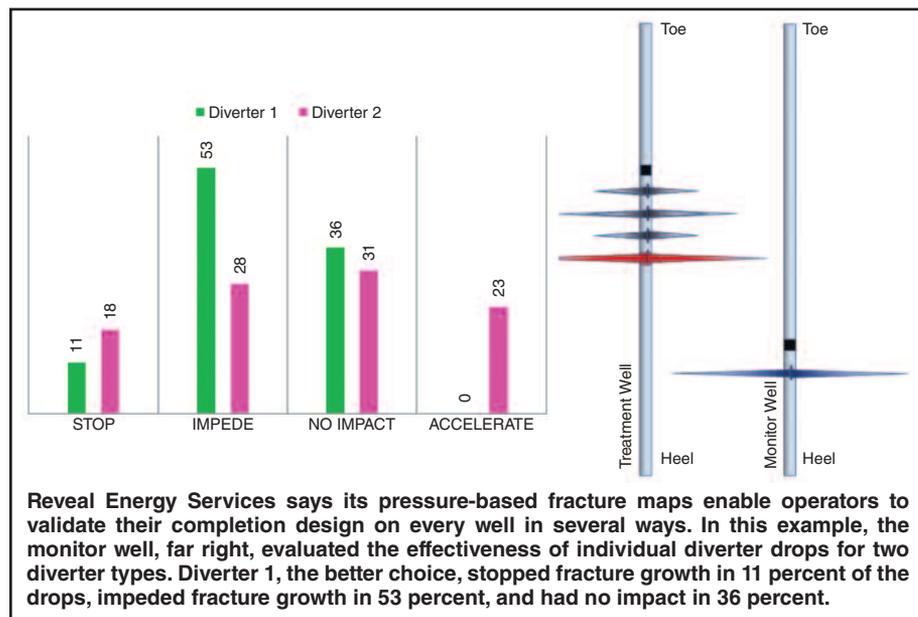
- Quantify 3-D fracture maps of half-length, height and asymmetry;
- Determine how far proppant has been placed within the fracture;
- Understand whether a diversion technique is working;
- Know if the fluid is distributed be-

tween multiple clusters; and

- Identify the depletion boundary surrounding a parent well.

"Pressure-based fracture monitoring enables 100 percent fracture assurance," says Sudhendu Kashikar, the company's CEO. "Because it only requires a pressure gauge on a nearby wellhead, it is simple to deploy. Although it is as accurate as legacy completion evaluation methods, the cost is typically less than 20 percent of those methods.

"The low cost, accuracy and ease of





deployment mean this technology can be applied on every well to act as a form of quality control,” Kashikar continues. “By providing a near real-time assessment of a completion, it allows operators to adapt to geological variations that occur throughout plays and to the gradual changes in stress profiles that occur as plays are developed, reducing geologic and financial risk.”

The pressure data can be processed quickly enough to inform decisions mid-completion, Kashikar mentions. “For example, after the first stage is completed, we can look at the diversion technique used, make changes for subsequent stages, and get rapid feedback on whether those changes improved performance,” he re-

ports.

The rapid feedback allows operators to test multiple completion ideas and zero in on the one that is most effective, Kashikar adds. “A customer interested in evaluating diversion techniques might deploy one in the first four stages, then modify the technique or switch to another based on our feedback,” he says. “By the end of the pad, the customer will be able to evaluate two or three diversion materials and techniques, and identify the combination that gave the best results.”

The physics that turn surface pressure measurements into details on fracture geometry, proppant placement, diversion effectiveness, cluster efficiency and de-

pletion boundaries are complex but proven, Kashikar asserts. He says Reveal Energy Services has validated its results by comparing them with ones from other technologies, such as microseismic and distributed acoustic sensing/distributed temperature sensing.

“This pressure-based fracture map technology has worked extremely well in every project where it has been applied,” he reports. “We have deployed it on almost 1,500 stages across seven basins in the United States and Canada, including the Permian, Eagle Ford, STACK/SCOOP, Woodford, Marcellus and Bakken. Every customer that has used it has continued to use it.” □