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New Tools Enable Better Completions

By Colter Cookson

With production performance varying from one well to another on the same pad, and even from one stage to another along a single lateral, optimizing stimulation designs from the toe to the heel can have measurable impacts on a well's completion efficiency, economic performance, and ultimate recovery potential.

Service companies and manufacturers are introducing new technologies to give engineers the ability to optimize all aspects of stimulation design, from determining where to place perforations, to making treatment adjustments on the fly for each individual stage, to using diagnostics and precise temperature/pressure data to further optimize frac designs on future wells.

Of course, designing an effective completion requires placing the right proppant in the stimulated reservoir volume. Whether a job calls for ultralight materials that will reach the end of even the longest fracture or ultratough materials that can withstand the extreme pressures of the Lower Tertiary, proppant manufacturers stand ready. The newest solutions even include proppants that reveal their locations within the fracture network once they are pumped downhole.

To deliver the proppants, pump manufacturers report developing durable but affordable systems that can deliver high horsepower efficiently over extended operating periods. Meanwhile, water treatment specialists continue to refine the technologies and expertise that are allowing customers to recycle or discharge produced water safely and reliably.

According to service providers and manufacturers, the latest completion advances share a common goal: to ensure that every completion maximizes well economics by increasing production at an affordable cost.

Detectable Proppants

Operators may soon have a new tool for analyzing completions: the proppant itself. "We developed an electric conductive proppant, which allows us to use surface electromagnetic receivers to tell where the proppant is," announces Don P. Conkle, the vice president of marketing and sales for CARBO.

"This detectable proppant technology is going to provide tremendous value to operators," he enthuses. "They will be able to tell the length and height of each fracture, and determine the ideal spacing for wells to maximize estimated ultimate recoveries and minimize total development costs.

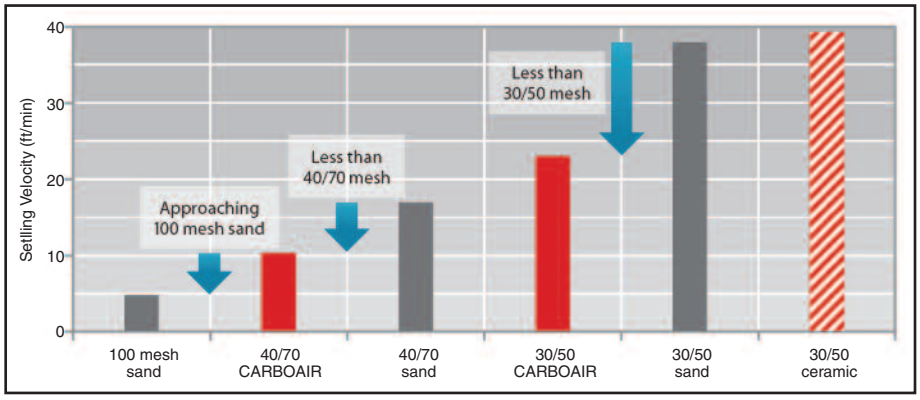
"We also will be able to help optimize proppant programs," he continues. "By varying the proppant sieve size and density with various fluid types, we will be able to see what frac length and height they provide, and calibrate economics. That is going to be game changing."

While many questions about the technology's full capabilities remain unanswered, Conkle says the first field trial went well. He indicates the company has several others planned.

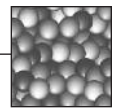
To improve production and ultimate recoveries from slickwater fracs, CARBO has introduced CARBOAIR™, a low-density, high-transport proppant. "CARBOAIR has a specific gravity of 2.0, or about 25 percent lighter than sand," Conkle offers. "It also settles 40-50 percent slower, and therefore is more likely to reach the end of a long fracture and maintain a higher propped height."

In many cases, the proppant can eliminate or reduce the need for gel and the associated formation damage, Conkle says. He adds that CARBOAIR's low specific gravity requires appreciably less proppant to achieve the desired propped fracture volume and can decrease horsepower and fluid requirements.

To boost production in applications that require stronger proppant, CARBO



CARBO's CARBOAIR™ ultralow density proppant settles slower than sand or resin-coated sand while offering equal or better conductivity, strength and durability. According to CARBO, these characteristics make the proppant ideal for increasing propped fracture height and length in slickwater or low-gel completions.



has introduced KRYPTOSPHERE® LD, a low-density version of a product designed for Lower Tertiary wells. "KRYPTOSPHERE LD substantially outperforms conventional low and intermediate density ceramics, and in some cases is an alternative to bauxite materials," Conkle says.

"The proppant has the highest conductivity available," he reports. "There are two reasons for that. First, the grain itself is extremely strong and durable. Second, we have engineered the proppant to have a smooth, spherical shape and uniform size to maximize the space between each proppant grain within the frac."

Because of the shape and smoothness, KRYPTOSPHERE LD and HD inflict less wear and tear on surface and downhole equipment, including fracturing company pumps and treating iron, Conkle adds. "Erosion tests show both proppants will be at least 50 percent less erosive than conventional proppants," he reveals. "This should allow larger proppant volumes to be pumped, which will result in higher ultimate recoveries in offshore areas where completion designs have been constrained by equipment durability, such as the deepwater Gulf of Mexico."

Conkle points out that CARBO is expanding its production assurance line. "Our goal is to put chemicals into the frac by placing them inside proppant, then gradually releasing the chemicals over multiple years to keep the frac and well free from damage," he outlines.

The company's first production assurance proppant contained a scale inhibitor called SCALEGUARD®. The first wells in which it was applied have been scale-free for 650 days, Conkle reports. "We are working on similar products for controlling paraffin, hydrogen sulfide, and salt," he says. "These products will pay for themselves the first time they prevent a workover." ❐