

Proppants Keep Pace With Technology

By Danny Boyd
Special Correspondent

Increasing lateral lengths and the addition of fracturing stages are driving proppant demand as providers continue to develop technological advances that allow operators to boost initial production and enhance estimated ultimate recoveries in U.S. resource plays.

Deepwater Proppant

CARBO continues to ready its KRYPTOSPHERE[™] ceramic, high-strength proppant in anticipation of initial deployment in the Lower Tertiary and other formations in the deepwater Gulf of Mexico, says Terry Palisch, global engineering adviser.

He says the company spent much of 2013 and early 2014 testing the product and introducing it to operators and service companies. "We continue to build inventory because next year we know there will be a lot of work done," Palisch projects. "We are preparing for big demand in 2015, along with some expected late-year-2014 initial implementation."

Capable of withstanding closure pressures as high as 30,000 psi, Palisch says KRYPTOSPHERE represents a technological step change with unparalleled levels of conductivity, strength and durability. He says the innovation began with a change in the manufacturing process as researchers looked for ways to minimize internal porosity, which limits proppant performance.

In addition to eliminating internal pores and enhancing crush strength, the manufacturing process provided other benefits, including producing uniformly round particles with smooth surfaces to help maximize performance. "By making

that surface smooth and eliminating outer porosity, it's virtually 100 percent resistant to acid," Palisch says.

In addition, he says KRYPTOSPHERE resists the pressure cycling that occurs

when wells have to be shut in periodically and then reopened.

Bauxite-based proppant is the primary competitor, but Palisch says KRYPTOSPHERE delivers twice the base line conductivity.

Research and development of KRYPTOSPHERE began six years ago at the behest of a prominent Gulf of Mexico operator looking for a better proppant for deepwater and deep-horizon wells, Palisch recalls. The CARBO pilot production plant went into operation last year. The manufacturing process also can be used to make existing proppants better, he remarks.

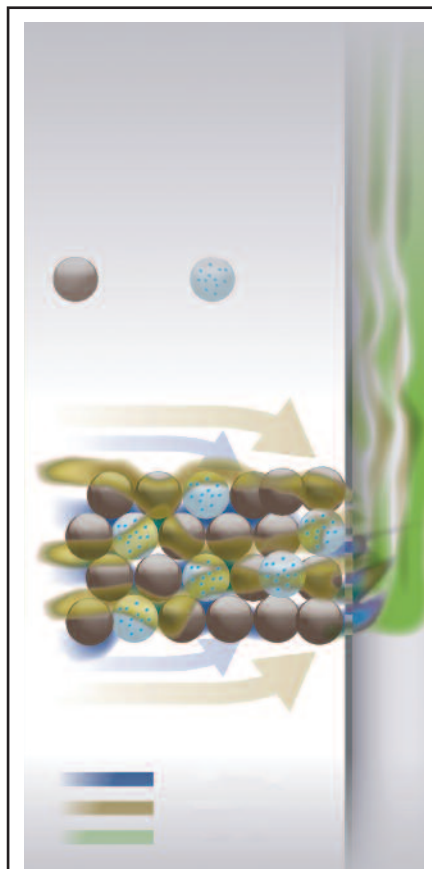
Scale Inhibition

CARBO also has unveiled SCALEGUARD[®], a ceramic proppant infused with scale-inhibiting chemicals that are placed throughout a fracture as part of the standard stimulation process, Palisch says. In a single treatment, it will safeguard the entire production system from the tip of the fracture through the wellbore to the surface processing equipment, he says.

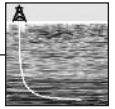
SCALEGUARD serves as both a scale inhibitor and proppant that has no adverse impact on fracture performance, since it does not compromise proppant pack conductivity, nor create excessive fines that restrict or block hydrocarbon flow spaces, Palisch says.

While KRYPTOSPHERE has no internal porosity, CARBO can place porosity in the proppant intentionally, and subsequently can infuse chemicals for release down hole, he reveals.

"In SCALEGUARD, we actually infuse scale inhibitor into that pore space," Palisch explains. "Between 2 and 5 percent of the designed proppant volume will consist of these porous grains containing



CARBO's SCALEGUARD[®] ceramic proppant is infused with scale-inhibiting chemicals placed throughout the entire fracture as part of the fracturing process. Serving as both a scale inhibitor and proppant, it has no adverse impact on fracture performance and safeguards the entire production system from scale formation.



scale inhibitor, so we are able to deploy scale inhibitors throughout the fracture. From the moment the water comes into the fracture, you inhibit your entire fracture and production system.”

CARBO continues its R&D work on other chemical delivery proppant technologies that may carry other production assurance chemicals such as paraffin or asphaltene inhibitors, or even gel breakers, Palisch mentions.

“We can infuse the chemicals in these proppant grains and deploy them everywhere the proppant travels,” he details. “The other feature of this product is that by putting a special coating on these infused grains, we can slow release time, and optimize and extend the life of the treatment. When you pump a liquid chemical treatment, in most cases the chemicals just flow back, so it is a very short-lived application. Depending on the production

rate, we are finding we can treat a well potentially for years by engineering the particle.”

Palisch says SCALEGUARD stays in place in the fracture to deliver long-term protection from scale. Its scale-inhibiting chemicals are released only on contact with water. The system is available in a range of proppant sizes and types, and is compatible with all types of frac fluid, he says. □