

## Technology Improves Proppant Design

By Danny Boyd  
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Evolving technologies are enabling oil and gas operators to use proppants that go deeper into fractures and provide superior conductivity, which results in greater yields and cost savings on frac jobs.

### Deepwater Proppant

CARBO Ceramics is unveiling its KRYPTOSPHERE™ ceramic proppant, designed to give Gulf of Mexico operators higher yields from frac jobs in deep water and ultradeep formations, says Terry Palisch, global engineering adviser.

"KRYPTOSPHERE technology involves a process to create a higher strength proppant for the deepwater Gulf of Mexico," Palisch remarks. "We are ramping up production at our manufacturing plant and taking orders. We have had numerous operators interested in talking about the proppant and technology."

KRYPTOSPHERE development began when a GOM operator encountering higher stresses and temperatures in the Lower Tertiary approached CARBO about developing a product that would give the operator twice the base-line conductivity of conventional proppants at 20,000 psi, Palisch recalls.

"It became apparent that at those stresses, conventional high-strength, bauxite-based ceramic proppants weren't going to be adequate," he reveals. "In response, basically, we combined a raw material change as well as some process and manufacturing changes to create KRYPTOSPHERE."

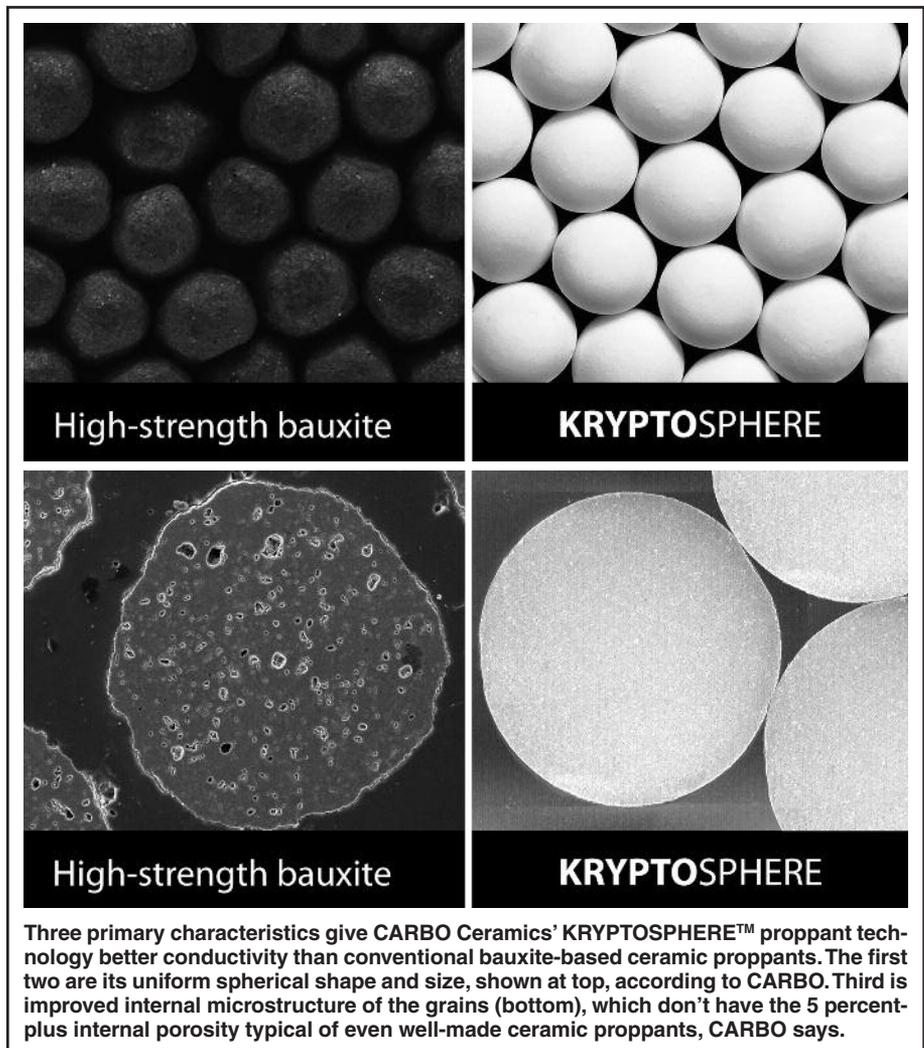
KRYPTOSPHERE has a higher alu-

mina content, Palisch outlines. Three primary characteristics contribute to its higher conductivity, he says. The first is its uniform spherical shape.

"Under a microscope, the particles

look like ping pong balls," he points out. "They are that round. Conventional proppants are not as round.

The second characteristic is uniform size. "For example, when you create a





proppant, 90 percent of the grains normally are between a 20 mesh and a 40 mesh, which basically is a doubling in size," Palisch outlines. "The KRYPTOSPHERE process gives us a single mesh size."

Greater differences in grain size can result in packed porosity as smaller grains fill in pores created by the larger grains, he says. But uniformity leads to a higher-porosity pack.

"The smoothness is going to affect the beta factor," Palisch says. "The lower the beta factor, the less tortuous the path, which means you have less pressure drop as you move fluids through your proppant pack. If you have irregularly shaped or

rough particles, it's harder for fluids to flow through that fracture."

The smooth surface, especially in GOM wells, also means the product is much less erosive, enabling operators to pump larger frac jobs and realize higher production, Palisch says.

KRYPTOSPHERE's third key characteristic is the substantially improved internal microstructure of the grains, he goes on. "We found that all proppants—even well-made ceramic proppants—can have 5 percent-plus internal porosity, and those internal pores can be relatively large in size," Palisch says. "Proppants typically break at the weakest point,

which is the largest pore. The KRYPTOSPHERE process virtually eliminates internal porosity."

The result, Palisch says, is a product with very high conductivity at high pressures that meets or exceeds CARBO's goal of realizing twice the base-line conductivity at 20,000 psi.

"We believe the process can be transferred to other product lines, so we won't necessarily have to use those high-alumina-content materials," Palisch says. "We can use lighter, more conventional raw material and create a better proppant." □