

QUIET PLEASE: An illustration depicts the AdvantageOne system outfitted with twin Caterpillar C32 diesel engines rated at 863 base horsepower each with acoustic sound enclosure for noise reduction.



Images: Halliburton

Linking data to take Advantage

With a focus on integrated communications, a next-generation deep-water cementing system keeps completions equipment and personnel in the loop, writes **Jennifer Pallanich**.

Halliburton's newest offshore cementing system focuses on integrating communications and turning data into actionable information. Aaron Williamson, the company's product manager for cementing surface equipment, said the skid was designed to address the complexity of deepwater and ultra-deepwater completions.

The communication loop in the AdvantageOne Offshore Cementing System is not just

about data but the personnel on the rig and at onshore facilities, he says.

"The AdvantageOne was created to get everyone communicating — human to human, equipment to human, and equipment to equipment," Williamson says.

"Communication is not easy with the cementing room being in the belly of a ship. Now, with the common communications loop, you can transmit what you're seeing to someone in drilling or even back onshore to

Houston. You're bringing more subject matter experts into the decision loop. They can see the same thing and have a common conversation to make the best decision to be made."

In 2012, Halliburton set out to integrate the communications involved in completions operations. Williamson joined the company as the project manager for the cementing equipment group the following year.

"This was our biggest project," he says. At the time, big data,

cloud computing and analytics were all buzzwords marking the digital revolution.

"We were trying to figure out what that meant to us, and what it meant to the oil and gas industry in general. We needed to figure out how to implement it in our industry. For a long time, we were answering a difficult question."

The industry collects vast amounts of data, but it must be processed in some way to become actionable information. And Halliburton wanted to take



MIX RESULTS: Three engineers in Duncan, Oklahoma, perform a cement mixing test during the technology verification phase of the project.

it a step further by ensuring different systems in the completions process, such as the bulk delivery equipment and the liquid additive equipment, could communicate, and that personnel could interact with that information.

“It’s a complex environment, and we’re aiming to simplify it so the service company and the operator can make informed completions decisions,” Williamson says. “This was all about integrating the communications. This brings everybody and the equipment into the same decision cycle.”

With its fully integrated shore-based and remote room communications capability, along with some new safety features, the system can be operated remotely, which helps increase safety.

“We have introduced safety features that tell the skid



ELECTRIC VERSION: An electric system with twin GEB-22 AC motors rated at 1150 base horsepower each.

what to do in case it loses communications. We’ve built in smart actions the skid can do, depending on the situation it is in,” Williamson says.

For example, if communications drop, the transmission kicks into neutral and the system holds pressures but stops pumping.

“This gives the shore-based or remote cementer the

opportunity to re-establish communications or, if necessary, proceed with manual operation.”

A dust extractor prevents dry bulk from entering the atmosphere, and an acoustic sound enclosure reduces the noise of the primary drive train engines.

The new system also replaces the radioactive densimeters, which measure density downhole during pumping



“When we trust our equipment, it leads to trust in the decisions we make.”

*Aaron Williamson,
Halliburton* »

» operations, with non-radioactive density and flow meters.

The system also automates certain activities. “Now the skid talks to the liquid additive system. It says, ‘this is how fast I’m delivering cement downhole, so I’m going to automatically meter the amount of liquid additive I need,’” he says.

While intended for deepwater and ultra-deepwater completions, the skid can also be used in shallow water. The first skid was slated to be used in the Gulf of Mexico by the end of March 2017.

AdvantageOne, which earned a Spotlight on New Technology award at the 2017 Offshore Technology Conference, is designed with an optional 20,000 psi manifold to allow work in water depths that exceed the pressure limits of conventional equipment.

Due to the narrow pressure margins commonly found in deepwater, lower-density cements are used to help manage equivalent circulating densities.

Halliburton’s Tuned Light mixing system makes it possible for the lower-density slurries to be achieved by blending hollow glass microspheres thoroughly and accurately, he says.

A six-pump liquid additive system is also integrated into the skid. Halliburton has four variants of AdvantageOne. Two are diesel and two are electric, and the company offers two different horsepower options to accommodate different performance needs.

“They’re high horsepower and slightly less horsepower,” Williamson says.

The diesel offerings have twin 563 and twin 860 horsepower, while the electric offerings provide twin 1150 horsepower and a combo of 1150/2300 horsepower.

AdvantageOne’s predecessor, Advantage, involved multiple skid units, so by combining the two skid units into one, the design team slimmed the footprint by 30%. The electric skid weighs 82,000 pounds and measures 13 feet, 12 feet tall and 27.5 feet long.


POWER DRIVE: One primary drive train module with Caterpillar C32 diesel engine and heat exchanger. With two primary motors per skid, this single module is capable of 863 base horsepower and is coupled with an Allison S6620 five-speed automatic transmission.



The diesel version comes in at 94,000 pounds and measures about 13 feet by 12 feet by 32.5 feet.

While the size reduction is important, a key feature is the system’s “intuitive” operation, Williamson says.

“You can’t just design a piece of equipment and test it without considering how it impacts the end user,” he says, noting the development team took human factors into consideration during the design phase.

“When we trust our equipment, it leads to trust in the decisions we make.” 

SMART PUMP: Integrated smart six-pump liquid additive module with automated rate delivery and dynamic inventory management.

