extra flow is needed to improve hole cleaning, such as in a high-angle well; and when flow needs to be reduced because of lost returns.

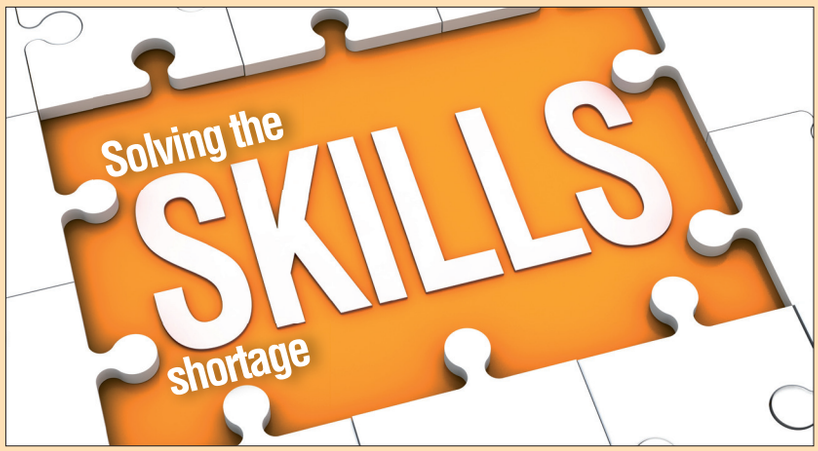
In total, he says, the reamer has been used on 14 deepwater runs with 100% success. The runs have all been 72° inclination or less with a total of 18,747ft drilled and reamed, 614 hours of drilling and reaming, and 929 hours of circulating. The tool is available in 6in by 7in and 6.5in by 7.5in, but 'theoretically the technology to achieve the low flow low pressure characteristics are scalable to any size that's required', Enterline says.

Ron Hinkie, senior account leader at Halliburton, notes that hybrid swellable technology was recently deployed on a deepwater well in the Gulf of Mexico. There was no liner-top packer available for the casing and liner sizes. This left the operator with the option of either performing a liner-top squeeze after cementing, which can be costly, or using a swellable packer below the mechanical hanger, where uncertainty about the presence of oil or water could create some variability in the swelling time. Swellable rubber will swell in the presence of oil, while a swellable packer with salt embedded in the rubber will swell in the presence of water or oil.

Halliburton's solution was a hybrid swellable packer, says Hinkie. 'It will swell, seal and hold pressure using either oil or water. Earlier we were talking about automation. This is about as automated as you can get. You run it into the hole and nothing more needs to be done. Once it sees the fuel, it swells.'

For this well Halliburton, was asked to deliver a differential pressure of 3500psi, but opted instead to design the swellable packer for a higher differential pressure to accelerate the swell speed of the packer, Hinkie says. 'The time to the first seal was two days, and the packer supplied 8137psi within five days.' OE

'It's gotten so complex that helping humans make better decisions, helping humans understand the information that is available and get better information is a challenge.'
Charlie Williams



For years the oil & gas industry has faced a looming skills shortage: older, more experienced personnel are leaving the business while an influx of new blood with limited experience is coming onboard. Finding solutions for this skill shortage was on the minds of attendees at the Galveston forum. **Audrey Leon** reports.

Charlie Williams, executive director of the Center for Offshore Safety (COS), acknowledges that the skills gap is an industry-wide problem; however, he doesn't believe the situation is dire.

'We've been talking about an age gap for 10 years,' Williams says. 'The fact is, a lot of people have stayed a long time in the industry and people are staying longer and longer.'

Williams spent 40 years at Shell, most recently as chief scientist for the company's well engineering and production technology division, before moving into his new role with COS in March. The organization, created in the aftermath of the Macondo disaster and supported by API, has focused on a number of safety-based initiatives regarding well control and completions as well as third party auditing.

Williams sees COS as an industry resource that can help bridge the skills gap through programs such as its contractor competency assurance plan, which measures and monitors contractors' training and mentoring systems. Learnings from this program will serve as a template that can be applied to other parts of the industry, not just contractors, Williams says.

He sees the transition from an older to younger workforce as a gradual shift with older workers opting to stay on as consultants. The industry is 'not going to fall off a cliff like people thought,' he says. 'We've been good at recruiting people.'

However, Williams notes that some workers right out of college lack the necessary math and science skills and technical degrees to do the work. Companies are finding they must go to high school age and even younger to draw young people into those fields. ExxonMobil, for instance, sponsors a series of programs aimed at middle-school aged children, such as 'Introduce a Girl to Engineering Day' where company employees can serve as on-site mentors.

A renewed focus on mentoring and training will help solve this problem, Williams says.

Some companies are hiring professional mentors or competency coaches who can observe workers and decide whether a trainee would benefit from running the module again, Williams notes. More could do this internally, he says, but there is a difficulty in finding coaches and mentors. Williams believes the competency assurance program that COS is running can have a positive impact.

With the looming skills shortage and a serious need to reduce human error in the field, many presenters are addressing the topic of automation with a renewed interest (*see lead Analysis*). The oil & gas industry, Williams says, should take advantage of automation and instrumentation to present information more effectively.

'It's gotten so complex that helping humans make better decisions, helping humans understand the information that is available and get better information is a challenge,' Williams says. OE