



'We figured we'd run out of downed wells, so we decided to focus on subsea intervention.'
Neil Crawford, Blue Ocean Technologies

Rigless, riserless and ready to roll

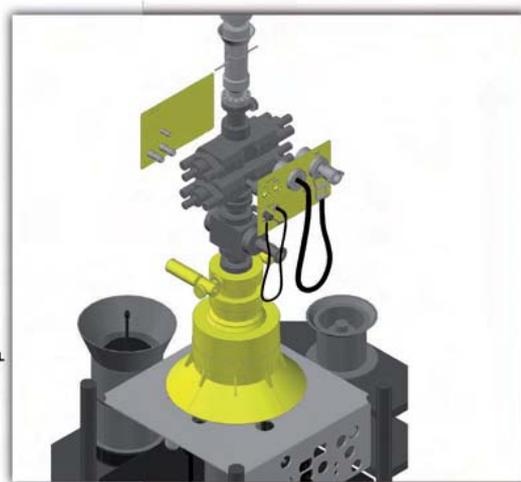
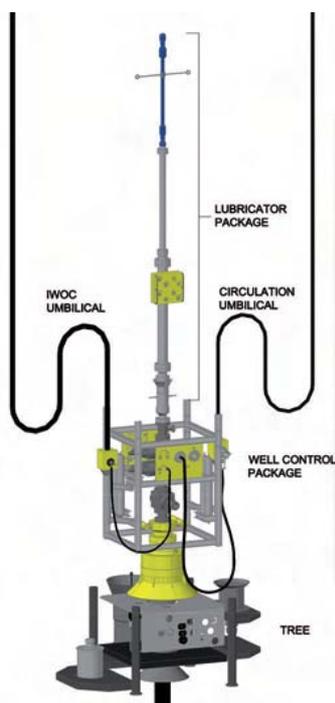
Drawing on experience gleaned from remediating well facilities downed by the hurricanes of 2005, a group of subsea intervention experts set their sights on rigless, riserless subsea intervention. **Jennifer Pallanich** talks to the brains behind the operation.

Blue Ocean Technologies, formed last year, teamed up with pumping experts Halliburton and recompletion specialists Supreme Service & Specialty Co to create a capability for subsea well P&A work, recompletions, logging and various intervention efforts. The result was Iris, or the Interchangeable Riserless Intervention System.

'We are able to get onto any subsea well and with proper planning we can do well intervention,' says Neil Crawford, president of Houston-based Blue Ocean Technologies. The system went from prototype to deployable in 10 months. Its first job is a well intervention in 1200ft of water in the Gulf of Mexico in 3Q 2009, to be deployed off a DP2 vessel. Blue Ocean is working on three well interventions in the Gulf of Mexico this year and is in discussions with operators for more, Crawford says.

The adaptation of several typical well control and sub-surface intervention equipment to subsea conditions has allowed Blue Ocean to offer this type of service, Crawford notes.

Halliburton built the subsea injector head that allows the use of coiled tubing in a well without a riser; the service company adapted a typical injector head so that it could work underwater. 'It functions like a normal injector that would be in an air environment,' says Perry Courville, Halliburton's group manager for coiled tubing and HWO well



During most interventions, Blue Ocean will have three lines in the water column – circulation umbilical, hydraulic control umbilical and wireline or coiled tubing.

intervention. 'It's a simple system, like surface equipment that we use on a day-in, day-out basis.'

This isn't Halliburton's first venture into subsea coiled tubing injector head territory, Courville notes; the company made one in the 1980s, designed for the North Sea. 'This is 001 v.2, if you will,' he says, explaining that the project team extrapolated from experience with that

unit when designing the new model. For instance, Courville says, whereas that early design focused on trying to keep the seawater from invading the hydraulic system by isolating the components from seawater, the new design 'will operate in seawater'. Adapting a coiled tubing injector head from a surface design to one that would function subsea meant, for example, changing the seals and fittings to accommodate the pressure differential, Courville says.

Being able to run the coiled tubing from a subsea location is what allows the Blue Ocean team the ability to offer riserless interventions, Crawford says. The system Blue Ocean offers is derived from experience in working with downed wells, he adds. 'You couldn't get a rig into the debris field,' he says. In those jobs, he says, it was necessary to figure out how to work in a rigless riserless manner. That solution was the first generation system built by the team, the latest being



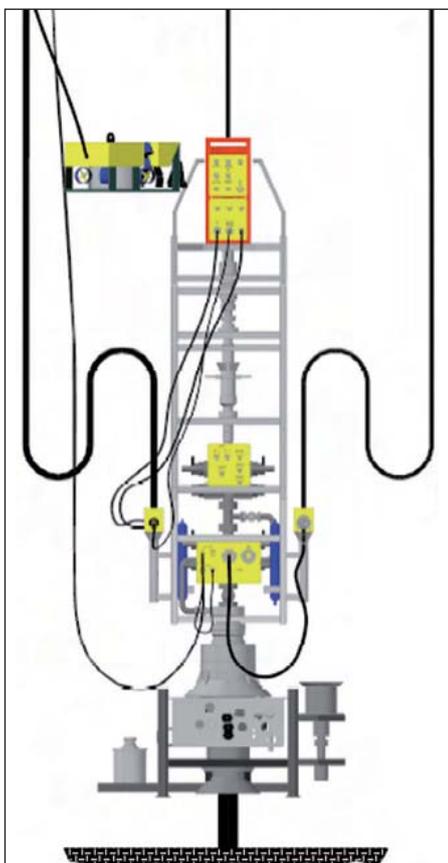
The subsea spread consists of the BOP stack, the hydraulic and circulation umbilicals, the disconnect capability and tooling. Pictured are the umbilicals and the lubricator.



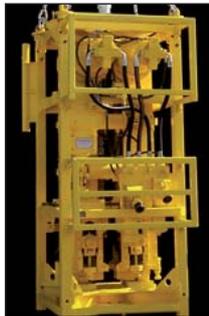
The deck spread includes a double-drum slickline and e-line unit, the cement unit, a cement lab, P-tanks, dual circulating pump skids and complete gas buster and flow-back package. Pictured are the dual circulation pumps, the double-drum slickline/e-line unit and the cement unit.

the third generation. In creating the Blue Ocean system, Crawford says, the team – comprising specialists in the subsea intervention, subsea installation, and completions and workover design fields – adapted that solution by adding ROV operability and increased intervention depth capabilities. ‘We figured we’d run out of downed wells, so we decided to focus on subsea intervention,’ he says. ‘This is what we do. This is all we do.’

As the team was designing Iris, high rig utilization rates translated to high day rates, which meant that any system that could do the work without requiring a rig would likely appeal to an operator’s desire to cut costs. The system, which can be deployed from a DP2, 100m-long vessel with a knuckleboom crane, is rated for 10,000ft of water and 10,000psi and can work on both horizontal and vertical trees. It is deployable either through a moonpool or over the side and requires roughly 50 crew beyond the ship’s personnel to operate. The system can begin work rapidly, Crawford notes. ‘We don’t have to run a riser. We don’t have to run anchors. We can work immediately’ simply by unspooling once the vessel arrives on site, he says. ‘The savings to the operator is enormous,’ Crawford says. ‘We’re less than half the price of a rig in day-to-day costs, and that’s worst case.’



Once Blue Ocean puts its latest Iris to work, the company will turn its attention to additional systems it has on the drawing board.



Halliburton’s subsea coiled tubing injection head.

Mike Shouse, subsea intervention specialist at Blue Ocean, says he believes the system will appeal to the industry because most of it is field-proven and ‘familiar’ – the chief exception being the subsea version of the coiled tubing injection head.

The Blue Ocean system is not designed for a single job, Crawford notes. ‘We’ve designed it to be flexible to work on all the wells,’ he says.

The system is designed to handle slickline and e-line operations and has a stack and lubricator ID of 6in.

Safety, of course, was a key design parameter, Crawford confirms. ‘Even though I don’t have a riser, I have a BOP on the well, and I’m not risking a release.’

Ian Still, program manager at Blue Ocean, notes the design plan includes two dual BOPs, which allows the system to meet any operator requirements. Blue Ocean’s modular system design allows additional barriers to be added to satisfy different operator policies.

Another component of the system includes JDR Cable Systems’ circulation umbilicals, which feature three 1½in ID lines. Tom Plank, account manager at JDR, says the umbilical is self-supporting for riserless, rigless open water applications. It relies on an encapsulated strength braid to support its own weight and that of the umbilical termination assembly, he says. He maintains the design is at the cutting edge of intervention umbilicals because it is the first open water cementing and circulation umbilical system of its type. JDR designed and manufactured the 1500m of umbilical for Blue Ocean’s current system, producing the cables at its Littleport facility in Cambridgeshire, UK, with engineering and project support provided by the company’s service center in Houston. JDR is now working with Blue Ocean to perform dynamic analyses to develop 5000ft and 10,000ft systems.

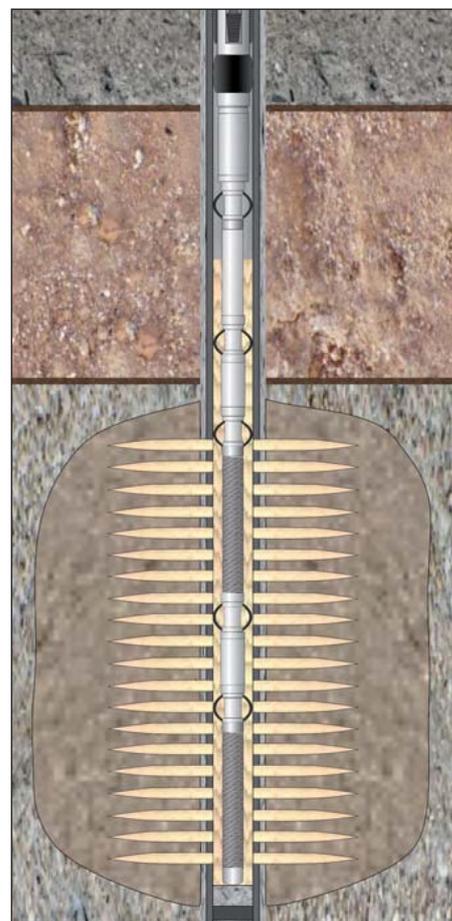
‘I like the UTA system because we can deploy your BOP stack and we’re not hindered by our circulation umbilical and are independent of the rest of our BOP stack, and that means quicker trip time,’ Shouse says.

Supreme’s contribution to the package

lies in its recompletion offering adapted for subsea use. Ron Hill, vice president of the company’s thru tubing division, says the company provides a recompletion system that can be placed in a cased hole through a short subsea lubricator. ‘We can run it in small sections and put it together as we go along,’ Hill says. Stack packs are not new, he says, it’s just a new approach in the subsea sense. It’s ‘just applying it to the subsea world that makes it unique’, Hill says.

According to Blue Ocean, IRIS will allow subsea P&A and temporary P&A, sliding sleeve intervention, uphole re-completes and sand wash outs, acid stimulations, subsea well and infrastructure diagnostics and intervention, subsea well completions, and damaged well remediation. In addition, the company can handle: platform, pipeline and umbilical decommissioning; deepwater and shelf completion design; workover engineering; and project planning, engineering and management services. The company’s *modus operandi* involves determining the issue and collaborating on the procedure development to determine the project’s plan.

‘There are jobs that rigs are good at, and that’s drilling. We’re not replacing that,’ Crawford says. **OE**



Supreme’s in tubing/thru tubing completion method.