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PLUS: HOW ROV ACE SCHILLING AND FMC ARE PLANNING TO PAVE THE WAY TO THE 'SILICON SEAFLOOR'

‘Our belief has been for a long time that the subsea industry has lagged behind the rest of the planet in its adoption of semiconductors in the content of the machine.’

Tyler Schilling



Growing the ‘silicon seafloor’

It’s been a year since FMC Technologies acquired a 45% stake in Schilling Robotics for \$116 million, with an option to take full ownership of the ROV specialist by 2013. **Russell McCulley** talks to Schilling Robotics founder Tyler Schilling and FMC’s Brad Beitler and Brian Skeels about how the collaboration has fared so far, and what lies ahead.

If all goes as planned, Schilling Robotics will become a wholly-owned business unit of FMC by 2013. But the innovative Davis, California, ROV systems manufacturer will likely make the transition with its identity intact; plans call for Schilling president and CEO Tyler Schilling to stay on, should FMC opt to acquire the remaining 55% stake. ‘It’s the intent of both parties – at this time, anyway – that in that event, I would still remain at the company and play some kind of significant role in its ongoing development,’ Schilling says.

This isn’t Schilling’s first time at the corporate altar: in 1992, the company, which he founded a mere seven years earlier, got scooped up in a deal with the French multinational GEC Alstom, now the public company known as Alstom. The arrangement lasted until 2003, when Schilling bought itself out of the conglomerate. But with Tyler Schilling still running the company as an Alstom business unit, it was a productive decade: the company put \$20 million into development of its Remote Systems Engine, which effectively put Schilling Robotics in the ROV business.

Schilling’s R&D efforts in the early 1990s helped it capture a large share of the manipulator market, and its modular approach to ROV systems has also proved popular in the relatively small world of ROVs. Now, the company is in the midst of an effort to ‘digitalize’ many operations on the seafloor, and counting on the alliance with FMC to give that effort a big boost.

‘We’ve always had a very long-term vision here at the company, and that’s one of the things that has made us successful,’ Schilling says. That vision includes what Schilling likes to call the ‘silicon seafloor’, a reference to the so-called Silicon Valley just west of the company’s headquarters. ‘Our belief has been for a long time that the subsea

industry has lagged behind the rest of the planet in its adoption of semiconductors in the content of the machine,’ he says. ‘For instance, if you look at what’s happened to the refineries, and compare it to the seafloor – there’s much more automation and instrumentation on the refinery floor. And we’re convinced that that process is going to be repeated on the seafloor.

‘So the thing that interested us the most about FMC was that they have such a large footprint on the seafloor already, and are such significant participants there, that we think it’s a great conduit for us to be able to continue the process of making the silicon seafloor a reality.’

Schilling says the company’s track

record positions it well to take the lead on such an endeavor. ‘We are long-term experts and practitioners in two key technical areas. One of them is in developing integrated packaging techniques, largely for electronics, but also for mechanisms and hydraulics for use in the deep ocean,’ he says. ‘We have evolved and continue to develop a collection of techniques for packaging these items so they can be used reliably and productively in the deep ocean.

‘The other key area is the software dimension, where we work hard at forms of automation that help users of the equipment be more efficient and productive,’ he adds, noting that Schilling Robotics was the first to introduce station keeping for ROVs to automatically position the vehicles on the seafloor. ‘We’ve pushed hard on those two basic threads – the creative, integrated packaging, and the automation.’

For much of the offshore industry’s early years, the complexity of the equipment residing on the seafloor remained on what Schilling calls ‘a fairly shallow ramp,’ with ‘static valves and chokes that needed to be monitored and controlled’ but not a lot of ‘dynamism in the functions that are going on there.’ In the last decade or so, however,



Schilling Robotics’ Atlas manipulator, weighing only 110lb and capable of lifting 550lb, was introduced spring 2009.



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Brad Beitler, FMC

the complexity of subsea machinery has increased dramatically, and will continue to do so, he says.

'Just like on the refinery floor, these increases in complexity are going to require a great increase in the degree of instrumentation on these machines. What that means to us is that the silicon content, in the form of semiconductors, is going to follow that very same ramp.' That will mean a 'step-change in the service and maintenance strategy for this more complicated equipment,' Schilling says. 'So that's where we come in. We think we have some very clever and productive solutions, both for packaging the electronics that sit on these pieces of seafloor equipment and how you design it so ROVs and AUVs can productively service these things over the life of the field.'

'Those are some of the key dimensions that interested us about becoming part of FMC, and where I think a lot of the heavy lifting is going to occur in the collaboration between our two outfits.'

Brad Beitler, FMC's VP of technology, says the minority stake in Schilling Robotics 'allows us to work with their management team in attempting to create synergistic value in a space [ROV intervention] that we don't currently play in. By leaving their management team in place as the majority partner, they remain motivated and committed to make the relationship successful and drive value within the company; a benefit to both partners.'

Schilling, he says, has become 'the de-facto standard for all robotic

manipulator arms that are installed on the front of ROVs' from virtually all ROV manufacturers. 'Until now, the interface between ROVs and our subsea equipment has been via an age-old API interface that provides for limited ability to perform any true work on the subsea equipment. We believe that the combination of Schilling's intimate knowledge of how to effectively utilize robotics subsea, combined with our knowledge of the subsea system environment, will facilitate a convergence of the two technologies, providing a step change in intervention functionality and efficiency resulting in lower life of field costs.'

Schilling says the past year has 'greatly expanded our thought process. We had an inkling that there were a lot of important things we could do if we could create the right conduit to get our ideas realized. And now that we're working with people inside FMC, it's apparent that not only that is possible, but a good deal more.' Asked for specifics, Schilling says that the company is 'in the incubation stage of a couple of items' but not yet ready to unveil them. It will, however roll out a smaller version of its popular ultra-heavy duty ROV later this year (*see facing page*).

Beitler says the companies have 'set up development teams in the areas of ROV/subsea equipment interface and controls. We hope to exploit the capabilities of Schilling's ROV manipulator and station keeping technologies to make subsea ROV intervention much more efficient, maximizing the operator's vessel up time. On a drilling rig, this is a substantial value proposition.' On the controls side,

he says, 'we're tapping into Schilling's expertise in modular controls technology that will help us in reducing envelope sizes for our production controls and guide us toward more flexible open architecture platforms for future applications'.

FMC emerging technologies director Brian Skeels says that bringing Schilling on board helps the company 'fully integrate' the access, installation, operation and removal of subsea well hardware with ROVs. 'It also helps to have a fresh set of eyes, from a whole different perspective, shake up the design and manufacture processes – for both companies, FMC and Schilling – to make a better product. As we go deeper and longer offset, subsea hardware will have to rely more and more on ROV technology as a symbiotic relationship.'

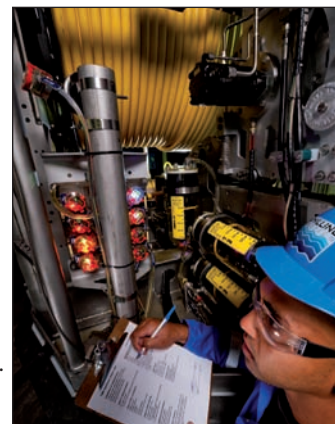
On the ROV front, Schilling says, the company is 'pushing hardest in a couple of areas, both aimed ultimately at improving the productivity of our customers'. The first is in equipment uptime: the 'fundamental reliability of the equipment itself,' he says, and the ability to quickly restore an ROV system to full functionality should some part of it fail.

'A little over a year ago, we brought on some talent from other industries that are higher volume industries that make complex machinery, so that we could adopt the practices and behaviors that they use to both design and manufacture highly reliable equipment without having to invent those techniques ourselves,' he says. The result has been a move to ROV manufacture that resembles practices used in the automotive and aircraft manufacturing industries. Schilling Robotics has also beefed up its testing practices, he says. 'We have the capability to do full environmental stress screening – which is basically shake-and-bake – in addition to the pressure testing required for our equipment.'

The company has also set a goal in its design process that repair or maintenance operations should be able to be completed in one hour or less. 'That really changes



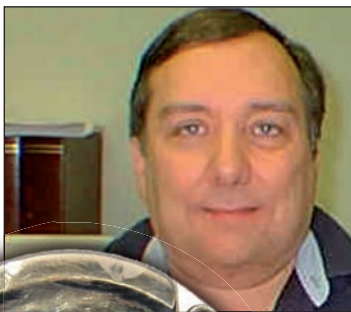
LEFT: Schilling ROV assembly technicians installing a ROV thruster and DTS control units.



RIGHT: Integration technician conducting factory acceptance testing of tether management system.

'Subsea hardware will have to rely more and more on ROV technology as a symbiotic relationship.'

Brian Skeels, FMC



'The drill support and field support sectors have been somewhat overlooked.'

Peter MacInnes, Schilling Robotics



how you think about your design,' Schilling says. Schilling Robotics 'is expanding on a process of designing our equipment in the form of what you could call mistake-proof bricks, or building blocks, so that the service procedures that the offshore technicians have to do have, to the best of the engineer's ability, only one possible way that it can come apart and go back together again. One of the things we have learned is that it's not nearly as helpful to our customers to take a 30-minute repair procedure and figure out how to make it only ten minutes long, but it's very important to figure out how to take a four-hour procedure and make it 45 minutes long.'

Schilling Robotics is also keeping focus on automation that increases productivity for operators: a 'long-term obsession' for the company, Schilling says, that includes the introduction of



station keeping in 2001 and the subsequent additions of 'new operational modes' to the technology.

'Inside the machine, our software will look at patterns of data that are coming from various instrument sensors and match them up to patterns – like the most experienced technician would – and give (operators) a series of possible steps to take to restore the system to full functionality. This is a tool to automate the trouble-shooting process. These are very complicated machines, and it's very difficult to be an expert on all subsystems and all dimensions of these machines. What we want to do, in essence, is embed in our control console a highly expert technician.'

Merging with a big corporation will help Schilling expand its geographic reach. 'FMC has a physical footprint in all the regions that we need to be active in, helping service our clients and helping them be more productive. We have

already made progress in doing that in Brazil, and we're in motion to do that in Singapore and West Africa,' he says. 'This makes it so much more practical for us to have a meaningful presence in those areas for our customers.'

The past year's experience bodes well for the union, Schilling says.

'When we first started having discussions with [FMC] about the possibility of embarking on this, one of the things that I was very impressed with was that all the people we met there seemed an awful lot like the culture we had developed here at Schilling Robotics, where you just have a drive to get things done and make things happen,' he says. 'And I'm very pleased to report that the more we get to know more people in there, it really is culturally widespread within their organization. And that's a very comforting thought for us, that our cultures already are very closely aligned. I know from experience that that can be a real handful in these circumstances, trying to forge together two different cultures. And what I've found so far is that they look like a giant version of us.' **OE**

Rolling out a new ROV

Schilling Robotics plans to introduce a smaller version of its popular Ultra-Heavy Duty (UHD) ROV in 2010, with an eye on capturing a greater share of the drill support and field support sector. The 125hp HD ROV, which will have a standard depth rating of 3000m but can be customized to 6000m, incorporates a digital telemetry system featuring a gigabit Ethernet backbone and a system design based on core subsystems from Schilling's proprietary Remote Systems Engine. The 3400kg machine and equipment are designed to take up less deck space while performing operations that are increasingly in



demand, says Schilling VP of marketing Peter MacInnes.

'The installed infrastructure on the seafloor has increased dramatically, and it all has to be inspected on a routine basis,' MacInnes says. Yet most of the ROVs built in the last several

years have been 150-200hp models geared to the offshore construction market. 'The drill support and field support sectors have been somewhat overlooked,' he says.

Schilling is seeing increasing demand from

international operators like Statoil and Petrobras, which will be utilizing many more deepwater support vessels in coming years. Companies are asking for ROV systems that have a smaller footprint but are capable of performing ultra-deepwater field support operations.

The new HD system can be configured for drill support, field support or construction applications, MacInnes says, and will introduce some motion control features that include automatic pilot options.

Schilling expects to begin manufacturing the HD in January and release the ROV in mid-2010. The company celebrated a milestone of sorts late in 2008, MacInnes says, with the delivery of its 50th UHD ROV system.