MARINE TECHNOLOGY REPORTER

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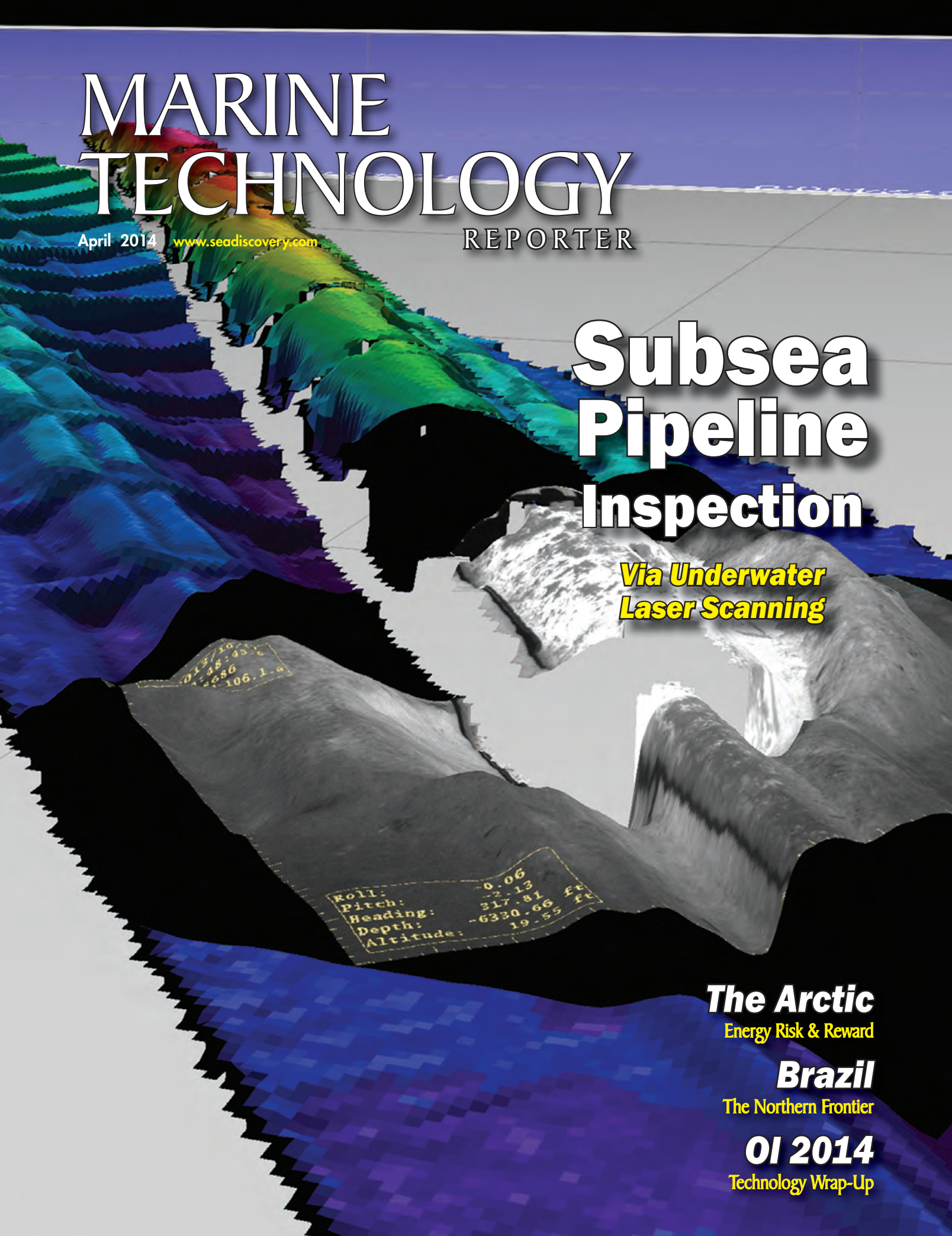

Subsea Pipeline Inspection

Via Underwater Laser Scanning

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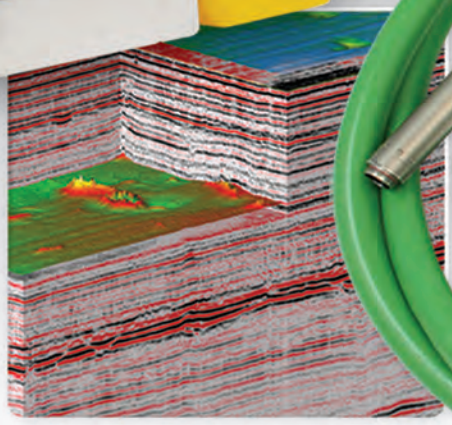

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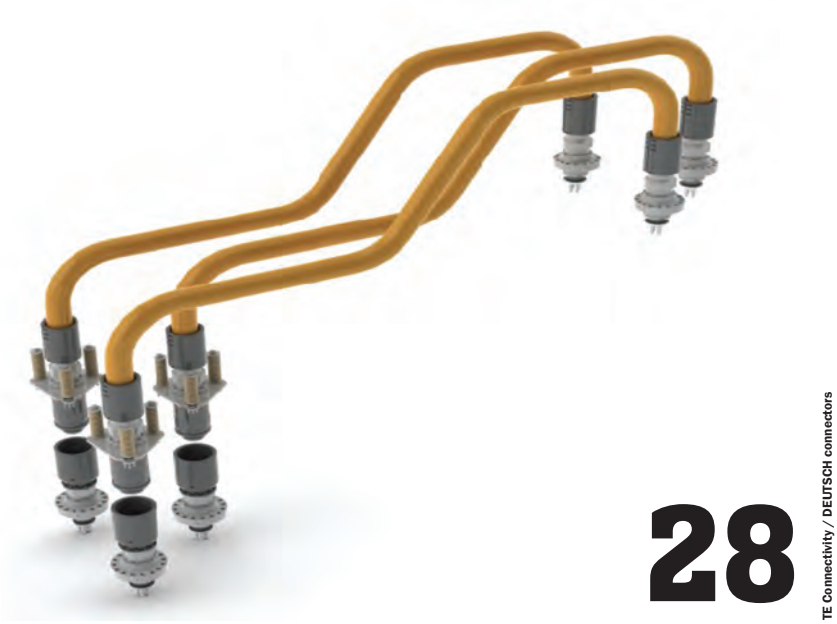

TE Connectivity / DEUTSCH connectors

Garry Karner

Being surrounded by a vast, resource-rich expanse of ocean has shaped every aspect of our history, culture and existence for over 500 years. That undeniable connection to the sea, and the creativity and persistence required to turn its challenges into opportunities has led this place to develop a cluster of ocean technology expertise that are second to none.

In 2014 the MTS/IEEE OCEANS Conference will take place in St. John's (YYT), Newfoundland and Labrador from September 14 to September 19. Visit us online to explore your opportunities for OCEANS '14.

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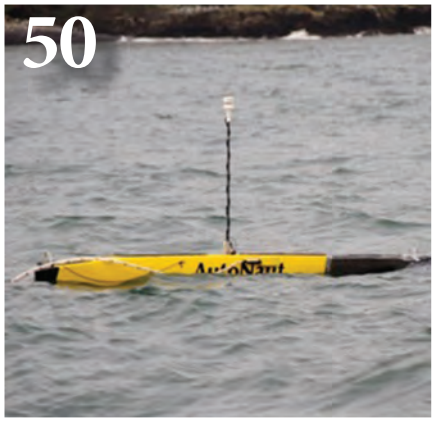

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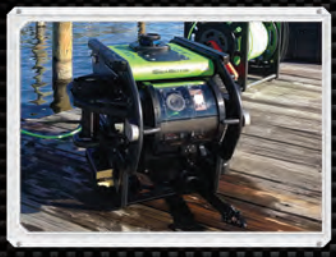

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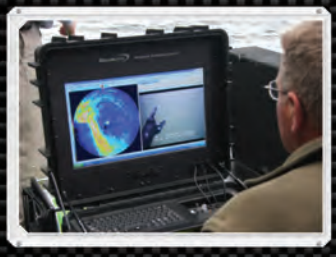

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While the Offshore Oil & Gas markets continue to push further from shore in ever-deeper waters, the need for proven technology to work more efficiently in increasingly hostile and unfamiliar environments grows in tandem. And while growth in the energy sector continues to energize multiple markets, it is worthy to note that there are a few looming clouds on the horizon of this traditionally cyclical market.

Jim McCaul of IMA has been a close friend and colleague for nearly 20 years, as he has served as "Editorial Consultant" on MTR sister-publication *Maritime Reporter & Engineering News* for decades. McCaul arguably has more insight and information on the Floating Production System market than anyone I know, as he has studied it meticulously – and generated C-Suite level quarterly market reports on the topic – for the last 20 years. As you know, these floating production system projects are multi-year, multi-billion dollar projects, and they can serve as a bellwether for the general overall health of the market. Today there are 320 oil and gas floating production units in service, on order or available for re-use in another field, with FPSOs accounting for 65% of the existing systems and 74% of the systems on order. While the number of production floaters in service has increased 84% over the past 10 years, McCaul notes in his latest monthly report for MR that the order projection for the coming five years is from 104 to 150 production floaters, which at face value seems strong but is significantly lower than the five-year forecast from last year of 124 to 190 units. **Why the big drop?**

First and foremost, there are increasingly evident strains on the deepwater supply chain, as costs for projects, people and equipment grow exponentially, in tandem with project complexity. Predictably, oil major capex budgets are starting to shrink, with ExxonMobil saying its capex spending for 2014 will be 6% less than last year, and Chevron cutting 2014 spending 5%. In addition, the rapid evolution of the U.S. shale oil and gas business is a growing factor, as oil companies are increasingly looking at faster, cheaper to develop projects on land as an alternative. For now offshore remains a strong growth market, but as you enter into long-range planning later in the year, pay heed to the clouds forming on the offshore horizon.

MARINE TECHNOLOGY REPORTER
www.seadiscovery.com
Vol. 57 *No. 3*
ISSN 1559-7415
USPS# 023-276
118 East 25th Street,
New York, NY 10010
tel: (212) 477-6700;
fax: (212) 254-6271

Marine Technology Reporter ISSN 1559-7415 is published monthly except for February, August, and December by New Wave Media, 118 E. 25th St., New York, NY 10010-2915. Periodicals Postage at New York, NY and additional mailing offices.

POSTMASTER: Send address changes to Marine Technology Reporter, 850 Montauk Hwy., #867, Bayport, NY 11705
Postmaster send notification (Form 3579) regarding undeliverable magazines to Marine Technology Reporter, 850 Montauk Hwy., #867, Bayport, NY 11705

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Predator II ROV
Put through its Paces @ FAU

Following the Underwater Intervention '14 exhibition in New Orleans, the crew from Seatronics, an Acteon company headed to the sunny shores of Florida Atlantic University (FAU) in Fort Lauderdale for a demonstration to key clients of the new and improved Predator II Observation class ROV. According to those who attended, the demo was impressive.

Florida Atlantic University (FAU) was the home for Seatronics' recent demonstration of the Predator II ROV, the latest addition to the formidable stable housed by the specialists in the rental and sale of marine electronic equipment, covering a range of applications: geophysical survey; navigation and positioning; oceanographic systems; video inspection; ROV survey; ROV tooling and diving and non destructive testing.

In short, Seatronics and its clients gathered at FAU to:

- Demonstrate the new Predator II system to various top end clients.
- Operationally test the new thruster arrangement
- Operationally test the new topside arrangement
- Perform training to key personnel in the operation of the system, and to
- Operationally test, evaluate and give feedback on the Seebyte Co-Pilot automated pilot control system under various conditions

Meet the Predator II ROV

The Predator systems, IP and manufacturing rights were purchased from Global Marine Systems Limited in November 2012, as Seatronics was looking to increase interest in ROV rentals and develop a small ROV with improved capabilities in fitting Survey Sensors and

ROV Tooling. Predator was identified as having the necessary performance, stability and ease of mobilization to meet these criteria.

Historically Seatronics supplied operators with Survey Sensors, but no supplier offered a one-stop-shop solution. Today Seatronics, which built its business and reputation as a leading supplier of Subsea Rental Technology and Equipment partly because it offers a complete tested, working system, now offers a complete ROV system with a range of sensors for hire or purchase.

Hand-built by Seatronics, Predator is a 300m-rated inspection class ROV designed to function in all market sectors globally including Oil & Gas, Military, Fisheries, Inshore Survey, Scientific Research, Telecommunications and Energy. Predator is designed to be compact and portable, easy to use and easy to maintain and is very different and almost unique in fact to the current obs-class ROV offerings currently on the market.

The full ROV system comprises of:

- Surface Control Unit (SCU)
- Surface Power Unit (SPU)
- Surface Hand Controller
- Umbilical tether cable
- ROV vehicle

Options include:

- Sonar (Teledyne BlueView)
- Various additional cameras
- Additional lighting
- Laser scaling
- Altimeter, and
- Manipulators
- SeeByte CoPilot automated control software.

The Demonstration

The Predator demo at FAU was designed to show the vehicle as versatile and capable under a number of conditions, and the first three days were spent demonstrating the system in a shallow harbor (1-2m) with low visibility (<1m) with no apparent current. A second demonstration site was utilized on the campus in the ICW later in the week in a 2 to 3 knot current. The ROV performed a hull inspection and bridge support structures in low visibility conditions. The demonstration was coordinated by Great Eastern Group's (GEG) Director of Operations - Bruce Morris at the FAU Dania Beach Campus. Great Eastern

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In the world of deep sea oil and gas recovery, the pressure is crushing. The need to maximize production from fields in deep water must be balanced with maintaining safety for workers and the environment. Delivering power to compressors and boosting equipment miles from shore... in thousands of feet of water is just the surface of the problem. It's a challenge our engineers thrive on. So when the quest for resources in harsh environments drives leading oil and gas companies to develop breakthrough solutions like sub-sea gas compression and sub-sea boosting, TE Connectivity (TE) dives deep with them to help make those technologies a reality.

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EVERY CONNECTION COUNTS

TE connectivity

Group had performed the research and design developmental testing in the U.S. market for the initial Predator I ROV system. GEG is the distributor for the Predator II ROV system on the U.S. East Coast & Midwest regions.

According to guests, the Predator II ROV system was visually stunning and impressed all with the new topside arrangement, a particularly important note as Morris had first-hand experience with the Predator 1 system. Important, too, was that the screen was bright and the general consensus was that it resembled HD quality. The thruster enhancements along with the SeeByte CoPilot system is a dramatic developmental improvement with this inspection class ROV system offering superb mid-water station-keeping, current and wave-busting and object tracking capabilities.

Improvements to Predator II were a pervasive theme of the demo, as Seatronics set out to show how its investment in the system could pay off for clients. In particular, since the system was acquired in late 2012, the Seatronics team set out to implement enhancements to the ROV Propulsion system.

Seatronics engineers have totally redesigned the thrusters making them more powerful and very reliable.

Seatronics found that by working with new materials for its rotary seal, and by using specialized manufacturing techniques, it was able to achieve an almost maintenance-free thruster design with the bonus of a 30% increase in thrust.

Sensor components used on the Predator system include;

- SeeByte - CoPilot software system
- Bowtech Ltd – Mini Colour camera
- Teledyne RDI – Explorer DVL
- Teledyne Blueview P900 or M900 2D Sonar

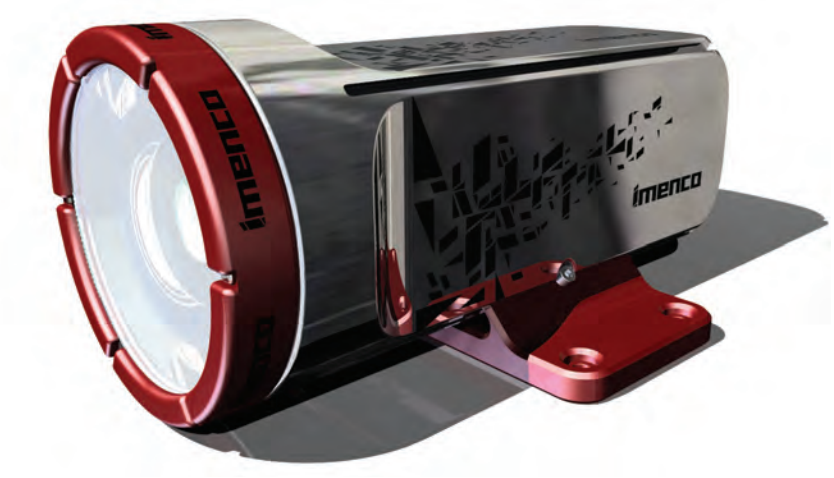
www.seatronics-group.com
www.predator-rov.com

Imenco & High Resolution Subsea Digital Imaging

Digital transmission is something most of us use - knowingly or otherwise - everyday, whether it be smart phones, tablets or via other electronic devices. The subsea industry is the exception with its reliance on analogue (SD or Standard Definition) cameras in the belief that analogue systems have sufficiently low latency.

Latency is the time it takes for the signal to travel from the subsea camera to the operators screen, via the ROV umbilical (wire). For the signal to make this journey, it needs to be converted to an analogue signal in the camera before travelling up the umbilical. Delays can be unacceptable when controlling manipulators on an ROV.

Imenco said it is about to challenge the established standards with the introduction of an all-digital system that will have considerable ramifications in the way the subsea industry carries out inspection tasks.



The electronics industry worldwide is seeing the availability of analogue modules diminishing rapidly. Imenco recognized this trend in 2012 and, having identified the enormous performance improvements that could be accrued through an all-digital system, have developed a new hardware and software data acquisition platform that will be launched later this year. The solution, and all of Imenco's future systems, will be run with Ethernet using the latest TCP/IP Standard.

With the PC inside the camera rather than on the surface customers will be able to tailor how they use the subsea system to meet their own specific demands using Apps supplied by Imenco or written specifically for their need.

Imenco has designed and written the software providing greater control over the image, lower latency and the ability

Bathymetry, Imagery, Water Column

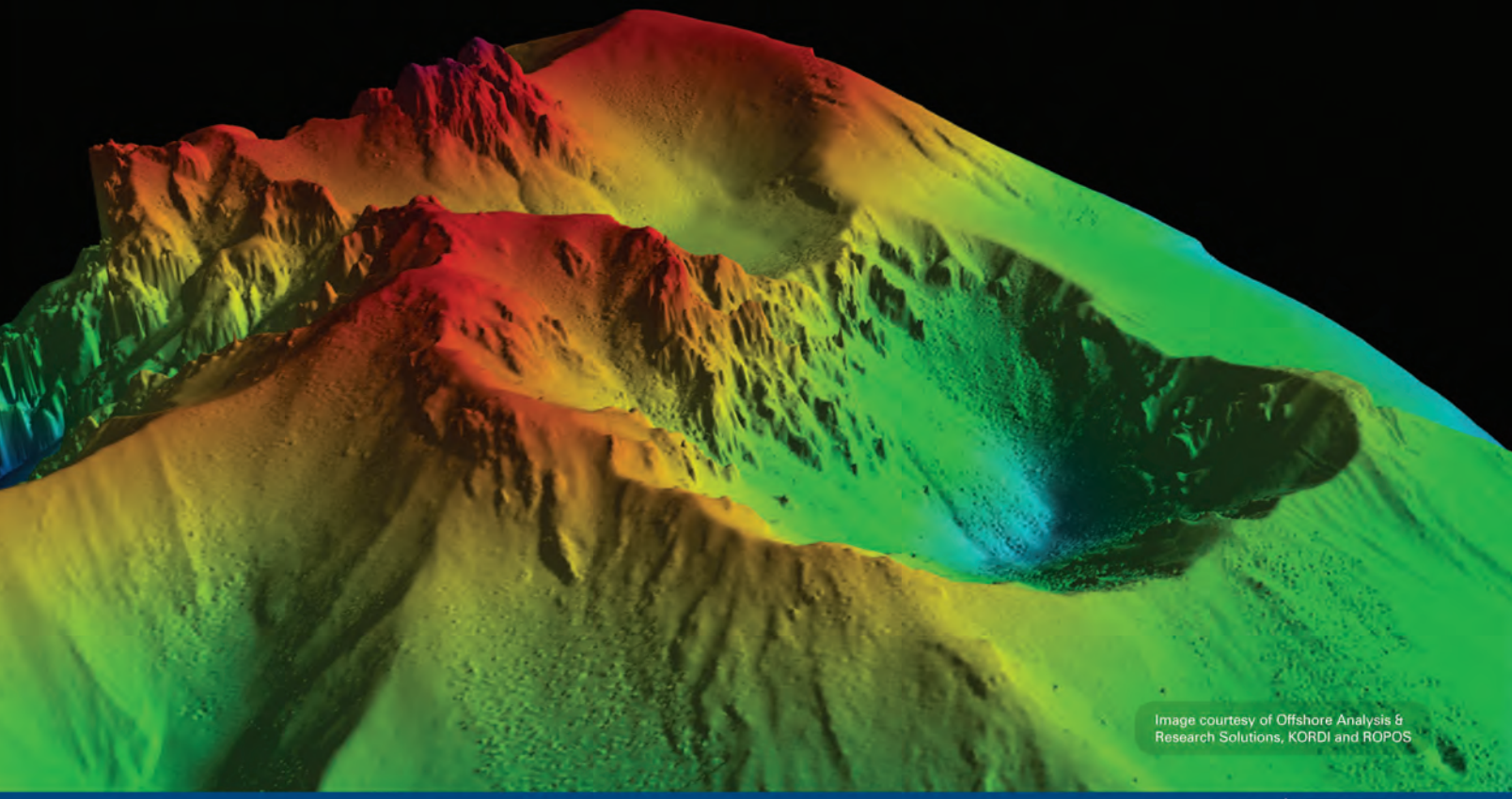


Image courtesy of Offshore Analysis & Research Solutions, KORDI and ROPOS

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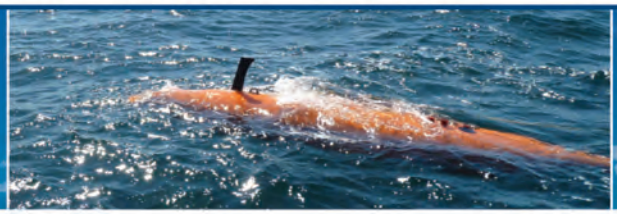

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to deliver potential communications activity currently unachievable in the subsea arena. The most exciting element is that subsea devices will be able to automatically talk to each other.

The software driven display system also has advantages over the typical operations in the ROV control room. Imenco's all-digital system will allow metadata to be used correctly during the image gathering process, with the operator using menu-driven controls in the background providing the ability to write notes and attach files to the image directly. One of the most useful properties of cameras run over TCP/IP will be the capability to potentially communicate wirelessly making the compatibility with the idea of a subsea internet in general, and specific application in particular, involving remote or stand-alone cameras increasingly possible.

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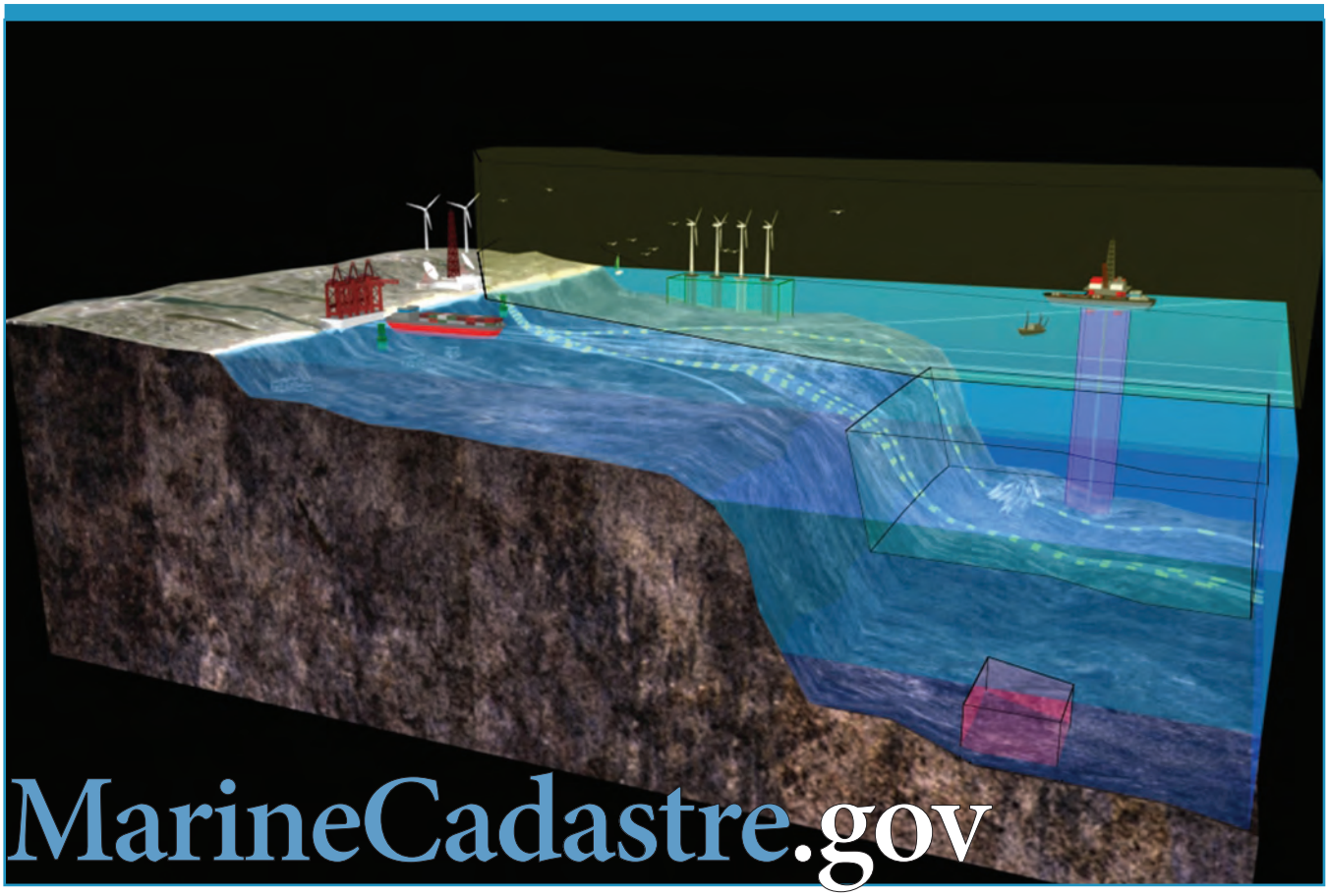

3D visualization tools for a clearer picture

The Ocean Dimensions animation helps users visualize how ocean data can apply to several dimensions. Two new products are the Ocean Dimensions animation and Crowded Ocean Spaces: A 3D View visualization. Viewers gain a more accurate picture of marine-site conflicts and compatibilities, including those related to offshore wind energy development. The visualization helps to show that marine uses are spread out among many dimensions: the sea surface, seafloor, water column, air column, and even the dimension of time.

Marine planners and managers who take into account these many dimensions are better able to consider specific uses for specific locations.

The animation and visualization are included on MarineCadastre.gov, an integrated information system that features 170-plus authoritative ocean data layers as well as offshore planning tools and technical support.

MarineCadastre.gov allows users to create and customize marine maps, share maps and data, and address critical planning details with partners.

MarineCadastre.gov was co-developed by the U.S. Department of the Interior (DOI) Bureau of Ocean Energy Management (BOEM) and the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center.

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Teknicraft debuts in London

Teknicraft Design's latest offshore support catamaran made a debut at the recent Oceanology 2014 conference held at the London ExCel Center in March. The MO1 was commissioned by Mainprize Offshore Ltd. of Scarborough, U.K.

The 83-ft. aluminum catamaran features a new wave piercing hull shape and the vessel is fit with Teknicraft's signature hydrofoil support system.

MO1 was purpose built to support the offshore wind farm industry, but the vessel has multi-mission capability and can easily support divers, hydrographic surveys, and geophysical work. MO1 has deck capacity for 40 metric tons and can provide transfers for 12 passengers in safety and comfort. The vessel's fuel capacity is more than 9,500 gallons, enabling MO1 to deliver fuel to sites in need. The vessel can comfortably cruise at 25 knots and the Teknicraft hull design provides added comfort in choppy seas.

U.S. boatbuilder, All American Marine, Inc., will be promoting Teknicraft Design wind farm support catamarans in North America as the exclusive licensed builder.

Main Particulars:

Length (OA)	25.3m
Length (WL)	24.3m
Length (Loadline)	23.3m
Beam	9.5m
Draft	2.0m
Passengers (Max)	12
Berths	4
Engines	2 x Caterpillar C32 ACERT
Rating	1194 kW/2300 rpm
Propulsion	FP Propeller
Speed-max	30 kn
Fuel Capacity	36000 lt
Cargo	40 T
Deck Load	1.5T/m
Construction	Marine Grade Aluminium
Hull Type	Hydrofoil Supported Catamaran
Certification	MCA MGN 280(M), Cat 1(SCV)

Ops Underway @ MHI Vestas Offshore Wind

Operations began recently at MHI Vestas Offshore Wind A/S, a new company dedicated to offshore wind turbine business jointly established by Mitsubishi Heavy Industries, Ltd. (MHI) and Vestas Wind Systems A/S of Denmark. The new joint-venture company consolidates the offshore wind power systems operations newly separated off from MHI and Vestas. By integrating their comprehensive technological strengths, market trustworthiness and abundant track records in offshore wind turbines, MHI and Vestas look for MHI Vestas Offshore Wind to become a top global player in this field, which is expected to mark sharp growth going forward.

MHI Vestas Offshore Wind is ready to perform a complete roster of functions relating to offshore wind turbines: from development, design, procurement and manufacture to marketing and after-sale servicing. Initially the JV will conduct business around Vestas' current 3MW V112, a gear-type wind turbine, and a newly developed 8 MW V164.

Fugro Upgrades Electric ROV Simulators

Fugro launched an important upgrade to its Electric ROV pilot training simulators. With the introduction of a new electric ROV control pod and suite of electric ROV specific components, Fugro's DeepWorks simulation software now models all electric sub-systems with greater accuracy and enables failure cases to be simulated on individual sensors and circuits. This enables not just a wider range of training scenarios to be conceived, but also enables new vehicle configurations to be assembled in a way that reflects their true circuit diagrams for more transparent testing and validation in the simulator before the vehicle enters service.

A new overlay designer has been added to the ROV simulator's runtime tools. This allows both scenario builders and training supervisors to quickly configure and manage overlays. Easy to use, the overlay designer displays navigation and sensor information in exactly the same way as the real vehicle system. Crucial instrumentation data such as heading, pitch and roll as well as camera tilt angle reaches the overlay through the control pod. Other simulation enhancements include a new garage system as used by the Saab Seaeye observation class vehicles in Fugro's fleet. This new tethering system allows vehicle specific docking and undocking training.

www.fugro.com

Meet the Anaconda-2

Courtesy of Swiftships

By Susan Buchanan

Recently, Swiftships Shipbuilders, LLC, in Morgan City, La., showcased the Anaconda-2 – an unmanned, 35-ft. craft in development – during a demonstration on the Atchafalaya River next to its HQ. The company partnered with the University of Louisiana at Lafayette (ULL) more than a year ago to produce technology for a vessel that can navigate without a pilot aboard. Swiftships and ULL are designing a boat that uses Global Positioning System/sensory data, and has the potential to support naval, enforcement and zone-protection operations, mainly on inland waters.

AN-2 Based on Earlier Vessel

"Anaconda-2 or AN-2 is the second iteration of the original Anaconda built by Swiftships in 2001," said Shehraze Shah, CEO, Swiftships. The diesel-powered, modified V hull form, all-aluminum Anaconda is a Swift Autonomous Vessel with twin water jet propulsions. The Anaconda can reach 50-plus knots and is designed to operate in Beaufort sea state two, or small wavelets, and can survive in sea state four – small waves with fairly frequent whitecaps.

"The SAV offers enhanced surveillance and reconnaissance, identification and interception capabilities," said Shah. "For more than eight hours at a time, it can perform force-protection duties, required by state and local authorities, coast guards and special operation commands, including the navies of the world." The SAV uses commercial, off-the-shelf technology, making it easier for overseas clients to adopt the craft, he said.

Swiftships & CajunBot

The U.S. military, meanwhile, continues to adopt unmanned technology. In 2001, Congress mandated that one-third of all ground vehicles in the U.S. Armed Forces be replaced with robotic vehicles by 2015. With an eye to that mandate, Swiftships paid attention to ULL's success with CajunBot, an all-terrain vehicle with autonomous piloting. A ULL computer engineering team, led by professor Arun Lakhotia, developed CajunBot, and entered the six wheeler in U.S. Department of Defense contests in 2004 and 2005. Because of ULL's expertise in control systems, sensors and robotics, Swiftships enlisted the university to provide the Anaconda with unmanned technology.

Working together since 2012, Swiftships and ULL have created a "Sensor

Bot on Water" that can navigate without human interaction, using GPS/sensory data instead of pre-programmed way points. The Anaconda was used to conduct missions during training at Emerald Warrior Challenge 2013, a two-week tactical exercise on the Gulf Coast sponsored by the U.S. Special Operations Command.

Special-Ops personnel from around the world gather yearly on the Gulf to participate in that exercise for urban and irregular warfare settings.

February's demo of the remotely controlled AN-2 on the Atchafalaya was the first step in developing Swiftships autonomous watercraft, Shah said. On Feb. 18, Swiftships and ULL employees, along with news reporters, U.S. Rep. Charles Boustany, R-Lafayette, and U.S. Department of Commerce trade specialist Brie Knox, boarded the AN-2 and zipped across the water. Joshua Vaughan, ULL assistant professor of mechanical engineering, piloted the vessel from his iPad.

Vaughan, along with mechanical engineering grad students Nicholas Bergeron and Brett Marks, are part of the unmanned system's development team. They're working with lasers, cameras, ultra-sound and other sensors that gauge currents and waves to detect obstacles like logs in the water and oncoming boats. That information will flow to a computer system that steers and accelerates the AN-2, mimicking the activities of a human pilot.

Last month, Vaughan discussed the project's research, hardware and performance steps or phases from the university's standpoint. "Phase 1 was the demonstrated ability, conducted on Feb. 18, to issue commands to the boat's controls – throttle, steering and clutches etc.," he said. "It was the simple remote control of the boat."

Phase 2 involves trajectory tracking. "In this stage, the Anaconda should be able to track simple pre-specified trajectories – a combination of lines and arcs – in low wind/current conditions and in the absence of obstacles," Vaughan said. "This phase demonstrates that we're able to autonomously generate and track the basic building blocks for more complex trajectories."

Courtesy of Swiftships & The University of Louisiana at Lafayette

The first two phases are early in the project. "Complexity increases exponentially after that," Vaughan said. "Personnel and funding will need to increase as well." In Phase 3 and beyond, "some primary goals include extending the autonomy developed in Phase 2 to include speeds approaching the limits of the Anaconda," Vaughan said. Researchers will work on more complex trajectories than in Phase 2 and will address obstacle avoidance and high winds.

Also in Phase 3, researchers plan to extend the vessel's remote operational distance by improving communication with the boat. They intend to refine the boat's unmanned navigation system, using maritime and waterway standards, so that the craft recognizes buoys, signal flags and other warnings and reacts to them. Other steps in the AN-2's development include deriving the boat's governing equations of motion; implementing sensor processing algorithms; and software testing, Vaughan said. Shah said $100,000 is being spent on AN-2 research, with additional costs to be covered by Swiftships.

"Continued funding is up to the Swiftships side," Vaughan said. "But I feel the results of this project could have a significant impact on maritime operations. We think its potential is a strong argument for support from state and federal funding agencies."

Ramesh Kolluru, ULL interim vice president for research, said the public-private partnership between Swiftships and the university will produce a number of benefits. The AN-2 gives undergrads and graduate students hands-on training, and Swiftships and ULL to-

CajunBot in the 2005 Defense Advanced Research Projects Agency Grand Challenge.

gether will train workers on the Anaconda, contributing to labor force development, he said.

Eric Geibel, Swiftships special programs director, said autonomous piloting has broad implications for the marine industry and noted that the company's vessels are always on the forefront of technology. The Anaconda can operate in air temperatures above 100 degrees Fahrenheit. With five weapons stations and a foam-filled structure, the vessel can engage in riverine warfare and remain afloat, even if it's pierced. The craft has an advanced-design bow ramp for cargo or personnel; collapsible seating; an optional trailer and truck; and can be helicopter lifted. It's unknown when the AN-2 will be market ready but last year Swiftships and ULL had a three-to-five year framework for its completion.

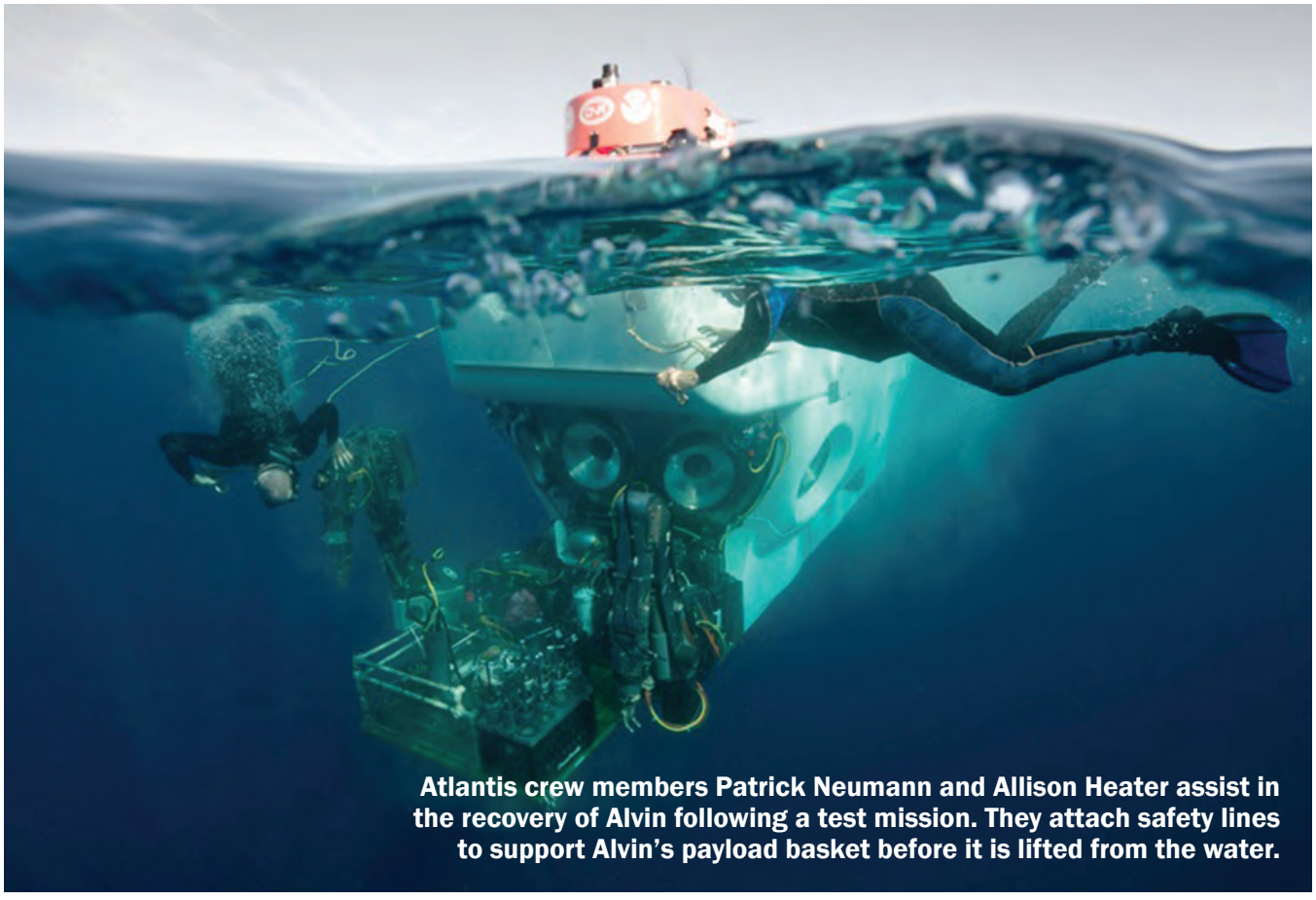
Upgraded Alvin Sub Passes *Scientific Sea Trials*

Scientists gave the rebuilt Alvin submarine two thumbs up after field-testing the nation's only human-occupied deep-sea research vehicle for the first time after a major $42-million overhaul that dramatically upgraded the sub's capabilities.

"We've tested the core functions of the new Alvin, and we believe we have a great new tool for the scientific community," said Harvard University scientist Peter Girguis. He was chief scientist of an expedition that ended March 26 in which scientists and pilots put the new sub through its paces in a series of dives under real field conditions. Their objectives were to assess the upgraded sub's new capabilities, to learn how to use them to the best advantage, to identify bugs, and to troubleshoot them.

The Alvin upgrade was funded by the National Science Foundation (NSF) and augmented with some private support from Woods Hole Oceanographic Institution (WHOI). In January 2014, its upgrade was complete and the sub was certified by the U.S. Navy to return to operations.

"Alvin is functionally a new vehicle, and, before returning it to a full research schedule, we wanted to test the vehicle, figure out how best to use its new features, and work out any bugs in order to make Alvin's transfer back to science operations more seamless," said Girguis. He is chair of the Deep Submer-



Atlantis crew members Patrick Neumann and Allison Heater assist in the recovery of Alvin following a test mission. They attach safety lines to support Alvin's payload basket before it is lifted from the water.

All photos courtesy of Chris Linder, Woods Hole Oceanographic Institution

gence Science Committee, the group of scientists from universities and organizations across the country who advise on the use of vehicles operated by the National Deep Submergence Facility at WHOI.

More than three years after its last research mission, the U.S. Navy-owned Alvin returned to the scene of its last scientific dives in the Gulf of Mexico, as a substantially different vehicle. In a series of dives, pilots and scientists tested the new automatic command-and control functions, the sub's new battery capacity, and high-definition cameras, and evaluated its maneuverability with the new forward lateral thruster.

"I think the new command-and-control systems make it easier for pilots to manage the sub, so they can participate more in the dive, rather than just drive," said Susan Humphris, the WHOI scientist who supervised the upgrade. She added, "The biggest advantage of the lateral thruster is that it enables Alvin to move sideways like a crab, saving valuable time in the sub. In the past, pilots had to back up and then go forward to move laterally."

Pilots and scientists also tested the sub's manipulator arms, whose shoulder joints were given more flexibility, extending their forward reach from 2.3 to 3 meters (93 to 118 inches) and expanding their coverage area from about 100 to 140 degrees. Scientists said that operations to grab, scoop, and core sediment and biological samples were enhanced by the two additional forward-looking viewports. The new sub has five, rather than three, viewports; the three forward-facing viewports are now 7, rather than 5, inches in diameter and have overlapping fields of view, assisting communication between scientists and the pilot operating the sub's manipulators.

"Having three forward-looking viewports lets you all look at the same things at the same time," said Amanda Demopoulos, a scientist at the U.S. Geological Survey. "We can simultaneously observe and coordinate collecting samples, working the manipulator arms, troubleshooting problems, or taking better routes."

One of the greatest milestones during the Alvin upgrade project was the forging of a new titanium personnel sphere. The new sphere has a 6.5-foot diameter compared with 6 feet in the old Alvin, increasing its volume by 18 percent. "It's got everything we wanted in terms of ergonomics," said George Luther, a University of Delaware scientist who served on the Replacement Human-Occupied-Vehicle Committee, which was established to advise the NSF on a new sub for the scientific community. "I couldn't believe how much more

Expedition chief scientist Peter Girguis and Jennifer Delaney of Harvard University extract the viscera of a deep-sea clam collected by Alvin. A preserved sample will be sent to the Ocean Genome Legacy, which aims to archive the DNA of every marine species and make the data available to scientists.

Scientists tested the upgraded Alvin's new capabilities on a science verification cruise in the Gulf of Mexico in March 2014.

room it felt like it had," he said after his March 19 dive. As for Alvin's new high-definition imaging systems, "we were thrilled right off the bat—the imagery is undoubtedly better than we had before," said Chris German, outgoing chief scientist for the National Deep Submergence Facility (NDSF) at WHOI. But the research team immediately launched lighting experiments to optimize those imaging capabilities. They rewired two additional lights in front of the sub's observer viewports, illuminating Alvin's prime "work areas"—where the viewing fields of the pilot and scientists overlap, within reach of Alvin's port and starboard manipulators. They also added another light on the elbow of Alvin's manipulator arm, which they can move to spotlight any areas or items of particular interest. The experiments proved successful on subsequent dives.

The expedition assessed the research vessel Atlantis's system to launch and recover the new, heavier Alvin, including the ship's A-frame, the gargantuan lift that hoists the sub off the deck and moves it off the stern, which was also significantly overhauled.

The expedition was designed to uncover technical problems, and, not unexpectedly, it did. As the research team examined the flood of video recordings from Alvin's first three dives, they discovered gaps in the data stream. They conducted an intensive effort to troubleshoot the problem. By the end of the cruise, they believe they identified the cause of the problem and are working on both temporary and long-term ways to fix it.

On what proved to be the expedition's final dive March 23, a mechanical device failed in the sub's carbon dioxide scrubber, which helps purify air in the sphere, and the mission was aborted. With only one working scrubber, but no spare, the sub could not continue diving before returning to port Wednesday in Gulfport, Miss.

"It's ironic that in this complex vehicle, it is a relatively simple mechanical component that gave out," said German.

"I'm glad it happened now and not during a regular science cruise," Girguis said. "I'm also impressed by the Alvin Operations Group. They are all over this, working the problem."

"We at NSF are glad the Science Verification Cruise (SVC) successfully exercised all the new capabilities of the overhauled Alvin," said Brian Midson, program director in NSF's Division of Ocean Sciences. "The improvements suggested by the SVC scientists in lighting and video data, as well as conveying to upcoming expeditions realistic expectations about how best to plan their dive time, prove the value of this shakedown cruise."

Photos & article courtesy of Chris Linder, Woods Hole Oceanographic Institution

SeaPerch

U. of Southern Mississippi site for

Fourth National SeaPerch Challenge

– Underwater Robotic Championships –

Excitement continues to build for the Fourth Annual National SeaPerch Challenge, as 2014 will see the largest group of SeaPerch competitors ever to assemble and compete for the title of National Champion.

Hosted by the Mississippi Regional SeaPerch Committee, this year's national competition will be held at the University of Southern Mississippi (Southern Miss) in Hattiesburg, MS, on Saturday May 17, 2014.

Here, more than 100 middle and high school teams from all over the country will come together for a weekend of learning, sharing, competing and fun. The teams scheduled to be in Mississippi have earned the right to compete against their peers on the national stage by winning at the regional level.

Registered participants and spectators will be treated to the "college experience," as the entire weekend's activities, including Friday night's ice cream cocial and Saturday's in-pool and poster competition events as well as the awards Banquet, dorm room accommodations and meals through Sunday morning, will be available for all on the picturesque Southern Miss. campus.

What is SeaPerch?

SeaPerch is the innovative K-12 underwater robotics program, sponsored by the Office of Naval Research (ONR) and managed by the Association of Unmanned Vehicle Systems International Foundation (AUVSIF), that trains teachers and group leaders to inspire their students to build their own Remotely Operated Vehicles (ROVs) following an academic curriculum consistent with national learning standards supporting Science, Technology, Engineering, and Mathematics (STEM) subjects with a marine engineering-based theme.

The program promotes hands-on learning of engineering and scientific concepts, problem solving, teamwork and critical thinking, and introduces students to potential and rewarding career opportunities in naval architecture, marine, ocean and naval engineering. "With guidance afforded by AUVSIF and with ONR's commitment to SeaPerch, we have grown exponentially, reaching more than 153,000 students to date," said Susan Nelson, Executive Director of SeaPerch. Currently more than 12,200 teachers and mentors are com-

SeaPerch brings together government, industry and academia in an effort to expose young people to careers and opportunity in science and technology. Beyond the learning experience, though, students are encouraged to simply have fun.

mitted to supporting student learning through this stimulating and fun hands-on activity and to promoting student discovery and excitement of STEM subjects leading to a potential future career path. The program reaches a diverse population, and participants in the National Challenge frequently include students from inner city Baltimore to rural Mississippi to Native American reservations in Minnesota to the islands of Hawaii, all of whom have now been introduced to STEM though SeaPerch. This year, there may even be the first international team coming from New Zealand to compete.

The weekend starts beginning on Friday, May 16, when arriving teams check into their dorm rooms before heading to registration, where they will check in and submit their ROVs for a compliance review. For those vehicles requiring adjustments and/or repairs, a triage station with spare parts and tools will be available. Following dinner at the student dining hall, teams will be treated that evening to an ice cream sSocial where students from across the country can meet, mingle and compare their design enhancements and innovations. All student participants will receive National SeaPerch

Challenge t-shirts and giveaway bags with items contributed by the SeaPerch program, corporate sponsors and the Mississippi hosts.

Competition day, Saturday, May 17, will begin at the university's Natatorium with the continuation of registration check-in and compliance reviews, for those not completing their inspection on Friday night. The opening ceremony, featuring a number of relevant speakers, will be accompanied by photographers, videographers and local media. Again this year, live streaming of the day's competition events will be provided via the SeaPerch website for the benefit of fellow classmates, parents and friends back home to follow the action.

This year teams may consist of a minimum of one student and one adult leader, and there is no restriction on the maximum number of students that can participate on a team. A juried poster competition is planned for the middle and high school teams to introduce their designs through graphic displays, to deliver oral presentations about their design philosophy and construction challenges and to answer questions posed by the judges. The in-pool technical competition events will consist of a submerged obstacle course, and an entirely new event, called the "Heist Challenge."

Specifications for both underwater events were posted on the SeaPerch website, **www.seaperch.org**, for teams to construct their own events for practice prior to the national

competition. Nearly 100 judges and volunteers are also anticipated to attend during the day in order to adequately oversee the multiple poster presentation and in-pool competitions as well as ensure a rewarding and memorable day for all.

On Saturday evening the gala awards banquet will take place in the Payne Center on campus where presentations of first-through-third place trophies in each event for middle school, high school and open classes will be awarded, and the SeaPerch National Champions will be revealed. In addition to more than 500 student team members and their leaders, classmates, parents, friends, volunteers, judges, invited guests, speakers and committee members will comprise the anticipated total of nearly 800 attendees. Invited speakers, representing corporate sponsors, local and state congressional representatives, ONR, U.S. Navy, U.S. Coast Guard and other military branch personnel, will be invited to observe the day's activities. All will be encouraged to arrive early, to observe the competitions, judge various events and speak first hand with the students before addressing them that evening at the banquet about the importance of STEM to their future careers. All student team members will receive participation medals, and be photographed by team for the benefit of their families and schools.

Sunday, May 18, will be a free day for the teams to explore on their own the rich cultural history and outdoor activities including parks, historic sites and museums in the greater Hattiesburg, Mississippi area.

Sponsorship opportunities are still available for individual, local and corporate funding, details of which are posted on the SeaPerch website. Also, judges and volunteers are always welcome. Should you be interested in participating as a volunteer or judge on May 17, contact Cheri Koch at koch@auvsifoundation.org.

Certificates of Participation are available both for student participants and for teachers and advisors to download following the National Challenge.

For news and updates concerning the National Challenge, please visit the SeaPerch website, **www.seaperch.org**, and for questions please contact Susan Nelson, Executive Director, at

e: snelson@seaperch.org

Subsea Processing

Boosting and Gas Compression Enabled through HV Wet Mate Connectors and Penetrators

By Josselin Legeay, Product Manager, High Power Systems – Deutsch Offshore
TE Connectivity (TE) - Aerospace Defense & Marine

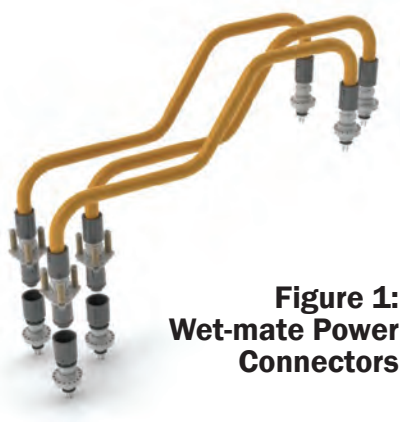
Offshore drilling activity continues to migrate into deeper waters, especially with new oil and gas discoveries happening in smaller reservoirs located in deeper waters. Making these discoveries commercially viable relies on not only revenue from high oil and gas prices but also on reducing operating expenses (OPEX) and capital expenditures (CAPEX). Oil and gas producers are now looking at new technologies to produce effectively these high-pressure, complex reservoirs. Technologies such as subsea boosting and subsea gas compression allow subsea processing of hydrocarbons to change the economics of deepwater production.

Processing the hydrocarbons on the seabed has several advantages:

- Saving the multibillion dollar cost of building a new platform by providing tiebacks to shore or existing facilities
- Enhancing oil/gas recovery rates to increase the income per CAPEX dollar
- Enabling future access to reserves that are currently inaccessible due to hazards like icebergs and hurricanes
- Increasing operational safety and reducing risks

The deeper the well is, the more potential energy is required to reach the host platform at the surface. Subsea boosting increases the flowrate of the oil or gas to the surface by reducing the back pressure on the well, and therefore increases the recovery factor of the reservoir. For oil, pumping can be used, while natural gases are boosted by compression. Another technique, which can be used in combination with pumping, is to separate the water and oil/gas, injecting the water back into the reservoir to limit pressure drops in the well. This not only saves energy (of getting the water to the topside facility and down again into the well), it also saves a lot of space and weight on the heavily crowded topside facilities.

Moving processing from the platform or shorelines to the seabed creates challenges in the design and deployment of the processing equipment. A limiting factor is the weight of such equipment, especially in deep waters. Weight (and size) issues require that the equipment is designed in a modular fashion, with modules then connected together on the sea floor. For example, transformers, circuit breakers, variable-frequency drives, and the final consumers (pump or compressor) all need to be interconnected. Modularity also presents advantages in retrieving, repairing, or upgrading equipment because it is more economical to replace a module than the entire system. Where several trains of pumps or compressors are in parallel, modularity allows selective shutdown and retrieval of a module, while the other trains continue to boost hydrocarbon production, increasing the overall availability factor of the subsea station. This also eases maintenance by allowing smaller intervention vessels, which are more readily available than high payload deployment vessels and less costly to operate.



[photo: TE Connectivity / DEUTSCH connectors]

Figure 1: Wet-mate Power Connectors

Wet-Mate Connectors Enable Modularity

A wet-mate connector is a device that allows connection of electrical conductors together. Connectors are designed for a certain current and voltage, frequency, and water depth. Their materials are corrosion resistant and designed to withstand the harsh conditions of subsea environments for their design life, typically up to 25 to 30 years.

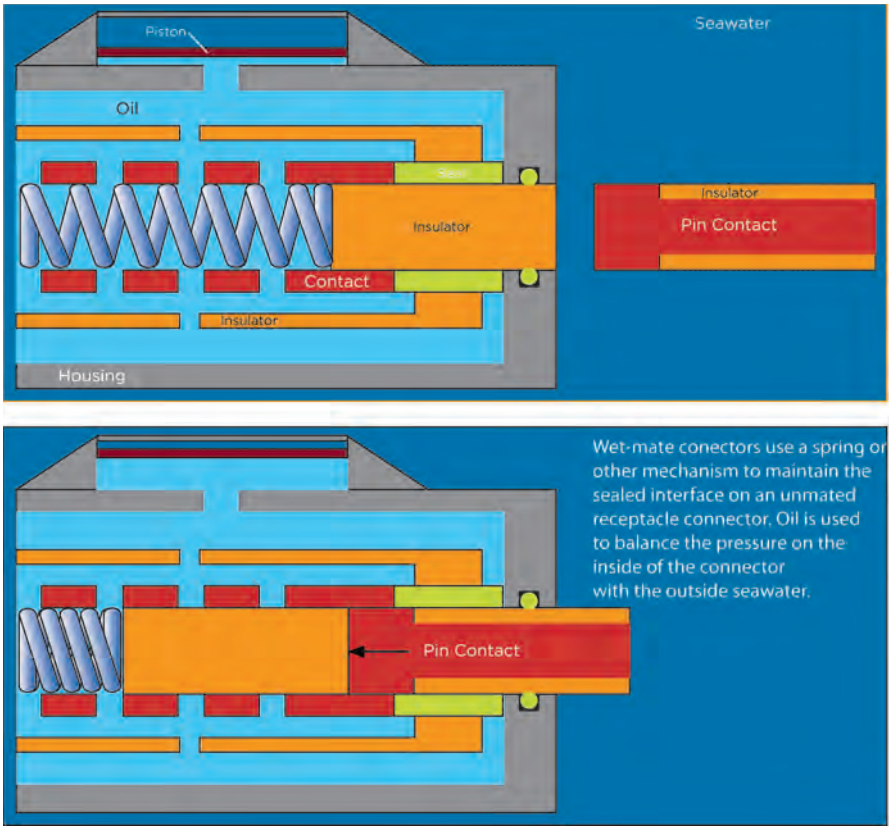
For modularity to be achieved, power distribution must rely on wet-mate high-voltage connectors that can be mated or unmated in an unprotected underwater environment. Figure 1 shows a typical configuration suing TE Connectivity's wet-mate connectors. In offshore ap-

plications, we distinguish between dry-mate and wet-mate connectors. Dry-mate connectors are mated topside in dry circumstances and then submerged to their rated depth. They cannot be interconnected on the sea floor. A subsea processing system will involve both dry-mate connectors within a module and wet-mate connectors for intermodule connectivity.

Typically, in a wet-mate connector, one mating half of the connector is insulated by a shuttle mechanism protecting the female contact when unmated. A mechanical spring keeps the shuttle mechanism closed, sealing the interface. During the mating operation, the shuttle is pushed in by the male pin/contact; simultaneously, a set of seals and membranes cleans/wipes the male pin and ensures no water is allowed into the mated pair. The internal oil is displaced by the pin contact. Figure 2 shows the basic operation during mating.

The design of a wet-mate connector involves pressure-balanced dielectric oil.

Figure 2: Operation of a wet-mate connector



[photo: TE Connectivity / DEUTSCH connectors]

In order to maintain insulation throughout operations and over the design life, the connector is oil filled and pressure balanced. A bladder or piston mechanism equalizes the internal pressure of the connector to the outside water pressure. This allows no differential pressure across the seals and wiping membranes, thereby achieving a very effective wiping effect on the male pin.

Application of subsea wet-mate connectors is similar to other connector applications—they are used to directly connect two modules or to connect a cable to a module.

A special type of wet-mate connector is the penetrator. The penetrator is a feed-through connector used to separate chambers or separate a chamber from the outside world. It is basically a bushing designed to accommodate pressure differentials. The inside of a sealed piece of equipment, for example, may be at a significant different pressure than the surrounding seabed. When possible, subsea modules are pressure balanced—i.e., fluid filled, with the fluid being adjusted at the same sea pressure as outside the module. This allows for thinner walls, reduced weight, and higher reliability as seals are not required to withstand differential pressures. Some modules, such as those containing electronics or other devices such as circuit breakers, cannot withstand pressure higher than atmospheric. Therefore, a penetrator is used to prevent the seawater from leaking into them. On other devices, such as pumps and compressors, which are potentially exposed to the reservoir shut-in pressures, pressure ratings can get up to 15 kpsi/1034 bars.

Penetrators are rated for withstanding pressures—5 kpsi, 10 kpsi and 15 kpsi—which linked to the reservoir pressure. This is due to the fact that the boosting unit is in contact with the hydrocarbons. In case of a shutdown, the whole reservoir pressure may apply to the penetrator. The penetrator serves an environmentally important function: An electrical failure would mean a loss of production, but a mechanical failure would release hydrocarbons into the environment.

On other modules not linked to the oil flow, the penetrators are the barrier ensuring the electrical integrity of the module, preventing the modules from being flooded with water. DEUTSCH Wet-mate connectors, then, are key elements allowing cost-effective and technically feasible deployment, while penetrators are essential to preserve the integrity of the complete electrical power supply and to prevent hydrocarbon release into the environment.

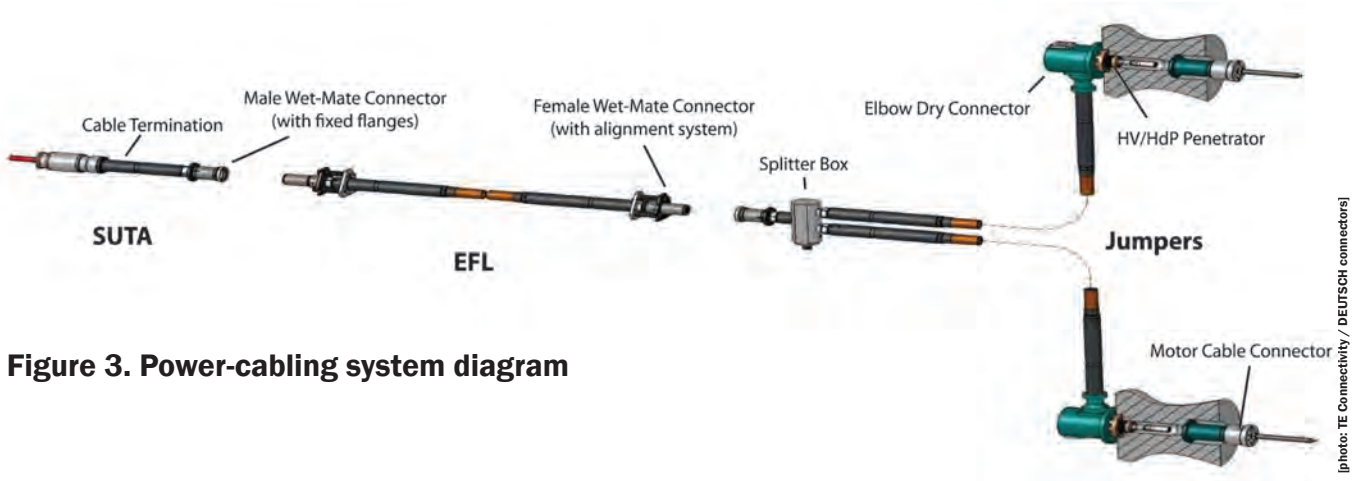
Specifying Wet-Mate Connectors

A high-voltage wet-mate connector is usually specified by the following criteria:

- **Voltage/Current Rating:** Voltage and current handling capabilities are, of course, the basic metrics in choosing any power connector. Since power in subsea systems is usually three-phase, a connector is specified through three values, such as 18/30 (36) kV. The first number, 18 kV, is the phase-to-ground rating. The second, 30 kV, is the phase-to-phase rating. The final 36 kV is the maximum system voltage.

Some operational philosophies require the connectors to still operate when there is a ground fault on one of the three phases. In that case, the connector needs to withstand the second value (30kV in our example) and is selected accordingly.

- **Frequency:** Depending on the connectors and the application, the frequency can be low (50 or 60 Hz) for transmission. Higher frequencies—up to 200 Hz—are found downstream of a variable-speed drive. For some long, step-out applications, low-frequency AC transmission or DC can come into play.
- **Water Depth/Pressure:** Connectors must withstand not only the pressures of deepwater applications, but also other harsh conditions. Today, subsea processing must withstand depths of up to 3000 meters, and the need to withstand even deeper depths is expected in the next decade.
- **Temperature Rating:** Seabed temperatures are usually rather low and very stable, but the connectors and penetrators need to withstand the storage temperature which may be in direct sunlight in the very hot weather of the Gulf of Mexico or may be in the very cold winter of the Norwegian continental shelf. Penetrators must also be able to withstand the high temperatures generated by the modules (up to 90°C) or the hy-



[photo: TE Connectivity / DEUTSCH connectors]

Figure 3. Power-cabling system diagram

drocarbons, which may be up to 200°C.

A Typical Interconnection System

Figure 3 shows a typical power-cabling system. An umbilical cable is terminated to a SUTA (subsea umbilical termination assembly), which is roughly equivalent to the wall socket in your home. From the SUTA, electrical flying leads (EFLs) bring power to the pump or other modules. To continue the home analogy, EFLs are like extension cords. A secondary jumper harness ensures connection from the EFL to the penetrator that serves as a transition at the pressurized motor enclosure.

Wet-mate connectors are highly engineered devices suitable for harsh marine environments. They are a key element of subsea equipment used in the subsea factory processing for oil & gas extraction. Wet-mate connectors provide a means of communications between the control room and the subsea equipment. They enable information retrieval from the sensors located in the well and related subsea equipment to assess the integrity of the well and related equipment optimizing reservoir production. They are more complex than standard electrical connectors because of the need to provide a sealed interface that can be maintained at subsea water pressures, carry high voltages and currents, and deliver very long operating lives. Products such as TE's DEUTSCH line of subsea wet-mate connectors and penetrators are the result of years of offshore experience, both topside and undersea. Our product development advantage includes a close working relationship with designers and users of deepwater equipment to best match the connector to application needs, providing for subsea power distribution and subsea processing in a safe, reliable and economical manner.

Josselin Legeay is Product Manager for High Power Systems within TE Connectivity, Global Aerospace, Defense & Marine. Josselin has more than 10 years' experience with subsea electrical connecters. His areas of expertise include high voltage connectors, connection systems and subsea distribution/collection systems. You can connect with Josselin at www.DesignSmarterFaster.com.

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Brazil's Northern Frontier

By Claudio Paschoa

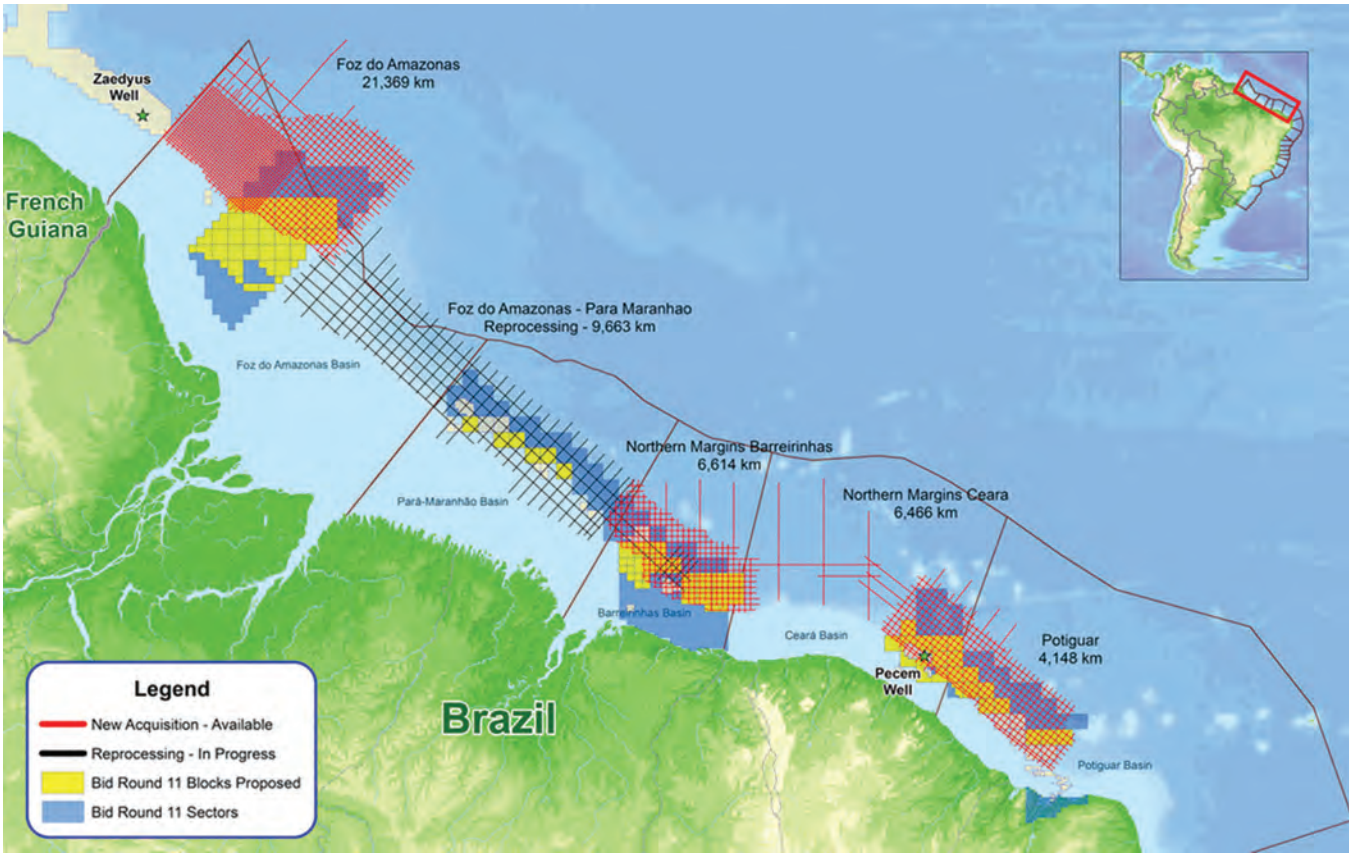
In an effort to spread out oil and gas production to other parts of the country and increase overall oil production, Brazil has finally intensified hydrocarbon exploration along its northeastern and northern coasts. These are some of the poorest regions in the country and infrastructure for oil and gas exploration is minimal, yet significant discoveries and seismic indicators of large reservoirs are tantalizing and have attracted major local and foreign investors. Potential for oil discoveries in the area is proven, yet players will be faced by many challenges offshore and on land in order to uncork reservoirs at the Northern Frontier.

The Northern Frontier

Brazil's Northern Frontier is divided between five states; Amapá, Pará and Maranhão, Piauí and Rio Grande do Norte and has five offshore sedimentary basins; Foz do Amazonas Basin, Pará-Maranhão Basin, Barreirinhas Basin, Ceará Basin and Potiguar Basin. The ANP's (National Petroleum Agency) 11th round of bidding, which took place in May 2013, finally opened up the Northern Frontier, also known as the Equatorial Margin (EM), to intensive exploration, although Petrobras (Brazil's National Operator) and partners have been drilling and producing on a limited scale in these regions for more than a decade. Magda Chambriard, ANP Director, explained that, "The Brazilian equatorial margin basins are classified by the ANP as exploration frontiers and have promising potential for discoveries of turbidite sandstones (formations that form oil reservoirs post-salt) from the Upper Cretaceous, especially in deep water."

Spectrum ASA has been leading seismic surveys in the region for some years now and analysis of the seismic data confirms that prospectivity potential is high because the source rock, the migration to a reservoir rock, and the trapping have been identified in key areas. Petrobras' President, Maria das Graças Foster and Petrobras' E&P Director, José Formigli

Brazil Equatorial Margin and tie-ins-image by Spectrum ASA.



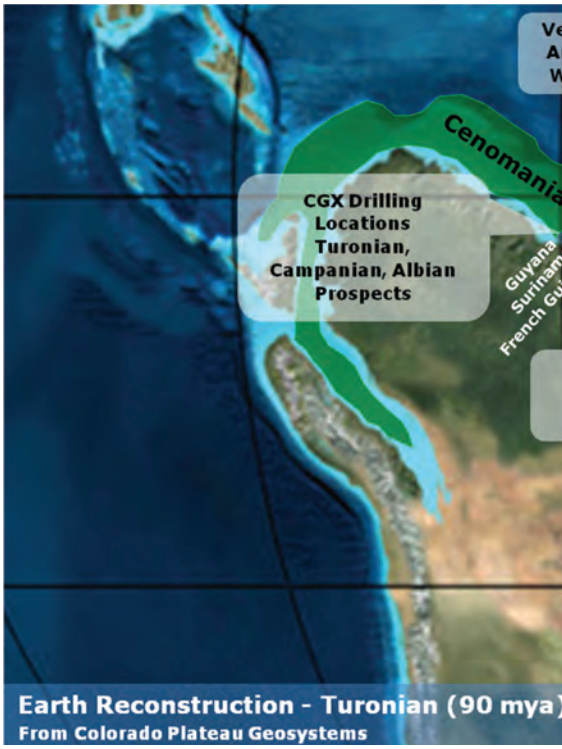
have both indicated that the equatorial margin will be the next great challenge for Brazil's oil and gas industry after the pre-salt, mainly due to the fact that there have been significant analogous oil and gas discoveries in West Africa, and there is much geological similarity between the equatorial margins on both sides of the Atlantic. The seismic data, including the re-processed data indicates that robust reservoirs are present in all the basins along the EM. Recently, there has been exploratory success by Petrobras at an unnamed deepwater play around 200km offshore of the coast of the state of Pará, in the Pará-Maranhão Basin and also off Rio Grande do Norte, in the Potiguar Basin, where the Pitú exploration well, 1,731 meters deep and 55km from the coast, struck oil.

Spectrum Seismic Survey Campaign

In 2013 Spectrum ASA acquired 38,588km of new long offset 2D seismic data covering the Foz do Amazonas, Barreirinhas, Ceará and Potiguar Basins in the EM. In addition, a re-processing effort is underway on a seismic dataset tying the Foz do Amazonas, Pará-Maranhão and Barreirinhas Basins. This re-processing effort is indicating that some of these basins may be linked. Spectrum has accumulated more than 48,000km of Multi-Client seismic in this area of extremely high potential. This data, along with final PSTM (Pre-Stack Time Migration), PSDM (Pre-Stack Depth Migration) was made available for Brazil's 11th round of bidding.

In December 2013, Spectrum and CGG announced that it would launch, as equal partners, a large, high-end BroadSeis 3D multi-client survey program offshore Brazil focusing on a large area of the Foz do Amazonas Basin. Rune Eng, CEO of Spectrum said, "This opportunity for us to join forces with CGG in our project development and employ CGG's top-notch technology in our next phase in this area is a milestone for Spectrum." Rune also highlighted that "the Northern Mar-

Photo: Michel Floch



Seismic Streamer MV Oceanic Endeavour.

gins of Brazil have been a core area for our investment campaigns over recent years." The project has received high prefunding from a number of major industry players and covers an area of 11,330 sq. km. The Foz do Amazonas Basin survey is being acquired by the MV Oceanic Endeavour deploying Sercel's next-generation Sentinel RD solid streamer and started in January 2014. The Sentinel RD has a reduced diameter and a 15% weight reduction, compared to the original Sentinel, providing reduced cable drag and increased storage capacity aboard the seismic vessel. Pascal Rouiller, CEO of Sercel, and Senior Executive Vice President of CGGVeritas said, "Offering the best signal-to-noise ratio, Sentinel is the most operationally efficient system available in the industry today." While the CEO of CGGVeritas, Jean-Georges Malcor said, "Sentinel RD can be deployed for a wider range of layout options including denser or longer configurations to meet growing demand for high-end marine seismic techniques such as broadband, high-density and long-offset acquisition."

The seismic streamer vessel, MV Oceanic Endeavour, was launched in 2008 and is equipped to tow up to 16 streamers, and 8 gunstrings. She is one of the most powerful and high-capacity vessels of her class in the world, and has a crew of 70. The high-end BroadSeis data set will be processed in CGG's state-of-the-art subsurface imaging center in downtown Rio de Janeiro using CGG's proprietary geovation software for seismic data processing, imaging and reservoir characterization, including a new generation of massive high-density wide-azimuth datasets, true 3D wide-azimuth algorithms and anisotropic depth imaging along with the latest compute-intensive imaging algorithms. "There is an unsurprising high level of industry interest in the Brazilian equatorial margin given the recent Zaedyus discovery to the northwest of Foz do Amazonas as well as analogous discoveries in the West African equatorial margin. Our joint program with Spectrum will capitalize on CGG's high-end BroadSeis technology and Spectrum's recent 2D program experience in the Fóz do Amazonas Basin to bring unique insight to this high-potential area," said Malcor.

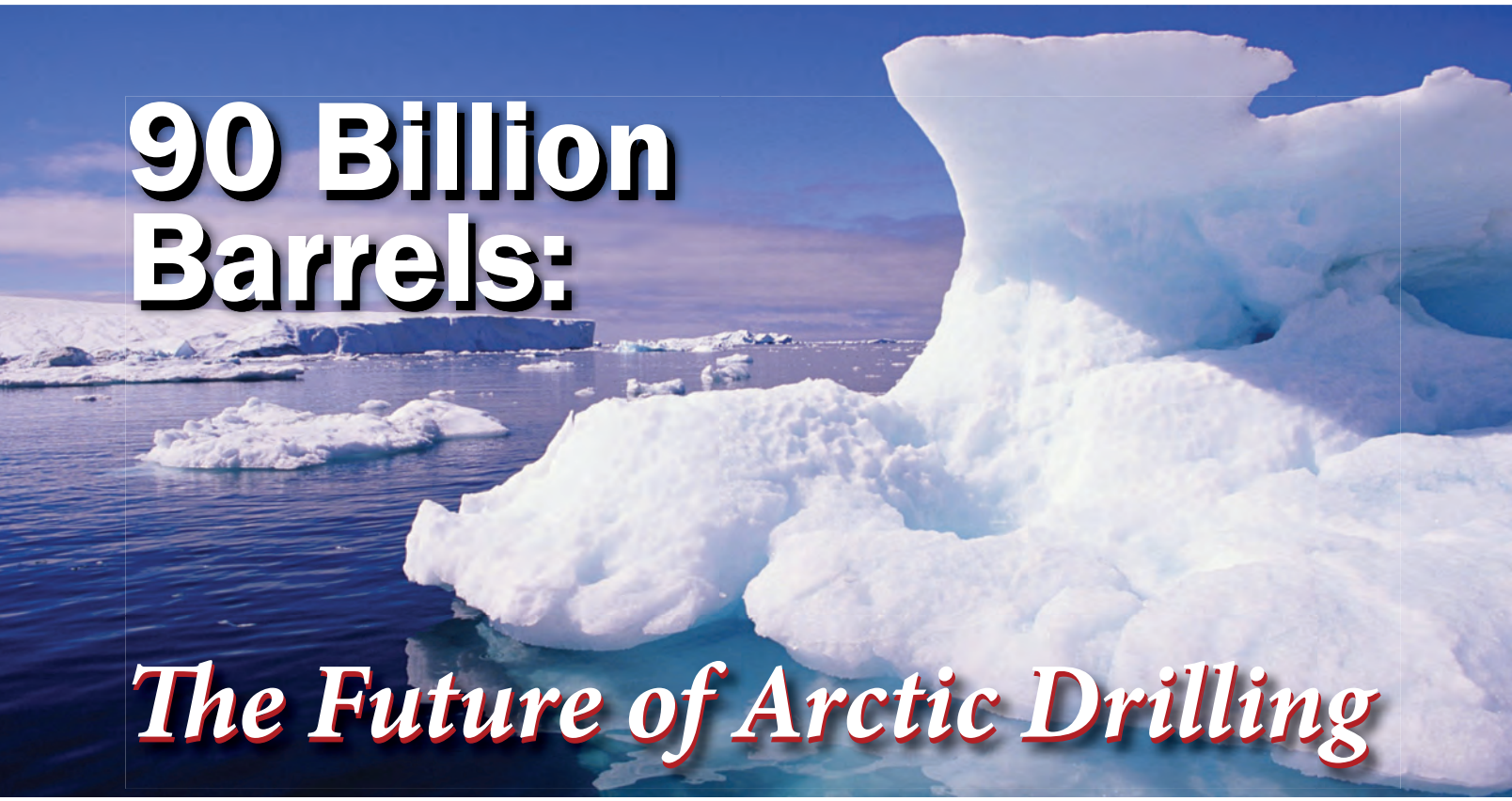
Exploration Challenges

Petrobras geologist have stated that the EM's geology is more complex that at other Brazilian basin essentially due to interpretation difficulties caused by shear faults that resulted in a far more complex model for these sedimentary basins and that when separating from the African continent, the movements at the South Atlantic coast were more of distention and not of dragging of one over the other. This created a very complex situation and is still interfering in the definition of the dynamics of the region's petroleum system. With speeds of up to 1 meter per second (1.94 knots), currents in the region are another major hurdle operator need to overcome during E&P. In some areas along the EM the

The Zaedyus discovery and recent discoveries off Brazil have proven the Equatorial Atlantic Margin potential-image CGX

operator needs to place the rig dozens of kilometers against the current, before starting to lower a BOP or other subsea equipment to land it at the planned location on the seabed. There have already been a significant number of incidents where rigs have been pushed out of position by the powerful currents, on average, this occurs much more frequently at the EM than at any other oil basin off Brazil. Tide and wind dynamics have a stronger influence on sea conditions at the shallow continental shelf than in deepwater, while deepwater locations are affected by strong surface and deepwater currents that can run hundreds of meters deep and potentially up to 100 km wide, capable of creating shifting vortices that can affect localized current direction and speed causing cross-currents, which can be even stronger than the normal currents, significantly increasing the forces placed on risers, flowlines and other subsea equipment.

There is only very limited infrastructure, such as ports and port equipment, refineries, equipment transportation, offshore aviation, environmental services and labor. Operators will need to invest in building up support centers and training centers in the area, as qualified local content in North Brazil is hardly abundant. Oil spill response infrastructure will also need to be large and robust to be capable of dealing with the strong deepwater currents, as these remote seas and shores will be affected by any oil spill and are home to the largest mangrove coast in the world, Coastal Conservation Areas, Marine National Parks, and major river-mouths. Primary environmental studies will also need to be made along most of the northern coast and offshore and this will increase field development costs and may also delay exploratory drilling operations. In some instances Brazil's Environmental Agency (Ibama) may not grant environmental licenses to some exploration blocks acquired during the 11th bidding round after environmental studies are analyzed.



90 Billion Barrels:

The Future of Arctic Drilling

By Tyson Bottenus

Royal Dutch Shell announced at the end of January that it would suspend all drilling activity in Arctic waters off Alaska due to a "multibillion-dollar scaling back of new projects." The move comes just two weeks after the Anglo-Dutch company pulled out of an Australian liquefied natural gas (LNG) project and a month after it scrapped plans on a $20 billion dollar project to develop an onshore natural gas-to-diesel facility in Louisiana.

Aside from Royal Dutch Shell's financial difficulties, it also begs the question as to what the future of Arctic drilling will be in the coming years. In 2008, the United States Geological Survey estimated that areas north of the Arctic Circle had an estimated 90 billion barrels of undiscovered, "technically recoverable" oil. But seeing as the region is covered by ice three fourths of the year, many think that the quest to drill in the Arctic Ocean is quixotic at best.

"Industrial development in these waters brings a new set of challenges and a larger set of risks than in other oceans because people and machinery will be working in some of the most remote and harshest conditions on the planet," said the PEW Charitable Trusts in a report from September 2013 on what standards oil and gas companies should enact to prevent disasters such as the type Deepwater Horizon did to the Gulf of Mexico in 2010.

The threat of incidents like Deepwater Horizon has brought environmental activism on arctic oil drilling into frenzy. Last September Greenpeace activists and crewmembers were arrested after attempting to scale Gazprom's Prirazlomnaya drilling platform in the Pechora Sea, north of Russia. Their detainment was met with an international outcry and in November their charges were dropped from piracy to hooliganism before eventually getting dismissed by Russian courts.

What worries scientists about the Arctic is how difficult an oil spill response plan would be to carry out if a spill occurred. Unlike with Deepwater Horizon – a spill that happened in a warm water environment, an oil spill in the Arctic would be difficult at best, devastating at its worst in a complex and fragile environement. The presence of ice hindered cleanup efforts when Icelandic containership Godafoss ran aground and started leaking oil in February 2011.

Now that Royal Dutch Shell has suspended plans to drill, it remains to be seen who will take up the charge to procure the estimated 90 billion barrels. An overwhelming question that will need to be asked eventually is how - in such a vast and

Image above: Cold & remote, drilling in the Arctic represent daunting conditions for oil and gas operations.

remote region - will they assemble such a response team?

THE *KULLUK*

On December 21, 2012, the mobile drilling barge *Kulluk* departed from the docks of Dutch Harbor, Alaska on its way south by tug to Seattle. She carried a crew of 18 along with 150,000 gallons of fuel and oil onboard. The 81-m rig, owned and operated by Royal Dutch Shell, had a four-day window of good weather to get out of the notoriously rough and cold patch of water known as the Gulf of Alaska. The distance between the two ports is roughly 2,000 miles and it was expected that the journey would take weeks. Top speed for the *Kulluk* was 4 knots. Time passed interminably for the crew, who were mostly from the Gulf of Mexico and had never been this far north.

As they motored, a storm developed and the towline connecting the *Kulluk* to the tug snapped. Hastily the crew rigged a weaker, emergency towline but this became useless when the tug's engines cut out, leaving both the tug and 28,000 ton *Kulluk* at the mercy of the storm. As this was the dead of winter in the Gulf of Alaska, there were no other boats nearby that could lend any assistance, so a distress call went out to the Coast Guard. Gusts of wind at this time reportedly were in excess of over 50 knots and produced 40 ft.waves.

The Coast Guard arrived but soon found the situation out of hand. Now with 70 knot winds blowing hard, the tugboat Alert released *Kulluk* and let her drift.

At 9 p.m. on December 31, *Kulluk* ran aground on the rocks of Sitkalidak Island off Kodiak. It would be another week before crews could float the *Kulluk* again. In the days and weeks afterward, experts weighed in with the opinion that it was clear Shell's massive $290 million effort to extract oil was no match for Alaska's weather and sea conditions.

Kulluk became grounded on New Years Eve, 2012, and quickly became a lightning rod for lack of oversight into oil drilling in the Arctic.

11 Nobel laureates including South African Bishop Desmond Tutu and German chancellor Angela Merkel expressed concerns or sent letters to Russian president Vladimir Putin regarding the detainment of the Arctic 30, seen here scaling the rig in the Pechora Sea.

And so did the Department of the Interior who, in a March 2013 report, stated:

This review has confirmed that Shell entered the drilling season not fully prepared in terms of fabricating and testing certain critical systems and establishing the scope of its operational plans. The lack of adequate preparation put pressure on Shell's overall operations and timelines at the end of the drilling season. Indeed, because Shell was unable to get certified and then deploy its specialized Arctic Containment System (ACS) – which the Department of the Interior (DOI) required to be on site in the event of a loss of well control – the company was not allowed to drill into hydrocarbon-bearing zones.

Then-Secretary of the Interior Ken Salazar put it in even simpler terms: "Shell screwed up in 2012 and we are not going to let them screw up after their pause is removed."

Lessons Learned

The Pew Charitable Trusts reports in its recommendations on Arctic drilling that all drilling operations should be limited to periods of time when it is actually possible for crews to clean up the oil spill in Arctic conditions. Otherwise why else would a company go in if they couldn't clean up a potential spill?

The answer, simply, is that right now they legally can.

With regards to oil spills and how the U.S. legislation operates, it's safe to say that much of the regulations and laws that exist now are knee-jerk reactions to prior calamities. After the *Exxon Valdez* spilled 11 million gallons into Alaska's Prince William Sound, the United States Congress passed the Oil Pollution Act of 1990 – a defining act that required oil and gas companies to create a "plan to prevent spills that may occur" and have a "detailed containment and cleanup plan" for oil spills.

Exxon Valdez was the largest oil spill in US history - until Deepwater Horizon in 2010. That year, a bill almost passed

which would have raised from $75 million to $10 billion limit that for which BP would be held responsible. But it didn't pass, and although BP was still responsible for all cleanup costs, statutes in the Oil Pollution Act of 1990 limited BP's monetary damages to $75 million.

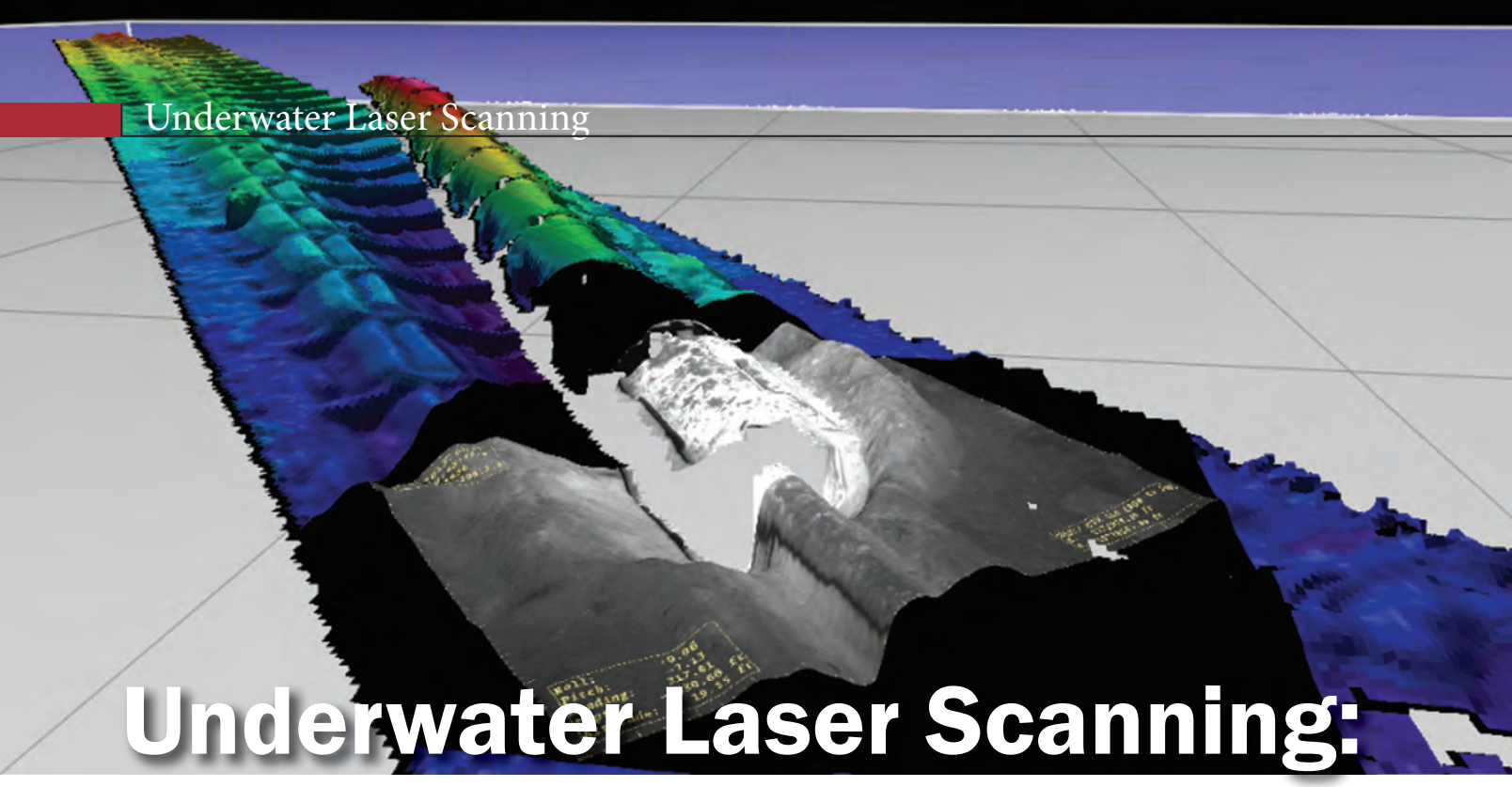
As the Arctic warms, and it becomes more feasible for companies such as Royal Dutch Shell to start drilling offshore, it only seems responsible that the fiscal penalties involved with an accidental oil spill increase. Currently there is no disincentive for oil and gas companies to enter into risky environmental situations. Incidents such as that of the *Kulluk* in 2012, or the lessons that remained unlearned after *Exxon Valdez* in 1990 and twenty years later, with Deepwater Horizon, plague the industry and need to be acted upon responsibly. Eleven people went down with the oil platform in 2010 when Deepwater Horizon blew up. Fortunately, no one passed away when the *Kulluk* became grounded.

After $6 billion dollars in spending on oil drilling in the Arctic, Royal Dutch Shell is no closer than it was when it began. With 2014 scrapped, is it possible that another campaign will be launched further on down the road, say in 2015 or 2016?

Many think not. Royal Dutch Shell's new chief executive Ben van Beurden told analysts, "2014 will be a year where we are changing emphasis, to improve our returns and cash-flow performance." He also stated, "the lack of a clear path forward means I am not prepared to commit further resources for drilling in Alaska."

But even Royal Dutch Shell's current financial issues can't hinder the industry for too long. Other national players are beginning to enter the Arctic game, such as Canada and Denmark. Much of this activity is being brought about by Arctic ice beginning to melt away extensively as a result of climate change.

"In 50 years, if the ice cap is gone, it might change somewhat," said Martin Pratt, an expert from UK's Durham University, in an interview with *Financial Times* last February. "But it's still going to be cold, it's still going to be stormy and it's still going to be dark. It isn't the first place in the world you would look to exploit oil if you were given the choice."



Underwater Laser Scanning:

For Subsea Pipeline Inspection

By Jason Gillham, CEO, 2G Robotics

Underwater Laser based micro-bathymetry is becoming a new standard for subsea pipeline and asset inspection. As the industry moves to deeper and more hostile environments for extraction of oil, technology to manage the risks involved in these environments are critical. This became most evident during the Deepwater Horizon sinking in 2010 and the subsequent free flowing well. The economic and environmental cost incurred whenever such events occur is a constant reminder of this need for responsible and safe continued operations. A key aspect to this safe continued operation is inspection monitoring maintenance and repair (IMMR) activities. Major oil producers recognize this requirement and have begun to employ underwater laser scanning technology for a variety of applications.

C & C Technologies is setting new standards for subsea asset inspection through the use of underwater laser scanning technology provided by2G Robotics. Laser scanning has a number of benefits for close range inspection over traditional acoustic techniques, providing 100x the resolution. This increased resolution lets operators see and measure details that were previously unavailable. By reducing uncertainty about the condition of an asset, improved decision making is possible, thus reducing risk and ensuring continued safe operation..

Critical Pipeline Features

Pipelines that are laid on the seabed are exposed to a number of external hazards. Anchor drag damage, seismic activity, currents from the sea itself through to corrosion, pipeline movement and erosion resulting in free-spans.

Anchor Drag Damage

Anchor drags can result in scoring and bending of the pipelines. Assessing the optimal corrective action in these situations is highly valuable. By capturing a precise 3D model, engineers can evaluate if the pipeline can be acceptable without significant repair. When repair is a viable option, highly detailed data enables restorative planning with confidence.

Free Spans

Sediment transport due to seabed currents can result in unsupported pipeline spans (free-spans). As these spans grow, the stress on the pipe increases as it holds up more and more of its own weight. If these are not addressed they can lead to failures and ultimately ruptures.

Both of these issues are critical to the longevity of pipeline assets and without highly precise information, it is possible to miss potentially critical information.

Image above: Meshed laser based micro-bathymetry data with a single still picture of a buoyancy collar overlaid onto the data.

Challenges With Existing Technology

Existing subsea metrology techniques have been unable to provide the level of detail afforded by underwater laser scanner technology. Video on its own provides an easy to understand and interpret qualitative assessment of an asset. From imagery, damage locations can be observed but assumptions about the sizes of features observed are required when making decisions and this can lead to incorrect assumption resulting in unnecessary expenses or asset failures. The use of laser scaling techniques can aid in size estimations but true measurements are not achieved.

Multibeam sonar is the traditional technique for collecting measurement data over pipelines. This technique is very good at collecting data over long ranges, particularly in high silt conditions where optical technique will fail. However, since sonar is a mechanical wave, as it propagates through the water, the wave front spreads apart like a ripple on the top of the water and thus the area over which the sonar signal takes its measurement is relatively large. Due to this large acoustic footprint, sonar systems are not able to resolve fine features and may incorrectly report there to be returns at the edge of a target where no target exists, resulting in potentially misleading information.

Laser scanning, while not able to penetrate through silt and travel larger distances, is able to resolve very fine details and accurately define the edges of structures. The graphic below demonstrates with a simple example the differences in the physics between sonar and laser prorogation.

View animations describing this behavior here:
www.2grobotics.com/MTR201405

Laser Scanner Integration and Deployment

2G Robotics underwater laser scanners operate using a trigonometric approach. There are two key components, the laser emitter and the receiver. By projecting a 50 degree fan of laser light from the emitter, a stripe of laser light projects on the target surface. The light from the target surface scatters in all directions with a component of this light reflecting back to the optical sensor (the receiver). The optical sensor measures the angle to the laser light all along the line, based on knowing this angle as well as the relative positioning between the laser emitter and receiver, a profile of points is calculated. Moving the laser plane, either with an integrated rotary actuator or an external system, a series of adjacent profiles is collected to build a complete 3D point cloud representation of the surface of the object being scanned.

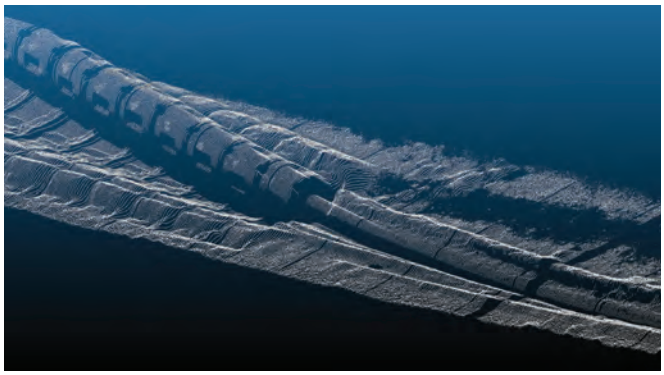
For profiling pipelines, the laser scanner integrates with vehicles in a near equivalent manner as multi beam sonar. When using an external system to move the laser for capturing adjacent profiles such as pipeline profiling, precise positioning is required. To synchronize the laser data with the position information, the data is time tagged and synchronization between the clocks is accomplished with standard PPS (Pulse Per Second) protocols. Additionally, an accurate understanding of the alignment between the positioning system origin and the sensor origin is required, and this is achieved through standard patch tests.

When integrating with an AUV, the laser and the sensor components can independently be mounted into the vehicle in a configuration that preserves the hydrodynamics of the AUV. A calibration process is then performed by the operators to determine the accurate relative positioning. Communication with the 2G Robotics system is accomplished through a binary protocol and code libraries can be provided.

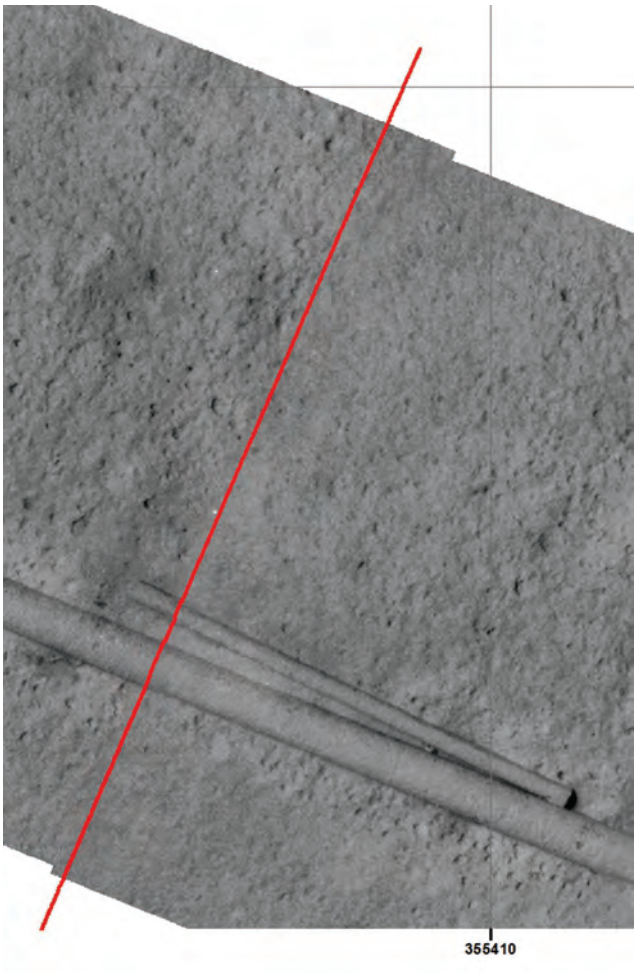
When integrating with an ROV, the laser and sensor housings can remain on the spacer arm and installed directly onto the vehicle with no additional sensor calibration required. It is also possible to mount multiple synchronized systems to an ROV for scanning the sides of pipelines. The systems are controlled through a standard 10/100 Ethernet link to the surface and data is published in standard LAS format for use with standard survey packages.

C & C Technologies Results

C & C Technologies is a leader for subsea pipeline inspec-



Visit www.2grobotics.com/MTR201405 to see a video animation of this point cloud.



Adjunct pipeline anomaly initially identified with magnetometer data. The high resolution picture provides a clear understanding of what is present but for complete understanding a profile along the red line was extracted from laser data.

tion pioneering the use of AUVs for deep water surveys. It has performed more than 325,000 km of inspection and currently have a fleet of four Hugin AUVs. Through adding enhanced sensor packages to its Hugin VI vehicle it has created an inspection class AUV for high detailed pipeline surveys, where these surveys have traditionally been performed using ROVs. In its inspection class AUV, C & C Technologies has incorporated a number of sensors including:

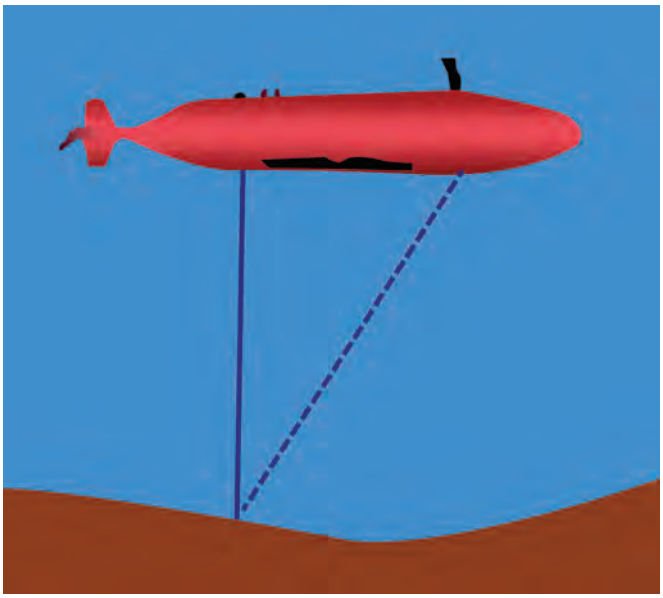
- MicroTesla magnatometer
- High Resolution Digital Still Camera
  1360 x 1024 pixels
  ~ 6 x 4.5 m coverage from 8 m altitude
  ~ 5 mm resolution
- Multibeam Sonar
  Kongsberg EM 2040
  200/300/400 kHz
  140° Swath
  400 beams – .7° x .7°
  Water Column Support
- Micro-Bathymetry Subsea Laser Scanner
  2G Robotics ULS-500 Underwater Laser Scanner
  50 degree swath
  1400 beams
  ~1mm range resolution

In the Fall of 2013, C & C Technologies took delivery of the ULS-500 systems and performed a number of inspection demonstrations with some of their customers. Using its unique suite of sensors, the company was able to determine information that previously would not have been feasible from an AUV. In one particular instance, an anomaly was identified using the magnetometer. Nothing of note was identified through the sonar data. The high resolution camera was able to very clearly determine that a section of pipe abutted the pipeline being inspected. Using the laser scanner, the geometry of the pipe was understood as was the relative position between the pipe and the surroundings. Based on the profile data and fitting circles to this data, it can be clearly seen that the main 8-in. pipeline is not in a free-span state, while the smaller adjunct pipeline is suspended over the ground at this location. Unlike sonar that will provide false returns at the intersection between the ground and the pipeline, the laser data is crisp and does not contain any false returns, allowing for this sort of small offset free span assessment to be performed using only data from the top of the pipeline.

At other locations during these initial inspections, a sleeper and buoyancy collars were inspected, the resulting laser data is shown below.

By having both the laser data in addition to the still imagery, C & C Technologies is able to generate 3D pictures by laying the pictures over the laser scanner based micro-bathymetry.

Since the trails last year, C & C Technologies has continued to operate their inspection class system. With underwater laser scanning now the standard for sub-sea pipeline inspections, they have just completed an order for two more ULS-500 systems.



Side view of the ULS-500 integrated into a Hugin AUV. The laser is emitted from the rear port of the vehicle and scatters in all directions, some of the scattered light is reflected toward the sensor at the front of the vehicle and based on the angle the light is reflected back to the forward sensor and the calibrated baseline between the laser and the sensor, the distance to the target is calculated.

New Standard for Inspections

Major oil and gas companies are recognizing the value that this technology can bring in meeting their risk reduction objectives. They are beginning to require the use of laser scanners for sub-sea pipeline inspection operations as standard with better than 5mm resolution. The ULS-500 has been proven to collect this level of high quality results. By understanding the pipelines to the level obtained by C & C Technologies, their customers are able to ensure the continued safe operation of their assets.

Beyond Pipelines

2G Robotics ULS-500 underwater laser scanners have been used in other applications requiring high resolution data. Most notably, the technology was deployed by ADUS Deep Ocean immediately after the par-buckling operation of the Costa Concordia to scan the damage to the side of the ship being crushed against the rocks off the Italian coat line. Moving forward 2G Robotics will continue to work with our existing and new customers as underwater laser scanners become a standard for all high precision underwater measurement requirements.

Birns

Wilson

Kongsberg's Uhlen, Caris' Hoggarth @ OI '14

Birns Celebrates 60th

BIRNS, Inc. celebrated a major milestone at the recent Underwater Intervention show in New Orleans. 2014 marks the company's 60th year in business, and BIRNS held a well attended event in its booth at the show to commemorate the anniversary. The event included a slideshow of historical company photos honoring the founding CEO Jack Birns, a former LIFE Magazine photographer, and the company's achievements to present day in a presentation by current CEO Eric Birns. Festivities included cocktails and a large 60th birthday cake, as well as drawings for a new touchscreen laptop and a pair of Beats headphones. "I am humbled and grateful that BIRNS has had the honor of serving the industry for the last six decades," says Eric Birns, President and CEO. "My father started this company as a small business in Hollywood selling photographic equipment to the Navy and other customers, and we have now become an ISO 9001:2008 and NAVSEA PRO-020 certified global leader in high performance connectors and lighting solutions."

Ecosse Subsea Wins Renewables Contract

Ecosse Subsea Systems Ltd (ESS) won a $7.5 million contract to design, build and operate a cable-lay system for a European utilities provider. The Scottish-based company will support the Array Cable Lay and pull-in component of a wind farm project located off the Humber Estuary in north east England.

Mike Wilson, ESS managing director, said the company's growing reputation in renewable subsea projects had opened up new markets to Scotland's only equipment-owning energy sector cable-laying specialist.

He said, "We've completed countless cable and pipe lay projects in the major oil and gas producing regions but this award is a breakthrough in to the renewables cable-lay market which could significantly impact on our business.

Brown Joins Harkand GOM Team

Global inspection, repair, maintenance (IRM) and light construction company Harkand appointed Mike Brown as general manager of diving services in North America. A U.S. Navy veteran, Brown has considerable experience of commercial diving in the offshore oil and gas sector having held number of senior positions in a career spanning more than 35 years. He was most recently working with Chet Morrison Contractors as general manager of the offshore construction division. Prior to CMC, he worked as vice president and general manager with EPIC Divers & Marine Contractors, a subsidiary of Tetra Technologies; and worked across 36 countries in five continents.

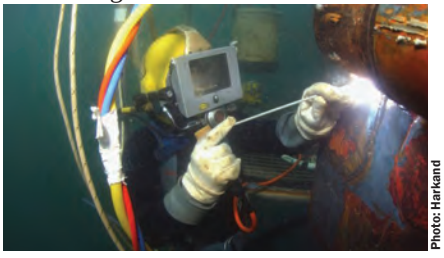


Photo: Harkand

CARIS, Kongsberg Renew MOU

CARIS and Kongsberg Maritime put pen to paper on an enhanced Memorandum of Understanding (MOU) at Oceanology International 2014 in London. CARIS and Kongsberg, who have partnered for over a decade, continue to work closely together to ensure their hydrographic solutions work hand-in-hand. Expanding upon previously signed agreements, the renewed MOU will continue to facilitate the migration of Kongsberg Neptune users to the CARIS HIPS and SIPS software. In addition to this, CARIS will now be able to provide Kongsberg's SISQA software with HIPS and SIPS, which will allow users to accurately re-sound velocity correct Kongsberg multibeam data in CARIS using the original proprietary algorithms.

Wilson Returns to Falmouth Scientific

Falmouth Scientific, Inc. (FSI), a Cataumet, Mass.-based designer and manufacturer of precision oceanographic instrumentation and systems, appointed

Wilson

Gjoerlmesli

Brian Wilson to the position of Sales & Applications Engineer. Wilson has more than 25 years of experience in the Oceanographic Instrumentation Industry. He is returning to FSI where he was the Customer Service Manager from 2002-2006. His skills and knowledge base range from the design and production of the FSI products, to the direct involvement in the applications, sales, and customer service needs for a very diverse customer base. Brian will make an immediate and very positive impact with his expertise across the entire FSI product line.

Guidance for Subsea Installations

Failures of installed pipes, umbilicals and cables during installation can potentially lead to higher costs for the oil and gas industry and delayed start-ups. However, there are currently no Standards or Recommended Practices that address analysis methodology related to the laying of such products. To address this, DNV GL has launched a Joint Industry Project (JIP) to develop best practice guidelines on this matter. Twenty industry partners have signed up for the JIP, including Statoil, Petrobras and Woodside, as well as all the major installation contractors.

According to DNV GL, the overall purpose of the JIP is to present the typical challenges that should be addressed in planning and design of marine operations and to establish a common basis for installation design of pipelines, umbilicals and cables:

- establish standardized procedures for planning and design of lay operations that may be used in all projects irrespective of operator (oil company);
- ensure an overall understanding of design requirements arising from installation loads (essential for suppliers);
- ensure an overall understanding of typical behavior and limitations inherent in pipes, umbilicals and cables (essential for installation contractors);
- compile the industry's best practice through workshops, and
- clarify inconsistencies between codes currently in use.

The project will run for 12-18 months and the intention is to eventually incorporate the output into existing DNV GL rules and standards.

"At DNV GL, we see a great variety in the quality of installation analysis reports we receive from the industry. Although there are many examples of good engineering practice, we often find ourselves commenting on the same issues. By providing the industry with relevant guidelines, we hope to improve the efficiency and quality of both installation engineering and verification work. We are very happy with the positive response from the industry and their willingness to contribute in the development of these guidelines," said Elisabeth Gjølmesli, Principal Engineer - Riser Technology, DNV GL.

Partners are: ABB, Allseas, Boskalis/VSMC, Bureau Veritas, EMAS, Heerema, Hyundai Heavy Industries, JFE Steel, KW Ltd., McDermott, Nexans, NOV, Petrobras, Saipem, Statoil, Subsea7, Technip, Tideway, Wood Group Kenny and Woodside.

FairfieldNodal Chairman to Retire

FairfieldNodal said that its chairman, Dr. William A. Schneider, Sr., has elected to retire after more than 33 years of service. Walter Pharris has been named the new chairman, and he will continue to serve as FairfieldNodal's president and CEO, positions he has held for the past 21 years.

Bibby Remote Expands Fleet

Bibby Remote Intervention Limited (BRIL) expanded its fleet by signing a charter agreement for an IRM (Inspection Repair and Maintenance) light construction vessel and adding an additional two ROVs (Remote Operating Vehicles) to its operations. The charter agreement with Olympic Shipping is for a newly built MT6021 vessel for a three year period, with options to extend for an additional two years. The vessel will be mobilized with ROVs from BRIL and is expected to arrive in Aberdeen in early April next year.

Mike Arnold, Bibby Offshore's COO for the western hemisphere, said, "The business is now in control of a fleet of nine vessels and 15 ROVs. These new additions demonstrate our ongoing commitment to develop our current capabilities and expand our offering of flexible services to clients on a worldwide basis, and this is a reflection of our significant growth over the past 10 years.

"The charter of the MT6021 in particular is a significant investment as we look to build up a comprehensive range of assets, which we can tailor to the specific requirements of our clients."

Additionally BRIL expanded its ROV fleet with the purchase of two new heavy-duty vehicles. The two ROVs, due to arrive in March and June this year, are both SMD Quasar 150hp vehicles. Capable of survey, construction, and drill support operations, these units will most likely be used to support Bibby Offshore's expansion into Southeast Asia and North America.

Quasar ROV being launched

NHC: 25 Years of Testing and Trials

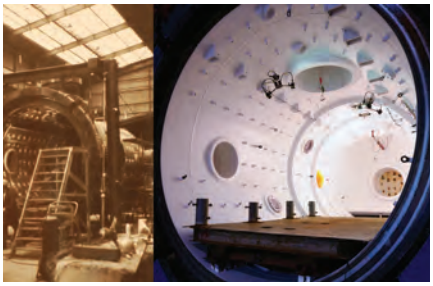


Photo: NHC

Since its founding in 1987, NHC Testing department has carried out and assisted with a variety of projects across a wide variety of disciplines and applications. NHC chambers are capable of simulating pressure depths of up to 800 bar or altitude to 50,000 ft., while also creating temperature and environmental changes in wet or dry environments. This ability to create a range of variants within a safe and accredited facility has attracted customers from around the world looking to test everything from subsea modules, ROV and submarine components to aircraft assemblies and medical equipment. The chambers have also been used for various manned trials including altitude trials for athletes, equipment trials such as pregnancy tests and defibrillators for use by people who live in high altitude areas, as well as being one of the few facilities in the world to simulate hyperbaric environments for divers to carry out wet or dry welding trials.

DOF Subsea, Seaway Extend Contract

DOF Subsea won a Master Service Agreement (MSA) extension with Seaway Heavy Lifting for the provision of positioning services onboard its Stanislav Yudin and Oleg Strashnov crane vessels. DOF Subsea offers services to third parties across the globe through its survey and positioning division. The contract with Seaway Heavy Lifting was announced in January 2014 and has been extended for a further two years plus options.

MacArtney & LISST Instruments

MacArtney entered an exclusive repre-

sentative agreement with Seattle based oceanographic instrument manufacturer, Sequoia Scientific Inc., to distribute the full range of LISST laser particle sizers and other Sequoia products in Denmark, Norway, Sweden, Finland and Iceland.

SEAmagine Adds New Sales Representative

SEAmagine Hydrospace Corporation, a designer and manufacturer of manned submersibles headquartered in Claremont, California, announced the addition of new sales representation through the Galveston, Texas firm of Global Ocean Access, Inc., a worldwide supplier of ocean industry products.

Frame Agreement with Forum/Dynacon

DSS announced frame agreement with Forum Subsea Technologies Dynacon business as a preferred vendor of standard LARS designs. This agreement increases DSS's ability to fulfill its aggressive growth plan while maintaining the highest quality equipment as to maintain DSS's "Best in Class" mission statement. In support of this frame agreement, Dynacon has committed its resources to support DSS with service and spares globally.

LinkQuest Delivers

LinkQuest recently delivered a TrackLink 5000HA, a long-range USBL acoustic tracking system capable of reaching a range of 5,000m, to Israel Oceanographic & Limnological Research (IOLR), nonprofit governmental research institute that primarily monitors and conducts research of the marine and fresh water environments. After delivery, the system was immediately installed and commissioned successfully by IOLR.

Applied Acoustics, iXBlue Cooperation

Applied Acoustic Engineering (AAE) and iXBlue recently released details of a formal working relationship between the two companies, permitting cross compatibility between their acoustic positioning products to create a greater degree of flexibility across a wide market area. Conceived during 2013 and approved earlier this year, the agreement allows Applied Acoustics' complete range of 1000 Series transponders to operate with iXBlue's GAPS USBL systems using a jointly developed set of acoustic protocols.

After Oceanology International

OI '14 in London was one of the more vibrant subsea exhibitions in years, filled with new product and service introductions. Following is some of the news coming out of OI '14.

Acclaimed Software

At Oceanology International 2014 Acclaimed Software demonstrated its GNSS offshore positioning bespoke software capabilities and its marine software systems. The company also showed its iObox, a synchronized serial data capture and control, allowing operations to be recorded or performed to the millisecond within applications on non-real-time operating systems. The iObox is a software system which is adaptable for vessel or subsea ROV survey and installation operations.

www.the-acclaimed.com

MetOcean Debuts iBCN Beacons

MetOcean Data Systems introduced the iBCN Iridium beacons as part of its NOVATECH product line. The iBCN products are the next-generation of MetOcean's NOVATECH Iridium beacons, designed for tracking and locating of assets. The self-contained submersible beacons use the bidirectional capabilities of the Iridium satellite telemetry system, allowing end users to receive real-time GPS location of their asset. According to the manufacturer, the iBCN also boasts improved lifetime, a rugged and innovative design and the capability for Iridium and Bluetooth configuration. The iBCN Iridium beacons offer five battery housing options: self-contained, remote head, OEM, and extended battery life with the option of lithium or alkaline batteries.

www.metocean.com

Seatronics Impresses with Predator, SeeTrack CoPilot Demo

SeeByte and Seatronics demonstrated the fruits of their collaboration at OI '14. Having announced their partnership in July last year, SeeByte and Seatronics have been working together to bring

Wave-Propelled Vessel Debuts

AutoNaut is a wave-propelled vessel for ocean research launched at OI '14. Built by MOST (Autonomous Vessels) Ltd. for very long endurance autonomous data gathering the 3.5m AutoNaut also harvests solar energy at sea to power its electronics. The new unmanned surface vessel (USV) uses motion from the ocean to propel itself, silently, with stability and zero emissions. Fresh back from sea trials with AutoNaut in Scotland founder Directors David Maclean and Mike Poole were on hand at OI to explain its potential. "AutoNaut is revolutionary," said Poole, "because it is the first commercial use of a wave propulsion technology that can be scaled from a 1 meter hull to a ship. Such zero emission power, using the energy of the waves to propel a vessel, has great future potential for the marine world."

In sea trials off Oban AutoNaut's high tech platform control system enabled it to follow tracks between waypoints within a few meters, automatically calculating the allowance for tide and wind as she progressed at around 2 knots, on all headings relative to the wind and waves. AutoNaut was released to operate autonomously, with control from ashore through 24/7 Iridium satellite communications. She also logged weather and seawater data from sensors installed on the mast and through the hull. The 3.5 meter AutoNaut USV on show in London was built for a contract under the Government-backed Small Business Research Initiative (SBRI) to develop vehicles, known generically as Long Endurance Marine Unmanned Surface Vehicles (LEMUSV), that will carry out sustained marine research over long periods. The Technology Strategy Board and Natural

www.autonautusv.com

(Photo: Seatronics)

SeeByte's software control capabilities to the Seatronics Predator ROV. Having integrated and demonstrated SeeTrack CoPilot at trials in Florida earlier in the year, Seatronics took the system to OI, where they held daily demos of SeeTrack CoPilot's advanced control capabilities.

www.seebyte.com

Unique System Range on Display

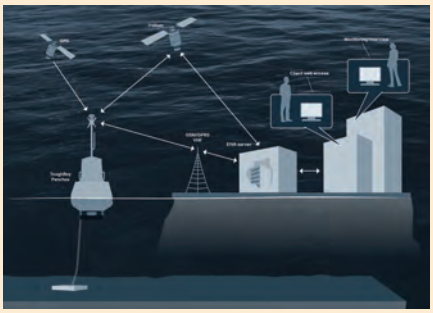
Unique System (U.K.) displayed a range of products and services that represent each of the companies within the Unique Maritime Group. A few of these products include a selection of survey equipment, including a Klein sonar and a range of Tritech, Ixsea and Sonardyne 6G equipment. It also had a selection of Unique Seaflex bag styles on display, including the Inflatable Buoyancy units and the Air Lift bags.

Another key feature of the display was the newly designed Unique Hydra eDMS100 dive monitoring system. The eDMS100 is the first fully integrated surface diver monitoring system operating via a PLC/PC based unit that is housed in a standard 19" electronics rack with remote "Sensor Stations" located at key areas around the dive system. Each monitored parameter can have a number of fully customizable alarm conditions that can be set depending on the diving operators specific needs. Some of the key features are: full sensor logging, event and alarm logging, dive report creation, sensor fault indication, fully customizable alarms, remote network view zccess, wireless maintenance access and a minimum of 2,000 hours logging capacity.

www.uniquegroup.com

Photo: Unique System

Buoy Range Added to the EIVA



EIVA ToughBoy Panchax is a wave buoy designed for lowest possible total cost of ownership, as the first member of EIVA's new buoy product range.

The first day of the OI saw the launch of a new buoy product range – ToughBoy Panchax – produced by the Danish offshore specialist EIVA. "ToughBoy Panchax is a wave buoy designed to ensure the lowest possible total cost of ownership in the market achieved through a competitive purchase price together with low service and communications costs. This wave buoy is effectively a software product considering the wave algorithm, the data logging and remote monitoring, and as such it fits EIVA's strengths perfectly," said Jeppe Nielsen, CEO, EIVA.

An integrated Teledyne RD Instruments ADCP and a thoroughly-tested, advanced wave sensor provide high-precision current and wave data. The settings and transmission are adjusted according to customer needs, keeping communications expenditures at a minimum.

From harbor monitoring to wave energy studies and any type of wave and current measurement surveys in between, the ToughBoy Panchax is up to the task. Electronics with low power consumption and a battery based on intelligent charging technology ensure year-long battery life and thus long intervals between service inspections, that is, 12 months or more. This will cut the budget that is normally dedicated to inspections by at least 50%. The web-based software solution of the ToughBoy Panchax allows for remote configuration and monitoring, thereby simplifying data transmission. The acquired data is transmitted to the customer, to EIVA servers as a backup option and to USB drives on the buoy for on-site retrieval. This virtually eliminates the risk of data loss.

www.eiva.com

Septentrio Wins VERIPOS Order

VERIPOS is concluding the upgrade of its entire global network of GNSS reference stations with high performance multi frequency GPS/GLONASS/Galileo/BeiDou receivers from Septentrio. VERIPOS owns and operates a network of more than 80 reference stations worldwide that is used to determine estimates of the orbit and clock errors of multiple GNSS satellite constellations. VERIPOS uses these estimates to calculate corrections which are then broadcast to end users to significantly improve the accuracy of positioning. At the heart of the network is Septentrio PolaRx4, a fully featured reference receiver that provides high-quality tracking and measurement of all available and upcoming GNSS signals.

www.septentrio.com

Image: Septentrio

New Acoustic Release from Teledyne Benthos

Teledyne Benthos launched the R12K Acoustic Release. According to the manufacturer, the development and design process included an in-depth needs assessment across a broad spectrum of the user base. The resulting new product, R12K, aims to combine the reliability of the Teledyne Benthos acoustic release mechanical design with new electronic systems that improve the functional aspects of the product.

Image: Teledyne Benthos

The Model R12K Deep Sea Acoustic Transponding release is the first product in the Benthos release line to benefit from this new electronics architecture. The new units are digital signal processor (DSP) based allowing the move from audible status confirmations to visual signal confirmations.

Performance enhancements for the R12K units include:

- Battery voltage indication, including percent remaining, on command
- Unit tilt measurement, 0-180 degrees (+/- 1%), available on command
- Positive confirmation of release status on command.

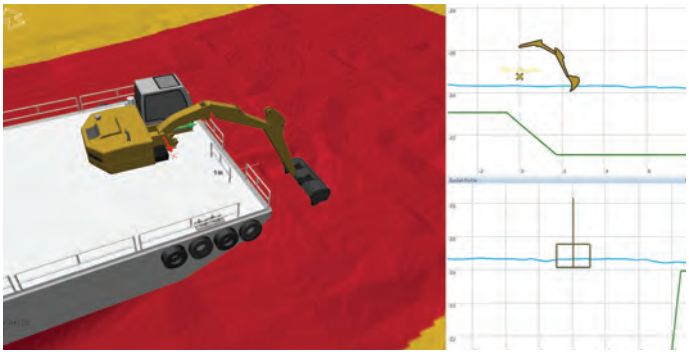
The R12K is designed for full ocean depth mooring recovery applications with a rugged stainless steel package and a 5,000kg load rating. Every release is functionally tested to full ocean depth pressures.

www.benthos.com

Sonardyne's SensorView Software

Sonardyne International launched the SensorView monitoring software designed to provide a user-friendly interface to access raw sensor data direct from subsea acoustic instrumentation. SensorView was developed in response to customer demand to stream sensor data directly from subsea transponders; either in parallel with a Sonardyne 6G (Sixth Generation) USBL and LBL acoustic positioning system or com-

EIVA Launches Dredging System



The EIVA NaviSuite Uca software bundle, a plug and play solution for integration with the Trimble GCS900 Grade Control System for excavators was recently launched and is the result of collaboration between EIVA and Trimble, established to enable Trimble customers to choose EIVA software for use with the Trimble GCS900 Grade Control System for excavators. Using EIVA software with the GCS900 allows dredging contractors to leverage the capabilities of the EIVA dredging software with the precise positioning capabilities of the Trimble system. "The collaboration between our companies allows contractors to add EIVA's expertise in underwater visualization and dredging workflows to Trimble's market leading system for excavator machine guidance. The result is unparalleled productivity in marine construction and dredging operations," said Roz Buick, VP and GM, Trimble Heavy Civil Construction Division The 3D EIVA software allows for efficient and precise dredging operations, which means less time spent in the cab and an overall reduced timeframe of operations, from pre-survey to end-report. NaviSuite Uca was also developed in close collaboration with JD-Contractor, a dredging specialist and customer representative. According the Palle Møller, Captain of M/S Marcos, JD-Contractor, NaviSuite Uca has proven its worth: "We're very happy with the solution that integrates the EIVA software with the Trimble GCS900 Grade Control System for excavators, and use it for all dredging operations. The 3D visualization allows us to change the angle of the view as needed. This combined with the real-time information from the Trimble system for the precise position of the excavator's bucket means we constantly have a complete overview of how far we've come, if the bottom of the trench is even and if we've missed a section."

www.trimble.com // www.eiva.com

pletely independently of it. Applications include monitoring the deployment of subsea structures as they are lowered to the seabed and remote environmental monitoring.

The high speed data telemetry capabilities of Sonardyne's 6G instruments ensure that sensor data can be streamed to a user's desktop in real-time.

www.sonardyne.com

Teledyne TSS Launches AHRS and INS Systems

Following a two-year development program, Teledyne TSS previewed a complete new family of advanced AHRS and INS (Inertial Navigation and Attitude and Heading Reference Systems) named Saturn at OI '14.

The Saturn family is based upon fiber-optic technology developed and manufactured by Teledyne TSS. The family also incorporates advanced digital signal processing and algorithm design to deliver a highly accurate and reliable product to meet the demanding needs of the marine market. All units are compact, lightweight in both air and water and provide a unique alternative to competitive products.

As the first tranche of a comprehensive product development program, there are four versions of the Saturn family with two basic grades of accuracy available in both surface and subsea configurations. To summarize, the Saturn 10 has a heading accuracy of 0.1° sec. lat. RMS, with a pitch/roll accuracy of 0.01°. Heave accuracy 5% or 5cm.Saturn 30 has a heading accuracy of 0.3° sec. lat. RMS with a pitch/roll accuracy of 0.2°. Heave accuracy 5% or 5cm.

Both subsea versions use titanium casings rated to 4,000m as standard.

teledyne-tss.com

iXBlue Announces RAMSES Launch

iXBlue launched the next-generation medium-frequency RAMSES, a long synthetic baseline positioning system for ROV/AUV navigation, offshore oil and gas support, metrology and other demanding subsea applications. The system can be tightly coupled with iXBlue inertial navigation systems (INS) and delivers extreme precision and robustness in challenging acoustic operational environments. Available in MF and LF versions (medium frequency for most applications and low frequency for ultra-long range applications), RAMSES is part of iXBlue's inertial-acoustic solutions for underwater positioning and navigation.

www.ixblue.com

Kongsberg Launches Gyrocompass

OI '14 was the launching point for a new range of Gyrocompass products based on MRU technology from Kongsberg Maritime's sensor Powerhouse, Kongsberg Seatex. The first model available is MGC R3, which includes three Ring Laser Gyros (RLGs) and three linear accelerometers providing highly accurate readings suitable for demanding applications such as seabed mapping.

MGC R3 complements the well-established and comprehensive range of MRU models (Motion Reference Unit) for high-end offshore and survey applications. MGC R3 has INS capabilities with embedded north seeking algorithms and outputs both raw (gyro and accelerometer) and processed sensor data including heading, roll, pitch, heave and position.

www.km.kongsberg.com

New 2D Sonar from Teledyne BlueView

Teledyne BlueView released the M900-D rated to 4,000m of depth. The M900-D system is housed in thick-walled air-filled aluminum housing, providing maximum reliability while keeping to the compact nature of the MSeries sonar line.

The M900-D also includes BlueView's third generation electronics package, which is smaller, lower power and produces improved imagery. "The M900-D is the first expansion of the next generation of Teledyne BlueView's 2D sonar family. We strive to continually improve the technology to provide the most reliable, versatile and user friendly sonar systems on the market," said Ted Germann, Teledyne BlueView's Chief of Sales and Marketing.

www.blueview.com

FSI Announces new LF Bubble Gun

Falmouth Scientific, Inc. presented the HMS-620LF Low Frequency Bubble Gun Seismic System at OI '14. FSI's Bubble Gun Systems are suited for small boat shallow water geophysical surveys. Bubble Gun systems use a contained air volume to generate narrow band, low frequency acoustic signals. The data collected with HMS-620 systems rivals that of much larger, heavier, and more expensive air-gun, boomer and sparker systems without the need for large power sources or air compressors. This technology provides superior signal penetration through coarse sand, gravel tills and other difficult to penetrate sediments.

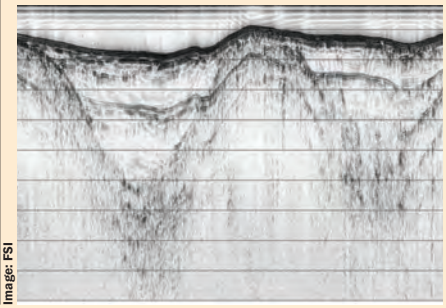


Image: FSI

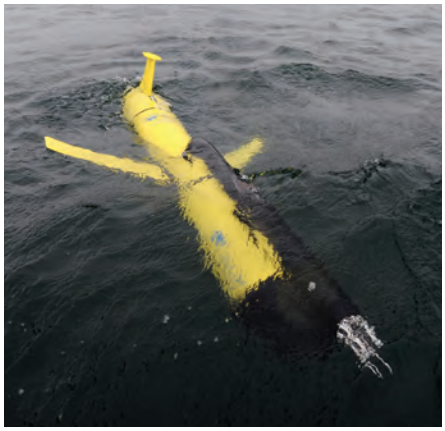
www.falmouth.com

Optech Debuts Turbid Water Module for CZMIL

Optech released the HydroFusion Turbid Water Module, a powerful new tool that enables the Optech CZMIL Coastal Zone Mapping and Imaging Lidar (CZMIL) to collect bathymetry data in water conditions that were previously impossible to capture.

Based on Optech's experience in lidar bathymetry waveform analysis, the Turbid Water Module is an addition to the

TWR Delivers 6 Slocum Turbulence Gliders



Teledyne Webb Research (TWR) delivered six Slocum Turbulence Measurement Gliders to NOC Liverpool, U.K.; Helmholtz-Zentrum Geesthacht Germany; and New York University.

New York University will be using the Slocum turbulence glider in a project aimed at projecting global sea-level change. The gliders will be used to study the interaction of warm, salty North Atlantic waters with cold, fresh polar waters coming from the melt of outlet glaciers along the coast of Greenland. Where these waters meet there appears to be layering and interleaving of the two water masses, said Professor David Holland. "A glider, equipped with a turbulence measuring device, should allow us to explore the mixing that occurs between these waters in areas difficult to access by ship because of the presence of sea ice and icebergs. Observations of the amount of mixing are important as it will allow us to validate numerical models of these largely unsampled areas of the world ocean, critical to projecting future global sea level change." In February NOC Liverpool added two turbulence gliders to its existing Slocum glider fleet as part of the Liverpool Coastal Observatory. The new turbulence gliders will be used in the NERC and DEFRA-funded Shelf Sea Biogeochemistry (SSB) program. This intensive campaign will consist of six cruises in the Celtic Sea during 2014 using the newly commissioned £75M Royal Research Ship Discovery with the aim of better understanding of nutrient and carbon cycling within the shelf seas, and of their overall role in global biogeochemical cycles. The Helmholtz team led by Dr. Jeff Carpenter will use the turbulence gliders primarily in the relatively shallow coastal waters of the North and Baltic Seas to study turbulent transport of important quantities such as heat, momentum, suspended sediments and nutrients. The program will shed new light on the crucial role of turbulent processes in coastal oceans.

TWR (U.S.A.) entered into an agreement with Rockland Scientific (Canada) to integrate the MicroRider modular turbulence measurement package with the Slocum Glider in early 2013. To date Teledyne Webb has delivered 16 Slocum Turbulence Measurement Gliders to Germany, Norway, Japan, the U.K. and U.S.A.

www.webbresearch.com

Optech CZMIL HydroFusion workflow specifically designed to detect and extract bathymetry measurements from turbid, shallow waters and muddy, less reflective seafloors, areas where previous lidar bathymeters could not extract depth measurements. Combined with the advanced hardware of the Optech CZMIL, the Turbid Water Module has successfully made seafloor measurements from very shallow waters (depth <1-2 m) in highly turbid conditions (Kd >0.5 m-1) with dark, muddy bottoms (reflectance = 3-5%).

www.optech.com

Teledyne RD Instruments Extends DVL Line

Teledyne RD Instruments, a manufacturer of acoustic doppler products, launched two new doppler velocity Log (DVL) product lines to round out the company's expanding underwater navigation capabilities. Building on the company's industry standard Workhorse Navigator and Explorer line of DVLs, the Pathfinder and Pioneer products represent the latest in its next generation technology. The Pathfinder DVL uses a piston head transducer, similar to the Navigator, and the Pioneer utilizes a phase array transducer, similar to the Explorer DVLs. However, the Pioneer and Pathfinder DVLs utilize the company's new next generation electronics, which offer the following advantages: increased range, reduced power consumption, decreased volume, additional communication channels and increased reliability / lower life cycle cost.

rdinstruments.com

Kongsberg Makes Multiple Debuts in London at Oceanology 2014

Kongsberg Maritime announced at OI '14 that it will add the new **MUNIN AUV** to its subsea equipment rental pool in Aberdeen. Expected to be available for hire in October 2014, the MUNIN AUV will further enhance the existing portfolio of Kongsberg Maritime Ltd rental equipment, which supports customers within the offshore oil and gas, environmental and renewable energy markets. The MUNIN AUV is designed to collect high resolution sonar data georeferenced by a survey grade positioning system. Capable of providing the same high-level performance and survey accuracy as the established KONGSBERG AUV range, MUNIN is an efficient, compact vehicle that enables easier launch and recovery and the possibility of using smaller launch vessels.

Leak detection and environmental monitoring within the offshore renewables and oil and gas sectors were a key focus for Kongsberg Maritime at OI '14, with the world launch of a new approach to subsea monitoring. The **Modular Subsea Monitoring-Network (MSM)** is a flexible solution deployable on projects of all types and scale and is designed to offer continuous monitoring of the subsea environment and alerting of events such as oil and gas leakages from subsea installations, pipelines and risers. The MSM is built on a foundation of field proven technology including Kongsberg cNODE for underwater acoustic positioning and data link, a range of Kongsberg hydroacoustic sensors and third party sensors, in addition to sophisticated chemical sensors and hydrocarbon sniffers from Kongsberg Maritime partner Contros Systems & Solutions GmbH. Advanced data processing and power management strategies ensure MSM's ability to deliver critical sensor data continuously, for long duration missions. The modularity and scalability of the MSM allows for easy deployment and adaptation to different monitoring tasks.

Kongsberg Maritime displayed its latest camera innovations on its booth at Oceanology International 2014, including the new **OE14-522 HD Pan and Tilt Zoom (PATZ) Camera.** With a compact Omega dome design, this sophisticated new camera offers beyond hemispherical viewing and excellent optical performance in the deepest waters.

It features an all-new belt driven PATZ mechanism which provides smooth, accurate and infinitely variable speed controlled head movement. Based on Kongsberg Maritime's color zoom inspection camera, the new OE14-522 HD PATZ can provide high definition (HD) or high quality standard definition (SD) signal output.

www.km.kongsberg.com

Product Spotlight: FLEXUS

More than an ROTV

MacArtney introduced FLEXUS, a new data acquisition system. Based on a simple and rugged, yet flexible remotely operated towed vehicle, the FLEXUS composes a versatile and user friendly system suitable for a multitude of oceanographic, monitoring and survey applications.

Like the more advanced MacArtney TRIAXUS and FOCUS-2 ROTV systems, FLEXUS is based on a towed vehicle featuring a broad range of innovative features and benefits. The FLEXUS vehicle is suitable for several mission types including effective and detailed mapping of physical and chemical parameters in the water column. The vehicle can be controlled vertically with an operational envelope of 0-200 m and is able to operate at a tow speed of up to 10 knots and with a vertical speed of up to 1 m/s.

In addition, FLEXUS is able to carry out a broad variety of different scientific monitoring tasks and can be reconfigured for new applications. With regards to instrumentation, CTD packages, transmissometers, flourmeters and sensors for PAR, turbidity and dissolved oxygen are among the broad variety of oceanographic equipment mountable onboard the FLEXUS vehicle.

The system may also be equipped with traditional survey sensors including side scan sonars. The high level of flexibility offered by the FLEXUS vehicle is enabled by a powerful MacArtney NEXUS MK E electric multiplexer which comprises the heart and backbone of the FLEXUS system. By means of the NEXUS MK E multiplexer, the FLEXUS vehicle can be used with existing marine winch and cable solutions and coupled with the compact footprint of the vehicle itself, it is fully deployable from even small sized vessels of opportunity. Moreover, featuring multiple channels and connectivity options on the subsea multiplexer unit, the NEXUS MK E allows FLEXUS operators to combine systems and sensors in several ingenious ways to perform an extensive range of operations.

While the NEXUS MK E can be used onboard the FLEXUS vehicle, it can also be easily dismounted for use with other applications on other sensor and instrument carrying oceanographic platforms, including CTDs, landers, corers, drop camera systems and custom bottom tow sledges.

www.macartney.com

Photo: MacArtney

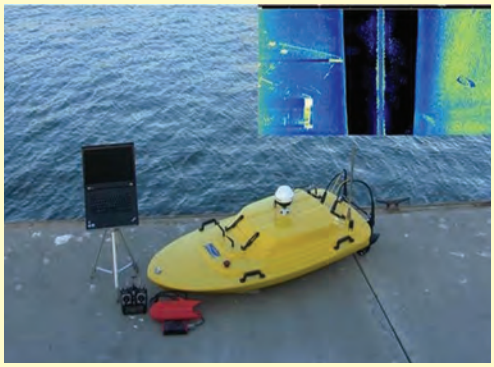
Insulated Wire Expands

Insulated Wire (IW) announced the expansion of its capabilities to produce custom composite cables featuring low smoke/zero halogen polyurethane jackets. The company hasseen sales of these cables grow significantly – particularly in naval applications, both on submarine and surface vessels.

IW's composite cables provide a myriad of options. Components can include individually shielded and jacketed signal transmission cables, power cables, microwave cables and fiber optic. Depending on the application, cables can be optimized to address issues such as hydrostatic pressure, tensile loads, concentrated compression points, etc. Overall shielding can be provided with ferrous or non-ferrous materials. High performance, non-metallic braids and strength members, such as Kevlar are also available. The cable, shown with this release, was produced for a submarine application and contains multiple, individual signal cables and IW's Tuf-Flex microwave cables for use at frequencies up to 18 GHz. Water block fillers and binders are incorporated under a double braided Sn/Cu braid and polyurethane jacket. Cable withstands the anticipated environmental extremes in accordance with the method requirements of MIL-DTL-24643B par 4.8.8 and can withstand Hydrostatic pressure up to 1050psi.

E: msarni@insulatedwire.com

Tritech StarFish for Z-Boat 1800



The Oceanscience Group unveiled the first Z-Boat 1800 remotely-operated survey boat with integrated side scan sonar, from Tritech International. The new boat provides a shore operator with real-time high definition side scan imagery from Tritech's StarFish 990F side scan on a portable 1.8m surface vessel. The StarFish side scan is attached to a special skeg (keel fin) under the Z-Boat, eliminating the need for a dedicated hull mounted transducer. In addition, the compact size of the StarFish topside box means that a single or dual frequency single beam echosounder can still be accommodated on the Z-Boat. Z-Boats with single beam echosounders are in operation around the world and can perform shallow water hydrographic surveys in natural and industrial water environments.

www.tritech.co.uk

Nautronix to Supply DPR System for Rig

Nautronix won an order from HHI, Korea to supply a NASNet Dynamic Positioning Reference (DPR) System which will be used on the Bollsta Dolphin drilling rig. NASNet DPR is a position reference system for Dynamic Positioning that also features the benefits of the NASNet subsea acoustic positioning system and can be used either within pre-installed field-wide NASNet arrays, or as a localized positioning system. According to Nautronix, the system provides robust mitigation against many of the risks associated with both acoustic and satellite positioning systems, allowing multiple users to benefit simultaneously from the same array with no risk of interference. NASNet DPR uses cutting edge acoustic technology combined with a user-friendly interface to provide high speed position updates and stable positioning in water depths up to 4,000m.

www.nautronix.com

Lankhorst Mooring Ropes for Western Isles Development FPSO

Lankhorst Ropes won a contract by Aberdeen based Dana Petroleum to provide Gama 98 polyester mooring lines for the Western Isles Development FPSO vessel (Floating Production Storage and Offloading).

Given the weather conditions in the North Sea, and relatively shallow water depth, the cylindrically shaped FPSO will use a semi-taut leg mooring system. It will be moored with 14 polyester mooring lines in three clusters of 4, 4 and 6 lines at 250m water depth. Two clusters will have longer lines to the prevailing weather that, together with seabed chain, will provide the lateral restoring force needed to keep the production vessel on station.

The Gama 98 polyester rope tethers are made from high efficiency, parallel laid sub-rope cores within an outer braided jacket. During manufacture all of the sub-ropes are monitored to ensure they all have equal tension and length, ensuring a 100% torque free rope. The Western Isles Project (Dana 77% and Cieco 23%) will develop two discovered oil fields called Harris and Barra in the Northern North Sea, 160km east of the Shetlands and 12km west of Tern field. It involves a subsea development of at least five production and four water injection wells plus two exploration wells tied back to a new build floating production, storage and offloading vessel (FPSO) with oil export using shuttle tankers.

www.lankhorstropes.com

Seacon Expands Connector Range

With increasing requirements for connectors to operate in hazardous environments and many applications now requiring quick and safe disconnection of connectors to be used in these environments SEA CON has developed a new robust range of Exd connectors due to be released soon. The EX-MATE is based around SEA CON's existing and successful SEA-MATE connector range and is fully wet-mateable in addition to its suitability for use in explosive environments. This new range will be available in four shell sizes (G, K, L, M) with between 2 & 37 contact configurations, however like the SEA-MATE range this series has interchangeable inserts so can be adapted to a number of pin configurations.

www.seaconworldwide.com

iXBlue, Septentrio Create ATLANS-C

iXBlue launched its new ATLANS-C position and orientation system, developed in close cooperation with Septentrio Satellite Navigation. The system is designed to provide continuous and accurate positioning in urban environments, where global navigation satellite system (GNSS) signals are obscured, intermittent or possibly distorted by reflective surfaces.

www.ixblue.com

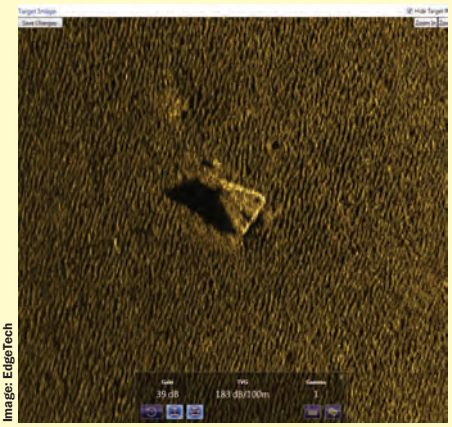


Image: EdgeTech

EdgeTech System for Polish Defense AUVs

EdgeTech said that with the introduction of the 2205 AUV-based sonar system, manufacturers and operators of smaller sized AUV systems have embraced the high quality sonars which were traditionally only available in larger sized AUV systems. The recently delivered Teledyne Gavia AUVs to the Polish Ministry of Defense for mine countermeasure's (MCM) were equipped with the latest EdgeTech 600/1,600 kHz simultaneous dual frequency side scan sonar payloads. The very high frequency EdgeTech systems were selected for the long range detection and the ultrahigh resolution classification capability for MLO's (mine like objects). The EdgeTech 2205 classification frequency of 1,600 kHz is capable of producing near photographic quality images of targets making MLO target classification very easy as shown in the attached MLO sonar image. Other 2205 attributes that contributed to the selection of the EdgeTech systems were low power, small electronics' volume and compact transducers making integration on the small AUVs possible and easy.

www.edgetech.com

HYPACK

Automatic Download of ENC Charts

This new feature allows U.S.-based users to quickly obtain the most recent charts provided by NOAA and the USACE at no additional charge. U.S.-based users who have an Internet connection will be able to download the charts from the USACE and NOAA web-map servers with the click of a button. Both agencies have made their charts available for download, and HYPACK has made it easy to ensure users have the latest chart data. This is a two-step process:

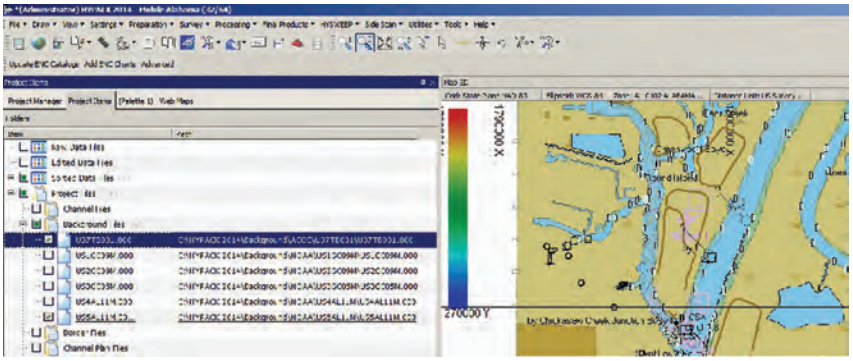
1. Step One: Update ENC Catalog: HYPACK downloads the latest chart catalogs over the Internet from the NOAA and USACE map servers. This information is stored in the HYPACK 2014 folder.

2. Step Two: Add ENC Charts: HYPACK automatically downloads any NOAA S-57 Charts or USACE IENC Charts. It uses the extents of the HYPACK Map window and downloads any chart that has information inside that window. The charts are saved to the ACOE or NOAA subfolders under the \HYPACK 2014\ Background folder.

In the figure below, HYPACK 2014 downloaded five charts from the NOAA S-57 chart server and one chart from the USACE IENC (ACOE) chart server. It automatically sorts the chart to place the ones with the most detail on the top of the display.
The Advanced menu item displays the Web ENC window which allows for more specific control over which charts are loaded. (By Lourdes Evans)

www.hypack.com

Five NOAA S-57 Charts and One USACE IENC



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2014 Editorial Calendar

ISSUE	EDITORIAL	BONUS DISTRIBUTION	AD CLOSE
JANUARY/ FEBRUARY	**Subsea Vehicles: UUVs** **Market:** Harsh Environment Systems: Arctic Ops **Tech:** Scientific Deck Machinery **Product:** Training Resources	**Arctic Technology Conference** Feb. 10-12, Houston **Subsea Tieback** March 4-6, San Antonio	January 21
MARCH	**Instrumentation: Measurement, Process & Analysis** **Market:** Oceanology Intl '14 Technology Spotlight **Tech:** Umbilicals, Cables, Connectors & Power Supply **Product:** Sonar Systems & Seafloor Mapping	**Oceanology International** March 11-13, London	February 18
APRIL	**Offshore Energy** **Market:** Seismic Vessels & Systems **Tech:** Deepwater Positioning, Mooring & Anchoring **Product:** Subsea Pipeline Survey & Inspection	**Offshore Technology Conference** May 5-8, Houston **AUVSI 2014** May 12-15, Orlando	March 27
MAY	**AUV Operations** **Market:** Offshore Renewable Energy: Wind, Wave & Tide **Tech:** Salvage & Recovery **Product:** Remote Sensing & Environmental Monitoring	**Energy Ocean International** June 3-5, Atlantic City	April 24
JUNE	**Hydrographic Survey** **Market:** Comms, Telemetry & Data Processing **Tech:** GPS, Gyro Compasses & MEMS Motion Tracking **Product:** Underwater Imaging: Lights, Cameras, Sonar		May 27
JULY/ AUGUST	**MTR100** Annual Listing of 100 Leading Subsea Companies **Special Report:** Oceans 2014 Preview **Region Focus:** Newfoundland and Labrador, Canada		July 21
SEPTEMBER	**Ocean Observation: Gliders, Buoys & Sub-Surface Networks** **Market:** Research Vessels **Tech:** ROV Tech: Workclass to Micro Systems **Product:** Geospacial Software Systems for Hydrography	**Oceans 2014** Sept. 14-19, St. John's, Newfoundland and Labrador, Canada	August 21
OCTOBER	**Subsea Defense** **Market:** Oil Spill Monitoring & Tracking **Tech:** Seafloor Engineering & Remote Operations **Product:** Fiber Optic and Electrical Connectors	**Clean Gulf** Dec. 2-4, San Antonio	September 25
NOVEMBER/ DECEMBER	**Fresh Water Monitoring & Senors** **Market:** Subea Engineering & Construction **Tech:** Offshore Inspection, Maintenance & Repair (IMR) **Product:** Commercial Diving: Lights, Cameras, Helmets	**Underwater Intervention 2015** New Orleans	November 26

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