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News for the Ocean Industry

INNOVATIVE TOOLING ENABLES ROV OPERATION IN DEEPWATER FIELDS

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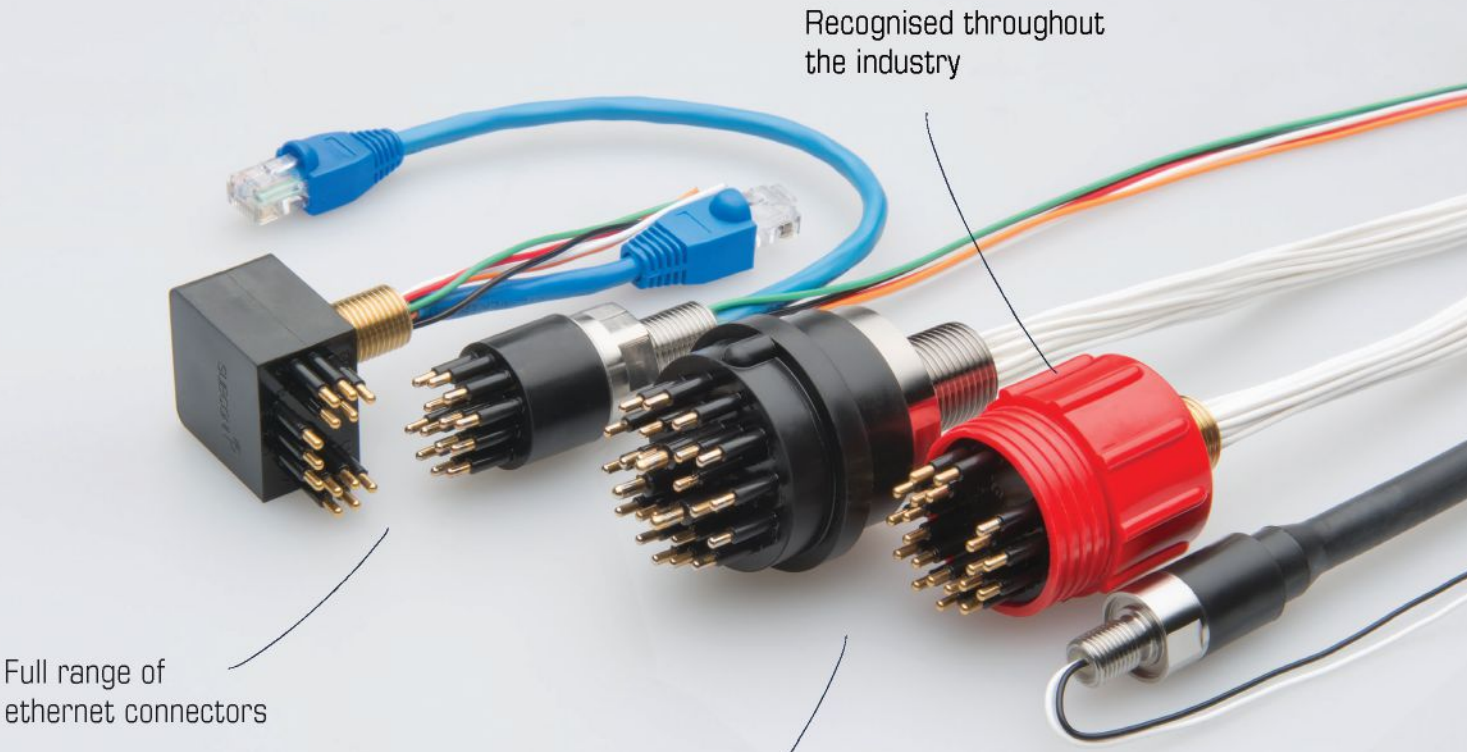

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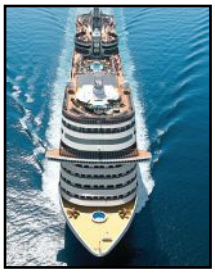

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Cover Photo

The Oceaneering® Millennium® Plus remotely operated vehicle (ROV) successfully completes another mission.

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Product Focus

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Product Focus
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TSC Technology Systems Corp.

Ocean News & Technology ISSN# 1082-6106 is published 12 times a year by Technology Systems Corporation, 7897 SW Jack James Dr., Suite A, Stuart, FL 34997, telephone 772-221-7720.

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Preparation is Key in a Low Oil Price Environment

By Ryan Lumsden, Global Sales Director, Forum Energy Technologies

Figures released by the International Marine Contractors Association in 2015 estimated there were in excess of 700 ROVs in operation around the world. Finding definitive numbers is hard to come by, but we believe this may be a fairly conservative figure and the actual number is even higher.

Even more difficult to establish, however, is just how much of the world's ROV fleet is currently being utilised. This number could now be as low as 50% to 60% due to the low oil price of the last 18 months having greatly affected the entire oil and gas industry globally, including ROV manufacturers, suppliers, and operators.

How the changing global landscape has affected ROV numbers is as yet unknown, but pressure has certainly been felt throughout the sector as shrinking margins and cost cutting have required many tough decisions.

While the focus on ensuring the safety of the workforce, environment, and assets remains unchanged, the challenge is in finding ways to maintain these levels of performance at a lower price.

Although difficult, the new environment has also provided opportunities. One of the most encouraging is that major operators are now more receptive than ever in considering different approaches and improved technologies.

Being thoroughly prepared ahead of deployment to minimise time spent working offshore is one area where businesses can reduce costs. Prohibitive vessel costs and the complexities of subsea work make it important to get it right first time. To support this, it is vital that those carrying out the work are aware of the potential scenarios they will encounter and the most appropriate techniques for dealing with such issues.

Even though we are faced with devising innovative approaches in what is an inhospitable environment, it is possible to simulate the required task and the conditions onshore in order to model different techniques before tackling the job for real.

Subsea test facilities provide the opportunity to do just that. It is possible to replicate situations in a safe environment where approaches can be trialled, modified, and perfected to ensure operators get it right first time offshore.

Making use of test tanks ahead of deployment makes it possible to trial the performance of multiple ROVs to establish the most effective ways vehicles can work together on larger projects. This can include having a first ROV with decommissioning-specific tools permanently attached and additional vehicles being used to observe, take readings, or record the work.

A good size tank means ROV thrusters and manoeuvrability can be fully tested and clients can view the vehicles along with tooling to see how they operate in a real environment—a particular benefit for the heavy-duty tooling more common with decommissioning work. Hyperbaric facilities can also provide tooling and machinery to be tested at the equivalent pressure when working at depth.

Being able to accurately recreate the scenarios being faced is key in the success of complex projects. An alternative to physically recreating the hardware is to use software to provide the experience of similar types of work. This supports pilot training practice prior to mobilisation. Scenarios can be developed with the performance of ROV access and manoeuvrability, tether management, and manipulator reach and any hazards are documented.

This is of particular importance in the rapidly growing decommissioning market where working initially towards cost certainty and then going beyond to achieve cost reduction are two of the main goals of operators.

As many platforms all over the globe reach the end of their working life, those tasked with their shutdown and removal have to devise ways to do this with little in the way of plans or records from the initial installation work available. A great deal of research and improvisation is required to provide solutions to one-off problems when it comes to their removal.

As decommissioning continues to grow across a maturing industry, operators will be pushed to demonstrate that they can work accurately, safely, and within budget. This will take place on a scale unmatched since the platforms were installed, with a great deal of scrutiny on the quality of the work and in a lower oil price environment than had initially been expected.

The offshore oil and gas industry has come a long way in a short period of time. Making better use of the available tools to inform our work and avoid mistakes and costly downtime has been a simple way the industry has been able to work smarter and operate effectively in today's low oil price environment.

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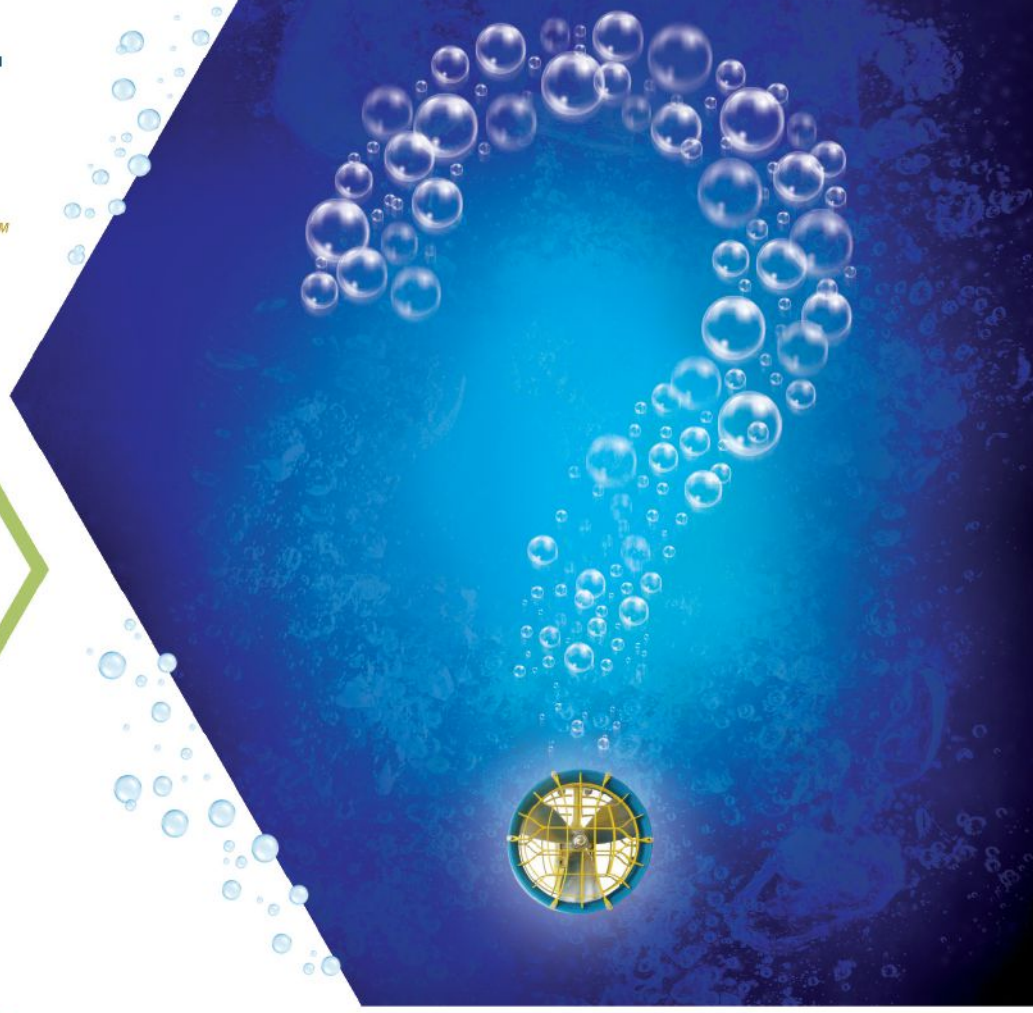

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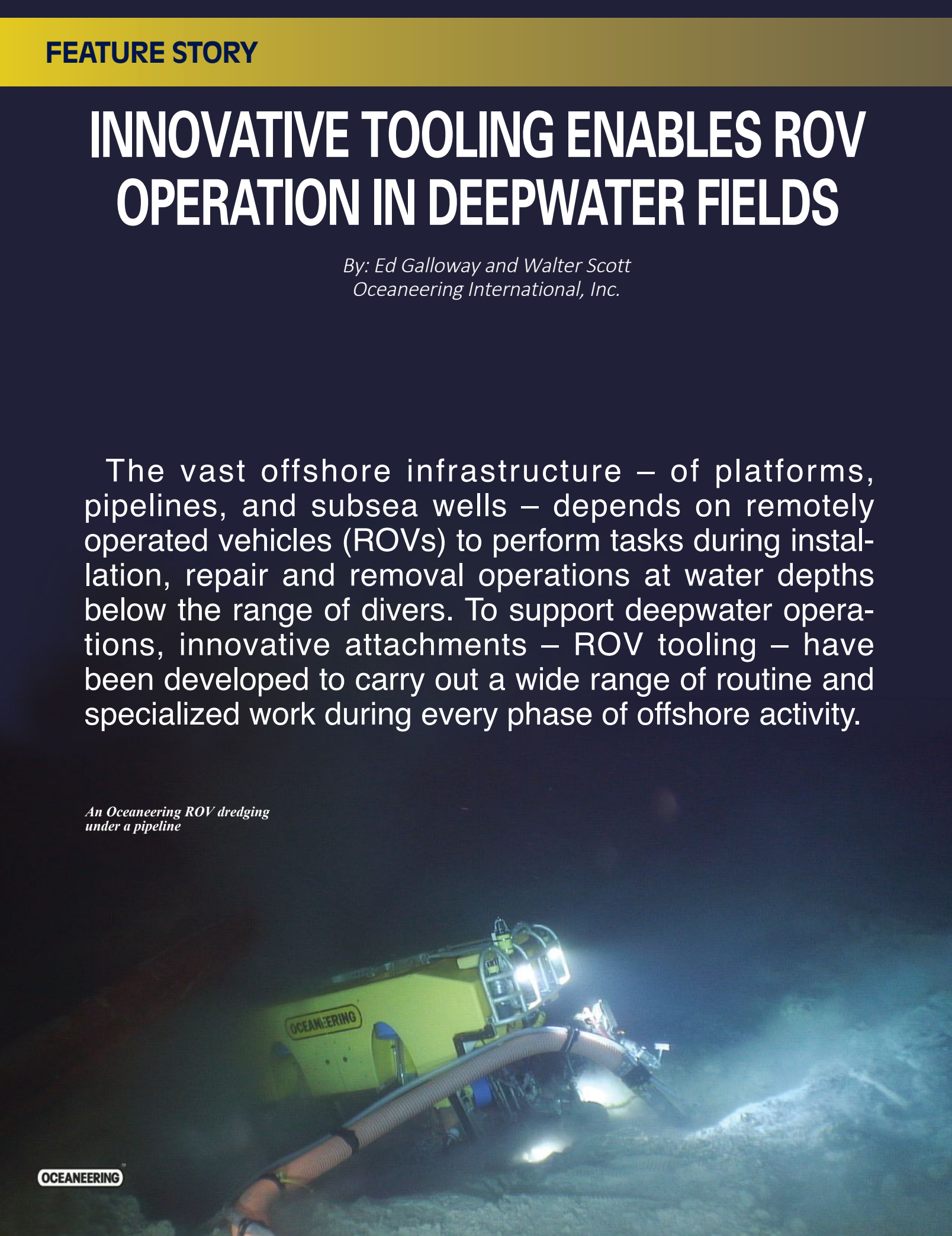
INNOVATIVE TOOLING ENABLES ROV OPERATION IN DEEPWATER FIELDS

By: Ed Galloway and Walter Scott
Oceaneering International, Inc.

The vast offshore infrastructure – of platforms, pipelines, and subsea wells – depends on remotely operated vehicles (ROVs) to perform tasks during installation, repair and removal operations at water depths below the range of divers. To support deepwater operations, innovative attachments – ROV tooling – have been developed to carry out a wide range of routine and specialized work during every phase of offshore activity.



An Oceaneering ROV dredging under a pipeline

ROV Operations

Tethered to the surface and controlled by operators on service vessels, ROVs are self-propelled submarine devices. ROVs carry lights and video cameras so operators can see the subsea work environment and have hydro-electric power units and telemetry that drive and manipulate tools to perform specific tasks. The ROV is analogous to a tractor, and ROV tools are its functional implements. Instead of mowing, digging, and plowing, ROV tools manipulate wellheads, tighten bolts, connect flow lines, perform inspections, and cut and grind pipe, among many other tasks. ROV tools, and the components they interface with, require innovative designs to perform tasks without the dexterity of human divers.

Tooling Development

The first ROV tools were developed to directly mimic tools used by divers. Handheld brushes used to clean wellheads were attached to rotating shafts on the ROV. These simple attachments have since evolved into extremely efficient cleaning heads, sized to match specific wellhead designs and project needs.

Suites of tooling have been developed to suit industry needs, inclusive of tooling required to complete pipeline repair. ROV operable devices including dredges, lift frames, coating and insulation removal tools, and cutting attachments have been added to the catalog available to operators.

Additional advancements in technology are also evident in the three standard ROV tooling categories: drilling support, completion, and production enhancement tooling.

Drilling Support Tooling

The extensive ROV toolkit used to support drilling operations includes torque tools, impact wrenches, hub cleaning tools, hard and soft line cutters, grinders, ROV dredgers, cleaning tools, pH meters, current meters, BOP skids, annulus valves, metrology systems, tree connectors, hot stabs, and lock down measuring sleeves—all of which have undergone design modifications to ensure their operability in the harshest conditions and in deepwater applications. Innovative systems like flying lead orientation tools (FLOTs) enable quick and efficient connection of flying leads to wellheads and manifolds, and seal test kits enable efficient testing of seals on connections once they are made.

Completion Tooling

Completion tools, often deployed in conjunction with Installation, Workover, and Control Systems (IWOCS), are essential to the assembly and activation of the subsea infrastructure and are the most widely used category of ROV tooling.

Rotary torque tools used to support completion operations have the capability to deliver up to 25,000 ft-lb of torque. ROVs can deploy specifically designed, high-pressure duplex pumps for injecting methanol, glycol, seawater, and control fluid into wellheads and subsea equipment. FLOTs provide efficient interconnection of subsea components during the completion phase.

A full range of linear valve actuator tools, operated hydraulically or mechanically, provides the interface with ROV-operable valves, hot-stab manifolds, and torque tool buckets. Instrumentation including inclinometers, current meters, torque meters, and flow meters, along with data telemetry systems, help ensure reliable operation.

ROV-mounted skids can convey injection pumps, and modular skids have been designed to provide auxiliary hydraulic power in the subsea environment during completion operations in deep water fields. A specialized hydrotest skid enables testing of flow lines up to 20 miles long at up to 20,000 psi.

Production Enhancement

ROV tooling used for production enhancement performs flowline remediation or well stimulation on subsea flow lines that are blocked by hydrates, paraffin, or asphaltenes. Oceaneering's ROV deployed Flowline Remediation System includes a liquid/gas separator and a subsea hydraulic power unit and is controlled on board the service vessel. It was designed to provide the most effective and least invasive method for clearing hydrates from flow lines. Alternatively, a hydrate remediation ROV skid can be used to remediate smaller lines at water depths up to 10,000 ft.

Class I-IV Torque Tool.

Oceaneering also offers an innovative and cost-saving rigless and riser-less well stimulation system that can be used to enhance production from subsea wells with vertical or horizontal trees. The system can be configured to inject stimulation chemicals at rate of up to 15 bbl per minute at up to 15,000 psi using a single or dual vessel configuration.

Planning for ROV Operations

According to ROV tooling experts, oil company operators should consider several factors when planning tool requirements for subsea operations. As operators regularly contract for ROV services from local or global companies, it is important to understand the capabilities of the ROV systems available on location. Work-class ROVs have varied electro-hydraulic power ratings, and the tooling used must be able to function within the ROV's capabilities and must be compatible with control and telemetry lines within the ROV. Oceaneering has developed its ROV tooling to be compatible with all commercial ROV systems, eliminating the need to onboard additional tooling to meet the requirements of various ROV types.

Operators must also provide the tool supplier with information about the ROV-vessel interface and define how the ROV will be deployed. ROV launch and recovery systems (LARS) are a common method of deployment and are often built into the service vessel. It is, therefore, important to ensure proposed tool skids have adequate clearance when attached to the ROV.

To control costs, some operators scrimp on contingency ROV tools and spare parts. However, given the high cost of logistics and downtime, it is sensible and a sound economic approach to order adequate spare parts, backup tools, and contingency ROV tooling to address common problems.

Technical support is another consideration. A qualified ROV tool technician on board the service vessel can resolve issues as they occur and keep equipment in good operating condition. When selecting an ROV tool supplier, operators should pay particular attention to the supplier's service infrastructure and its ability to respond in a timely manner with engineering support and equipment.

Custom Tooling Packages

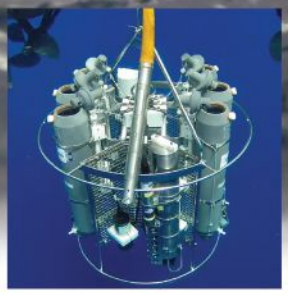
ROV operations supporting subsea activities require a wide variety of tooling (cutting, cleaning, measuring, torque tools, etc.). Sourced individually, these tools are likely to arrive at the shore base and service vessel in multiple crates that occupy an inordinate amount of deck space and are difficult to manage. Custom tooling packages offer a solution to improve efficiency, reduce logistics, and minimize the tooling footprint. Delivered in a single Connex box, tooling kits can be tailored to provide standard and contingency tools, as well as spare parts, for specific applications.

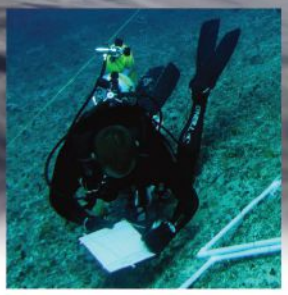
Continuous Technology Development

As subsea activity increases globally and deepwater technology advances, continuous development of new ROV tooling is required. Oceaneering has a dedicated design team focused on development of ROV tooling. Long-term projects include innovative systems commissioned by deepwater operators to create tooling to interface with subsea equipment at greater water depths and at higher pressure ratings. In the next decade, it is anticipated that more than 1,000 of the world's 9,000 offshore platforms will be decommissioned. This further highlights the changing and challenging environments that ROV tooling must evolve to meet. Oceaneering is at the forefront of developing these solutions and builds prototypes at its Houston facilities. The tooling is tested underwater at NASA's Neutral Buoyancy Laboratory located on site.

As requirements for ROV tooling for use in deepwater applications increases, so must the innovation and effort dedicated to meeting the industry's needs. Adequate planning and bundled tooling packages for drilling support, completions, and production enhancement offer operators a cost-effective, tailored solution to meet project needs in deepwater applications. Technological advancements and new designs will further bolster the tooling catalogs available to operators and ensure the safety and integrity of ROV operations.

Multipurpose Cleaning Tool.

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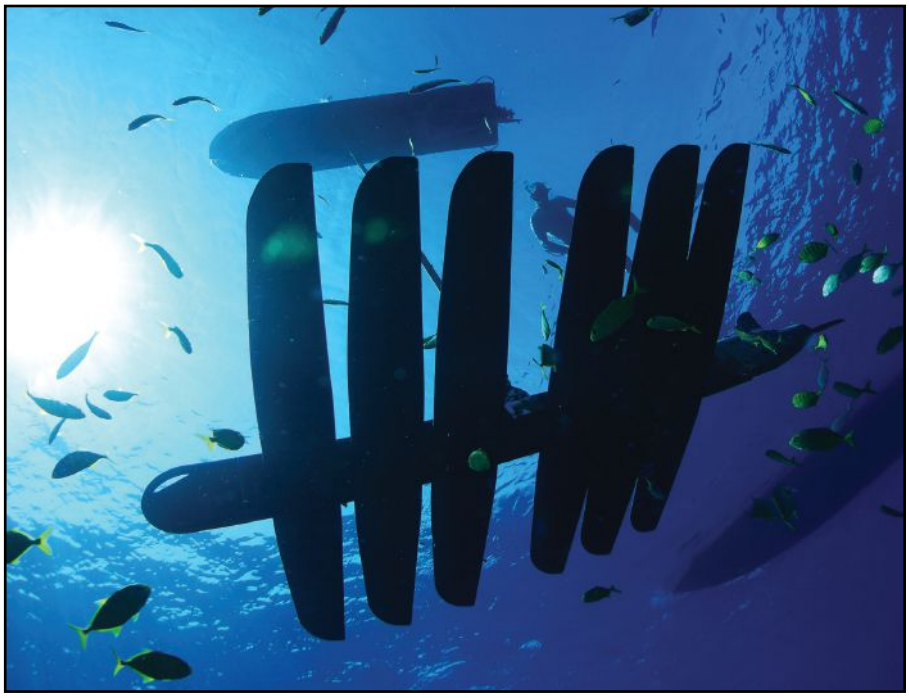
in this section

Liquid Robotics Wave Glider swims 2,808 nmi to Hawaii after fighting illegal fishing in the South Pacific



Liquid Robotics® has announced that a Wave Glider® swam 2,808 nmi to the Big Island of Hawaii after successfully completing a 4-month patrol mission of the Pitcairn Island Marine Sanctuary for the UK Foreign & Commonwealth Office (FCO). This achievement represents a fundamental enabling capability for unmanned systems as it proves the feasibility and flexibility of autonomous mission deployment. Using the Wave Glider platform, Liquid Robotics' customers are able to deploy sensors in the most remote marine locations without sending a large ship for recovery. This opens up large expanses of the ocean that once were previously inaccessible due to the high cost and risk of deploying manned vessels for research, commerce, or defense.

The Wave Glider began its mission on 27 November 2015 in the South Pacific, where it helped the UK FCO protect the Pitcairn Island Marine Sanctuary against illegal fishing activities. After successfully completing its mission, the Wave Glider was remotely piloted through strong equatorial currents, doldrums, and challenging sea states back to port in Hawaii. Along the way, it collected 9,516 measurements of meteorological, oceanographic, and marine biodiversity data over expanses rarely traveled. This data was recently used to support the worldwide Fishackathon, a program sponsored by the U.S. Department of State to promote innovative ways to stop illegal and unregulated fishing. Altogether, the Wave Glider was continuously at sea, untouched, for 213 days while traveling a total of 7,205 nmi (13,344 km).

"The Wave Glider's ability to travel to and from remote mission areas is a real game changer for our customers," said Roger Hine, co-founder and chief technology officer. "This enables them to collect real-time data from previously inaccessible waters without the expense of manned deployment or recovery missions. This is an incredibly powerful tool for helping our customers capitalize new opportunities at sea."

To learn more about the Pitcairn Island Marine Sanctuary surveillance mission and the Wave Glider's journey, visit www.liquid-robotics.com/Pitcairn-swim-home.

MTS announces Kevin Traver as new executive director

The Marine Technology Society (MTS) announced Kevin Traver as its executive director. In this position Traver will lead the organization in its mission to promote awareness, understanding, advancement and application of marine technology.

Traver joins MTS from the Navy League of the United States, where as vice president for corporate affairs he grew successful programs, partnerships and campaigns by developing strong relationships with key decision makers in the business community as well as the Navy, Coast Guard, Marine Corps, Maritime Administration and Merchant Marines.

Traver has extensive experience in association and non-profit management. Prior to the Navy League of the United States, he worked for the U.S. Chamber of Commerce, was the executive director of the National Maritime Heritage Foundation, and served in the United States Marine Corps. Originally from Mystic, Connecticut, Traver received his undergraduate and graduate degrees from the University of Connecticut.

The Marine Technology Society's ROV Committee announces winners of its 2016 annual scholarships

Rylee Knox, Jory Fleming, Kyle Neumann and Katherine Clevenger have been selected as recipients of the Marine Technology Society's 2016 ROV Committee Scholarships. In addition, Annina Baker received MTS ROV Committee MATE Center Scholarship.

Rylee Knox was awarded $10,000 and attends Maine Maritime Academy, majoring in Marine Systems Engineering. Jory Fleming was awarded $5,000 and attends University of South Carolina where he is pursuing a Marine Science degree. Kyle Neumann received $5,000 and attends University of California Santa Barbara, studying Marine Science. Katherine Clevenger was awarded $2,500 and attends East Carolina University, studying Nautical Archeology. As winner of the MTS ROV Committee MATE Center (Marine Advanced Technology Education) Scholarship, Annina Baker, who attends Villanova University, majoring in Mechanical Engineering received $2,500.

Since 1994, the MTS ROV Committee has awarded over $500,000 to deserving students who have an interest in ROVs. Scholarship applications for 2017/18 must be postmarked by April 15, 2017. Details on how to apply and additional information on the MTS ROV Committee can be found at www.rov.org.

Artifacts discovered on return expedition to Antikythera shipwreck

An international research team has discovered spectacular artifacts during its ongoing excavation of the famous Antikythera shipwreck (circa 65 B.C.). The shipwreck is located off the Greek island of Antikythera in the Aegean Sea.

Led by archaeologists and technical experts from the Hellenic Ministry of Culture and Sports and Woods Hole Oceanographic Institution (WHOI), the team recovered 60 artifacts including gold jewelry, luxury glassware, a bronze spear from a statue, elements of marble sculptures, resin/incense, ceramic decanters, and a unique artifact that may have been a defensive weapon to protect the massive ship against attacks from pirates. The team also confirmed the wreck of a second ancient cargo ship close by the Antikythera vessel.

"Our new technologies extend capabilities for marine science," said Brendan Foley, a marine archaeologist with WHOI. "Every new dive on the Antikythera shipwreck delivers gifts from the ancient past. The wreck offers touchstones to the full range of the human experience: from religion, music, and art, to travel, trade, and even warfare."

The Antikythera shipwreck, the largest ancient shipwreck ever discovered, was possibly a massive grain carrier. It was discovered and salvaged in 1900 by Greek sponge divers. In addition to dozens of marble statues and thousands of antiquities, their efforts produced the Antikythera Mechanism—an astounding artifact known as the world's first computer. In 1976, Jacques-Yves Cousteau and the CALYPSO crew returned to the wreck and recovered nearly 300 more objects, including skeletal remains of the passengers and crew.

The current high-tech, collaborative project brings robots, technical diving, and new laboratory analyses to this remarkable shipwreck. After precisely mapping a 10,500-sq. m (2.6 acres) area of seafloor around the wrecks with an autonomous robot, the team's divers descend to 52 m (170 ft) using mixed-gas, closed-circuit rebreathers to exactly locate, document, and retrieve the artifacts. Among other inquiries, the isotopes of recovered lead objects are analyzed to determine their origin, and ancient DNA is extracted from ceramic jars to reveal the food, drink, and medicines consumed by the

Antikythera team members Nikolas Giannoulakis, Theotokis Theodoulou, and Brendan Foley inspect small finds from the shipwreck while decompressing after a dive to 50 m (165 ft) (Photo by Brett Seymour, EUA/WHOI/ARG).

ancient seafarers. The team generates precise three-dimensional digital models of every artifact, allowing discoveries to be shared instantly and widely even if the objects remain on the seafloor.

"Reality Computing is bridging the physical and digital world," said Autodesk explorer-in-residence Jonathan Knowles. "We see great potential in working with WHOI to capture, analyze, and share the wonders of Antikythera with the world. "

The project is supported by corporate partners Hublot, Autodesk, Cosmote, Costa Navarino Resort and private sponsors Swordspoint Foundation, Jane and James Orr, the Domestic Property Committee of Kythera and Antikythera, the Municipality of Kythera, and private sponsors of WHOI.

The research team consists of archaeologists Dr. Theotokis Theodoulou and Dr. Dimitris Kourkoumelis (Hellenic Ministry of Culture and Sports); Research Specialist Dr. Brendan Foley (WHOI); archaeologist Alexander Tourtas; professional technical divers Edward O'Brien (WHOI), Philip Short, Alexandros Sotiriou, Nikolas Giannoulakis, and Gemma Smith; videographer Evan Kovacs; documentary director Michalis Tsimperopoulos; supported by Michalis Kelaidis, Dimitris Romio, and Dimitris Manoliades. The robotic survey was conducted by Prof. Stefan Williams, Dr. Oscar Pizarro, and Christian Lees from the Australian Centre for Field Robotics, University of Sydney. U.S. National Parks Service underwater photographer Brett Seymour and archaeologist Dr. David Conlin volunteer their time and expertise.

For more information, visit www.whoi.edu.

World Ocean Council joins leading global alliance for coordinating earth observation data collection and use

The World Ocean Council has been approved as a Participating Partner to the Group On Earth Observations (GEO) – which includes 102 member governments, the European Commission, and 103 Participating Organizations (international bodies with a commitment to advance Earth observations).

For more information, visit www.earthobservations.org.

Snap sediment for your chance to win a camera

Aquatec Group invites you to unlock your creativity and enter their photo competition. This year Aquatec are calling out for your photographs of sediment along with a clever caption. Whether it is a picture of a sandy beach, an underwater scene or a lab experiment, we want to see it! The prize up for grabs is an underwater camera. Everyone is welcome to enter the competition, so if you have a sediment inspired photo, get involved today!

Aquatec customers are encouraged to submit their pictures of Aquatec instruments in deployment to receive an additional promotion of a £25 voucher.

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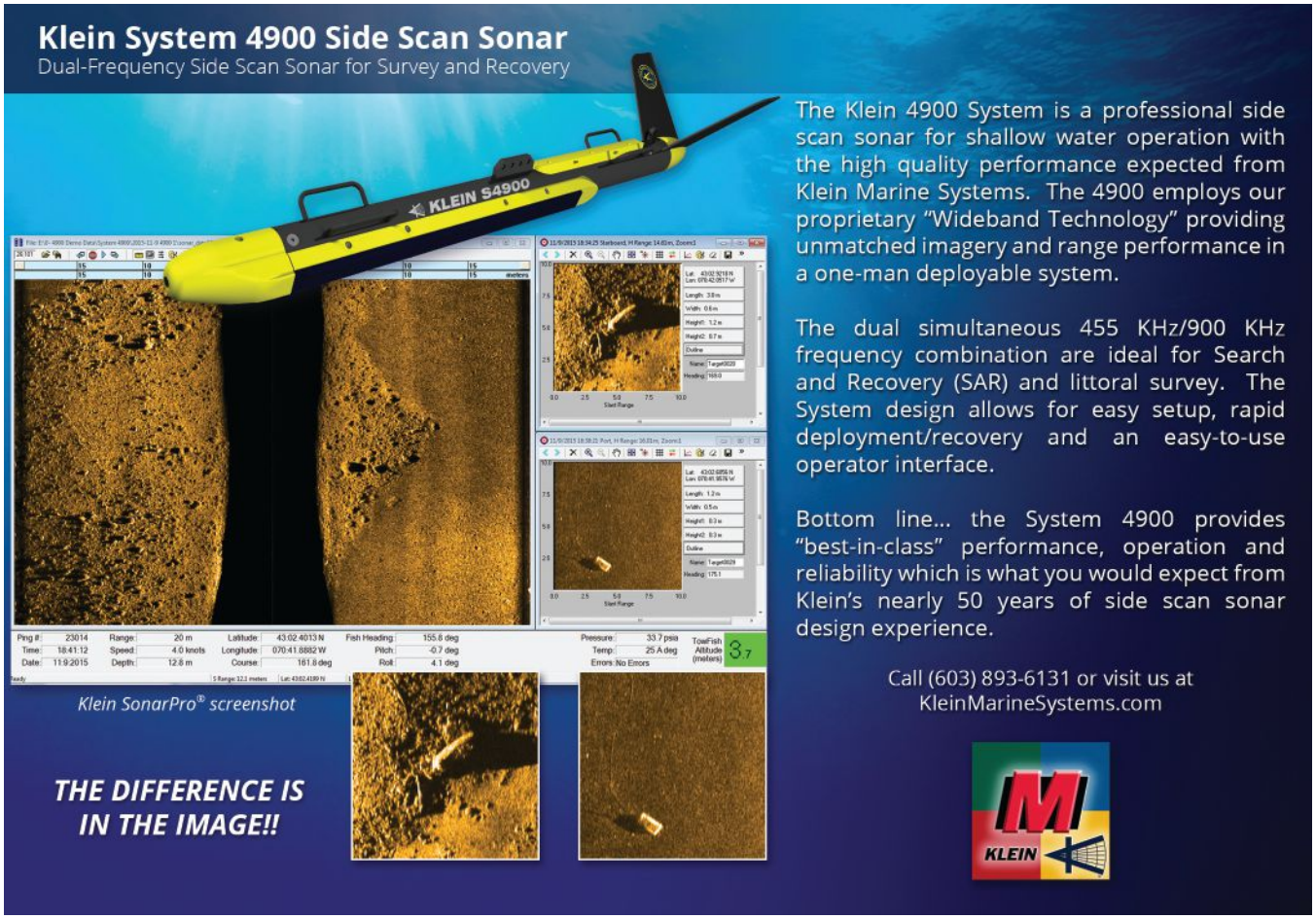
OR Email your image to us at photo@aquatecgroup.com along with your name and caption .

Entries may be exhibited on our website and shared on social media. All entries must be submitted by midnight on the 31st August 2016. Terms and conditions apply. More information is available at www.aquatecgroup.com/94-photo.



Big companies unite to push LNG as a marine fuel

Carnival Corporation & plc, DNV GL, ENGIE, ENN, GE, GTT, Lloyd's Register, Mitsubishi Corporation, NYK Line, Port of Rotterdam, Qatargas, Shell, TOTE Inc. and Wartsila all have announced a new cross-industry initiative called SEA\LNG to help push for the increase in the use of liquefied natural gas (LNG) as a marine fuel.

Peter Keller, chairman of SEA\LNG and executive vice president of TOTE Inc., said, "We recognise the need to work closely with key players across the value chain, including shipping companies, classification societies, ports, major LNG suppliers, downstream companies, infrastructure providers and OEMs (original equipment manufacturers) to ensure an understanding of the environmental and performance benefits of LNG as a marine transport fuel. SEA\LNG aims to address market barriers and help transform the use of LNG as a marine fuel into a global reality."

Crowley to launch weekly LCL shipping service from Houston to 33 port destinations in the Caribbean Basin

Crowley Maritime Corporation announced that it began offering weekly, fixed-day, less-than-container-load (LCL) shipping services from Houston to 33 port destinations throughout the Caribbean Basin on 1 July. The new logistics service will be the only one of its kind available from the Houston gateway.

This new offering is designed to further enhance supply chain options for those shipping directly into the Caribbean Basin from the West and Gulf Coasts of the U.S.

"Customers will be able to drop their cargo in Houston, and with our weekly, fixed-day service, have their cargo landed virtually anywhere within the eastern and western Caribbean and Central America," said Mike Griglione, Crowley's general manager of logistics in Houston. "This is just another way we are adding value to our customers' supply chains by both increasing the velocity of those supply chains with our integrated services and reducing their total landed cost."

In addition to LCL transportation, Crowley also offers custom packing options, cargo consolidation and deconsolidation, warehousing, distribution, cross-docking, freight forwarding, import/export documentation, last-mile delivery, cargo insurance, and customs brokerage services for cargo of all types and sizes.

For more information, visit www.crowley.com.

Genscape & exactEarth expand AIS and maritime data services collaboration

Genscape announced that it is expanding its AIS and maritime data services collaboration with exactEarth. For more than 3 years, the two companies have had a successful collaboration combining their respective industry-leading capabilities in satellite and terrestrial AIS data services to offer a range of global AIS products to governments and commercial markets around the world.

The extended partnership focuses on building and delivering the next generation services and datasets required by financial information services and trading firms. exactEarth is now offering exactShipDB, a new, enhanced vessel information service utilizing the Genscape Vesseltracker Ship Database. Additional solutions under exploration are port information, event history, and vessel movement prediction. These new, differentiated, and value-added solutions will extend and grow existing multi-year relationships with financial markets-focused customers.

For more information, visit www.genscape.com.

U.S. Coast Guard announces new towing vessel regulations

The U.S. Coast Guard announced new towing vessel regulations establishing new requirements for the design, construction, on-board equipment and operation of towing vessels.

These regulations, which were developed over time with input from the Towing Safety Advisory Committee (TSAC) and the towing vessel industry, can be read online at: www.federalregister.gov/articles/2016/06/20/2016-12857/inspection-of-towing-vessels.

Inauguration of expanded Panama Canal ushers in new era of global trade

During the official inauguration ceremony, Panamanian President Juan Carlos Varela and Panama Canal Administrator and CEO Jorge L. Quijano spoke to a crowd of more than 25,000 jubilant Panamanians, canal employees, heads of state and dignitaries from around the world, canal customers, shipping and trade executives, and nearly 1,000 journalists. This is the first expansion of the waterway since its original construction.

The inaugural transit began with the passage of neopanamax vessel COSCO Shipping Panama through the Agua Clara Locks on the Atlantic side of the country and concluded with its transit through the Cocoli Locks on the Pacific side. The ship is en route to Asia.

Considered and analyzed with more than 100 studies, the expansion will provide greater economies of scale to global commerce. It will introduce new routes, liner services, and segments such as liquefied natural gas (LNG).

The expansion program is the canal's largest enhancement project. In 2006, more than 75% of Panamanians approved the project in a nation-wide referendum, and, in 2007, construction of the $5.25 billion project began. It included the construction of a new set of locks on the Atlantic and Pacific sides of the waterway and the excavation of more than 150 million cu. m of material, creating a second lane of traffic and doubling the cargo capacity of the waterway.

For more information, visit https://micanaldepanama.com/expansion.

IMCA publishes 2014 DP incident reports

Seventy one accounts of incidents that took place in 2014 on 54 vessels were submitted for the annual 'Dynamic positioning station keeping incidents: Incidents for 2014' (M 231) report produced by the International Marine Contractors Association (IMCA). These accounts have been analysed, made anonymous and detailed in the report online and free at www.imca-int.com/media/252294/imcam231.pdf.

Thruster/propulsion issues proved to be the main cause for dynamic positioning (DP) incidents in 2014, accounting for 36% of such events; followed by computer issues at 18% and power and references, both at 13%. Following these as the main cause are human error (10%), external factors (3%) and environment (also at 3%). There were no recorded main causes attributed to electrical failings.

GE technology to power one of the world's largest crane vessels

Based on a recently signed deal between GE's Marine Solutions business and Sembcorp Marine, GE is set to provide technology that will be at the heart of the operations of Heerema's new SSCV Sleipnir. At 220 m long and 102 m wide, Sleipnir is to become the world's largest crane vessel. It will be equipped with two cranes, each boasting a lifting capacity of 10,000 tons, and will be used for offshore construction and heavy lifting.

To enable smooth operations on board the vessel, GE is set to provide the electrical part of the power and propulsion system including 12 sets of 8-MW generators, eight units of 5.5-MW propulsion motors, medium-voltage switchboards, transformers and MV7000 drives. The power generated from the system will position and propel the vessel and provide electricity to the vessel's onboard systems.

Overcoming various technical challenges, the solution provided by GE has been conceived from the ground up to meet requirements specific to this project. As a result, the entire power system

is designed for fault tolerance in accordance with Lloyds Register's Rules (DP AAA). While being more compact than standard solutions, GE's solution has advanced sensors built in to help operators monitor the health of each piece of equipment in real time and signal possible malfunctions.

For more information, visit www.ge.com.

Wärtsilä generating sets the choice for Chinese container vessels

Wärtsilä has been awarded the contract to supply newbuild Chinese container vessels with a total of 24 9-cylinder Wärtsilä 32 Auxpac generating sets. The engines will power six 21,000 TEU ships being built at the Shanghai Waigaoqiao Shipyard (SWS) for China Shipping Container Lines (CSCL). The order was placed in June with Wärtsilä's joint venture company CSSC Wärtsilä Engine (Shanghai) Co Ltd (CWEC).

Because of its reliability, efficiency, and high availability, the Wärtsilä 32 Auxpac engine has become a popular choice for vessels in the upper end of the shipping market. The Wärtsilä 32 is the most powerful of the company's Auxpac range of generating sets. In March of this year, the engine was ordered for eight new CSCL container ships; in January 2015 for five new container vessels built for China Ocean Shipping Group (COSCO); and also in 2015 for another 11 new COSCO vessels. Four Wärtsilä 32 engines are required for each of these ships.

The Wärtsilä engines will be delivered to the yard commencing mid 2017.

The Wärtsilä Auxpac 32 is the auxiliary engine version of the well-proven Wärtsilä 32 family, of which more than 1,200 engines are in operation worldwide.

For more information, visit www.wartsila.com.

IOOS awards $31M for ocean observing

U.S. IOOS is proud to announce the awarding of over $31 million in grants to support ocean, coastal and Great Lakes observing efforts throughout the United States, Caribbean and Pacific.

The funds are distributed primarily in the form of 5-year cooperative agreements, augmented by funds from other federal offices and agencies, as well as outside groups: NOAA's Office Oceanic and Atmospheric Research (OAR), NOAA's Ocean Acidification Program (OAP), the National Weather Service (NWS), NOAA Fisheries (NMFS), NOAA's Office of Coast Survey (OCS), NOAA's Office for Coastal Management, NOAA's National Centers for Coastal Ocean Science (NCCOS), NOAA's Satellite and Information Service (NESDIS), the U.S. Geological Survey (USGS), NOAA's Great Lakes Environmental Research Laboratory (GLERL), and the IOOS Association. Some additional funding is directed through the Ocean Technology Transition (OTT) project at IOOS, which sponsors the transition of emerging technologies to operational mode.

For more information, visit https://ioos.noaa.gov/about/.

UK's oldest deep-water Marine Protected Area successfully protects coral reefs

A unique study recently published by scientists from the National Oceanography Centre and University College Cork shows that deep, cold-water corals are very slow to recover from damage. Therefore deep-water Marine Protected Areas (MPAs) protect vulnerable marine ecosystems most effectively when they are put in place before that damage occurs.

This study used data from deep-water robots to compare a section of the northern Rockall Trough, off NorthWest Scotland, before and after an MPA was set up. The coral populations remained stable in areas that had not been impacted by trawling before the area was closed to all bottom contact fisheries. However, the amount of live coral dropped dramatically in the parts of the MPA that had sustained previous damage, with hardly any live coral being found during the follow-up survey. Despite 8 years of protection, there were very few indications of new coral growth. Some deep-sea species grow slowly and do not recover from impacts quickly or easily.

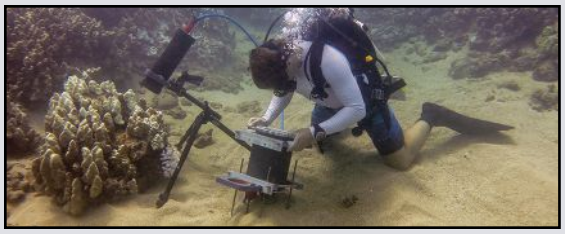
For more information, visit www.noc.ac.uk.

Researchers develop novel microscope to study the underwater world

A new microscopic imaging system is revealing a never-before-seen view of the underwater world. Researchers from Scripps Institution of Oceanography at the University of California San Diego have designed and built a diver-operated underwater microscope to study millimeter-scale processes as they occur naturally on the seafloor.

Many important biological processes in the ocean take place at microscopic scales, but when scientists remove organisms from their native habitats to study them in the lab, much of the information and its context are lost. In a quest to overcome this challenge, Scripps oceanographer Jules Jaffe and his team have developed a new type of underwater microscope to image marine microorganisms in their natural settings without disturbing them.

The Benthic Underwater Microscope, or BUM, is a two-part system—an underwater computer with a diver interface tethered to a microscopic imaging unit—to study marine subjects at nearly micron resolution. The instrument has a high magnification lens, a ring of focused LED lights for fast exposures, fluorescence imaging capabilities, and a flexible tunable lens, similar to the human eye, to change focus for viewing structures in 3-D.



Scripps graduate student Andrew Mullen positions the Benthic Underwater Microscope to study coral competition.

Ice algae: The engine of life in the central Arctic Ocean

Algae that live in and under the sea ice play a much greater role for the Arctic food web than previously assumed. In a new study, biologists of the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, showed that not only animals that live directly under the ice thrive on carbon produced by so-called ice algae. Even species that mostly live at greater depth depend to a large extent on carbon from these algae. This also means that the decline of the Arctic sea ice may have far-reaching consequences for the entire food web of the Arctic Ocean. Their results have been published online in the journal Limnology & Oceanography.

The summer sea ice in the Arctic is diminishing at a rapid pace and with it the habitat of ice algae. The consequences of this decline for the Arctic ecosystem are difficult to predict. Scientists of the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research showed the significance of ice algae for the Arctic food web in this context. "A number of studies have already speculated that ice algae are an important energy source for the polar ecosystems. We have now been able to show that not only animals associated with ice meet the majority of their carbon needs from ice algae, but that, surprisingly, so do species that mostly live at greater depths," says lead author Doreen Kohlbach.

In a new study, she and her colleagues examined copepods, amphipods, crustaceans and sea angels from the central Arctic Ocean and their dependence on ice algae. A number of these species use the underside of the sea ice as their habitat. Many other species of zooplankton, however, spend their entire lives floating in water depths up to 1,000 m and more.

Based on the new study, it is now possible to back up the flow of ice algae carbon through the summer food web in the central Arctic using specific figures. AWI biologists can use these figures in model calculations to assess the consequences of the sea ice decline for the Arctic ecosystem.

For more information, visit www.awi.de.

Historic marine mammal sound archive now online

Over his more than 40 years as a scientist at Woods Hole Oceanographic Institution (WHOI), William Watkins led the effort to collect and catalog the vocalizations made by marine mammals. In the last decade of his career, he strove to digitize as many of his recordings as possible, with the goal of making them publicly available.

Watkins passed away in 2004, but his ambition for his collection has finally been realized. With support from the WHOI Marine Mammal Center, a team from WHOI has launched the online, open access William Watkins Marine Mammal Sound Database.

After Watkins' death, WHOI marine biologist Laela Sayigh was determined to see his wishes carried out. "It would have been a crime to have that amazing resource just sitting in boxes collecting dust, instead of making it available to the public."

For more information, visit http://cis.whoi.edu/science/B/whalesounds/index.cfm.

CSA conducts seagrass enhancement project

CSA Ocean Sciences Inc. (CSA) has been contracted by the State of North Carolina Department of Transportation to conduct novel seagrass enhancement using the manipulation of wind wave energy to provide new and sustained seagrass acreage in anticipation of unavoidable impacts.

The Bonner Bridge—which connects Pea and Bodie islands at the

Oregon Inlet, is a lifeline for tourism and tropical storm evacuation of the North Carolina northern outer banks—has reached its engineering limits and is slated for replacement. The least impact estimated from the new bridge alignment still requires the recovery of no less than 1.28 acres of highly productive seagrasses (eelgrass [*Zostera marina*] and shoalgrass [*Halodule wrightii*]).

Approved by both federal and state regulatory agencies, this project will build on extensive research previously conducted by current CSA staff in order to exploit and manipulate the relationship between seagrass bed patchiness and waves and currents as an enhancement strategy. Using wave forecasting techniques to guide the size and location of a 500-ft long wave break, CSA will design and install the wave break among chronically patchy seagrass beds near the bridge. This will alleviate disruption of seagrass beds from waves and allow the beds to coalesce, ultimately creating more complete seagrass cover of the estuarine seafloor.

Added seagrass cover provides increased nursery and refuge areas for ecologically and economically important fish, shrimp, and crabs as well as increasing their abundance. Importantly, through this ecological engineering approach to seagrass enhancement, ecosystem services are provided even before any existing habitat is disrupted—a vital consideration in resource management where limited opportunities exist for enhancement. This novel approach provides a new opportunity to recover seagrass habitat loss associated with unavoidable project-related effects as well as in the face of declining seagrass cover globally.

For more information, visit www.csaocean.com.

Turbine blades for first U.S. offshore wind farm arrive in Rhode Island

Offshore construction activities are beginning to ramp up for the Block Island Wind Farm, with the arrival this week of the 240-ft long turbine blades at Deepwater Wind and GE's assembly facility at ProvPort.

On 28 June, local stevedores began offloading the 15 blades at the Providence port facility. The blades and the tower sections already assembled there are scheduled to travel by boat to the Block Island Wind Farm site in the beginning of August.

GE is supplying the 6-MW Haliade 150 offshore wind turbines for the Block Island Wind Farm. The blades were built in Denmark by GE's subcontractor, LM Wind Power.

Meanwhile, installation of the submarine cables for the wind farm and the Island's new connection to the mainland are making significant progress: The 6.5-mi submarine cable connecting the wind farm to Block Island has been installed. In addition, National Grid's 17-mi sea2shore cable connection between Block Island and mainland Rhode Island reached a major milestone last week with the successful landing of the cable on Block Island's shore. In July, Deepwater Wind will complete the cable connections between the wind turbines themselves.

For more information, visit www.dwwind.com.

DONG Energy wins tender for Dutch offshore wind farms

The Netherlands' Minister of Economic Affairs has awarded DONG Energy the concession to build The Netherlands' offshore wind farms Borssele 1 and 2. DONG Energy won the concessions with an average bid strike price, excluding transmission costs of 72.70 EUR per MWh during the first 15 years of the contract. After that, the wind farms will receive the market price.

Only 4 years ago, DONG Energy set an ambitious 2020 cost target of reaching EUR 100 per MWh over the life-time of a wind farm—the so-called levelized cost of electricity—including transmission costs. This target, which was later adopted by the offshore wind industry, has now been reached.

DONG Energy will, in accordance with the Dutch tender regulation, build Borssele 1 and 2 within 4 years with a flexibility of 1 year. The wind farms' capacity of two times 350 MW will translate into supply of CO_2-free electricity covering the annual power consumption of approximately one million Dutch households.

The reduction of cost of electricity is driven by cross-industry collaboration, ongoing innovation of wind turbines and blades, continuous improvements of foundation design and installation methods, higher cable capacity, a growing and competitive supply chain and not least the synergies from building large-scale capacity sites such as Borssele 1 and 2. In addition, the Dutch sites offer good seabed conditions as well as good and stable wind speeds, which contribute to high output from each turbine.

For more information, visit www.dongenergy.com.

New European programme to fund open sea testing for ocean energy

Led by the European Marine Energy Centre (EMEC), the FORESEA (Funding Ocean Renewable Energy through Strategic European Action) project will provide funding support to ocean energy technology developers to access Europe's world-leading ocean energy test facilities:

- EMEC (Orkney Islands, UK);
- SmartBay (Galway, Ireland);
- SEM-REV (Nantes, France); and,
- Tidal Testing Centre (Den Oever, Netherlands).

The test centres will be supported by European industry group Ocean Energy Europe, based in Brussels.

The first call for applicants to apply for support packages is scheduled to be announced at a later date.

Investors in the ocean energy sector want to see that technology has been proven to work in the sea and at scale before committing. However, the cost of pre-commercial demonstration of full-scale ocean energy technology is high. This results in the so-called "valley-of-death" phenomenon and prevents products reaching the market.

Companies debut world's longest offshore wind blade

Adwen and LM Wind Power have partnered to take a large step forward towards lowering the cost of energy in offshore, putting their respective technology expertise together to present the longest blade in the world.

The huge component of 88.4 m has been specifically designed for Adwen's AD 8-180 wind turbine model, with 8 MW nominal capacity and 180 m rotor diameter. The first of these huge blades has just been manufactured at LM Wind Power's factory in Lunderskov, Denmark, and will be transported to a facility in Aalborg where it will commence rigorous testing in the framework of Adwen's extensive product validation plan.

The engineering teams of both companies have been working together for months to design and integrate a blade that represents an important step forward in the race to lower the Levelized Cost of Energy (LCoE). With the largest rotor in the industry, the AD 8-180 has the highest annual energy production (AEP) of all wind turbines.

The LM 88.4 P blade has been designed with manufacturability and reliability in mind, benefiting from the unique know-how of LM Wind Power, developing large blades for offshore application for the past 25 years and resulting in a 925-MW installed base. LM Wind Power's track record combined with Adwen's powerful turbine, technology and unique experience from operating 630-MW offshore wind farms has resulted in a state-of-the-art rotor integration with innovative features, building on proven technologies.

The 88.4 m length of the blades is the best compromise between swept area, energy production, and the weight as well as the loads transferred to the wind turbine. This combination provides the optimum balance of plant costs and contributes to one of the most competitive LCoE in the industry. In addition, the blade design has been conceived with scalability in mind to enable the further development of Adwen's 8-MW platform.

For more information, visit www.adwenoffshore.com

Trelleborg wins contract for Borwin3 floatover

Trelleborg's engineered products operation announces it has been awarded a contract by the Siemens/Petrofac consortium for its first floatover installation of an offshore converter platform: BorWin3 wind farm project. The high voltage direct current (HVDC) converter station will sit nearly 130 km off the German coast in the North Sea.

Siemens will supply the HVDC transmission technology, while consortium partner, Petrofac will be responsible for the construction and installation of the platform.

Vincent Tan, sales and marketing manager for Trelleborg's engineered products operation, says: "BorWin3 is only the third wind farm converter project in the world to utilize floatover technology, so it is a significant project not only for Trelleborg, but the industry too. For the installation of the 18,500 metric tonne topside onto the substructure, we have been contracted to supply six sets of leg mating units and the same amount of deck support units."

Trelleborg's leg mating units (LMUs) make a floatover transition possible by damping the forces created as the topside's load is transferred to the jacket. Consisting of steel structures filled with elastomeric pads, the LMUs are designed to take up the static and dynamic forces of the topside structure as well as the horizontal forces due to open sea motions during installation. The assembled LMU can be installed either on the topside or substructure. In addition, deck support units (DSUs) are fixed on the barge that will transport the platform's topside to its site offshore. These combat the destabilizing effects of adverse weather and sea conditions during transport.

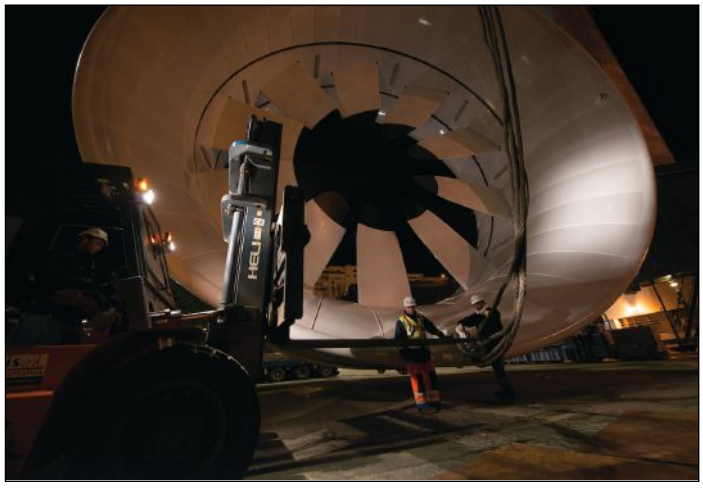
The converter is designed to transmit 900 MW of wind power, which equates to the annual electricity consumption of one million German households. Trelleborg will begin fabrication of LMUs and DSUs with immediate effect and its solutions are scheduled for delivery in 2018. The entire project is due for completion in 2019.

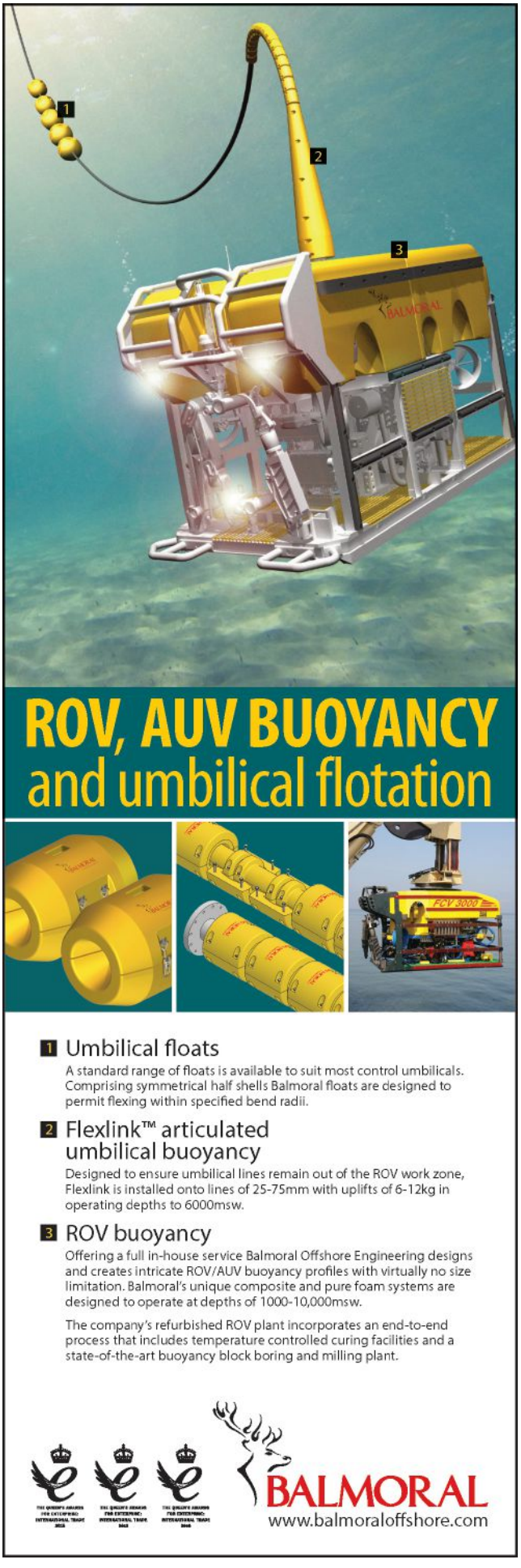
For more information, visit www.trelleborg.com.

Defining optimum operational speeds for tidal turbines

Tidal turbine manufacturer OpenHydro Technology Ltd, a DCNS company, have opted for Nortek's Signature instrumentation to aide in their understanding of the environment in which their 16-m diameter tidal turbines operate. Two such turbines have already been deployed on EDF's Paimpol-Bré hat project in France. Two more turbines are in the final stages of completion and will be deployed in the Bay of Fundy, Nova Scotia later this summer.

With OpenHydro's turbines being deployed on such a large scale, their requirement for understanding local currents could not be more pressing. Understanding the flow field around each turbine is crucial to understanding the optimum operational speeds and the loads on the turbine itself. Furthermore, quantifying these currents improves understanding of how the turbine structure affects the currents and thus the local environment. OpenHydro chose Nortek's Signature500 current profiler for its measurement range capabilities and high-end performance specifications. "The Nortek Signature500 is a superb measurement device which performs very well. The devices have been easily integrated into our system thanks to their usability and the data recorded so far has been of excellent quality," says Hamish Kerr, oceanographic engineer at Open Hydro.





OpenHydro hope to utilise the very fast sampling and concurrent capabilities of the Signature500 to define current velocities to an unprecedented degree. These measurements are key, not just to OpenHydro but, eventually, the entire tidal community. They will help validate and improve existing numerical models, bringing a level of understanding to the tidal sector that will aid in mitigating some of the risk and thus the cost of deployment, which is crucial for the growth of the sector. "Nortek's tireless customer service has been a great help to us and has made the task of integration, installation, data acquisition and processing go very smoothly," Hamish Kerr adds.

For more information, visit www.nortek.no.

Siemens expands portfolio with 8 MW offshore wind turbine

Siemens' direct drive wind turbine technology for offshore and onshore wind turbines has reached the next development milestone: The latest addition to the offshore direct drive platform, the SWT-8.0-154, represents yet another significant step towards grid parity for offshore wind. The 8-MW turbine is based on the existing offshore direct drive platform, incorporating only smaller evolutions.

The first SWT-8.0-154 will be installed in early 2017 and will allow for up to 10% higher annual energy production (AEP) under offshore wind conditions as compared to the 7-MW model. Once again, the offshore direct drive platform enables a significant reduction in the Levelized Cost of Energy (LCoE) at low risk. Type certification for the 8-MW turbine is expected to be obtained at the beginning of 2018. At the same time, Siemens' high performance wind turbine for medium to low onshore wind sites has reached the next milestone: The SWT-3.3-130 has successfully obtained type certification from DNV GL.

The upgrade of the offshore direct drive wind turbine to 8 MW is made possible through the introduction of new magnet technology with an even higher grade than that introduced in the SWT-7.0-154. This enables a rated power increase of more than 14% from 7.0 to 8.0 MW. Similar to the previous upgrade from 6.0 to 7.0 MW, the 8-MW turbine will benefit from the established supply chain and proven components of offshore direct drive technology. These components include the B75 blade and the medium-voltage transformer of the SWT-8.0-154. Since the higher rating will be achieved with only a few component upgrades, customers will again benefit from fast time-to-market and low risk as the key value drivers.

Siemens' direct drive technology has an excellent track record. Approximately 150 offshore direct drive wind turbines rated at 6 MW have already been installed and commissioned. Two SWT-7.0-154 prototypes, installed at the Østerild test site in Northwestern Denmark, are performing well above expectations. The SWT-8.0-154 prototype is planned to be installed by early 2017. Onshore, a total of 1,240 Siemens direct drive onshore wind turbines are in operation worldwide as of end of March 2016.

Siemens has obtained type certification from the DNV GL certifying body for the company's innovative SWT-3.3-130 onshore wind turbine. The high performance direct drive machine for medium to low wind conditions is rated at 3.3 MW and equipped with a 130-m diameter rotor. It introduces a new generation of the proven direct drive onshore product platform. The official certificate is a further step on the way to serial production of the turbine. As part of the certification process, DNV GL experts were provided full access to the engineering design details, to Siemens assembly facilities and to the SWT-3.3-130 prototype installed at the test site in Høvsøre, Denmark. Evaluation included assessment of the maturity of the turbine design, its manufacturing, installation and commissioning processes and the related documentation.

For more information, visit www.siemens.com.

New York State to participate in offshore wind lease auction

The New York State Energy Research and Development Authority (NYSERDA) announced it will participate in the U.S. Department of Interior's Bureau of Ocean Energy Management's (BOEM) auction for a commercial offshore wind energy lease off the coast of Long Island. Offshore wind is a critical component in meeting Governor Andrew M. Cuomo's aggressive clean energy goals, including generating 50% of the state's electricity from renewables by 2030. By taking this action to participate in the lease auction, NYSERDA will seek to ensure offshore wind in New York will be developed at the lowest possible cost for electricity consumers while protecting the environment and growing the economy.

The 81,000-acre lease area is located south of Long Island, off the Rockaway Peninsula. If NYSERDA is chosen as the winning bidder, it will be able to lead the development and timing of the site's progress, providing the state the opportunity to benefit consumers with lower project costs and ensure that any project minimizes impacts on coastal communities, the environment, fisheries and maritime industries. NYSERDA will conduct robust stakeholder outreach and work closely with community members, environmental advocates, and federal and local partners.

As part of its pre-development work, NYSERDA will produce environmental studies and a resource assessment and site characterization to further reduce project costs and impacts. NYSERDA will then package this work with a power purchase mechanism and select a project developer through a competitive process. This strategy minimizes project risks and provides developers certainty to secure financing, maximizing competition and ultimately lowering project costs for consumers.

For more information, visit www.nyserda.ny.gov.

ORPC Ireland selected to proceed to grant agreement stage for major project

Horizon 2020, the European Union's Framework Programme for Research and Innovation, has selected ORPC Ireland, a wholly owned subsidiary of Ocean Renewable Power Company, to enter the grant agreement process for a project to advance the performance and reliability of ocean energy technology electrical systems by developing a more robust power transfer system from prime mover to electric grid. Through the MaREI Centre in the Environmental Research Institute, University College Cork (UCC), lab testing will be conducted at the Lir National Ocean Test Facility in Ringaskiddy, Cork Harbour, Ireland, to validate system improvements to a full-scale ORPC hydrokinetic turbine and the associated economics.

ORPC Ireland's request was one of a number of proposals selected to advance to the grant agreement stage out of a total of 78 submitted to Horizon 2020. In addition to UCC, partners for the project include Fraunhofer-Gesellschaft, Germany; Letterkenny Institute of Technology, Ireland; and SKF (U.K.) Limited, U.K.

Ocean Renewable Power Company, LLC is a global leader in hydrokinetic power system technology and project solutions. Worldwide, it is the only company to have built, operated and delivered power to a utility grid from a hydrokinetic tidal project and to a local microgrid from a hydrokinetic river project. ORPC is committed to working with local partners and creating local economic opportunities.

For more information, visit www.orpc.co.

Wave monitoring buoy deployed off Mauritius

Wave energy developer Carnegie Wave Energy Limited announced the successful deployment and commissioning of a wave monitoring buoy off the south coast of Mauritius carried out in conjunction with its Mauritian Project partners: The Mauritian Research Council (MRC) and Australia's High Commission-Mauritius.

This announcement follows Carnegie's signing of a collaboration agreement with the Mauritius Research Council (MRC) to identify opportunities and develop pathways for commercial wave energy plants, for the republic of Mauritius, that are capable of providing a sustainable source of electrical power. The project is funded through a partnership between the Australian and Mauritian Governments and is being administered by the MRC and involves Carnegie receiving payment for delivering a series of work packages that constitute this Project. Other contributors include the Mauritian Coast Guard, Energy Made Clean, Mauritian Meteorlogical services, Mauritian Ministry of Housing and the University of Western Australia.

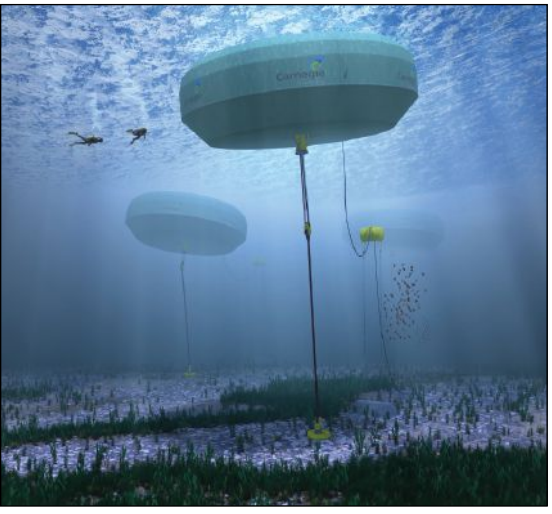
The project is broken into three work packages:

1. A high-penetration renewable energy roadmap for Mauritius, including technical, commercial and financial feasibility.

2. Assess the wave energy resource, site conditions and priority sites for commercial CETO wave energy devices.

3. Design a decentralized micro-grid for the Island of Rodrigues, offering battery storage and control systems that enable higher renewable energy penetration (including wave).

The deployment of the Wave Monitoring Buoy falls under work package number two. Carnegie's Alliance Partner, Energy Made Clean, are involved in the delivery of work packages one and three.



The purpose of this deployment is to gather data in order to quantify the wave energy resource in support of a potential CETO wave energy project in Mauritius. Such a project will be capable of producing electricity as well as desalinated water from an untapped and abundant renewable energy resource. The wave buoy will collect data for a minimum period of 6 months.

For more information, visit www.carnegiewave.com.

The Swedish Energy Agency grants funds to projects focusing on Minesto's technology

Swedish tidal energy developer Minesto, together with industry and academia partners, have been granted research funds totaling SEK 5.7 million by the Swedish Energy Agency.

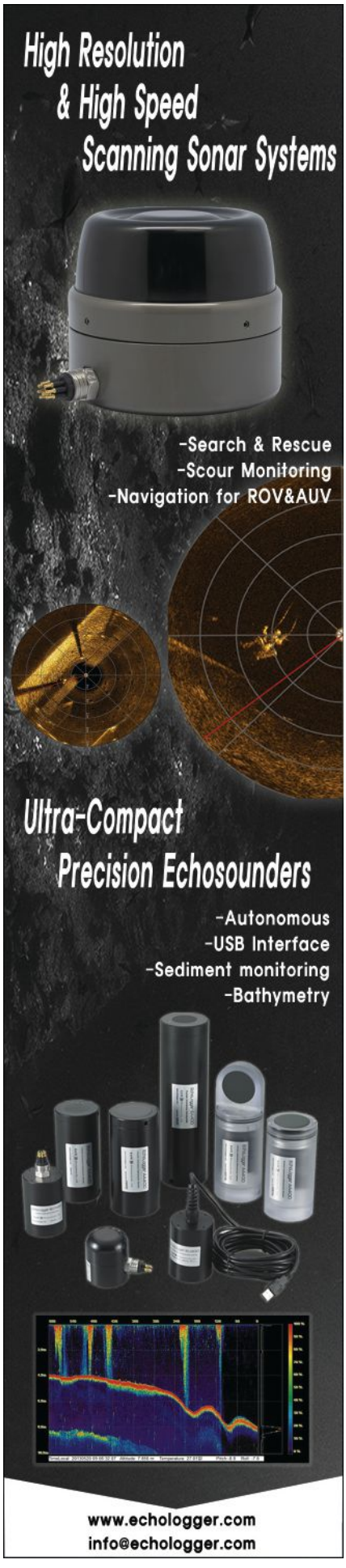
Minesto's patented technology Deep Green is the only proven marine power plant that can extract energy from low-velocity tidal and ocean currents in a cost-effective way. The concept has been developed over nearly a decade and for the last 3 years quarter scale ocean testing is ongoing outside the coast of Northern Ireland. In parallel to this, Minesto develops its first power plant in full scale, which is to be launched in Wales in the summer of 2017.

Two research projects have now received funding from the Swedish Energy Agency. The projects are focused on the further development of Deep Green, and the purpose is to optimize the first full-scale model. The two projects are granted funds totaling SEK 5.7 million.

The research projects are Cost Efficiency of Marine Energy Converters is a collaboration between Minesto, SSPA and Moorlink and the project is customized for Deep Green. It will focus on improvements to the mooring and rudder design as well as on full-scale simulations.

The Way of the Dragon: Optimization of subsea power plants ("kite" is also "dragon" in Swedish) is a collaboration between Minesto, University of Gothenburg's Department of Marine Sciences and Chalmers University of Technology. The project will allow Minesto access to state-of-the-art turbulence modelling, specifically designed for the company.

For more information, visit www.minesto.com.



GM, U.S. Navy collaborating on fuel cell-powered UUVs

General Motors, the Office of Naval Research and the U.S. Naval Research Laboratory are cooperating to incorporate automotive hydrogen fuel cell systems into the next generation of Navy UUVs.

Hydrogen fuel cells convert high-energy hydrogen efficiently into electricity, resulting in vehicles with greater range and endurance than those powered with batteries. Under the ONR's Innovative Naval Prototype program for Large Displacement UUVs, energy is a core technology in the Navy's goals for vehicles with more than 60 days endurance.

The Naval Research Laboratory recently concluded an evaluation of a prototype UUV equipped with a GM fuel cell at the heart of the vehicle powertrain. The tests, a key step in the development of an at-sea prototype, were conducted in pools at the Naval Surface Warfare Center in Carderock, Maryland.

"Our in-water experiments with an integrated prototype show that fuel cells can be game changers for autonomous underwater systems," said Frank Herr, ONR's department head for Ocean Battlespace Sensing. "Reliability, high energy, and cost effectiveness—all brought to us via GM's partnering—are particularly important as Navy looks to use UUVs as force multipliers."

Hydrogen fuel cell propulsion technology helps address two major automotive environmental challenges: petroleum use and carbon dioxide emissions. Fuel cell vehicles can operate on renewable hydrogen from sources like wind and biomass stored for later use. Once converted to electricity, water vapor is the only emission. Recharging takes only minutes.

GM's fuel cells are compact and lightweight and have high reliability and performance. Lower cost is achievable through volume production. These attributes match the goals of the Navy to develop reliable, affordable systems.

For more information, visit www.gm.com.

Elbit USV successfully completes torpedo launch trials

Elbit Systems recently completed a trial test torpedo launch from its Seagull multi-mission, autonomous Unmanned Surface Vessel (USV) system. The trial, performed out of Israel's Haifa port, demonstrated the capability of Seagull to install and launch light-weight torpedoes, adding to the advanced capabilities of the USV, which is designed to carry out unmanned maritime missions, such as protection of critical sea areas and high-value assets against submarines and sea mine threats.

Introduced earlier this year, Seagull is a 12-m long multi-mission USV system equipped with one or two vessels that can be operated and controlled in concert from manned ships or from the shore. Seagull provides multi-mission capabilities and can be employed for ASW, MCM, EW, maritime security and other related missions, leveraging modular mission system installation and offering a high level of autonomy.

In its full configuration, the advanced USV system delivers unmanned end-to-end mine hunting operation capability, taking the man out of the minefield. It features inherent C4I capabilities for enhanced Situation Awareness (SA) and has a large fuel capacity that allows it to remain at sea for several days.

For more information, visit www.elbitsystems.com.

Bollinger Delivers the USCGC Joseph Tezanos

Bollinger Shipyards has delivered the USCGC Joseph Tezanos, the 18th Fast Response Cutter (FRC) to the United States Coast Guard.

The announcement was made by Bollinger president & C.E.O., Ben Bordelon. "We are very pleased to announce the delivery of the latest FRC built by Bollinger Shipyards, the USCGC Joseph Tezanos, to the U.S. Coast Guard. The fleet of FRCs already in commission have more than proven their worth with tons of narcotics seized, thousands of illegal aliens interdicted and many lives saved. We at Bollinger Shipyards are looking forward to hearing of the heroic exploits of the Joseph Tezanos as it joins the Coast Guard's operational fleet."

The 154-ft patrol craft USCGC Joseph Tezanos is the 18th vessel in the Coast Guard's Sentinel-class FRC program. To build the FRC, Bollinger used a proven, in-service parent craft design based on the Damen Stan Patrol Boat 4708. It has a flank speed of 28 kts; state-of-the-art command, control, communications and computer technology; and a stern launch system for the vessel's 26 ft cutter boat. The FRC has been described as an operational "game changer" by senior Coast Guard officials.

The Coast Guard took delivery on 22 June 2016 in Key West, Florida, and is scheduled to commission the vessel in Puerto Rico during August 2016.

Each FRC is named for an enlisted Coast Guard hero who distinguished him or herself in the line of duty. This vessel is named after Coast Guard Hero Joseph Tezanos, who was awarded the Navy and Marine Corps medal for distinguished heroism while leading the rescue of more than 40 injured service members following the explosion of a Navy LST in Pearl Harbor, Hawaii in 1944.

www.bollingershipyards.com.

Ingalls Shipbuilding awarded contract to build LHA 8

Huntington Ingalls Industries' (HII) Ingalls Shipbuilding division has been selected to build the U.S. Navy's next large-deck amphibious assault warship, LHA 8. The contract value, for the planning, advanced engineering and procurement of long-lead material, is $272,467,161. The award includes options that, if exercised, would bring the cumulative value of the contract to $3.1 billion.

Ingalls is currently the sole builder of large-deck amphibious ships for the Navy. The shipyard delivered its first amphibious assault ship, the Iwo Jima-class USS Tripoli (LPH

10), in 1966. Ingalls has since built five Tarawa-class (LHA 1) ships, eight Wasp-class (LHD 1) ships and the first in a new class of amphibious assault ships, America (LHA 6), in 2014. The second ship in that class, Tripoli (LHA 7), is currently under construction and scheduled to launch next summer.

For more information, visit www.huntingtoningalls.com.

Austal delivers LCS 8

Austal Limited announced that the future USS Montgomery (LCS 8) has been delivered to the U.S. Navy during a ceremony held aboard the ship at Austal USA's shipyard in Mobile, Alabama, USA, on 23 June.

Delivery marks the official transfer of Montgomery from the shipbuilder to the Navy. It is the final milestone prior to commissioning, which is planned for September 2016 in Mobile, Alabama. LCS 8 is the seventh littoral combat ship to be delivered to the Navy and the fourth of the Independence variant, which is noted for its trimaran hull.

LCS is a modular, reconfigurable ship, with three types of mission packages including surface warfare, mine countermeasures, and anti-submarine warfare. The LCS class consists of the Freedom variant and Independence variant, designed and built by two industry teams. The Freedom variant team is led by Lockheed Martin (for the odd-numbered hulls, e.g. LCS 1). The Independence variant team is led by Austal USA (for LCS 6 and follow-on even-numbered hulls).

The Program Executive Office Littoral Combat Ships is responsible for delivering and sustaining littoral mission capabilities to the fleet. Delivering high-quality warfighting assets while balancing affordability and capability is key to supporting the nation's maritime strategy.

Six additional LCS remain under construction in Mobile as part of an 11-ship contract worth over US$3.5 billion from the U.S. Navy. Gabrielle Giffords (LCS 10), Omaha (LCS 12) and Manchester (LCS 14) are all preparing for trials. Assembly is well underway on Tulsa (LCS 16) and Charleston (LCS 18) while modules for Cincinnati (LCS 20) are under construction in Austal's module manufacturing facility.

For more information, visit www.austal.com or www.navy.mil.

Nations participate in RIMPAC 2016

Twenty-six nations, 45 ships, five submarines, more than 200 aircraft, and 25,000 personnel will participate in the biennial Rim of the Pacific (RIMPAC) exercise scheduled 30 June to 4 August, in and around the Hawaiian Islands and Southern California.

The world's largest international maritime exercise, RIMPAC provides a unique training opportunity that helps participants foster and sustain the cooperative relationships critical to ensuring the safety of sea lanes and security on the world's oceans. RIMPAC 2016 is the 25th exercise in the series that began in 1971.

Hosted by U.S. Pacific Fleet, RIMPAC 2016 is led by U.S. Vice Adm. Nora Tyson, commander of the U.S. 3rd Fleet (C3F), who will serve as the Combined Task Force (CTF) commander. Royal Australian Navy Rear Adm. Scott Bishop will serve as deputy commander of the CTF, and Japan Maritime Self Defense Force Rear Adm. Koji Manabe as the vice commander. Other key leaders of the multinational force will include Commodore Malcolm Wise

of the Royal Australian Navy, who will command the maritime component; Brig. Gen. Blaise Frawley of the Royal Canadian Air Force, who will command the air component; and the amphibious task force will be led by Royal New Zealand Navy Commodore James Gilmour.

This year, the Trident Warrior experimentation series will highlight fleet innovation during the sea amphibious operations in the Southern California operating area and feature a harpoon missile shoot from an LCS, the U.S. Navy's newest surface platform.

The theme of RIMPAC 2016 is "Capable, Adaptive, Partners." The participating nations and forces will exercise a wide range of capabilities and demonstrate the inherent flexibility of maritime forces. These capabilities range from disaster relief and maritime security operations to sea control and complex warfighting. The relevant, realistic training program includes amphibious operations, gunnery, missile, anti-submarine, and air defense exercises as well as counter-piracy, mine clearance operations, explosive ordnance disposal, and diving and salvage operations.

For more information, visit www.navy.mil.

DCNS delivers helicopter carrier to Egyptian Navy

DCNS recently delivered the first of two helicopter carriers acquired by the Arab Republic of Egypt in October 2015, the LHD (Landing Helo Dock) Gamal Abdel Nasser. The flag transfer ceremony took place in the presence of Egyptian and French Navies' Chiefs of Staff; Admiral Rabie and Admiral Rogel; Hervé Guillou, chairman and chief executive officer of DCNS; Laurent Castaing, chairman and chief executive officer of STX France; and senior Egyptian and French officials. By 2020, DCNS will have supplied at least seven combat vessels to Egypt, thus contributing to the modernization of the Arab Republic of Egypt's defense system.

In October 2015, DCNS signed a contract with the Ministry of Defence of the Arab Republic of Egypt for the supply of two Mistral-class Landing Helo Docks (LHDs).The flag transfer of the first of the two helicopter carriers, the LHD Gamal Abdel Nasser, contributes to the continuity of the strategic partnership with the Egyptian Defence Ministry, already initiated in July 2014 by the signature of a contract for the sale of four Gowind® corvettes, and in August 2015 by the delivery of the FREMM multi-mission frigate Tahya Misr to the Egyptian Navy. In addition, DCNS is committed to supporting the Egyptian Navy over the longer term, thanks in particular to the multi-annual maintenance contracts for the Egyptian vessels as well as through technologies transfer allowing the Alexandria Shipyards to build three of the four Gowind® corvettes ordered in 2014. Other projects are currently under consideration to accelerate full operational capability of the Egyptian Navy.

The Mistral-class LHD is a vessel that responds to the needs of numerous navies thanks to its versatility. It allows a wide spectrum of civil and military missions. With a length of 199 m and a speed exceeding 18 kts, the Mistral-class LHD vessel is characterized by its high capacity for the transportation of troops, equipment, heavy helicopters and landing craft, which the LHD is capable of projecting around the world. It is equipped with an electric propulsion system that uses pods. It also has an onboard hospital and can carry out large-scale humanitarian missions. Its highly capable communication system makes it the ideal command vessel within a naval force.

For more information, visit www.dcnsgroup.com.

Trials of anti-torpedo decoy completed

DCNS, Chemring Countermeasures and Terma conducted joint operational trials of their Torpedo Defense Solution. This solution integrates Terma's C-Guard Decoy Launching System with DCNS's CANTO® Anti-Torpedo Decoy and the Chemring Launch Module which, combined, is designated NATO standard CANTO® 130mm.

The main purpose of the trials was to confirm the live operation of the CANTO® 130mm decoy in its purpose to lure incoming torpedoes from their original target: the ship launching the decoy. Additionally, the trials aimed to prove the performance of the Chemring launch module and the Terma C-Guard ability to launch the decoy.

Once the CANTO® 130mm decoy is launched from C-Guard and enters the water, it starts generating numerous acoustic signals that mask the noise from the ship and generate copious false targets, hence diluting/confusing the homing ability of the incoming torpedo. By deploying CANTO® decoys correctly with associated evasive maneuvers, the ship is able to steer away from the torpedo target zone to safety while the torpedo, homing on the false targets presented by the decoy, eventually dissipates all its energy or fuel.

The trials, facilitated by The Royal Danish Navy (RDN) and The Danish Defense Acquisition and Logistics Organization (DALO), were performed from the Danish Frigate HDMS Iver Huitfeldt off the coast of Northern Zealand, Denmark.

As a result of the successful trial, C-Guard is now the first and currently the only Decoy Launching System fully integrated with the CANTO® 130mm anti-torpedo functionality, hence fully qualified to deploy CANTO® 130mm decoys.

For more information, visit www.dcnsgroup.com.

HII awarded majority of contract design work for LX(R)

Huntington Ingalls Industries' (HII) Ingalls Shipbuilding division has been selected to perform the majority of the contract design work for the U.S. Navy's amphibious warfare ship replacement, known as LX(R). The Department of Defense made the announcement at the same time Ingalls was awarded a contract to build the next large-deck amphibious assault warship, LHA 8.

LX(R) will replace the Navy's Harpers Ferry- and Whidbey Island-class dock landing ships and will use the same hull as the San Antonio (LPD 17) class. Ingalls has delivered 10 of the LPD 17 ships to the Navy, is currently building the 11th, Portland (LPD 27), and has received more than $300 million in advance procurement funding for the 12th, Fort Lauderdale (LPD 28).

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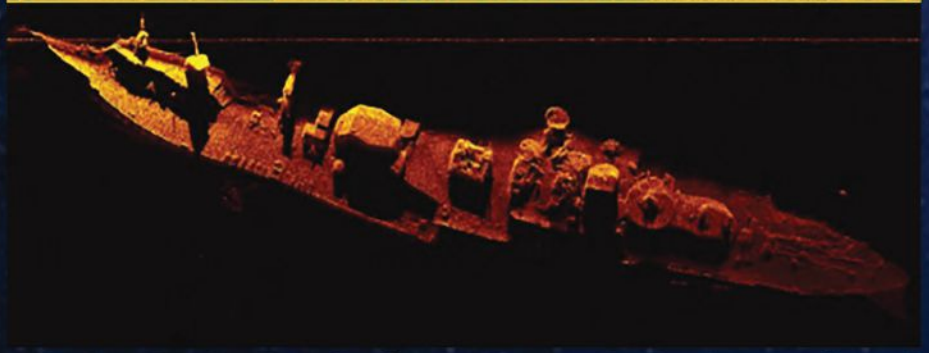

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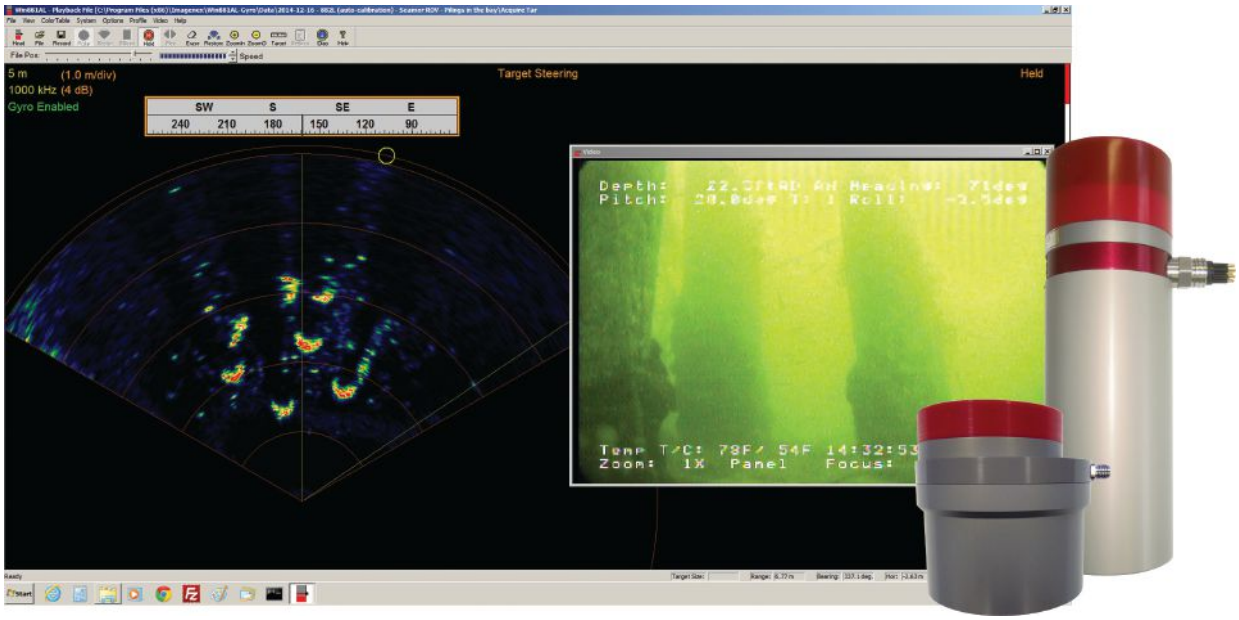
Imagenex 881AL-GS Gyro-stabilized Scanning Sonar

By: Paul Unterweiser, Lieutenant Commander, U.S. Navy (Ret.)

Paul Unterweiser is a retired U.S. Navy officer, USCG licensed master, ROV pilot and, for the last 10 years, president of Marine Simulation LLC, a software company located in North Carolina specializing in developing training simulators for ROV pilot schools and other marine industry applications.



The Imagenex model 881A-GS, 881L-GS (881A/L-GS), and 882-GS are gyro stabilized, high-resolution scanning sonars. Manufactured in Canada, the 881A/L-GS is available in models built to withstand depths up to 10,000 m and can scan and display targets from 0.2 to 200 m away. Available with an RS-485, RS-232, or Ethernet interface gives the user a wide range of options for integration into an existing underwater platform.

The principal benefit of a gyro stabilized sonar is that it can produce a clear sonar image regardless of how the host vehicle may be moving. That clear image is the key capability that allows the software controlling the sonar to incorporate more complex functionality. In the case of the 881A/L-GS, one advanced feature that proved itself invaluable (to be covered in greater detail later) is target focused scanning.

The package I received from Imagenex included the 881AL-GS gyro-stabilized sonar, 4 lead pigtail for integration into my ROV, software and documentation on a CD, and an RS-485 to USB interface (which is available as an option). It differs from the model 881A-GS or 881L-GS in that it is intended to be mounted horizontally, which allows it to be used with smaller, low-profile underwater vehicles such as ROVs and AUVs. The only other component I added was a voltage regulator to convert my ROV's nominal 14.8 volts to the 881AL-GS required 24 volts. Fortunately, the power requirements of the sonar were minimal (less than 7 W) so a tiny, off-the-shelf regulator was all I needed to complete the integration.

The 881AL-GS size and shape are a bit different from other sonars I've used. The main housing is an aluminum tube with a red polyurethane transducer mounted at one end at 90 degrees. The entire unit is roughly 28 cm in length and weighs 1.6 kg (in air)—and so needs to be mounted on a vehicle capable of handling a sonar of this size.

Mounting the sonar is straightforward, but the mounting location must be chosen carefully, allowing unobstructed sonar transmission while also protecting the transducer from damage. The sonar may be mounted transducer "up" or "down" providing more options when choosing a mounting location.

I divided my testing of the 881AL-GS into three parts: initial setup and bench testing, static testing in the water, and fully operational testing at a dive site.

Bench test

Once I had all the components necessary to integrate the sonar, setting it up was straightforward. Two leads of the sonar's pigtail supply power and the other two are for RS-485 serial communications. I installed the supplied software and drivers (initially on a 10-in. Windows tablet and then later on a laptop), connected the sonar to the serial/USB interface, and supplied power to the sonar. I launched the software, selected the COM port, and a few seconds later it was working. I have to say that setting up the sonar was considerably easier than I expected. The system automatically starts an initialization and calibration process as soon as it has power. A few seconds later, it's ready to go.

With the sonar running on the bench, I took a few minutes to familiarize myself with the included software. The software interface, just like the integration, was straightforward and simple to use. At the top of the screen are icons and pull down menus. To the right are larger icons for the most frequently used functions (which just happen to be ideally sized for touch screen use as well); the remainder of the screen is filled by the sonar display. There is an option in the settings for a separate video window so both video and sonar can be displayed and controlled via the same software interface.

Static test

My first "in the water" test was conducted in conditions typical for the coastal estuaries of North Carolina. The bottom was a combination of silt and weeds with a depth ranging from 0 to 10 m. Visibility was less than 1 m, making navigation without a sonar virtually impossible. Potential sonar targets ranged from soft sand banks to hard oyster beds and a variety of steel and wood pilings.

Although I used a 10-in. Windows tablet during the bench test, I decided that a larger screen would be easier to see in the field so used a 15-in. laptop instead. The 881AL-GS was mounted to the under-side of our mini ROV and launched alongside a floating dock. My objective was to become familiar with the 881AL-GS and software while keeping the ROV as stationary as possible. The ROV was kept just below the surface and held in place using thrusters and tether tension. I ran the sonar at various ranges and levels of gain to get a feel for the submerged terrain and obstacles.

After letting the sonar run for a few minutes, I decided to give the "Acquire Target" feature a try. This feature allows the operator to select and direct the sonar's beam towards a contact on the display. The gyro stabilization is then employed to track the selected target regardless of where the ROV (and transducer) may be pointing.

I picked what looked like a small oyster bed 30 m from the ROV's position, selected the "Acquire Target" icon and then clicked on the oyster bed on the screen. The display then changed from full 360 degrees of sweep to a 120 degree sector centered on my oyster bed. I then pivoted the ROV while holding position and watched as the sonar sector on the screen matched whatever movement the ROV made. The smaller sonar sector and quick response of the gyro resulted in quick refresh rates of the painted target. I could immediately see that this could be an enormously useful tool in any application where a scanning sonar is required for navigation.

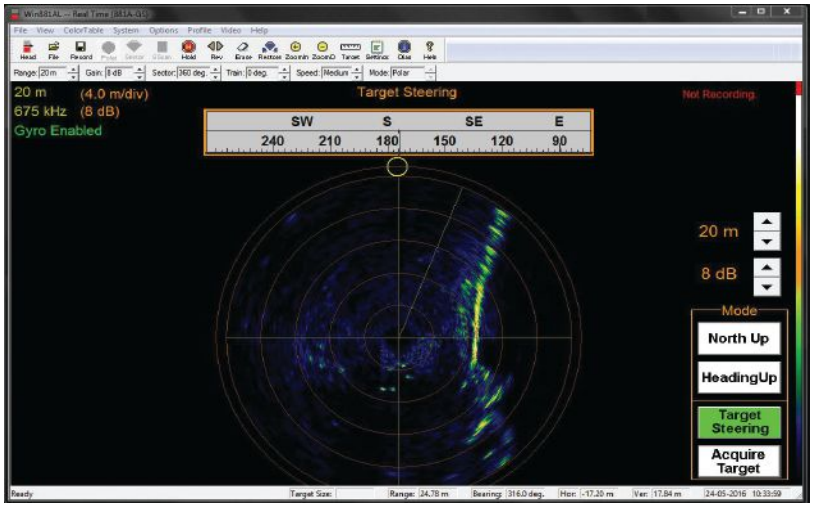
Operational test

Operational testing was conducted in similar conditions as the static tests. Visibility was less than 1 m so I navigated entirely with compass heading, depth, and sonar.

Immediately after launching the ROV, I did a full 360 degree "polar" scan of the surrounding area out to 100 m to help visualize the underwater terrain. Setting the sonar display to "Heading Up" I had a clear picture of the terrain and identified a series of wooden pilings roughly 10 m away. I changed the sonar range to 10 m and then flew the ROV to the piling. The gyro-stabilization did an excellent job of keeping the displayed image clean and understandable as I flew the short distance to the piling. The Imagenex software display includes a "yellow circle" that swings around the circumference of the polar display indicating the current heading of the ROV in addition to a compass heading graphic at the top of the application window. This feature made flying towards the piling easy. I repeated the same scenario with targets at roughly 15 and 20 m with similar results. Without gyro-stabilization I would have needed to stop every few minutes to allow the sonar image to stabilize before then re-orienting myself to the ROV's new position before continuing towards the contact.

The next mission took place near a highway overpass. Conditions were similar to the earlier mission with the addition of roughly half a knot of current caused by an out-going tide. Repeating the steps from earlier missions, I identified a concrete piling on the sonar roughly 50 m away.

With the sonar in "Target Steering" mode, I clicked on "Acquire Target" and then clicked on the bridge piling. The display immediately switched from a full polar sweep to a 120 degree sector centered on the piling in the distance. Watching only the heading display and sonar contact while maintaining a depth of roughly 3 m, I flew the ROV towards the contact. Every time the ROV turned, veered, or pitched, the sonar display instantly responded with an equal, corresponding movement on the display.



I did notice that over a longer period of time, the target seemed to drift a degree or two, but this is expected of any gyro-stabilized system. Although I didn't feel this small amount of drift required it, I could have simply selected "calibrate gyro" from the top pull-down menu to eliminate any amount of drift that may have accumulated. Based on my field experience with the Imagenex 881AL-GS, I felt that as long as I was able to locate a target on the sonar I could navigate to it regardless of what the ROV might be doing.

Closing thoughts

Overall I was very impressed with the performance of the Imagenex model 881AL-GS. Construction was excellent. Installation of the software and integration of the hardware into our ROV were both easy and straightforward. Using the 881AL-GS was equally straightforward, and the included software provided all the features and information I needed.

But what made the 881AL-GS really stand out was its gyro-stabilization. With gyro-stabilization, scanning sonar becomes a very effective tool with a number of key benefits:

- Sonar targets are more easily identified;
- The ROV does not need to stop to stabilize the sonar image, thus transit time to a target is reduced; and
- Bottom terrain and obstacles are more clearly defined and thus more easily avoided.

These benefits make the Imagenex GS family of gyro-stabilized sonars ideal for any application where a scanning sonar is required, but would be especially suited to Search and Recovery (SAR) and operation in limited visibility.

For more infomation visit: www.imagenex.com.

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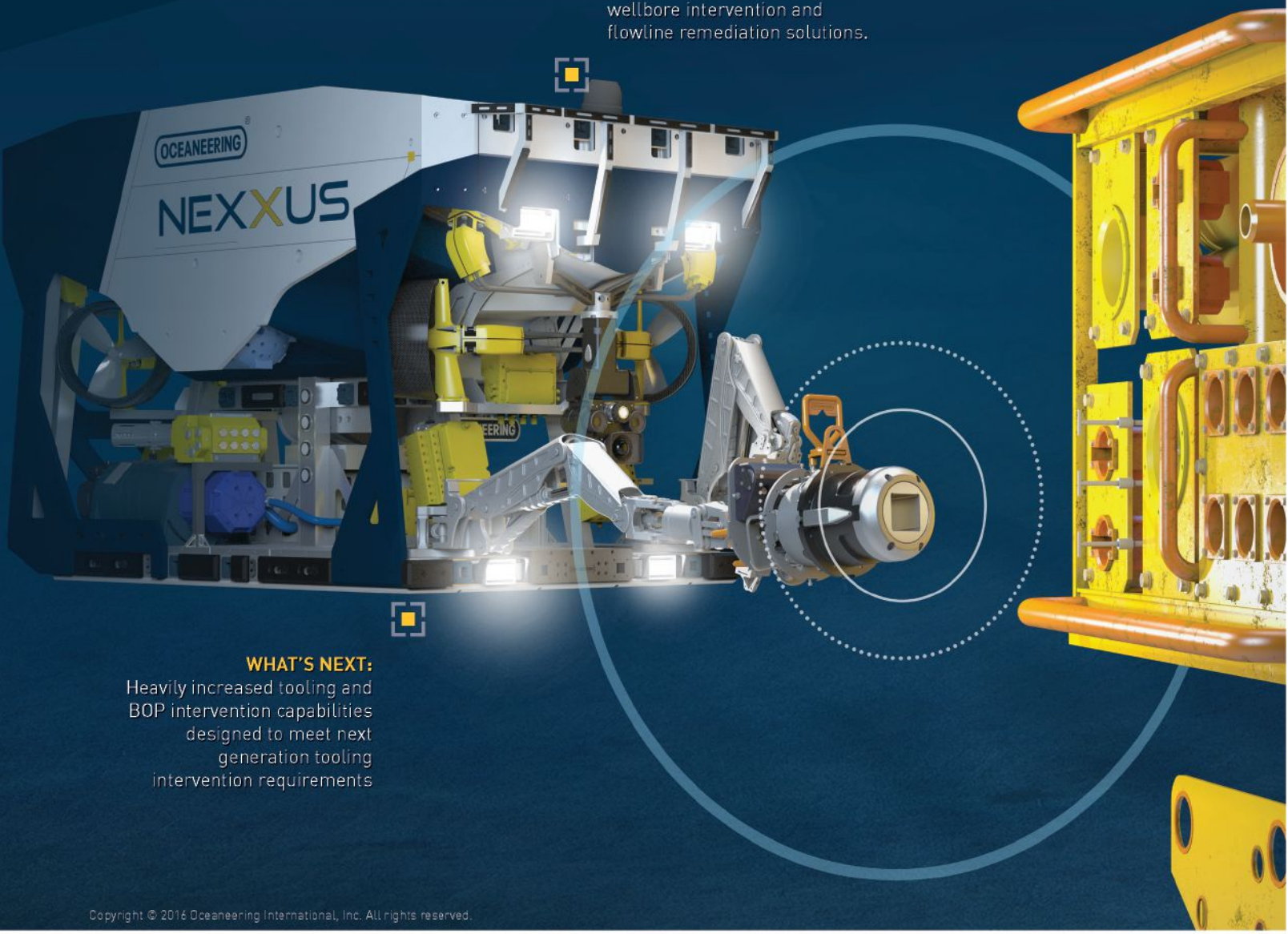

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OFFSHORE INDUSTRY

in this section

InterMoor Pte successfully completes marine aspects of Malikai TLP float-off operation in Malaysia

InterMoor, an Acteon company and part of its foundations and moorings business, recently completed its involvement in the Shell Malikai Tension Leg Platform (TLP) float-off operations.

The TLP was loaded onto the Dockwise Heavy Lift Vessel White Marlin at Malaysia Marine and Heavy Engineering (MMHE) shipyard in Pasir Gudang, Malaysia, and transported to a float-off location in the Singapore Straits.

Contracted by TMJV, a joint venture between Technip and MMHE Shipyard, InterMoor Pte was responsible for the marine aspects of the float-off and tow of Shell's Malikai TLP through the Johor Straits into the Singapore Straits and to a float-off location for various nearshore commissioning tasks to be performed, prior to return to the shipyard.

The work scope also included engineering analysis and procedures, project management for the nearshore operations, management of chartered vessels, provision of offshore personnel and various ancillary services. InterMoor also subcontracted Acteon sister company UTEC to provide survey and positioning for the TLP and marine spread. The offshore operation was completed safely and without incident in April this year.

Martin Kobiela, managing director, InterMoor Pte in Singapore, said, "From start to finish, InterMoor Pte's contribution lasted 6 months. Although a lot of the work is standard for us, particularly the towing and marine activities, many of the work scopes were novel, particularly the provision of catering and sanitation services. Our team was diligent in its care of the project both from Singapore and on location in the MMHE shipyard, Malaysia, and is proud to have been associated with this important development for the region."

The TLP will be installed at the Malikai field in a water depth of approximately 600 m.

Innovative system enhances efficiencies and reduces costs

UTEC Survey, an Acteon company and one of the world's largest independent offshore and onshore survey providers, has successfully completed a significant ROV navigation and seismic node positioning project in deepwater Gulf of Mexico.

The project, carried out for seismic nodal technology leader FairfieldNodal and undertaken in 2,425 m of water, involved use of the latest software and navigation technologies available to simplify operations, increase cost savings on an original scope of work, provide greater precision, increase efficiencies and thereby reduce job time.

UTEC conducted the project using a combination of acoustics and inertial positioning technology. A key element was the creation of an improved navigation software package incorporating the latest NavView technology from data and positioning analysis expert 4D Nav. The system provided enhanced and precise positioning awareness along with the management of inertial sensors and a bespoke link to FairfieldNodal's data acquisition system.

The innovative, real-time software enabled UTEC to integrate three separate positioning modules into one comprehensive package to increase efficiency and streamline user operations. It also provided enhanced graphics capabilities, following the replacement of existing online navigation, inertial navigation and node management software.

UTEC regional manager (Americas) Dave Ross said: "The successful completion of this project underlines the value in applying innovative solutions to increase operational efficiency and address costs, which is critical in the modern industry.

"Our excellent relationship with 4DNav meant that we were able to provide a bespoke solution to FairfieldNodal, which exceeded expectations, eliminated the need for multiple computers, streamlined activities and created a much more efficient operation. We are delighted at the successful outcome achieved by this exciting solution."

For further information, visit www.utecsurvey.com

BP awards Bibby Offshore combined diving campaign

Bibby Offshore, a leading subsea services provider to the oil and gas industry, has successfully secured an important contract with BP. The 15 day project, to commence in August 2016, will see diving support vessel Bibby Topaz, working on four BP operations across three of its North Sea assets.

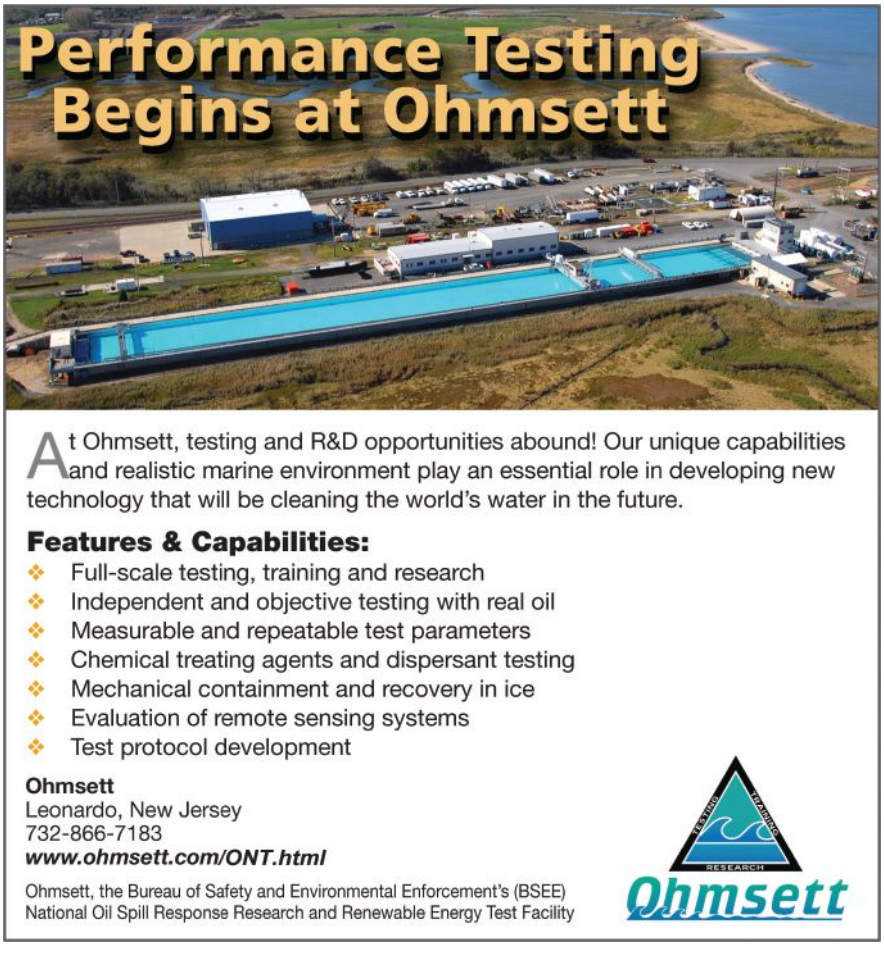
The platforms involved include Central North Sea-based asset Bruce, east of Shetland-based Magnus, and the Mirren field, which is part of the Eastern Trough Area Project (ETAP), one of the largest and most complex North Sea oil and gas developments of the past 20 years.

Bibby Topaz

The project, managed by the Bibby Offshore team, involves the supply of air and saturation diving support to perform operations including spool and flowline disconnection, evaluation and installation of conductor clamp guides, alignment clamp installation and modifications to a gas lift system.

Fraser Moonie, chief operating officer at Bibby Offshore, said: "Encouraging innovation is one of our core values and it was through our team's innovative approach that we were successful in being awarded this contract from BP. Through our innovative engineering solution we managed to reduce offshore operations which in turn provided efficiencies and cost savings."

"We are pleased to continue our strong relationship with BP, built up internationally over the last 10 years and more recently in the UK North Sea. Client satisfaction and confidence is imperative to Bibby Offshore and we are pleased that BP has trusted us with this important piece of repeat business."



Hess Denmark renews integrity inspection contract with DNV GL

Hess Denmark ApS has awarded a contract to DNV GL to provide asset integrity inspection management of its South Arne field including Risked Based Inspection (RBI) services and Non-Destructive Testing (NDT) inspection services. The contract continues an 18-year partnership between Hess and the leading technical advisor to the oil & gas industry.

The asset integrity inspection assessments will address:

- The process systems using pressure-retaining equipment and piping;
- The concrete gravity base and tower;
- The steel structure, both topsides and subsea; and
- Oil export pipeline and offloading buoy.

"DNV GL has been contracted to provide integrity inspection on the South Arne field since 1998. The renewal of this partnership demonstrates the importance of high-quality service delivery in a cost-pressured market. Further, the contract shows Hess's confidence in DNV GL's ability to deliver efficient solutions

which can help manage operation costs for the South Arne field," says Kjell Eriksson, regional manager for Norway, DNV GL – Oil & Gas.

The contract has an estimated annual value of 10 MDKK and is based on both KPI, lump sum and rate based remuneration principles.

Amplus Energy secures future of Aberdeen-based Survey company

Amplus Energy, an Aberdeen-based floating production services firm, has concluded a multi million pound deal to buy Aberdeen-based survey company, Andrews Survey, from the administrators of the Harkand Group, which went into administration at the beginning of May.

Andrews Survey provides survey and positioning services to the offshore oil and gas and renewables markets and has continued operating normally throughout the Harkand administration period. Andrews Survey has 42 staff, all of whom will transfer over with the company and will operate independently as part of the Amplus Group with immediate effect. The company will relocate to the Amplus Group's Bridge of Don premises in Grandholm Drive at the end of July 2016.

It is the second time that the Amplus Energy managing director, Ian Herd, has acquired Andrews Survey. Mr. Herd initially purchased the survey company in 2007, when he ran Integrated Subsea Services (ISS). ISS and Andrews Survey worked successfully together for 5 years prior to both companies being sold to the Harkand Group in 2012.

This time round, Andrews Survey attracted a significant number of potential buyers and the administrators received several offers for the company prior to concluding the transaction with Amplus Energy.

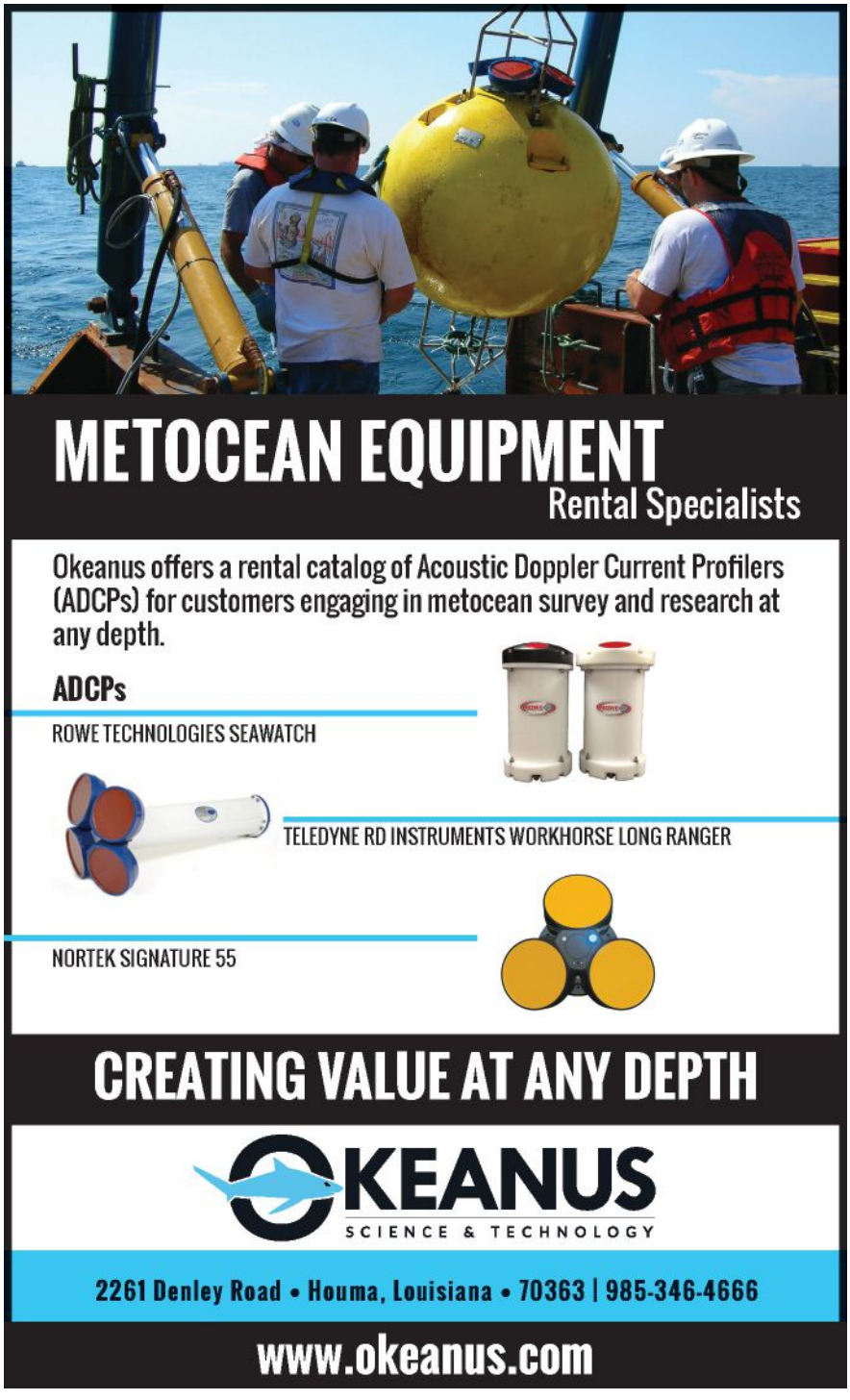
The deal has secured the future of the Survey company, which will continue to operate independently as Andrews Survey under the existing management team and as part of the Amplus Group.

Ian Herd, managing director of Amplus Energy, said: "This was a great opportunity for Amplus to acquire a very good company with an excellent reputation in an extremely difficult market. I know the company and the management team very well and I'm confident we can quickly get Andrews Survey back on an even keel. This is a very good fit for Amplus Energy and allows us to significantly expand our service offering to our clients."

Managing director of Andrews Survey, Stuart Reid, said: "It has been a difficult time for the team at Andrews Survey and we are relieved that a suitable buyer has been found. Our management team and staff have worked closely with Ian before and we work well together. We all feel that Andrews Survey being part of the Amplus Group will bring stability back to the business. We have a strong brand name in the industry and this deal will allow us to, once again, work more independently."

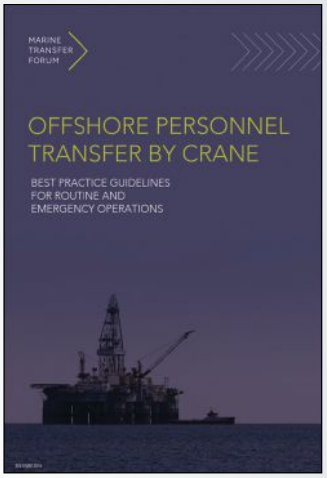
The acquisition will ensure Amplus has a bigger presence in the North Sea, West Africa and the Gulf of Mexico markets as the firm looks to win survey work and contracts for the Amplus FPSO vessel (floating, production, storage and offloading), utilising their innovative dynamically positioned (DP) versatile production unit (VPU).

Amplus Energy Services is positioning itself to build presence in its market and grow the business to create more



New milestone reached for transferring personnel offshore

A new guidance document has been published by the Marine Transfer Forum. "Offshore Personnel Transfer by Crane—Best Practice Guidelines for Routine and Emergency Operations" aims to support an international market which performs over 5 million passenger transfers every year. Developed by EnerMech, DNV GL, Reflex Marine and Seacor Marine the guideline benefits from a range of expertise, which reflect the key roles in ensuring safe and efficient marine transfer operations.



The development of the guideline involved a period of detailed industry consultation. International Marine Contractors Association (IMCA), Institute of Occupational Safety and Health (IOSH) and Damen Shipyards also made key contributions, ensuring it reflects best practice and is relevant to the growing marine renewable energy sector as well as traditional offshore sectors.

Simon Hatson, chair of IOSH's Offshore Group, said: "We welcome the publication of these new guidelines. The offshore industry is one in which workers face many inherent risks, but all workers, irrespective of their industry, should be covered by a culture of care.

These guidelines will assist operators in continuing to protect the safety and health of employees who face risk on a daily basis. IOSH is delighted to have been able to have an input in their development."

"Market conditions, new technologies, evolving logistics demands in offshore wind, and increasing industry trends toward marine versus helicopter-based logistics all bring the case for marine transportation methods into sharper focus. This guidance will help operators review the options and implement the most appropriate solutions," explained Robin Proctor, Reflex Marine's main contact for the Marine Transfer Forum.

To download the guideline and find out more about the Marine Transfer Forum visit www.marinetransferforum.org. For further information, please contact Robin Proctor by emailing info@marinetransferforum.org or calling +44 (0)1872 321155.

ABS, Keppel define JDPs to accelerate innovation

Industry partners address critical technology challenges. (Singapore) ABS, the leading provider of classification services to the offshore industry, is pursuing multiple major joint development projects (JDP) with Keppel Offshore & Marine Technology Centre (KOMtech). The JDPs will include topics such as special purpose rigs, data analytics, and subsea technology.

Senior managers and technical personnel from both companies came together for a 2-day workshop to identify areas where they can collaborate to develop innovative technology to address offshore industry challenges and improve efficiency on existing processes.

"This collaboration clearly defines our role as a technology leader and trusted advisor in the industry," says ABS Pacific division president Derek Novak. "Working with Keppel on these JDPs illustrates our ability to develop new technologies, find novel solutions and establish fresh approaches for validating these concepts."

"As a longtime partner, we greatly appreciate ABS' view of the industry and insights into technology trends. This collaboration is part of KOMtech's strategy to deepen collaboration with like-minded partners," says Michael Chia, managing director (marine & technology) of Keppel Offshore & Marine and Managing Director of KOMtech.

Plans are in place for the details of the JDPs to be finalized in the next few months. The projects are scheduled to be completed within the next 2 years.

DBS completes project for 'one of a kind' well intervention system

A leading northeast surface preparation and protective coatings company has completed a five-figure project on a unique well intervention system.

Davidsons Blast Services (DBS), a family run business based in Peterhead that provides blast cleaning and application of protective coatings to the oil and gas, marine and subsea industries, was awarded the contract early this year by Maritime Developments Limited (MDL), a leading back deck solutions company.

DBS was contracted by MDL to blast clean and apply a three coat topside paint system to MDL's m-IDP (Integrated Deployment Package), a new flexible pipe deployment and retrieval system developed by MDL for subsea pipe manufacturer, Magma Global.

The m-IDP is a compact, highly developed and multi-function system designed specifically for installation, retrieval and storage of 3-in. 15 ksi m-pipe, the lightweight pipe manufactured by Magma Global, to help reduce the costs and risks associated with light well intervention.

Taking just under 3 months to complete the coatings on the innovative system, DBS consulted with MDL at every stage of the process from initial brief to final delivery of the m-IDP. DBS' NORSOK accredited team completed the project with precision and attention to detail, ensuring thorough surface preparation and coating integrity had been achieved.

The three-coat topside coating system was carried out in accordance with MDL's bespoke paint specification as well as the stringent coating procedure developed by DBS. All testing was undertaken by a DBS NACE qualified inspector.

Bruce Davidson, managing director for DBS, said: "Our premises in Peterhead were custom built 6 years ago and in that period we have concentrated our time and efforts on ensuring that DBS' first class facilities, together with our expert dynamic coatings team, are the best fit for today's ever changing innovative structures."

"Our purpose-built facilities offered MDL an ideal combination of a large blasting hall and a climate-controlled paint hall, ensuring optimum conditions for delivering a successful coatings project. It is these factors that lead DBS to continually deliver a first-class service and an enviable track

record for completing high-quality finishes on time and within budget. We have a long-standing relationship with MDL, having carried out a number of projects for the company in the past. We are proud that our customers place repeat business with us and are honoured to have played a small but significant part of a larger project for MDL."

Cyberhawk completes world first for oil and gas supermajor

Cyberhawk Innovations, the world leader in unmanned aerial vehicle (UAV) and drone inspection and survey, has completed the world's first ever UAV internal industrial chimney inspection for one of the world's largest oil and gas supermajors.

The project, which took place earlier this year, was completed over the course of 2 days at one of Europe's largest and most complex refineries.

Traditional internal industrial chimney inspections require personnel to climb inside dangerous and potentially chemically hazardous areas. Inspecting the chimney stack with Cyberhawk's UAVs allowed for a quick and safe audit of the chimney and meant that personnel were not required to physically enter the chimney to complete the inspection.

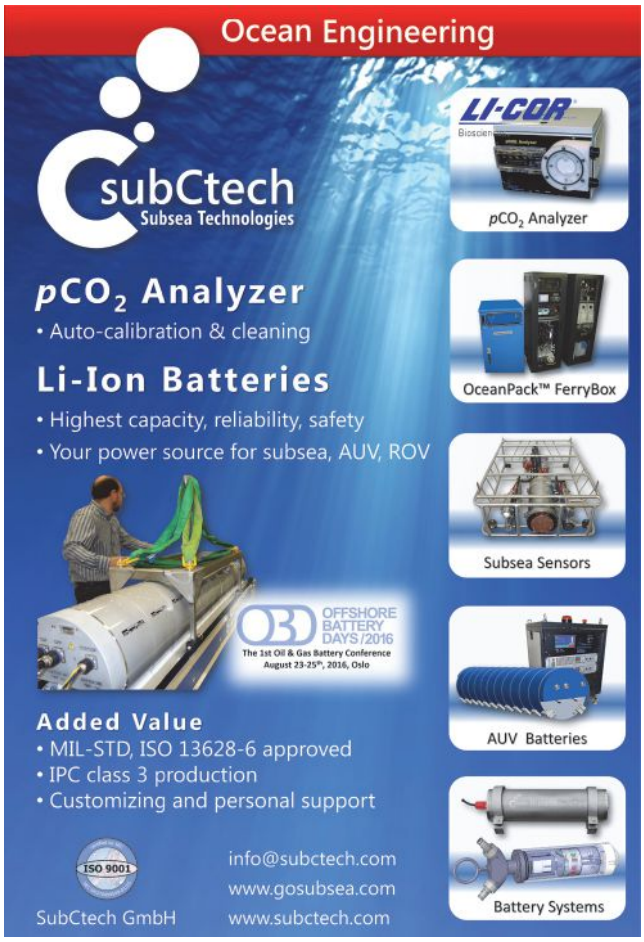
This new internal chimney inspection solution complements its existing industry-leading external chimney stack inspection service, which involves using a drone to capture high-definition images of the stack's full external surface, before creating a three-dimensional model of the chimney. This then provides accurate sizing and positioning of defects along with the provision of high-definition orthophotos of each elevation of the chimney, all delivered in Cyberhawk's cloud-based asset management software, iHawk.

Malcolm Connolly, technical director and founder of Cyberhawk said: "We have been working with this particular client for more than six years, and this project demonstrates continued confidence from one of the world's oil and gas supermajors in our ability to deliver more complex and challenging projects.

"Our portfolio includes a significant amount of work undertaken at refinery and petrochemical sites, such as flare stacks, cooling towers and piperack inspections. We have already been using UAVs to conduct external inspections on chimneys for more than 5 years, and the completion of this recent workscope has proven the feasibility of using drones internally. Completion of this project represents a major leap forward for drone technology and demonstrates the huge safety improvements on offer."

This project continues to build upon Cyberhawk's industry-leading drone inspection service, which last year saw the team undertake the world's first internal inspection of a cargo oil tank on an operational FPSO using a UAV. Projects this year have also added to the company's internal inspection credentials, with the completion of internal steam boiler inspections, at operational thermal power stations, the inspection of oil storage tanks and inside large chemical plants.

Headquartered in Livingston, Scotland, and with bases in Houston, the Middle East and Southeast Asia, Cyberhawk carried out the very first ROAV industrial inspection in 2009 and since then, has completed more than 25 world firsts to date, with blue-chip customers in more than 20 countries on four continents.



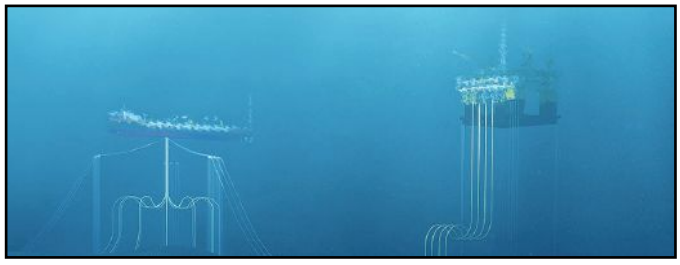
JIP validates DNV GL's helica software based on full-scale tests

A joint industry project run by DNV GL has replicated stresses measured in an umbilical subjected to tension and bending in full-scale tests, further validating the accuracy of the analysis software Helica. DNV GL's Helica can analyse thousands of simulations in a matter of minutes, improving engineering efficiency and significantly reducing design cost.

Subsea engineers calculate stresses in umbilicals and flexible pipes using software to ensure that individual components will not fail. Such failures could lead to costly production shut-downs or hydrocarbon leaks. DNV GL's Helica software, which calculates stresses in umbilical and flexible pipe components, has now been proven to deliver highly accurate results through a joint industry project (JIP). Helica has previously been verified against publicly available data. The JIP compared stresses calculated using Helica with measured stresses in a full-scale umbilical sample subjected to tension and bending, and the analysis results correlated remarkably well with the test data.

"As far as we know, this is the first time anyone has been able to demonstrate such a remarkably strong correlation between analysis results and such high-quality stress measurements in full-scale subsea umbilicals," says Nils Sø dahl, vice president, riser technology, DNV GL – Oil & Gas. The JIP, which included Ultra Deep LCC, ExxonMobil, Oceaneering, Shell, Technip and ABB, based its research on data provided by ExxonMobil. "We are very grateful to ExxonMobil for contributing stress measurements to the JIP and giving us this opportunity," says Sø dahl.

Helica is a highly efficient cross-section analysis tool that calculates mechanical properties, capacities, and fatigue of umbilicals and flexible pipes. Based on these analyses, engineers can optimize design and save cost not only in the design stage, but throughout the lifecycle of the subsea system. Helica can perform thousands of simulations in a matter of minutes, whereas subsea engineers relying on the industry's most commonly used finite element analysis (FEA) tools today may spend hours to build a model and perform a simulation of a single load case.



"We strongly believe that Helica will be the new industry standard for stress and fatigue analysis of flexible pipes and umbilicals," says Are Fø llesdal Tjø nn, CEO DNV GL-Software.

The JIP validation results were presented at the ISOPE (International Society of Offshore and Polar Engineers) annual International Ocean and Polar Engineering Conference in Rhodos, Greece on 27 June.

DNV GL simultaneously launched Helica 2.5, featuring a new module for extreme capacity checks and a new interface to commonly used global analysis software, such as Orcaflex, Riflex and Flexcom.

Lloyd's Register extends drilling rig integrity support for its expertise in blow-out preventors (BOPs) for deepwater exploration off the coast of Trinidad

Lloyd's Register (LR), a leading provider of integrity, compliance and specialist risk consulting services, announced they have extended rig integrity support for the Deepwater Invictus drilling rig. The company's expertise in blow-out preventors (BOPs) and rig integrity will be used to provide confidence in how risk is managed for deepwater drilling and well exploration.

Kevin Comeau, dynamic positioning / power management & marine safety systems manager at LR says: "We have had a team supporting the Gulf Of Mexico (GOM) drilling program on board Deepwater Invictus and it is this same team that has been requested for BHP Billiton's drilling program in Trinidad. Although the core part of our work is on BOP operation, rig integrity and compliance, we will also provide expertise in performing inspections, risk assessments and training for personnel working on the rig."

The BOP is often the final line of defence for protecting life and the environment and so there is high demand for a transparent and well-structured risk assessment approach that helps rig owners and operators to monitor the BOP's safety performance.

A subsea BOP is a special system that is highly regulated and among one of the few pieces of equipment that combines multiple functions such as drilling and operations control, a tool for preventing risk and supporting emergency response procedures. BOPs were developed to cope with extreme erratic pressures and uncontrolled flows emanating from well reservoirs during drilling. These factors mean that simple component failures can cause drilling operators to be exposed to severe risk.

Before the market downturn, LR was reviewing more than 350 drilling rigs each year. The company has unmatched expertise in the provision of maintenance and asset management services, specifically designed to meet the needs of the drilling industry.

"As the industry looks to implement new, best-in-class offshore drilling operations, we believe we have a great deal to contribute to the conversation," highlighted Comeau. "Developments in BOP underline that new technology is not a barrier. It is seen as the catalyst for better performing oil and gas sector and a competitive necessity among the key operators.

"Our work with BHP Billiton is a great example of how synergies between companies can lead to innovative risk and reliability work that help make the industry more reliable, better performing and safer."

Deepwater Invictus was delivered in 2014 and is IMO registered vessel 9620592 with a gross tonnage of 68034. It has a rated drill depth of 40,000 ft. The continuation of support for the Trinidad drilling campaign with BHP started in May 2016.

Saab Seaeye investing to grow lead in electric work capable technology

As markets increasingly turn to the cost-saving benefits of electric systems in the search for economies, industry leader Saab Seaeye reveals further investment in the development of underwater work solutions.

"We are investing in expanding both our technological and operational resources to focus on further extending the work capabilities of our electric systems," says director, Matt Bates.

He explains this has involved establishing additional organisational structures, including a new project management team and a systems engineering group to specifically address the technology needs of particular markets.

He says that expanding the work capability of electric systems follows a growing trend amongst operators to focus on task accomplishment and efficiency as the key drivers in technology selection, rather than horsepower or other over-simplified metrics - and indeed are increasingly open to newer alternatives to conventional ROV system operations.

"For 30 years, we have pioneered many innovations in electric underwater robotic systems that have helped shape the industry. Now, at a time when the market seeks the most cost effective solutions possible, we are accelerating our technological edge to provide more advanced solutions at the lowest possible total operating cost to meet the changing needs and perspectives of the market."

The company is already ahead of the electric work vehicle trend, he says, with their launch of the Leopard system, the Sabertooth hybrid vehicle and other on-going developments. He sees that investment in the creation of further intelligent robotic building blocks for new vehicle systems, bespoke solutions and electric tooling will further boost the work capability of electric robotic systems in general.

He highlights the Leopard in particular, not just because it is seen as the world's most powerful electric work ROV system of its size, but is increasingly being chosen over hydraulic solutions across a wide range of industries.

When compared to a 66-ton hydraulic equivalent, the Leopard's 25-ton complete package offers considerable savings, with a much smaller footprint, faster mobilisation time, lower maintenance costs and a requirement for fewer staff.

Along with its advanced intelligent control architecture, the vehicle's pioneering design highlights many new concepts that are making ROV systems smaller, smarter, more flexible and more powerful.

This kind of smart technology, agility and ability to cope with strong currents, is increasingly giving electric systems an advantage over hydraulic options for many challenging applications.

"There are projects where hydraulic systems remain the right and proper choice, but there is a growing recognition in the market that power and conventional solutions should not always be the key decider, because power gathers costs. This is why the trend, when specifying underwater systems, is to focus on the task and operational environment, not horsepower.

The market today needs lower cost solutions and a future that continues to minimise cost and maximise quality of performance – and seeks innovative solutions.

Indeed autonomous and hybrid vehicles, hosted and seabed resident vehicles, tools and sensors, as well as vehicles operating from unmanned surface vessels, are all examples of the huge opportunity to employ new technologies and innovative solutions that can bring cost and performance efficiencies to underwater operations.

Further investment in developing more common electric building blocks along with our flexible system architecture, will continue to advance these cost saving solutions at an increasing, yet reliable rate.

Forum Energy Technologies receives order for three ROVs

Forum Energy Technologies, Inc. announced that it has received an order from New Orient Marine Pte. Ltd, to supply three ROVs for its multi-purpose ice-class vessel currently under construction in Singapore.

The order includes two Perry™ XLX 200 horsepower, 4,000 m work-class ROV systems and one Sub-Atlantic™ Comanche 3,000 m observation-class ROV. Forum will also provide operation and maintenance training for New Orient Marine's personnel as well as on board support during the ROV mobilisation.

Forum's ROV systems are scheduled for delivery this year. New Orient Marine's new build, multi-purpose ice-class vessel has been designed to operate in ambient temperatures as low as minus 30°C. The first project for the new vessel will involve subsea intervention, inspection, maintenance and underwater welding of existing gas pipeline systems.

For more information, visit www.f-e-t.com.

Contract to build signed by UTAS for Australia's first ISE Explorer AUV

International Submarine Engineering Ltd is pleased to announce the signing of a contract to build a 5,000-m depth explorer class AUV for the University of Tasmania (UTAS) and the Australian Research Council (ARC) Antarctic Gateway Partnership project. This Explorer will be ISE's fourth under-ice capable AUV that builds on the success of Theseus and the two Arctic Explorer vehicles owned and operated by Natural Resources Canada.

This Explorer is destined for the Australian Maritime College, a specialist institute of UTAS, and will be used by the Antarctic Gateway Partnership (AGP), an Australian Government funded initiative to build further polar research capability in Tasmania.

AGP Theme 4 (Marine Technology and Polar Environments) Leader and AMC Principal, Professor Neil Bose, said this Explorer will be utilized by a talented group of scientists and operators taking the under-ice capable vehicle into unexplored environments. Explorer's variable ballast system will facilitate unique science operations such as sediment and ice sampling. This will be a novel use for Explorer's variable ballast system that has been utitilized previously on Explorer and Theseus AUVs to facilitate parking and cable laying.

This Explorer AUV will be equipped with an EdgeTech

2205 sonar that incorporates side-scan, subbottom and bathymetric capabilities in one compact package. Explorer's modular design and unmatched dry payload volume provides opportunity for the AUV with room to grow, allowing UTAS researchers to adapt to the surprises that are inevitable when exploring never before seen areas of the ocean floor. New sensors and payloads can be integrated quickly and easily to adapt to new discoveries.

For more information, visit www.ise.bc.ca.

SeeByte and MIT autonomy collaborating to get robots working together

SeeByte and MIT (CSAIL) are pleased to announce that they are working together to improve the transfer of autonomy research and development between different autonomy systems. Currently, users of one autonomy system, including the architecture and messaging middleware, are limited in their ability to utilize an alternative system. SeeByte and MIT will enable greater flexibility for their customers and collaborators to select the most appropriate autonomy system.

MOOS-IvP is a set of open source C++ modules for providing autonomy on robotic platforms, in particular autonomous marine vehicles. The project is situated at MIT and is widely used in research programmes worldwide.

SeeByte's Neptune provides a payload control architecture, goal-based mission planning, and real-time autonomy engine for Unmanned Maritime Systems (UMS) to plan and execute autonomy behaviours for both single-vehicle and multi-vehicle missions. Neptune has been used operationally by various Navy customers, including in the U.S., Canada and the UK.

In order to provide users of both systems with flexibility, SeeByte and MIT will develop technical approaches to allow improved cooperation and collaboration between these autonomy systems. This is in direct response to customer requests as autonomy research programs become larger and more complex and as customers wish to transfer the output of their R&D activities into an operational environment. In particular, a common theme has been the transition from MOOS-IvP to Neptune for use in higher TRL activities.

Bob Black, CEO SeeByte, said "With high-tech innovative systems, collaboration with other like-minded partners is often key. MIT are providing world leading research in autonomy, and together I think both organisations will be able to harness the best capabilities of both to benefit our users."

For more information, visit www.seebyte.com.

CLIO Offshore launches survey, ROV and recovery services

CLIO Offshore, a division of OMEX—a world leader in deep-ocean exploration—is now offering client packages focused on survey, ROV and recovery for projects down to 6,000 m depth. The containerized packages are designed for fast and efficient mobilization to drive operations from conceptual stages to completion.

Project solutions delivered by CLIO Offshore may encompass a suite of individual tools and services to supplement existing operations or complete project delivery and management to meet a specific objective successfully ranging from desktop study through marine asset procurement and mobilization to execution and reporting.

In addition to the traditional site and route surveys for the offshore energy markets, CLIO Offshore's experience includes deep-ocean natural resource exploration, ship and airplane wreck exploration, archaeological recovery and conservation, and insurance documentation. Its tools can also be used for a wide-spectrum of subsea projects requiring the tools, team and technology that OMEX has assembled.

For more information, visit www.ClioOffshore.com.

Hydroid unveils new subsea hyperbaric testing system

Hydroid, Inc., a subsidiary of Kongsberg Maritime and a leading manufacturer of marine robotic systems, announced the installation of a new subsea Hyperbaric Testing System (HTS) at its manufacturing facility in Pocasset, Massachusetts. The testing system simulates hydrostatic pressures found at depths up to 6,000 m and will be used to test Hydroid's autonomous underwater vehicles (AUVs) and other marine robotics products to ensure their integrity at rated depth. This testing was previously performed at third party facilities; bringing this capability in-house will allow for faster response times and customized testing routines.

The Hyperbaric Testing System, manufactured by Telemark Technologies AS, Notodden, Norway (ASME Certified), provides unrivaled safety and capability. The system is 10,000 psig Maximum Allowable Operating Pressure (MAOP) and capable of testing equipment designed for use in ocean depths of up to 6,000 m. The innovative features of the new system include built-in safeties with secondary pressure containment, rapid turnaround time and full electrical and hydraulic interfaces to test the assemblies while at pressure. The internal vessel dimensions are 1 m in diameter and 2.2 m in height. This means the chamber can accommodate testing of Hydroid's complete family of AUVs, including the REMUS 100, New Generation REMUS 100, REMUS 600 and REMUS 6000, which can dive to 100, 600 and 6,000 m, respectively.

For more information, visit www.hydroid.com.

The Underwater Centre and Bibby Offshore offer apprentices unrivalled ROV experience

Scottish subsea training facility, The Underwater Centre, has linked up with Bibby Offshore to provide ROV apprentices with the opportunity to gain practical hands-on experience unavailable anywhere else in the world.

The apprentices, who are employed by Bibby Offshore but are still too young to go offshore, will benefit from operational experience in the field with live ROVs and will undertake a wide variety of tasks including the mobilisation/demobilisation of the work-class ROV.

The first two apprentices have completed 3 weeks of training where they gained experience in the Centre's mechanical workshop and also on board the work-class ROV vessel, Loch Sunart.

They, and other Bibby Offshore apprentices, will continue to train part-time at the Centre until they are fully qualified and ready to go offshore, learning all the skills available to students on the Centre's ROV courses, from the routine maintenance of an ROV system and hydraulic testing to tether insulation measurement and fibre-optic termination.

The Underwater Centre is a purpose-built subsea training and trials facility based on the shore of a seawater loch, well sheltered by the surrounding mountains. The Centre's unique location allows it to provide year-round training and testing in a tidal, open-water environment with access to depths of over 100 m.

For more information, visit www.theunderwatercentre.com.

Delta Subsea LLC and Boskalis Subsea Service to provide diving and ROV solutions

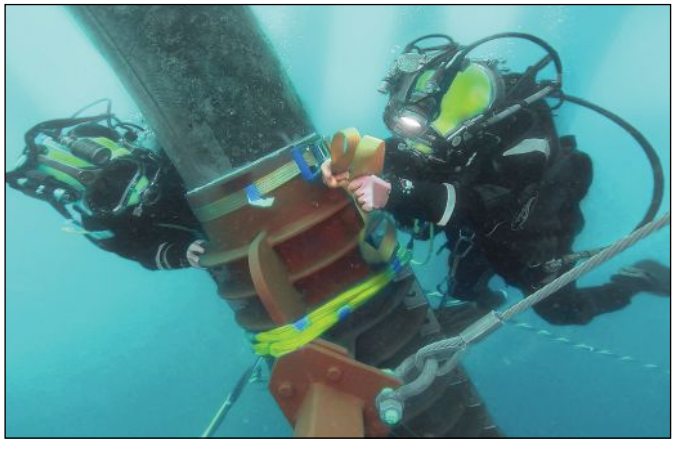
Delta Subsea LCC, a leading integrated independent provider of ROV services and solutions, and Boskalis Subsea Services, a global subsea IRM provider have entered into a Memorandum of Understanding to provide integrated diving and ROV solutions in the Gulf of Mexico.

The agreement reflects both companies' strategic decision to increase their overall service offerings across the Gulf of Mexico, providing a one-stop solutions provider for a broad range of underwater support services from the shelf to deep-water.

The principles of the agreement are set out with Delta Subsea providing specialist ROV interventions, engineering and tooling solutions and support vessels, whilst Boskalis will provide air and saturation diving equipment, services, associated project management and engineering. Boskalis operates the DP2 DSV Constructor with built-in 12-man SAT system with moonpool launched 3-man bell and integrated SPHL.

Boskalis and Delta have worked together over the past 6 years on a variety of projects from ROV support in Europe on UXO projects to diving support projects in Argentina.

For more information, visit www.boskalis.com.



Dorado sem-submersible AUV hits the water

The Canadian Navy's Interim Remote Mine-Sweeper DORADO—a purpose built Semi-Submersible Autonomous Underwater Vehicle (AUV) built and housed by International Submarine Engineering Ltd.—is performing sea trials currently in Belcarra, BC for a new application where a team of researchers from Dalhousie University are bringing environmental / water quality monitoring capability to the AUV. A comprehensive suite of measurements housed on the AUV will allow scientists to remotely survey near-surface/sea-surface conditions.

Funded by the Marine Environmental Observation Prediction and Response (MEOPAR) Network, Principal investigators, Dr. Douglas Wallace and Dr. Mae Seto saw the opportunity to employ DORADO as a way to rapidly survey large areas of the surface ocean. Chris L'Esperance, a Ph.D. student at Dalhousie University's Department of Oceanography, supported by a team from the Canada Excellence Research Chair in Ocean Science and Technology Laboratory, is leading the design, integration and testing of the system. On loan from Defence Research Development Canada (Dorado's Owner/Operator), L'Esperance and ISE's Operations Team are in Belcarra until 17 June.

For more information, visit For more information, visit www.ise.bc.ca.

Blue Robotics' new BlueROV2 enables underwater exploration and study

Torrance startup Blue Robotics announced a new high-performance and affordable underwater drone, the BlueROV2. The BlueROV2 continues Blue Robotics' mission to improve

the accessibility of ocean exploration and study. The BlueROV2 is available for pre-order reservations now and shipping will commence in August 2016.

Leveraging a vectored thruster configuration that is usually only seen in high-end vehicles, the BlueROV2 is smooth and stable yet highly maneuverable. It provides a solid platform to attach scientific equipment, film cinematographic quality shots, and explore the oceans down to a depth of 100 m.

Since announcing their first product, a low-cost underwater thruster motor, in 2014, Blue Robotics has been steadily releasing new enabling products ranging from watertight pressure enclosures to depth sensors and underwater lights.

The BlueROV2 comes in a number of different configurations, with a standard kit costing just around $3,000. "We're able to make the BlueROV2 at a fraction of the cost of similar

vehicles thanks to many of the same technologies that have made aerial drones affordable," said the company's founder, Rustom Jehangir. That includes the use of the open-source Pixhawk autopilot as well as a Raspberry Pi computer.

The BlueROV2 is available as a partially assembled kit that is simple and enjoyable to build and requires several hours of user assembly. Kits will begin shipping in August 2016.

For more information, visit www.bluerobotics.com.

Applied Acoustics equipment to assist in project investigating the risks associated with storing carbon dioxide under the seabed

Southampton researchers are playing a key role investigating the risks of leaks from carbon dioxide (CO_2) storage reservoirs situated under the seabed.

Academics from the University of Southampton will work with colleagues at the University of Edinburgh and the National Oceanography Centre Southampton (NOCS) on a NERC-funded project to understand the risks involved in the storage of CO_2 in depleted oil and gas reservoirs and saline aquifers in the North Sea.

Carbon capture and storage (CCS) is recognised as an important way of reducing the amount of CO_2 added to the atmosphere, and oil and gas reservoirs and saline aquifers are the preferred storage location of most European nations. However, a key element in the safety of such storage is to fully understand the risks of any leakage.

University of Southampton lead scientist Professor Jonathan Bull, a professor in Geology and Geophysics, said: "The location and potential size of any possible CO_2 leakage at the seafloor is critically dependent on the distribution and

permeability of fluid pathways in the marine sediments overlying any proposed storage reservoir."

The 4-year project aims to develop better techniques to locate these sub-seafloor structures and determine the permeability of the pathways so that they can be better constrained and quantified. Amongst other equipment specified for the project, the Applied Acoustics' DTS-500 deep-tow sparker will be used to survey the geology beneath the seabed to determine, in high resolution, the geophysical stratigraphy of the sedimentary basins.

For more information, visit www.appliedacoustics.

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First civil manned submarine sold in South America

Argentina's Coast Guard, the Prefectura Naval Argentina, has recently purchased the first manned submarine for civil applications in South America.

The manufacturer of the submarine is the California-based company Seamagine Hydrospace Corp. The submarine was sold through Mariscope Ingenieria SPA in Chile and Mariscope Argentina SA, subsidiary companies of the German ROV manufacturer Mariscope Meerestechnik and their Argentinean representative Aerofalcon.

The Ocean Pearl Model Submarine is depth rated to 380 m in order to be used in most of the lakes and Ocean areas in Argentina. The system was heavily equipped and counts on bi-directional tracking system, high-resolution sonar, HD camera on pan & tilt mechanism, multifunction hydraulic manipulator, altimeter, extreme LED lighting among other components.

The submarine is full ABS A1 classed and is delivered on a trailer that makes a land transportation easy and efficient, since any light truck or heavy duty pickup is allowed to trailer the vehicle.

The submarine will be used by Prefectura for search and recovery tasks but also for scientific purposes in cooperation with national and international research institutes and universities. The possibility to trailer the sub and to deploy it without the necessity of using a supply vessel permits the use of the sub in the lakes in the Andes. This is something only done formerly by Jacques Y. Cousteau in Peru. Lakes in Argentina nevertheless are very deep and abundant. Every year, people drown in these lakes and search and recovery is difficult due to the depth. Also most of these lakes are barely known underwater. Amazing results are expected from the use of a manned sub in these and other areas.

The servicing of the sub will be done by Mariscope Argentina SA, who counts on proper facilities and personnel for this purpose.

For more information, visit www.seamagine.com.

Marlink, Inmarsat enter strategic alliance for Fleet Xpress broadband services

Marlink has signed a strategic alliance with Inmarsat that will see Inmarsat's new Fleet Xpress service integrated into Marlink's existing service portfolio. Through the agreement, Marlink will bring more than 2,000 vessels to Inmarsat's new Fleet Xpress service over a 5-year period.

Fleet Xpress, the Global Xpress maritime solution, sets a new standard in broadband maritime communications, delivering the highest levels of reliable high-speed broadband connectivity and exceptional performance across all of the world's oceans as well as facilitating innovative "Connected Ship" applications.

Marlink unlocks significant operational potential for its Fleet Xpress customers by providing access to a diverse range of Value Added Solutions, including its XChange communication management platform with capabilities, including Universal Remote Access for increased IT efficiency and Bring Your Own Device (BYOD) for crew communication.

Fleet Xpress heralds a new era of innovation in the maritime sector. It facilitates the deployment of a new generation of Connected Ship applications and with them, a host of operational benefits that will support cost reductions and competitive advantage enhanced by those ship owners and operators that embrace the benefits of global, reliable, high-speed broadband services.

For more information, visit www.inmarsat.com.

Speedcast supports NY-Vendee yachts with live video

SpeedCast International Limited has provided the fleet of yachts competing in the New York-Vendée, Les Sables d'Olonne, with live video transmission. SpeedCast supported a fleet of yachts competing in the event, which concluded in June, after being appointed by Open Sports Management.

The competition was the first edition of the New York-Vendée race, qualifying skippers and Imoca Yachts for the next Vendée Globe, which begins at Les Sables d'Olonne on 6 November 2016.

Each of the yachts was equipped with SpeedCast's media transmission solution, with ClipWay Challenges as a key component. ClipWay is a proprietary software solution that enabled each team to forward live video footage of the race to the race headquarters and production team over a satellite network during the course of the challenging and exciting race.

For more information, visit www.speedcast.com.

Superyacht success for Fleet Xpress

Inmarsat has achieved the first commitment to its Fleet Xpress service by a superyacht owner just weeks after commercial launch in a deal secured through Inmarsat distributor e3 Systems.

The deal represents a major achievement for the service with an existing customer, establishing a position for Fleet Xpress in the highest of high-end markets.

Inmarsat-approved Fleet Xpress hardware was installed on sail yacht Juliet at the beginning of May, bringing new era Fleet Xpress connectivity on board the Ron Holland-designed, 44-m ketch built by Royal Huisman Shipyard in The Netherlands.

The Fleet Xpress installation is the finishing touch to a refit in the STP shipyard of yachting hub Palma de Mallorca. The project involved the installation of a new Sailor 100GX VSAT system and the Inmarsat GX bespoke below deck equipment configuration. The yacht was relaunched at the end of May 2016.

The Fleet Xpress service delivers high data speeds that are enabled by Inmarsat's Global Xpress Ka-band technology combined with the proven reliability of Inmarsat's FleetBroadband L-band service. Inmarsat offers the service based on committed data rates backed-up by service level agreements which guarantee that customers always receive the service for which they are paying.

With accommodation for eight guests and a professional crew of seven, Juliet is luxurious in every way, from the hand rubbed mahogany detail throughout to her array of water toys and audio visual entertainment.

For more information, visit www.inmarsat.com.

KVH: Shipowners must focus on operational optimization

Brent Bruun, executive vice president of mobile broadband for KVH Industries, Inc., and Mike Mitsock, the company's vice president of marketing, told an audience of invited guests at the Posidonia maritime conference in Athens, Greece, in June that the market needs to face up to the realities of how 24/7 connectivity between ship and shore is a real business necessity and is no longer a "nice to have," especially with the intense competition in today's shipping economy.

Mr. Bruun outlined how satellite communications can provide real value to ship operations in one of the most challenging periods in maritime history. He noted, "While satellite communications tend to account for less than 1% of ship operating costs, they are the lynchpin of optimizing the remainder of the operating cost equation."

Mr. Mitsock cataloged the major areas for potential operating cost savings and the role of KVH and its partners in focusing on big data to address each area. "The optimization of significant operational costs, such as fuel, through such measures as route planning and engine maintenance, can lead to sustainably lower overall costs," he said.

Citing an example from MISC Berhad, a leading Malaysian ship operator, Mr. Mitsock described further evidence of operational cost reductions. The ship operator recently credited improvements in maritime training supplied by Videotel, part of KVH Industries, with contributing to a 10% saving in dry-docking costs and a 9% reduction in MISC Berhad's vessel operating costs.

Connectivity is also a significant factor in crew retention, Mr. Mitsock said, using evidence from a Crew Connectivity 2015 Survey report by Futurenautics, which stated that "73% of respondents said that the level of crew communications services provided onboard did influence their decisions about which shipping company they worked for."

For more information, visit www.kvh.com.

Essberger moves its entire fleet to Marlink's Sealink VSAT services

The Hamburg headquartered John T. Essberger (JTE) Group will migrate the primary communication systems of its entire fleet to Sealink, Marlink's global maritime broadband VSAT service. The installation on 22 chemical tankers and 9 dry cargo vessels is expected to be completed by the end of the year.

Essberger was founded in 1924 as Atlantic Tank Reederei by tank ship pioneer John T. Essberger. The Essberger Tankers division fleet consists of highly sophisticated chemical vessels, while JTE Dry Cargo operates a fleet of modern bulk carriers, multi-purpose tonnage and container vessels, as well as cement tankers.

Essberger's move to VSAT reflects its commitment to technical innovation combined with safety required by Lloyd's quality assurance guidelines. The higher bandwidth and cost control offered by Sealink VSAT enables them to deliver new crew communication facilities and introduce streamlined processes for ship/shore data transfer. As Sealink is a global service, Essberger vessels can operate worldwide with data connectivity and voice communication always available.

All vessels will also be equipped with the XChange communication management system to comprehensively manage the fleets' IT and communication tasks via a single, integrated platform. Essberger will manage its voice, VoIP, and data connectivity for corporate and crew usage and also utilise the Universal Remote Access (URA) function of XChange to keep full control of their onboard IT network from shore. All vessels will be equipped with two voice lines and Wi-Fi access points to allow crew to connect with their own personal devices.

For more information, visit www.marlink.com.

Alaskan Leader Fisheries to install Inmarsat's Fleet Xpress

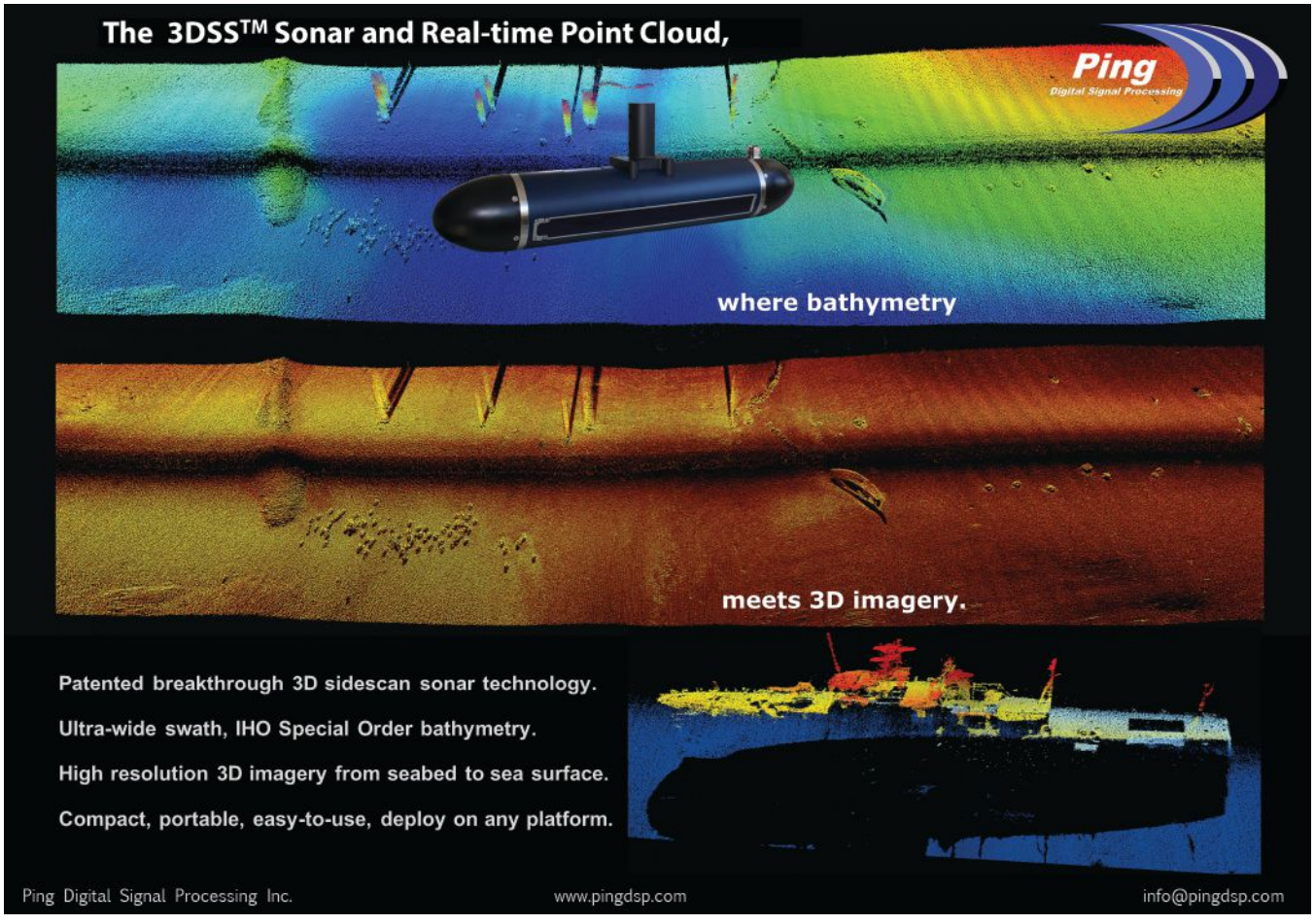
Inmarsat announced that its partner Network Innovations (NI), together with Fusion Marine Technology, have signed a contract with Alaskan Leader Fisheries to install Fleet Xpress, Inmarsat's new high-speed broadband maritime communications service, powered by Global Xpress (GX). The contract marks the first commission of Fleet Xpress in the remote and hostile waters of the Bering Sea.

Fleet Xpress sets a new standard in broadband maritime communications, delivering the highest levels of reliable high speed broadband connectivity and exceptional performance across all of the world's oceans as well as facilitating innovative Connected Ship applications.

Alaskan Leader Fisheries is an Alaskan-based commercial fishing company, specializing in the harvesting, processing and marketing of Alaskan seafood. Alaskan Leader Fisheries have chosen Fleet Xpress to support their daily business operations.

With Fleet Xpress, Alaskan Leader Fisheries shore-based sales teams can maximize their sales potential with up-to-date information on catch qualities and weights, while also sharing and recording geographical catch areas for more targeted sustainable fishing methods. Fleet Xpress is also intended to support the company's crew welfare initiatives to provide its seafarers with a vital communication link to friends and family and access to the Internet to alleviate the boredom on the long voyages at sea.

The install was led by NI partner Fusion Marine Technology and includes a Cobham 100GX 1-m VSAT antenna



that together with a FleetBroadband antenna and below deck unit form the hardware needed to operate the service. The antenna manufactured by hardware partner Cobham has been built to withstand the toughest weather conditions and provide stable connectivity regardless of weather and location.

With the continued success of the first vessel, Alaskan Leader Fisheries will look to install Fleet Xpress across their entire fleet of vessels.

For more information, visit www.inmarsat.com.

MSC Cruises, Marlink enhance guest connectivity across its fleet

MSC Cruises, the world's largest privately owned cruise line and market leader in Europe, South America and South Africa announced that it has worked together with Marlink to launch a next-generation connectivity for MSC Cruises' fleet with multi-band VSAT services.

Working with Marlink, MSC Cruises will provide dynamic bandwidth to its 12 existing ships as well as the next-generation ships currently under construction, including MSC Meraviglia and MSC Seaside. No matter the itinerary of the ships, the bandwidth will be able to accommodate seasonal fluctuations, thus optimizing the dedicated "cloud of bandwidth" available exclusively for MSC Cruises, ensuring all of the company's ships will be covered by one of the satellites that create a global service.

MSC Cruises' extensive bandwidth upgrade has been implemented to meet the growing demand from guests for fast social media and web access, access to work, and streaming services. Marlink's new services will provide unmatched levels of connectivity for MSC Cruises guests throughout the Company's itineraries the world over.

This announcement reflects MSC Cruises' position as an innovative and forward-thinking cruise line by offering one of the most advanced guest connectivity services available at sea. With several hundred Mbit/s available in Marlink's Sealink Cloud, MSC Cruises will deliver a whole new online experience for guests that are hungrier than ever for cost-effective, reliable Internet access for various usages while enjoying their holidays.

Marlink is installing a cutting-edge multi-band satellite communications solution that combines capacity on new Ku-band High Throughput Satellite (HTS) and traditional Ku-band widebeam satellites. The new services will allow fast, reliable access to the web—including social media sites—for guests across MSC Cruises' 12 modern cruise ships. The upgrade builds on MSC Cruises' already highly advanced VSAT network with new high throughput modems and network configuration designed to handle huge amounts of capacity from different satellite operators.

For more information, visit www.marlink.com.

Marlink boosts Stena Line passenger connectivity experience

Stena Line's ferry passengers are set to experience new levels of communication services following a significant upgrade to the VSAT connectivity on board. Marlink has more than trebled the bandwidth in Stena Line's fleet-wide Closed User Group (CUG) service and integrated GSM 3/4G services for connectivity during voyages in addition to in-port Internet Wi-Fi networks. The upgrade enables Stena Line to offer its passengers faster Internet speeds to meet the growing demand for access to social media and connectivity for working while travelling.

This upgrade puts unrivalled levels of Internet connectivity on board Stena Line ferries and strengthens the company's position as an early adopter of cutting-edge communication technology and services that keep passengers connected throughout a voyage. By combining Sealink VSAT, GSM 3/4G and Wi-Fi through its sophisticated multi-band solution, Marlink enables hundreds of separate high-speed Wi-Fi connections for Stena Line's 25-ship fleet.

The Sealink VSAT CUG configuration ensures high bandwidth and availability of voice and Internet access, in addition to providing the flexibility to

optimize connectivity based on demands. Before this upgrade, the CUG was based on an already industry-leading bandwidth allocation, that all 25 vessels in the fleet could access on a shared basis. Now, Stena Line's fleet has direct access to significantly more bandwidth on diverse, integrated carriers.

Stena Line's dynamic new service is designed specifically for its fleet to make the best use of a large, shared-capacity pool. Vessels receiving connectivity within 3/4G coverage areas or Wi-Fi while in port will require less from the VSAT CUG capacity, allowing even more satellite bandwidth to be available for other vessels and passengers at sea using the VSAT CUG. Taking advantage of Marlink's multi-band configuration, the vessels will switch automatically between Sealink VSAT and 3/4G in addition to hooking into port Wi-Fi services when docked, ensuring seamless communication and connectivity for passengers and crew.

For more information, visit www.marlink.com.

KVH adds maritime weather updates to content delivery service

KVH Industries, Inc. has announced that its content delivery service IP-MobileCast now includes high-resolution updates from Applied Weather Technology (AWT), a leading marine weather service provider, as a standard feature. Subscribing vessels will receive global weather data four times per day via the KVH mini-VSAT Broadband network without incurring any data transmission costs.

This standard feature is now available to all KVH mini-VSAT Broadband customers who are also licensed users of AWT's Bon Voyage System (BVS), a leading onboard application for weather rendering and voyage optimization. To begin receiving the AWT weather updates, mini-VSAT Broadband customers need only to subscribe to the FORECASTlink channel of KVH's IP-MobileCast service at no monthly charge.

The ability to provide weather data updates with no data transmission costs is made possible by KVH's IP-MobileCast multicast communications protocol, a technology launched by KVH in 2014. The IP-MobileCast service also features news, entertainment, training, and sports content for subscribing vessels at sea without affecting data transmission speeds or vessel communications performance.

For more information, visit www.kvh.com.

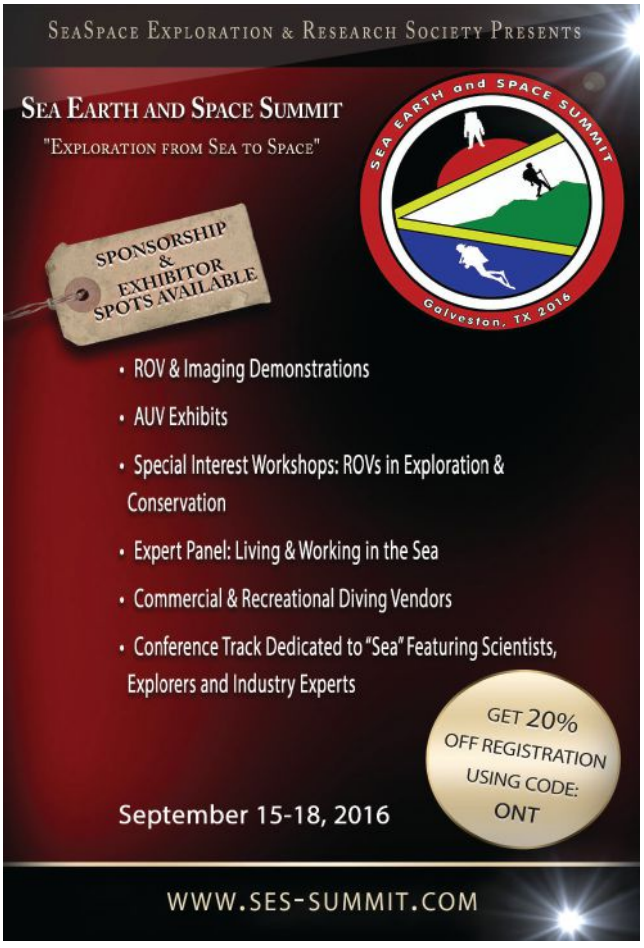
Inmarsat supports Operation Deep Freeze 2016

Inmarsat supported the National Oceanic and Atmospheric Administration (NOAA) team during Operation Deep Freeze 2016 while on board the U.S. Coast Guard's Heavy Icebreaker Polar Star.

Inmarsat provided satellite communications connectivity to the Polar Star as it cleared a channel through the sea ice for ships to resupply the McMurdo Research Station in the Ross Sea so an oil tanker and a supply ship could get to and from McMurdo Station to deliver fuel, food and other supplies.

NOAA's primary role in the operation involved collecting and transmitting data, images and video from unmanned Puma All Environment aircraft. Inmarsat satellite communications were used to keep the Puma in constant touch with the Polar Star while it went ahead of the ship, collecting data and images to deliver real-time information about the potential for treacherous conditions. Inmarsat's satellite communication services supported the mission by providing critical data and voice connectivity to the outside world, including aviation coordination and command centers in Antarctica and North America.

For more information, visit www.inmarsat.com.



Prysmian hands over transmission cable link to Terna

Prysmian Group announced that the extra high voltage power cable link between Sicily and Calabria across the Messina straits has been successfully handed over to its customer Terna Spa Rete Elettrica Nazionale.

Prysmian developed and produced a double-circuit 380 kV HVAC (high voltage alternate current) land and submarine cable system installed along a total route of approximately 44 km – of which 38 km running under water – between the power stations of Villafranca Tirrena in Sicily and Scilla in Calabria. The project includes the installation of the first permanent monitoring system, an exclusive of Prysmian, carried out by ways of 18 Pry-Cam Grids devices installed along the entire land route section.

Prysmian installed the submarine cable with their own cable ship Giulio Verne, the vessel with the largest operation capacity in the world in this sector. The land cables installation proved to be among the most technically complex ever, with operations carried out in a vertical shaft of 300 m and a 12% sloped and 2.8-km-long tunnel.

Prysmian was awarded the 300 million euro contract in December 2009. The order book of Prysmian in the power transmission business amounts to 3.2 billion euro. With the goal of further strengthening its worldwide leadership in the industry, the Group is currently involved in important investment programs both in terms of technology innovation (the announcement related to the first ever 700 kV HVDC cable system was recently released) and of project execution, with the launch of a new cable laying barge.

For more information, visit www.prysmian.com,

GlobalNexus announces new subsea cable

Bahamas-based GlobalNexus Ltd. has announced its entry into the telecommunications market to improve business efficiency in The Bahamas and throughout the Caribbean. The move will seamlessly connect the region to the rest of the world.

GlobalNexus, a privately held corporation headquartered in Nassau, is launching at a time when the need for reliable, fast and affordable Internet, voice, WAN (wide area networking) and other cloud services has never been higher. The company is currently operating in The Bahamas and offers Internet, voice and cloud-enabled networking and it expects further expansion in international services.

GlobalNexus' submarine network will provide high capacity connectivity between the Caribbean, Canada and the US. When complete, the enhanced network will bring much needed terabit-speed capacity to the region, along with important new routes. The network is backed by the most comprehensive enterprise SLA in The Bahamas, and ensures optimal performance, redundancy and reliability for any size business, including enterprise-level.

For more information, visit www.globalnexus.com.

NEC approaches the limit of transoceanic optical transmission efficiency

NEC Corporation has demonstrated a transmission capacity of 34.9 terabits per second (Tbit/s) on a single optical fiber, over a distance greater than 6,300 km. This achievement breaks the spectral efficiency record for transoceanic transmission, achieving 8.3 bit/s/Hz using the C-band spectrum. This is a 16.9% improvement on the previous record, which, according to research by NEC surpassed the previous world record of 7.1 bit/s/Hz.

These results come very close to the Shannon Limit, the fundamental spectral efficiency limit of optical communications. Maximizing spectral efficiency is one of the primary goals in the design of submarine cable networks, enabling the highest possible capacity per fiber pair, while reducing the terminal equipment cost, space and energy consumption. This demonstration of NEC's technologies comes within 0.5 decibels (dB) of the theoretical maximum value.

These results were presented at the post-deadline session of the Optical Fiber Communication Conference and Exhibition (OFC) 2016 in Anaheim, California.

For more information, visit www.nec.com.

National Grid completes sea2shore cable landing

Bringing offshore, wind-generated energy to the U.S. electric system for the first time took a major step forward this past weekend with the landing of a 20-mi undersea cable between the Rhode Island mainland and Block Island.

The cable will bring power created by the five-turbine Deepwater Wind Block Island Wind Farm project located just off the island to the mainland power grid. The undersea cable was installed between Scarborough State Beach in Narragansett, Rhode Island, and Crescent Beach on Block Island. The cable will ultimately be connected to a new National Grid substation being constructed on the island and to an existing substation in Wakefield, Rhode Island on the mainland. The same cable will also interconnect the privately owned Block Island Power Company (BIPCo) to the mainland. Until now, the island's electric power needs were met through diesel-powered generation. Once the system is energized, National Grid will purchase the output from the Deepwater Wind Farm through an agreement approved by the Rhode Island Public Utilities Commission and feed the power into the regional transmission system. BIPCo will purchase its power through the energy markets. A portion of that power will include output from the Deepwater Wind Farm.

"We still have several months of construction work and testing to complete before the system can be energized," said Rudy Wynter, president and COO of National Grid's FERC regulated businesses. "We're continuing to work closely with Deepwater Wind, BIPCo, the towns of New Shoreham, Narragansett, South Kingstown as well as state, local and federal permitting agencies to complete the project this fall."

The nearly five million pounds of undersea cable that connects the Deepwater Wind Farm to the island and the island to the mainland was manufactured in South Korea by LS Cable, which was also the company overseeing the installation of the cable for National Grid and Deepwater Wind.

Connecting the undersea cable to newly installed underground cable on the island will be completed this week. Underground duct banks through which connecting electric cables will run have been installed in Narragansett, South Kingstown and on Block Island and approximately 90% of the underground cables are in place. Cable splicing, overhead line, and substation construction will continue over the summer months. Substation testing and commissioning is scheduled to begin after Labor Day.

For more information, visit www.sea2shoreri.com.

Makai cable route planning software sees increase in sales

Makai Ocean Engineering, Inc. made multiple new sales of its popular software for route engineering, installation planning, and real-time lay control of subsea cables.

"We are pleased to announce multiple sales of MakaiPlan, MakaiPlan Pro, and MakaiLay to existing and new customers," said Dr. Venkata Jasti, Makai's manager of submarine cable systems. "We've worked hard on improving the functionality and user-friendliness of Makai's software suite, especially for subsea power cables. Helping our customers succeed in their route engineering, installation planning, and at-sea cable laying operations is what drives us."

Makai's recent sales include:

• CSCC – China Submarine Cable Construction Co. (China) purchased a license of MakaiLay;

• KCS – Kokusai Cable Ship Co., Ltd. (Japan) purchased a MakaiPlan Pro;

• GD – General Dynamics (USA) purchased an additional MakaiPlan Pro; and

• ALDA Marine (France) purchased three additional MakaiPlan licenses.

Unlike other GIS software, Makai provides clients with a comprehensive set of software tools and training that span the entire cable project, from inception to installation.

MakaiPlan is the world's #1 cable route planning and engineering software, with over 300 licenses sold over the last 14 years.

MakaiPlan Pro is powerful and precise 3D, dynamic simulation software used to identify installation risks and prepare a detailed installation plan before ever going to sea.

MakaiLay is advanced subsea cable installation software that enables users to lay submarine cables with the highest level of accuracy, speed, safety, and reliability possible today, dramatically reducing the risk of cable failures. The software has been rigorously tested and validated and has been used by over 75% of the global fleet of cable ships on countless commercial lays and military installations to successfully install well over 400,000 km of cable worldwide.

For more information, visit www.makai.com.

Offshore cable claims severity increases by 25% in 2015

Incidents relating to the installation and operation of high voltage subsea cables are the most costly cause of financial losses in the global offshore wind industry and led to insurance claims totalling more than €60 million in 2015. That is according to data assembled by GCube Underwriting Ltd. (GCube), the leading underwriter for renewable energy, in a new report entitled Down to the Wire: An Insurance Buyer's Guide to Subsea Cabling Incidents.

As the European offshore wind sector prepares to enter an extended phase of deepwater construction and new markets open up in North America and Asia, it is crucial that the industry starts to address a problematic bottleneck that can cause 100 days or more of unscheduled project delays and create substantial cost overruns.

On average, at least 10 subsea cable failures are declared to insurers each year in the offshore wind sector. While this frequency is low, the financial severity of these incidents upon developers, project owners and offshore transmission owners (OFTOs) continues to grow—such that they account for 77% of the total

global cost of offshore wind farm losses. Managing this financial impact will be essential if the industry is to meet increasingly stringent cost reduction targets and maintain its appeal to the international investment community.

In Down to the Wire, a report produced exclusively for GCube's community of insured clients and brokers, GCube explores the causation, financial impact and mitigation of subsea cabling incidents. Crucially, the report finds that two-thirds of cable faults recorded in GCube's extensive claims database can be attributed to contractor error during the installation phases, even if these do not manifest until the wind farms are operational.

This highlights a growing requirement, not only to ensure quality control during cable laying, but also to create more effective communications channels and improve data collection procedures.

For more information, visit www.gcube-insurance.com.

Agreement aims at Chinese OWF market

Covestro and Tekmar Energy Ltd. have signed a cooperation agreement on a high-performance and durable subsea cable protection for the China Offshore Wind Farm (OWF) market. This market is set to grow towards 10 GW of capacity within the next 3 to 5 years. Once operational, China's OWF capacity will be one of the world's largest in terms of size and production output, surpassing the scale of the entire existing and planned European production capacity in volume.

Both companies will collaborate on the development of Cable Protection Systems (CPS). They protect expensive and sensitive subsea energy cables at vulnerable locations from the wave and tidal action amongst other external forces. The development covers many solutions from bend stiffeners to bend restrictors, many of which are using TEKLINK® CPS developed by Tekmar based on Covestro specialty elastomers materials.

TEKLINK® CPS by Tekmar is a patented CPS for connection and protection of cables in wind turbine foundations. It involves several products such as stiffeners for damping movement, bend restrictors for offering lock-out protection and split-pipes for ballast and stability. Together, they enable to improve longevity and performance of offshore wind farms, to significantly increase the productivity and safety of the installation process and thereby to help the project owners to gain time and save money.

Throughout the development phase of these high-performance subsea cable protection solutions, Covestro provided crucial support in elastomers chemistry and processing expertise. The developed system leads to highly robust elastomers suitable for resisting severe offshore environmental conditions. To achieve the required impact and hydrolysis resistance for this application, Covestro recommended a system based on its well-known Desmodur® and Baytec® technologies.

As part of the cooperation agreement, Covestro will supply elastomer casting machinery, elastomer systems as well as processing know-how to enable the manufacturing of the cable protection systems in China developed by Tekmar in the UK.

For more information, visit www.tekmar.co.uk.

FASTER Cable System is ready for service

FASTER, a consortium of six international companies, together with its supplier NEC Corporation, announced that construction and end-to-end testing of a new trans-Pacific submarine cable system, the "FASTER Cable System," has been successfully completed and will start service on 30 June 2016.

The 9,000-km cable lands in Oregon in the United States and two landing points in Japan—Chiba and Mie prefectures. The system has extended connections to major hubs on the West Coast of the U.S. covering Los Angeles, the San Francisco Bay Area, Portland and Seattle. The two landing points in Japan facilitate the cable's easy access to major cities in Japan. FASTER's robust and resilient connectivity to many neighboring cable systems extends the cable's capacity beyond Japan to other Asian locations.

FASTER is the first trans-Pacific submarine cable system designed from day one to support digital coherent transmission technology, using optimized fibers throughout the submarine portion. The combination of extremely low loss fiber, without a dispersion compensation section, and the latest digital signal processor, which compensates for the huge amount of cumulative dispersion at the end of the cable, enable this six-fiber pair cable to deliver 60 Tbps of bandwidth across the Pacific.

Construction of the system was announced in August 2014 by the FASTER consortium, consisting of China Mobile International, China Telecom Global, Global Transit, Google, KDDI and Singtel.

For more information, visit www.nec.com.

Supply contract to build DARE signed

Seven of the most prominent telecom service providers from the Horn of Africa, East Africa and Middle East have signed a construction and maintenance agreement (C&MA) to build the Djibouti Africa Regional Express (DARE), a new and unique high capacity submarine cable system. The regional submarine cable system is expected to be completed by May 2018.

The DARE submarine cable system, spanning approximately 5,500 km, will connect Dar Es Salam, Mombasa, Mogadishu, Bossaso, Berbera, Mocha and Djibouti. The system will provide an alternative low latency route to Horn and East Africa. TE SubCom, a TE Connectivity Ltd. company and an industry pioneer in undersea communications technology, has been awarded the supplier contract for the DARE project, which will provide additional protection and diversity to existing heavily congested undersea cable systems.

The 100G cable system will deliver more than 60 Tbps of capacity, and each branch is implemented with optical add/drop multiplexing nodes (OADM).

DARE will stimulate exponential business growth in participating countries by providing robust, reliable and lowest latency connectivity. Additionally, the diversified Points of Presence (PoP) and future connectivity options in Djibouti, Yemen, Kenya, and Tanzania will provide vital flexibility for the consortium carriers and their customers.

The seven major carriers that make up the DARE consortium include Djibouti Telecom, TEAMS, TeleYemen, Telesom Company, Hormuud Telecom Somalia Inc., Golis Telecom, and Somtel Group.

For more information, visit www.te.com.

FCC adopts outage reporting rules

The Federal Communications Commission (FCC) has adopted rules that require submarine cable licensees to report significant outages to the FCC to help safeguard this critical communications infrastructure and promote reliable communications for businesses and consumers.

There are approximately 60 submarine cables that provide connectivity – voice, data and Internet service – between the mainland U.S. and Alaska, Hawaii, Guam, American Samoa, the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands, as well as the connectivity between the U.S. and the rest of the world. Submarine cables are vital to America's economic and national security, yet in the past

licensees have only reported outages to the FCC on a voluntary and inconsistent basis. When the FCC has received information on outages, it has been too limited to be of use.

The new outage reporting rules will enable the FCC to monitor the operational status of submarine cables and assist the agency in ensuring the reliability of this communications infrastructure.

The rules require submarine cable licensees to report major outages to the agency's Network Outage Reporting System (NORS). Other communications providers—including wireline, wireless, and satellite—already report outages to NORS. This has allowed the FCC to analyze outage trends, spot systemic issues, and work with providers to develop solutions to make communications more resilient and reliable.

In the Report and Order adopted recently, the FCC also noted that its International Bureau, in coordination with its Public Safety and Homeland Security Bureau, is developing and improving interagency coordination processes to facilitate rapid deployment and maintenance of undersea cables.

For more information, visit www.fcc.gov.

Huawei Marine, Rostelecom begin Kamchatka-Sakhalin

Huawei Marine and Rostelecom started the construction of submarine fiber optical telecommunication line connecting Kamchatka and Sakhalin. The construction of this 900 km submarine cable constitutes the second phase of the Far East cable system that connects the regions of Kamchatka-Sakhalin-Magadan and will be commissioned in Q1 of 2017. The new submarine cable backbone infrastructure will provide high-speed broadband Internet access to the population of Kamchatka krai and Magadan oblast.

Phase one connecting Sakhalin – Magadan was completed in 2015 along with the land-based telecommunication network on the Kamchatka peninsula. This terrestrial network connects to the submarine cable in the area of Ust-Bolsheretzk, from where the submarine cable is buried beneath the seabed as it crosses the Okhotsk Sea, connecting Ust-Bolsheretzk in Kamchatka with Okha residential point in Sakhalin. This will alleviate the dependence on the existing communication lines connecting Petropavlovsk-Kamchatsky as compared to the current land route that passes empty lands in the area of permafrost and very complex climate conditions.

For more information, visit www.huaweimarine.com.

Telefónica extends maintenance contract

Alcatel-Lucent Submarine Networks (ASN), now part of Nokia, and TE SubCom, a TE Connectivity Ltd. company, together with Telefónica, announced that they have renewed the marine maintenance service agreement for Telefónica's domestic and South America-1 (SAM-1) submarine cable systems.

Under the Atlantic Private Maintenance Agreement (APMA), ASN and TE SubCom will continue to make available three dedicated maintenance vessels in the Western Atlantic (Curaç ao) and Eastern Atlantic (Cape Verde and Calais) as well as experienced, fully trained and certified personnel for cable repairs on Telefónica's domestic and SAM-1 cable systems, totaling more than 27,000 km.

For more information, visit www.te.com.

Tight ROV Integration Puts Productivity on the Rise:

Improving the Relationship Between Man and Machine

By Marybeth Gilliam, Chief Marketing Officer, VP Sales, Greensea

The consumer electronics market figured out long ago that technology advancements could be significantly more powerful when they work together. For example, tight integration of data through our mobile devices allows us to make an online dinner reservation, receive driving instructions to the restaurant, add the phone number to our contacts, and instantly share the information with friends. While making an online reservation was a nice technology advancement, the integration of the information throughout our digital lives had a far more powerful effect on our productivity.

NOAA's Deep Discoverer runs a fully integrated Greensea system including navigation, vehicle control and payload control. Photo credit: National Oceanic and Atmospheric Administration/Department of Commerce

The marine industry is poised to make a similar shift. Until now, the majority of work and research in robotics—including within the subsea industry for ROVs—has been towards developing better, more intelligent sensors. This has led to more advanced machines, but not necessarily more useful machines. To increase productivity, we need to focus on system management. Through tight technology integration and improved communications with human operators, ROVs can become mission partners and work harder for us.

To make this leap, we need to think about software and hardware in a new way. We can no longer consider multiple sensors as the solution. True solutions will reside within a completely integrated system that includes the operator. When man and machine can share high-level knowledge generated from integrated technologies, the potential for productivity is exponentially elevated.

Elements of an Integrated System

There are three principal requirements for a cooperative, productive ROV partner:

- Ability to determine its own state (navigation);
- Ability to change its state to a desired or commanded state (control); and
- Ability to interface well with human operators (communications).

While each requirement is important, it is only when the three are fully integrated and working together that they can elevate a system to provide meaningful solutions. Tightly integrated navigation and control creates a more capable vehicle, and fully integrated communications provide operators with a streamlined, efficient workflow. Together, the vehicle becomes a significantly more capable partner.

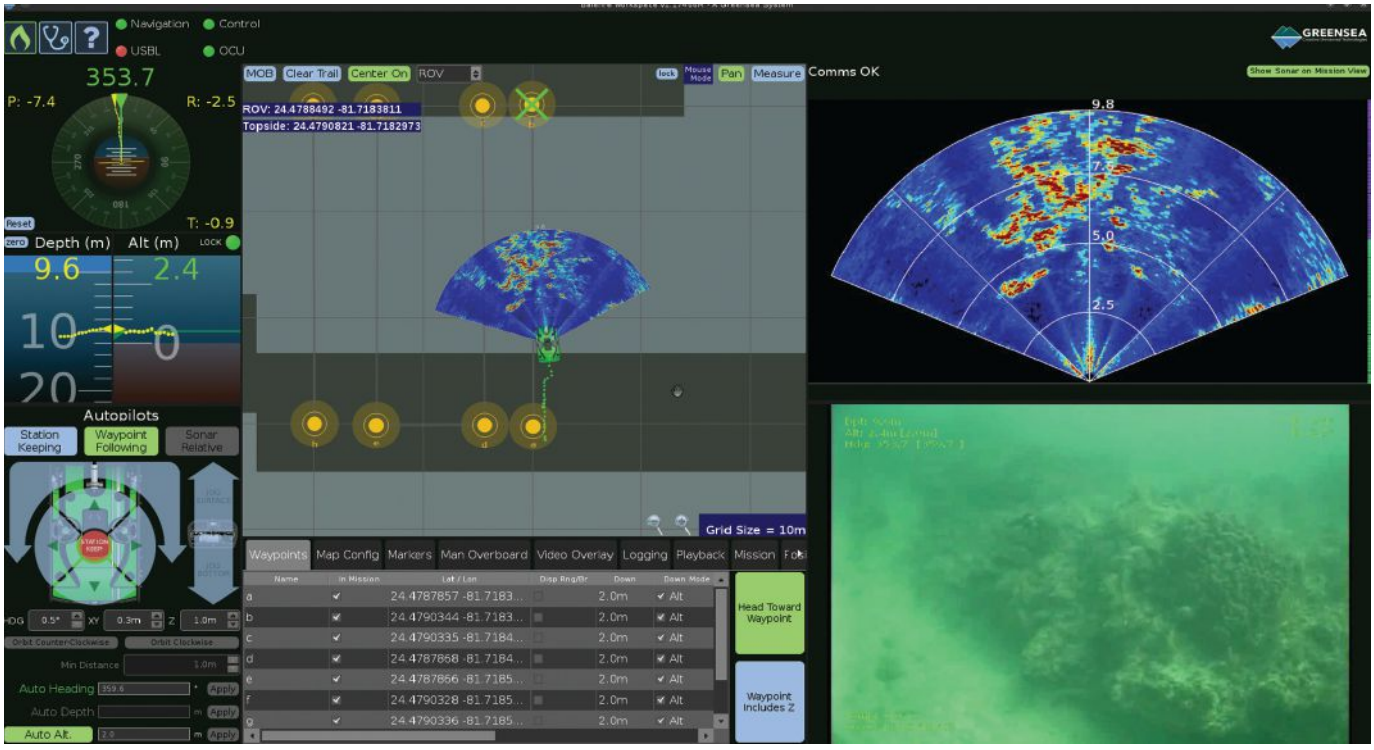
Navigation "systems" are plentiful in our industry but they are more aptly described as strap-on sensors rather than systems. While operators may be able to "see" their vehicle's position using sonar, video, USBL, or an INS, the vehicle itself—including the control system, payloads, and data—lacks this information.

The potential is clear. If the vehicle has the same information as the operator, it can execute high-level tasking versus simple motion commands. Knowing its location, the vehicle can now natively perform advanced vehicle control functions such as station keeping, automated route following, and target reacquisition—all necessary functions for the vehicle to operate as a contributing member of a team.

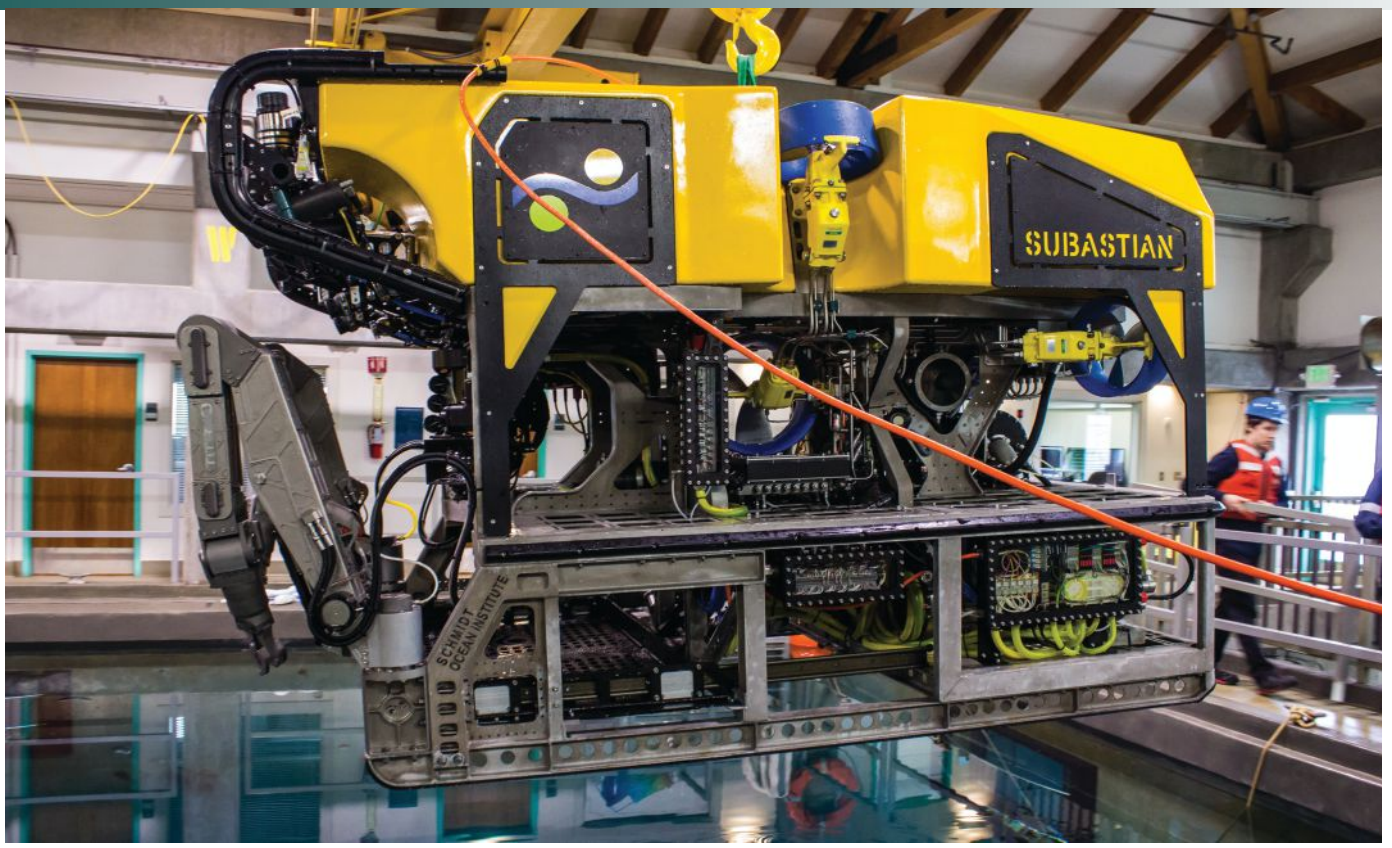
A well-integrated user interface—providing the entire workflow across all phases of ROV work (maintenance, modifications, diagnostics, and operation)—is essential to realizing the power of an integrated system. Why should an operator use separate computers, interfaces, and software applications to communicate with a single ROV? It's more efficient for an operator to learn and use one interface, regardless of the task, payload, or sensor complement. An efficient and effective user-interface optimizes workflow—the user interface becomes a "workspace."

Streamlining Workflow Through Integration

Consider the simple task of inspection with an observation class vehicle. Today, the pilot flies the vehicle and monitors the vehicle's status with the OEM's ROV interface, locates the object of inspection with the sonar manufacturer's interface, tracks the vehicle with the navigation system provider's interface (or perhaps a third-party chart plotting package), inspects the object and records video using a separate video system, and records inspection notes in a separate dive log package. Through this workflow, the operator is solely responsible for interpreting and transporting data between separate interfaces by making adjustments in the ROV's course based on what he sees in the sonar or video. Should any of these tools change, so does the workflow and interface.



The integrated Greensea Workspace is a fully distributed, networked system that fuses vehicle control, navigation, sensors, diagnostics, and data management into a single screen. Workspace supports multiple users, even in different locations, and all data is geo-referenced, time-stamped, and logged.



The new, state-of-the-art Schmidt Ocean Institute 4500m ROV, SuBastian, uses Greensea's OPENSEA operating platform for vehicle control and device management including multiple sonars (scanning and multibeam), cameras, navigation sensors, and scientific instruments. Photo credit: Carlie Wiener/Schmidt Ocean Institute.

Imagine this same task using a fully integrated system. Now, the pilot flies the vehicle, operates the sonar, tracks the vehicle, logs data, and manages video within a single software interface—exactly the same interface for any sensor or payload regardless of the manufacturer.

With this system, the operator locates the object of inspection and double-clicks the feature in the sonar image telling his ROV to track and fly to the feature at a set altitude and speed. Perhaps instead, the operator has created a mission plan telling the ROV to locate and inspect the object. While the ROV conducts the inspection, the operator logs data and records the job in the same software while supervising the job and ensuring the quality of data.

Upon completion, the operator presents the customer with a single cohesive data package captured from a single interface that coordinates and links all of the data from the job: navigation, video, sonar, and inspection notes. Now imagine we are tasked with repeating that inspection in exactly 1 year. The cost savings and increase in productivity for the integrated approach are enormous.

Industry Leaders Applying Integration

Carl Barrett, Program Manager for 3U Technologies, a leading international business consulting firm specializing in engineering project management, recently engaged Greensea Systems, Inc. to provide a fully integrated system for a work-class ROV under his management. "It makes sense that you can dial all this into one comprehensive solution. Instead of six disparate computers doing all these little things, we can put it all into one operating environment." He went on to say, "We had a computer running the CATHEX light controls, we had a computer running the Sub-Atlantic manifold, we had a computer running the ROV; how many computers are we going to need on this system? Now we have a system running the system."

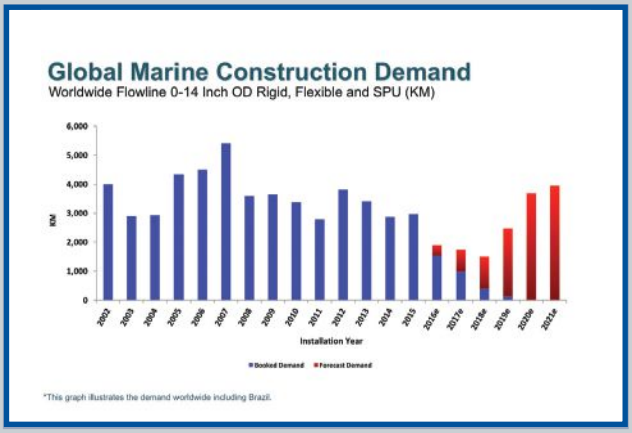
Raúl Enrique Peña, VP of Sales and Marketing, Deep Ocean Engineering Inc., has also seen the value that system integration provides to their clients. It is imperative that our military and homeland security clients are able to identify, track, observe, and reacquire a potentially dangerous target with ease and stability. Equipped with Greensea's integrated system, our Phantom T5 Defender vehicle delivers these mission critical features."

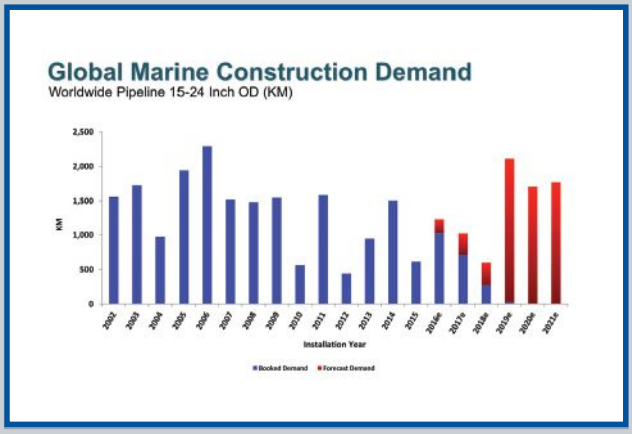
"The entire concept of operations for ROVs has changed," said Ben Kinnaman, CEO and president of Greensea. "Now, we can pre-plan missions and push more work down to the vehicle, freeing up the operator to concentrate on their surroundings and the greater mission. This is particularly important for military and security organizations." Kinnaman continued, "When we conduct testing at our training site, even inexperienced operators can identify a mine in sonar, click on the target in sonar, and then fly to it. All the navigation is in respect to the one thing they care about—the target."

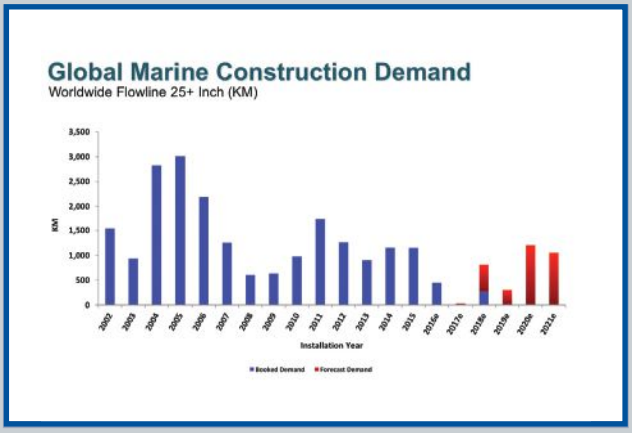
The marine community has always understood and valued the concept of "team." It is in partnership with a team that we tackle seemingly impossible missions on a regular basis. The next level of robotics embraces ROVs as fully integrated, communicating team members able to share high-level intelligence and decision-making alongside its operators to dramatically enhance the success of a mission.

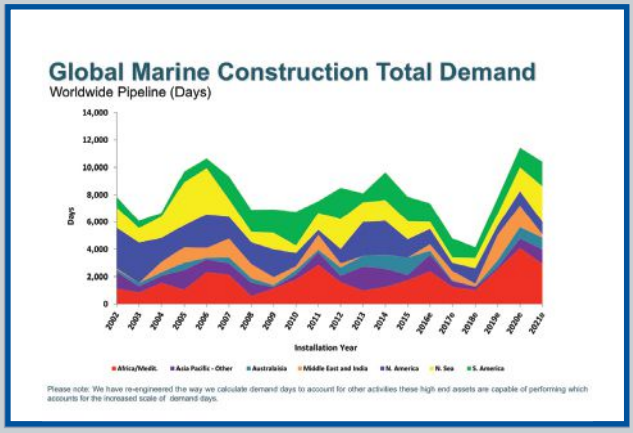
OFFSHORE STATS & DATA

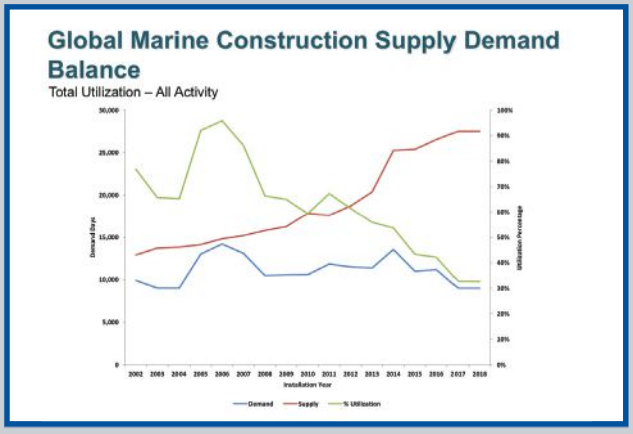
Quest Offshore Activity Report

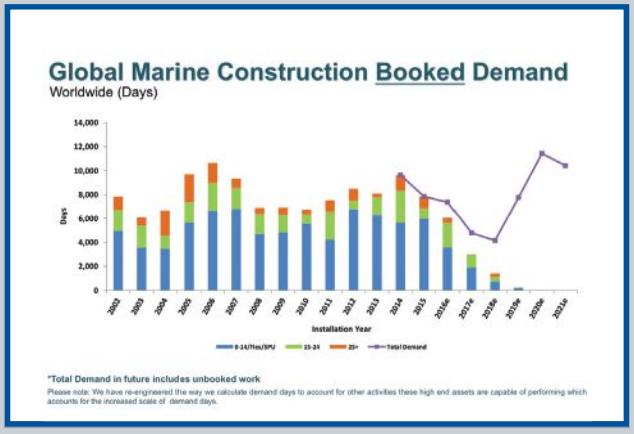












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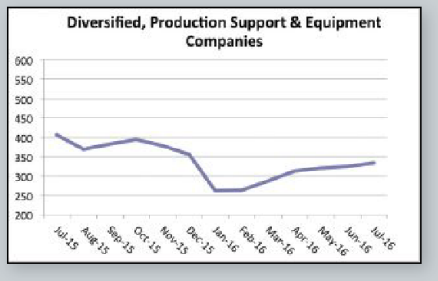
www.QuestOffshore.com • www.SubseaZone.com • www.FloatingProductionZone.com

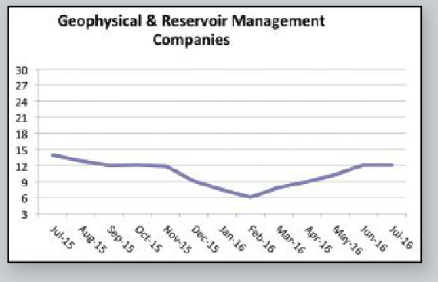
Monthly Stock Figures & Composite Index

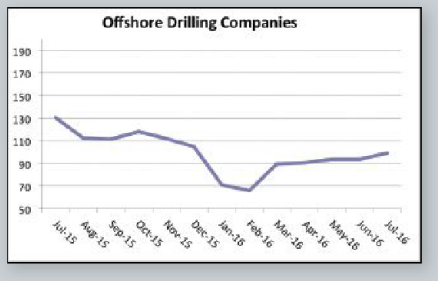
Industry Company Name	Symbol	Close(*Mid*) *July*	Close(*Mid*) *June*	Change	Change %	High	Low 52 week
Diversified, Production Support and Equipment Companies							
Baker Hughes, Inc.	BHI	45.88	45.28	0.60	1.3%	61.70	37.58
Forum Energy Technologies, Inc.	FET	16.19	17.45	-1.26	-7.2%	19.32	8.34
Drill-Quip, Inc.	DRQ	59.20	59.19	0.01	0.0%	69.43	48.88
Halliburton Company	HAL	45.52	42.79	2.73	6.4%	46.69	27.64
Tenaris SA	TS	28.58	27.24	1.34	4.9%	29.69	18.53
Newpark Resources, Inc.	NR	5.84	5.32	0.52	9.8%	8.19	3.35
Schlumberger Ltd.	SLB	79.56	75.84	3.72	4.9%	86.61	59.60
Superior Energy Services, Inc.	SPN	18.18	17.93	0.25	1.4%	19.83	8.25
Weatherford International, Inc.	WFT	6.09	6.06	0.03	0.5%	11.49	4.71
Deep Down, Inc.	DPDW	0.97	0.96	0.01	1.0%	0.98	0.85
FMC Technologies	FTI	27.43	26.11	1.32	5.1%	37.18	22.30
Total Diversified, Production, Support and Equipment.....		**333.44**	**324.17**	**9.27**	**2.9%**	**391.11**	**240.03**
Geophysical / Reservoir Management							
Dawson Geophysical Company	DWSN	7.68	7.36	0.32	4.3%	8.87	2.90
Mitcham Industries, Inc.	MIND	3.65	4.02	-0.37	-9.2%	5.00	2.24
Compagnie Gnrale de Gophysique-Veritas	CGV	0.77	0.72	0.05	6.9%	5.40	0.59
Total Geophysical / Reservoir Management..…….....		**12.10**	**12.10**	**0.00**	**0.0%**	**19.27**	**5.73**
Offshore Drilling Companies							
Atwood Oceanics, Inc.	ATW	11.77	10.96	0.81	7.4%	24.05	4.82
Diamond Offshore Drilling, Inc.	DO	26.15	23.89	2.26	9.5%	26.72	14.18
ENSCO International, Inc.	ESV	10.40	9.98	0.42	4.2%	20.21	7.25
Nabors Industries, Inc.	NBR	9.77	9.97	-0.20	-2.0%	12.77	4.93
Noble Drilling Corp.	NE	8.42	8.84	-0.42	-4.8%	14.64	6.66
Parker Drilling Company	PKD	2.20	2.30	-0.10	-4.3%	3.64	0.98
Rowan Companies, Inc.	RDC	17.92	17.19	0.73	4.2%	21.83	10.67
Transocean Offshore, Inc.	RIG	12.31	10.35	1.96	18.9%	17.19	7.67
Total Offshore Drilling..…….....		**98.94**	**93.48**	**5.46**	**5.8%**	**141.05**	**57.16**
Offshore Contractors, Services, and Support Companies							
Helix Energy Solutions Group, Inc.	HLX	6.56	6.98	-0.42	-6.0%	11.91	2.60
Gulf Island Fabrication	GIFI	6.96	6.75	0.21	3.1%	13.64	6.34
McDermott International, Inc.	MDR	5.05	4.51	0.54	12.0%	6.00	2.20
Oceaneering International	OII	30.89	31.33	-0.44	-1.4%	48.11	25.33
Subsea 7 SA	SUBCY.PK	10.38	8.77	1.61	18.4%	10.57	4.86
Technip ADS	TKPPY.PK	13.77	12.72	1.05	8.3%	15.13	9.69
Tetra Technologies, Inc.	TTI	6.30	5.49	0.81	14.8%	9.44	4.62
Total Offshore Contractors, Service, and Support..…….....		**79.91**	**76.55**	**3.36**	**4.4%**	**114.80**	**55.64**
Offshore Transportation and Boat Companies							
Seacor Holdings, Inc.	CKH	56.53	58.51	-1.98	-3.4%	67.60	41.24
Gulfmark Offshore, Inc.	GLF	3.48	3.56	-0.08	-2.2%	10.68	2.50
Bristow Group	BRS	13.42	14.08	-0.66	-4.7%	51.24	10.80
PHI, Inc.	PHII	19.69	19.10	0.59	3.1%	31.10	13.05
Tidewater, Inc.	TDW	4.87	4.57	0.30	6.6%	21.07	3.79
Swire Pacific	SWRAY	11.78	11.05	0.73	6.6%	13.08	9.06
Hornbeck Offshore	HOS	8.76	8.54	0.22	2.6%	20.98	5.58
Total Offshore Transportation and Boat ……..…….....		**118.53**	**119.41**	**-0.88**	**-0.7%**	**215.75**	**86.02**

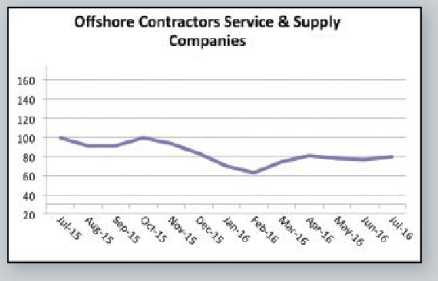
Monthly Stock Figures & Composite Index

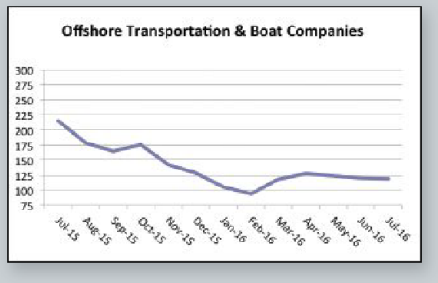
Industry	Close(*Mid*) *July*	Close(*Mid*) *June*	Change %	Change	High 52 week	Low
Total Diversified, Production, Support and Equipment	**333.44**	**324.17**	**9.27**	**2.9%**	**391.11**	**240.03**
Total Geophysical / Reservoir Management	**12.10**	**12.10**	**0.00**	**0.0%**	**19.27**	**5.73**
Total Offshore Drilling	**98.94**	**93.48**	**5.46**	**5.8%**	**141.05**	**57.16**
Total Offshore Contractors, Service and Support	**79.91**	**76.55**	**3.36**	**4.4%**	**114.80**	**55.64**
Total Offshore Transportation and Boat	**118.53**	**119.41**	**-0.88**	**-0.7%**	**215.75**	**86.02**
Total Offshore Source Index	**642.92**	**625.71**	**17.21**	**2.8%**	**881.98**	**444.58**

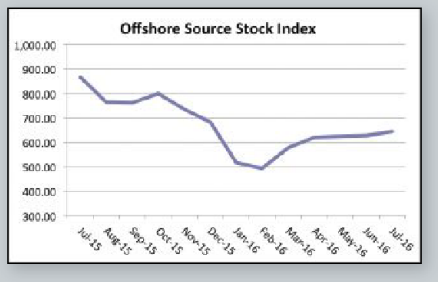










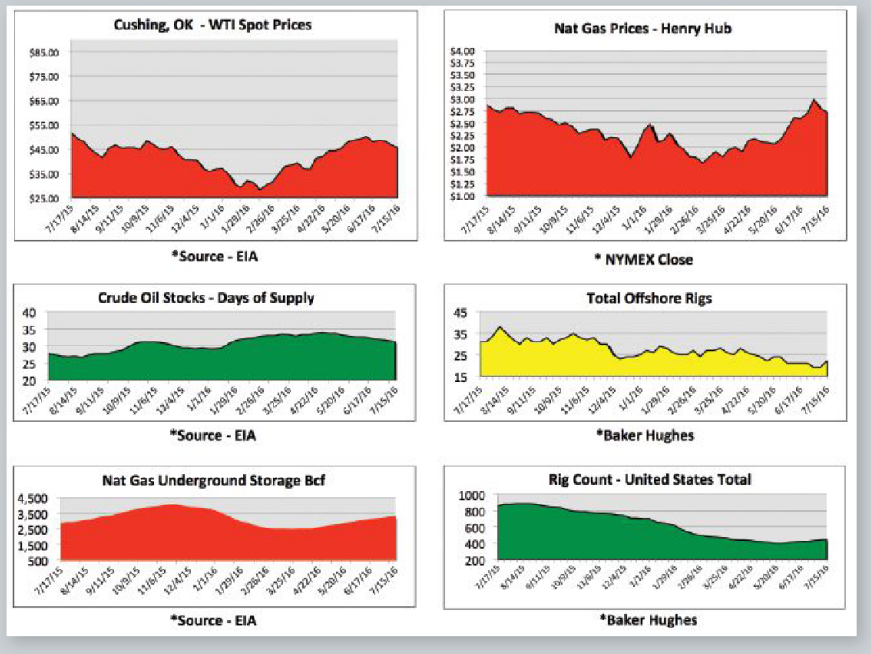


DISCLAIMER

The information on this page is provided for information and comparison purposes only and should not be used to make financial and business decisions and is accurate to the best of our knowledge for the period indicated.

Oil & Gas Industry Trends

Monitoring the Pulse of the U.S. Offshore Oil & Gas Industry



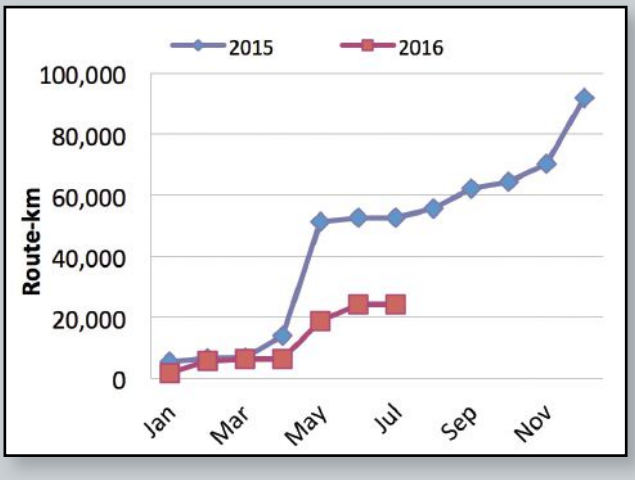
Positive trend, at least 3 weeks

Changing trend, less than 3 weeks

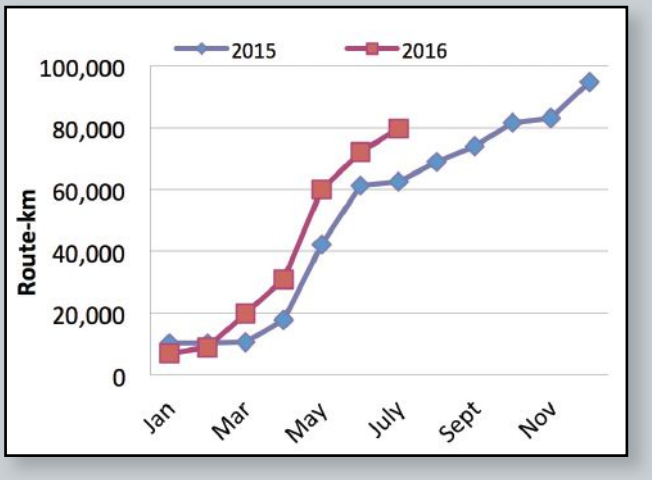
Negative trend, at least 3 weeks

Subsea Telecom & Power Cable Data

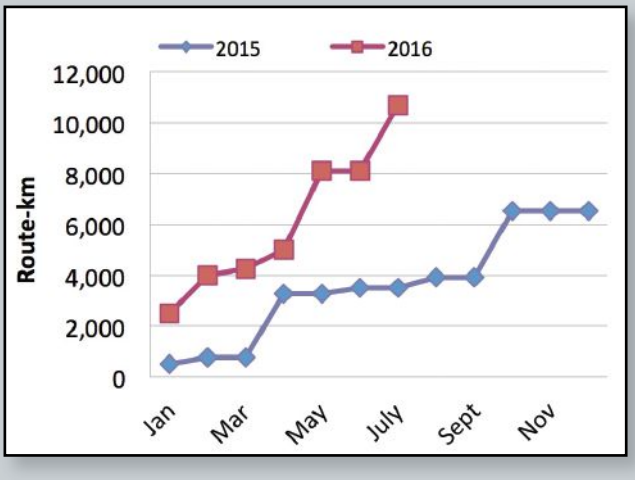
FO Cable Awards by Month



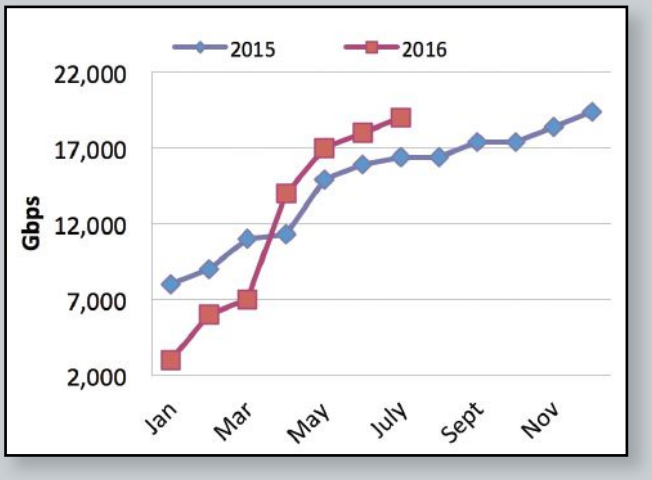
FO Cable Announcements



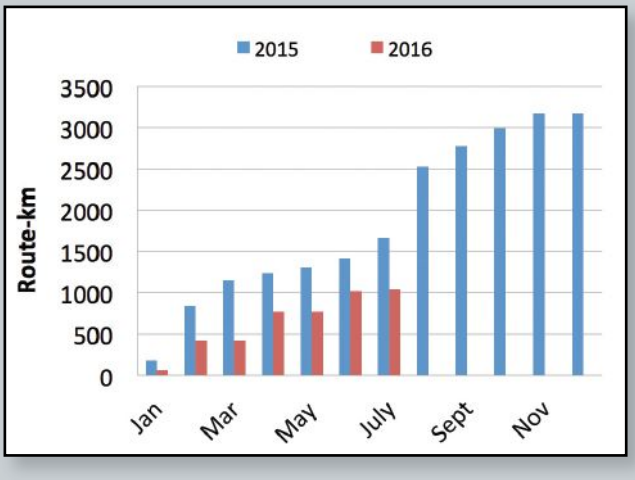
Submarine FO Cables Entering Service in Route-km



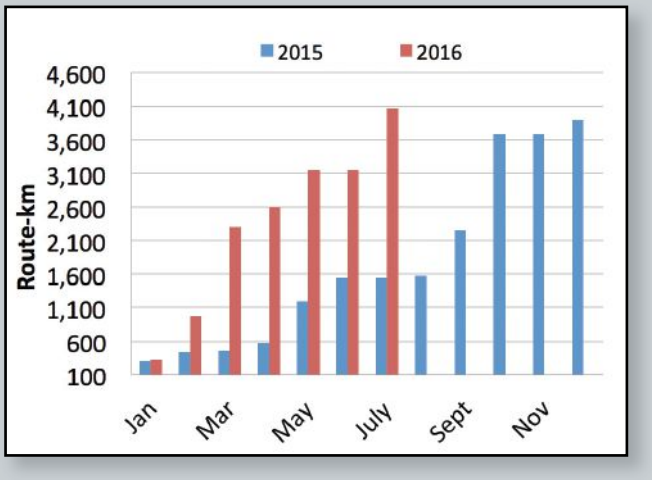
Upgrades of Existing Cable Systems in Gbps



Submarine Power Cable Awards in Route-km



Submarine Power Cable Announcements in Route-km



Gulf of Mexico Data
Current Deepwater Activity

Operator	Area	Block	OCS Lease	Rig Name	Prospect Name	Water Depth (ft)
SHELL OFFSHORE INC.	WR	508	G17001	T.O. DEEPWATER THALASSA	STONES	9,554
SHELL OFFSHORE INC.	AC	857	G17561	H&P 205	Great White	7,819
SHELL OFFSHORE INC.	MC	391	G26252	T.O. DEEPWATER PROTEUS	APPOMATTOX	7,166
EXXON MOBIL CORPORATION	WR	584	G20351	MAERSK VIKING	Julia	7,148
EXXON MOBIL CORPORATION	WR	584	G20351	* WIRELINE UNIT (HOUMA DIST)	Julia	7,148
UNION OIL COMPANY OF CALIFORNIA	WR	634	G18745	T.O. DISCOVERER CLEAR LEADER	Saint Malo	6,800
MARUBENI OIL & GAS USA INC	MC	217	G09790	ENSCO 8505	King's Peak	6,420
BP EXPLORATION & PRODUCTION INC	MC	822	G14658	T.O. DEVELOPMENT DRILLER III	Thunder Horse South	6,267
LLOG EXPLORATION OFFSHORE LLC	MC	257	G35325	SEADRILL WEST NEPTUNE		5,848
ANADARKO PETROLEUM CORPORATION	WR	51	G31938	* WIRELINE UNIT (HOUMA DIST)	Shenandoah	5,847
ANADARKO PETROLEUM CORPORATION	WR	51	G31938	DIAMOND OCEAN BLACKHAWK	Shenandoah	5,847
BP EXPLORATION & PRODUCTION INC	MC	776	G09866	SEADRILL WEST VELA	Thunder Horse North	5,636
BP EXPLORATION & PRODUCTION INC	MC	778	G09868	HELIX Q5000	Thunder Horse NORTH	5,631
ENI US OPERATING CO INC	MC	773	G16647	* COIL TUBING UNIT (N.O. DIST)	Devil's tower	5,610
ENI US OPERATING CO INC	MC	773	G16647	NABORS POOL 140	Devil's tower	5,610
COBALT INTERNATIONAL ENERGY LP	KC	129	G30924	ROWAN RELIANCE		5,519
ANADARKO PETROLEUM CORPORATION	GC	859	G24194	NOBLE BOB DOUGLAS	HEIDELBERG	5,355
ANADARKO PETROLEUM CORPORATION	GC	903	G24197	DIAMOND OCEAN BLACKHORNET	HEIDELBERG	5,257
CHEVRON USA INC	GC	806	G31751	PACIFIC SHARAV		4,720
HESS CORPORATION	MC	726	G24101	STENA FORTH	Tubular Bells	4,611
SHELL OFFSHORE INC.	MC	812	G34458	NOBLE DON TAYLOR		4,471
CHEVRON USA INC	GC	640	G20082	T.O. DISCOVERER INSPIRATION	Tahiti 2	4,292
CHEVRON USA INC	GC	640	G20082	T.O. DEEPWATER ASGARD	Tahiti 2	4,251
CHEVRON USA INC	GB	998	G31688	PACIFIC SANTA ANA		4,235
BHP BILLITON PETROLEUM (GOM) INC	GC	564	G34993	SEADRILL WEST AURIGA		4,226
ANADARKO PETROLEUM CORPORATION	EB	646	G20725	* HYDRAULIC WORKOVER UNIT (L	Eriksson	3,677
HESS CORPORATION	GC	512	G26315	DIAMOND OCEAN BLACKLION	Stampede	3,577
NOBLE ENERGY INC	MC	248	G27268	ATWOOD ADVANTAGE	Raton	3,368
MARATHON OIL COMPANY	GB	515	G20792	CAL-DIVE Q-4000	Ozona	3,287
SHELL OFFSHORE INC.	MC	851	G09882	NOBLE GLOBETROTTER		3,230
SHELL OFFSHORE INC.	MC	762	G07957	ATWOOD CONDOR	Deimos	3,144
SHELL OFFSHORE INC.	MC	807	G07963	OLYMPUS N88	MARS	3,039
CHEVRON USA INC	VK	786	G12119	NABORS 87	Petronius Compliant	1,754
HESS CORPORATION	GB	215	G09216	NOBLE PAUL ROMANO	Conger	1,458
LLOG EXPLORATION OFFSHORE LLC	MC	794	G34909	SEADRILL SEVAN LOUISIANA		1,386
WALTER OIL & GAS CORPORATION	EW	834	G33140	H&P 203	Hummingbird	1,186
ENVEN ENERGY VENTURES LLC	MC	194	G02643	* LIFT BOAT (NEW ORLEANS DIST)	Cognac	1,024
FIELDWOOD SD OFFSHORE LLC	EB	160	G02648	* NONE RIG PA OPERATION (LJ)	Cerveza	940
FIELDWOOD SD OFFSHORE LLC	EB	159	G02645	* WIRELINE UNIT (L.J.DIST)	Ligera	924
EXXON MOBIL CORPORATION	SM	6636	P00188	* WIRELINE (GENERIC)		842
ENVEN ENERGY VENTURES LLC	EW	873	G12136	* WIRELINE UNIT (HOUMA DIST)	Lobster	773
WHISTLER ENERGY II LLC	GC	18	G05809	NABORS MODS 201	Boxer	760
CHEVRON USA INC	GB	189	G06358	* WIRELINE UNIT (L.C.DIST)	Tick	718
FIELDWOOD SD OFFSHORE LLC	EB	110	G02650	* NONE RIG PA OPERATION (LJ)	Tequila	660

Deepwater prospects with drilling and workover activity: 44

Current Deepwater Activity as of Tuesday, July 26, 2016

Activity by Water Depth

Water Depth (m)	Active Leases	Approved Applications	Active
0 to 200	1,115	36,339	2,203
201 to 400	74	1,136	21
401 to 800	156	903	10
801 to 1,000	210	579	9
1,000 & above	2,229	2,159	30

Rig Activity Report 22 July 2016

Location	Week of 07/22	+/-	Week Ago	+/-	Year Ago
Land	440	18	422	-401	841
Inland Waters	3	0	3	-1	4
Offshore	19	-3	22	-12	31
U.S. Total	462	15	447	-414	876
Gulf Of Mexico	18	-3	21	-13	31
Canada	102	7	95	-98	200
North America	564	22	542	-512	1076

Activity by Water Depth Information current as of Tuesday, July 26, 2016.
Maximum number of rigs operating in the deepwater Gulf of Mexico. The rig unit includes platform rigs operating on deepwater production facilities in addition to the MODU's. The numbers do not distinguish between rigs drilling and those in service for completion and workover operations.

Information provided courtesy of the U.S. Bureau of Ocean Energy Management and Baker Hughes

Sound Metrics' ARIS Explorer 3000 provides the needed clarity for UXO identification

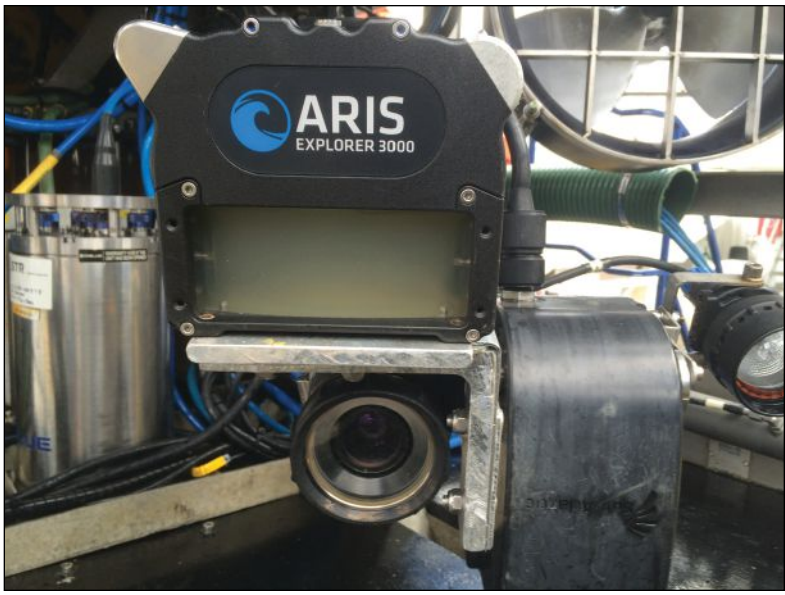
Sound Metrics, the leading manufacturer of high-resolution acoustic imaging sonars, provided an ARIS Explorer 3000 to aid in the identification and classification of Unexploded Ordnance (UXO) off the coast of the North Sea with outstanding results.

The coast of the North Sea is particularly turbid, due to strong currents and large amounts of sediment swept into the seabed by neighboring rivers. As a result, optical cameras are often ineffective, and other imaging sonars lack the high-resolution detail afforded by the ARIS Explorer 3000.

However, due to the unmatched clarity provided by the ARIS Explorer 3000 in zero-visibility waters, the sonar provided needed detail critical to the identification of UXO through high-resolution imaging. The clear and precise near-video-quality images allowed the team to confidently identify ordnance, where the navigation sonar and on-board optical camera made UXO identification difficult due to the lack of vital visual information.

Sound Metrics strives to offer the most advanced technology to provide innovative imaging solutions for a wide array of industries and applications.

For more information, visit www.soundmetrics.com.



EdgeTech 8011M acoustic release deck box now available with URI PIES comm interface

EdgeTech, a leader in high-resolution sonar imaging systems and underwater technology, now offers a communication interface to the University of Rhode Island Inverted Echo Sounder or "URI PIES" system through the 8011M deck box.

The URI PIES system, a popular instrument for many researchers, is often moored in deep locations for extended periods of time. Acoustic communication to the instrument is vital to ensure its safe return. The EdgeTech 8011M is one of the most versatile and field-proven acoustic command and ranging deck boxes available. The system can control and range on EdgeTech's full line of acoustic releases as well as other manufacturers' equipment.

Features include auto switching between 115 and 230 VAC and an internal self-charging battery. The serial and auxiliary ports allow for simple interfacing with other on-board equipment. The 8011M comes standard with a dunking transducer and 67 m of cable. The URI PIES communication interface comes standard on all new 8011M deck boxes. Customers that already own and operate an EdgeTech 8011M deck box have the opportunity to upgrade their units to include this interface as well.

For more information, visit www.edgetech.com.

New air-borne echosounder (Echologger Air50) used to study land/sea sediment exchange

Air-borne precision echosounder Echologger Air50 was launched and supplied to a world-renowned institute KIOST (Korea Institute of Ocean Science & Technology).

Twelve units were initially installed to study sediment movement and tide speed in a swash zone. KIOST has plans to deploy more devices to cover a wider area.

The unique device was developed to help researchers determine key parameters of sediment exchange between land and sea using air-borne ultrasound.

The Air50 uses air-borne ultrasound to measure accurate distance to the surface of water and land in swash zones with a high ping rate. The device can cover from 30 cm to 10 m in range with millimeter resolution. Multiple devices (up to 32) can be networked in series with a standardized MODBUS output protocol.

The compact unit measures only 70 mm in diameter and is 140 mm long.

For more information, visit www.echologger.com.

CMS-Geotech Ltd launches new monitoring system

Vibrocoring is an established fundamental phase of marine seabed investigations but its importance is often underestimated and much vibrocoring is carried out somewhat blindly, i.e. lowering the unit to the seabed, vibrating for a set time, and recovering to the surface in the hope that an adequate sample has been obtained.

CMS-Geotech is a UK leader specialising in vibrocoring and CPT site investigation and over the last 12 months has developed a new monitoring system, VAMP, to maximise the reliability and robustness of the sampling procedure whilst improving core sample integrity and efficiencies.

VAMP (Vibrocore Acquisition Monitoring Platform) and has been put through a series of rigorous field tests at over 75 locations around the UK in variety of offshore environments by CMS-Geotech engineers over the last 12 months and has been proved to increase sampling integrity and efficiency. It is now used daily in all vibrocoring operations carried out by CMS-Geotech using its own in-house built high-powered heavy-duty vibrocorers.

VAMP provides the operator with live, integrated telemetry information on screen. Key features include:

• Frame inclination – vital for when there is a maximum deviation angle specified for engineering purposes and for improved safety against slope instability in areas of soft muds or shifting sands and falling over due to tidal current forces.

• Barrel penetration – real-time indication of penetration distance and rate of advance enables operator to stop the test when no useful penetration is being gained, minimising sample disturbance and maximising sample integrity. Reduction in lost seabed bottom time improves the operational cycle time with associated cost-saving implications.

• Power consumption – logging of power consumption indicates relative difference between different strata in different locations due to *in situ* strength and particle characteristics.

• Live video feed of core barrel penetration and seabed conditions where conditions allow.

Further developments will assess the penetration/power consumption data, accounting for barrel skin friction and sediment characteristics to give better overview of relative *in situ* soil density & stiffness across the project site.

For more information, visit www.cms-geotech.co.uk.

MacArtney AHC winches for Canyon Offshore ROV vessels

MacArtney has supplied a total of four winch systems, all featuring active heave compensation (AHC) allowing Canyon to launch, operate and recover their ROVs under rough sea conditions.

With a global track record spanning two decades and a fleet of several purpose-built offshore support and construction vessels carrying cutting-edge ROV, geotechnical and trenching systems, Canyon Offshore has established itself as a leading supplier of subsea intervention, construction and engineering services.

The Grand Canyon vessel range comprises three identical ships (Grand Canyon I, II and III) delivered between 2012 and 2016. All the Grand Canyon vessels are delivered with the latest technology and powerful systems in order to maximise performance, flexibility and (cost) efficiency. The vessels are able to perform a broad range of subsea operations with high manoeuvrability and DP3-class station keeping for enabling work in severe weather conditions. All Grand Canyon vessels will feature a 250-t heave compensated crane as well as dual ROV systems.

Installed inside the port and starboard hangars of the Grand Canyon II and III, each of the MacArtney MERMAC R40 winches will be utilised to deploy two each 3,000-m rated work-class ROV systems that form the backbone of the subsea intervention toolkit of each vessel. Enabled by an integrated AHC system, the winches are able to actively filter out the effects of vessel motion (heave, pitch, and roll) hereby allowing Canyon to expand its window of ROV operation and substantially reduce weather-related downtime.

For more information, visit www.macartney.com.

Siltation, scour, and sediment transport monitoring instrument

The latest models of the SediMeter™ instrument are permanently sealed, low drag instruments designed for harsh conditions in the marine environment. As in the previous model, the sensor is composed of a vertical array of 36 optical backscatter detectors spaced 1 cm apart, inside a 15-mm tube. In the traditional deployment method, this sensor is placed in a 20-mm protective outer tube that is screwed down into the sediments or attached in a drilled hole in the case of hard bottoms. When only siltation is a concern, it can also be mounted using a frame lowered from a boat.

By analyzing the turbidity data the instrument can estimate the bottom level to better than 1 mm accuracy. It can be used to measure siltation from dredging spill on sensitive bottoms or in navigation channels or erosion off beaches, for instance. Others use it to register the sedimentation in water reservoirs, exploiting the fact that it can hold 16,384 measurements in memory.

The precision is better than 0.1 mm, which makes it possible to detect the movement of individual sand grains, and enables the instrument to detect sediment transport even in the absence of migrating bed forms. When there are wave ripples present, the ability to take 20 burst samples of level and a separate turbidity sensor makes it possible to

compare what happens during an entire wave period and differentiate between that and long-term changes.

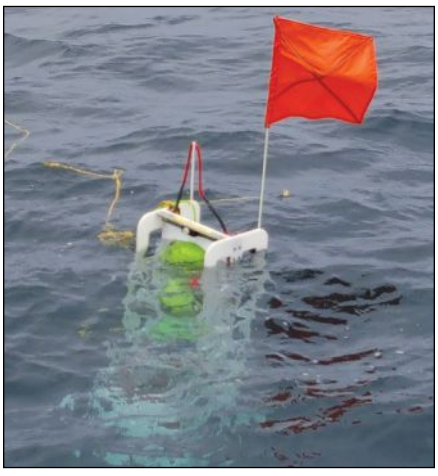
The instrument can be networked with RS485 cables, but also by radio using the SediLink™ radio modem, capable of using free frequencies in different regions of the world. A transparent dome hoses not only the radio but also a battery and a solar panel with enough capacity to keep the system going even in low-light winter conditions. It even has white blinking LEDs that serve both to show how it is operating and to alert seafarers about the presence of the buoy at night.

The second generation of SediMeter was developed to fit the bill for a sediment spill monitoring system designed in 2007 by Dr. Ulf Erlingsson, who was an expert for the Swedish government in supervising the most stringent spill monitoring project undertaken to date: The Øresund Link between Sweden and Denmark. The third generation builds on the second while incorporating feedback from the U.S. Army Corps of Engineers.

For more infomation, visit www.lindorm.com.

Nanolander™ rides new access to the sea

A charter vessel gets a researcher over a point of interest, but how can they access the remote interior of the sea? The Nanolander is a small, portable instrument delivery system that will carry sensor payloads and samplers to the seafloor up to 2 km deep, for any length of stay, return to the surface, and radio its range and bearing directly to the recovery ship. The Nanolander adapts quickly to a variety of fieldwork, from biology to ocean chemistry. One Nanolander, dubbed DOV BEEBE by its Scripps graduate student owner, was recently carried by a SeaKeepers Discovery Yacht, the MV Niyama, for engineering evaluation tests off the coast of San Diego. Her scientific investigation studies the expansion of the oxygen minimum zones of the world oceans. The sensor pod is a Sea-Bird SBE 37-SMP-ODO MicroCAT™ C-T-ODO (P) Recorder. Other commercial sensor pods, including those from RBR Ltd, AML Oceanographic, Xylem, SonTek, and Ocean Sensors as well as researcher-built devices, are readily adapted to the Nanolander.



Additional science-enabling payloads are available from Global Ocean Design and its allied marine industrial partners. Payload upgrades include an acoustic release/command/control system, a compact time-lapse video camera and light system, a baited drop arm, and a sediment sampler with roots in the Moore corer design.

For more information, visit www.globaloceandesign.com.

Forum launches new deep-water test tank

Leading subsea technology provider Forum Energy Technologies (UK) Limited has unveiled a deepwater test facility and received industry accreditation for the calibration laboratory at its new European Operational Centre in Aberdeen.

The indoor test tank is one of the largest in the northeast of Scotland and is dedicated to testing subsea tooling and survey sensors as well as work-class ROVs.

Staffed by dedicated personnel, the test tank and laboratory have a primary purpose to provide full control, certification and faster turnaround in preparing Forum's rental inventory for hire. In addition, the firm will also offer a full test and calibration service to customers.

The calibration laboratory has been accredited by Valeport Ltd and conforms to traceable procedures for the recalibration of Valeport CTDs (conductivity, temperature and density) and Sound Velocity sensors and parameters fitted on current meters, tide gauges, wave recorders and loggers.

In addition, seven of Forum Subsea Rentals' (FSR) engineers have undergone extensive training at Valeport on all aspects of the calibration of CTD and Sound Velocity parameters.

Forum's test tank and lab builds on the company's industry-leading subsea facilities across the UK. The company operates one of Europe's largest hyperbaric testing vessels at Moffat, Northumbria. The service is rated to 241bar (2,400 m depth) and is 2.4 m in

diameter with a length of 9.7 m.

In North Yorkshire, Forum's ROV manufacturing facility has a dedicated System Integration Test (SIT) facility. This includes an 11-m x 9-m x 6-m tank capable of fully submerging and flying multiple ROV systems or complete trenchers.

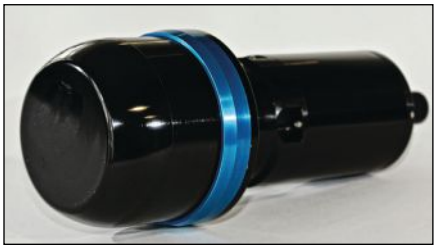
All Forum UK's facilities are accredited with ISO 9001 and are available for hire along with the technical support required to operate them.

For more information, please visit www.f-e-t.com.

Kongsberg's new Clariscan high-performance domed scanning sonar ready for delivery

Following introductions this year at Subsea Expo in January, Underwater Intervention in February, and Oceanology International in March, Kongsberg's state-of-the-art Clariscan Domed Scanning Sonar is now available. Clariscan combines wide bandwidth composite transducer technology developed by Kongsberg Maritime's Canadian subsidiary Kongsberg Mesotech, with a patented acoustic lens to provide exceptional image quality. This innovative new sonar offers the same protective attributes of standard domed transducers without the traditional loss in performance and image clarity.

Domed sonars were introduced in the 1990s using enclosed transducers in an oil-filled dome to provide mechanical protection and eliminate flooding due to O-ring failure on the exposed transducer shaft. While the oil-filled dome solved the O-ring flooding failures, it introduced beam defocusing in two conditions: warm & shallow and



cold & deep. The beam defocusing effect reduces clarity of the images produced and becomes more extreme in cold deepwater as depth increases. Until now, there has been no solution to this problem, aside from using a high-resolution scanning sonar head.

Kongsberg engineers have solved this problem by designing a patented acoustic lens that maintains beam focus through the entire operational temperature and depth range, significantly improving sonar performance and resulting in images that are much sharper. The Clariscan acoustic lens behaves like an optical contact lens, correcting the refraction caused by the oil in the dome.

Deepwater testing in the Gulf of Mexico has shown the clarity of images produced by the Clariscan compared to a standard 1171 domed sonar with composite transducer (see accompanying images). The two sonar heads were mounted side by side on the ROV and thus exposed to the same temperature, pressure and salinity conditions, and were operated simultaneously during image capture. The image quality of the Clariscan sonar unit is clearly superior, rivalling a high-resolution scanning sonar head.

Kongsberg is taking orders of the Clariscan Domed Scanning Sonar and the new units are going into production effective immediately.

For more information, visit www.km.kongsberg.com.

Tritech Gemini 620pd systems for Unique Group

Tritech International Ltd, has gained further success with its Gemini 620pd multibeam profiling sonar through a sale to Unique Group.

With an increased industry focus on reducing costs, without compromising on quality, Unique has purchased four Gemini 620pd sonars to enhance the company's expanding rental pool. The systems include two Tritech Gemini Hubs, to enable an accurate time stamp of data during data acquisition. Initially, the systems will support sub-marine cable installation work where the Gemini 620pd sonars will run in a dual-head configuration, to provide a wide swathe of high-resolution bathymetry data. The systems will also be used by Unique's customers to perform high-quality subsea construction and inspection operations.

The Gemini 620pd is a high-resolution multibeam echosounder with an effective angular resolution of 0.5°, offering a fast update rate of up to 50 Hz. Operating at 620 kHz and capable of providing a sharp 10-mm range resolution, Gemini 620pd offers standard features including automated bottom tracking, variable gate setting and gate tilting as well as roll compensation.

For more information, visit www.tritech.co.uk.

SA Instrumentation unveils new portable acoustic system

SA Instrumentation, one of the UK's leading designers and manufacturers of innovative acoustic technologies, has launched a new portable system that will have a wide range of applications in the areas of marine mammal and environmental research, conservation and civil construction work.

The Mobile PAM (passive acoustic monitoring) system is the latest in a suite of products designed by the Tayport-based company and is particularly easy to use in difficult and harsh environments such as on boats, in the field and on civil construction sites.

The multi-channel Mobile PAM incorporates the latest Microsoft tablet and a screen and can be configured for use with hydrophones, microphones and geophones for picking up sound.

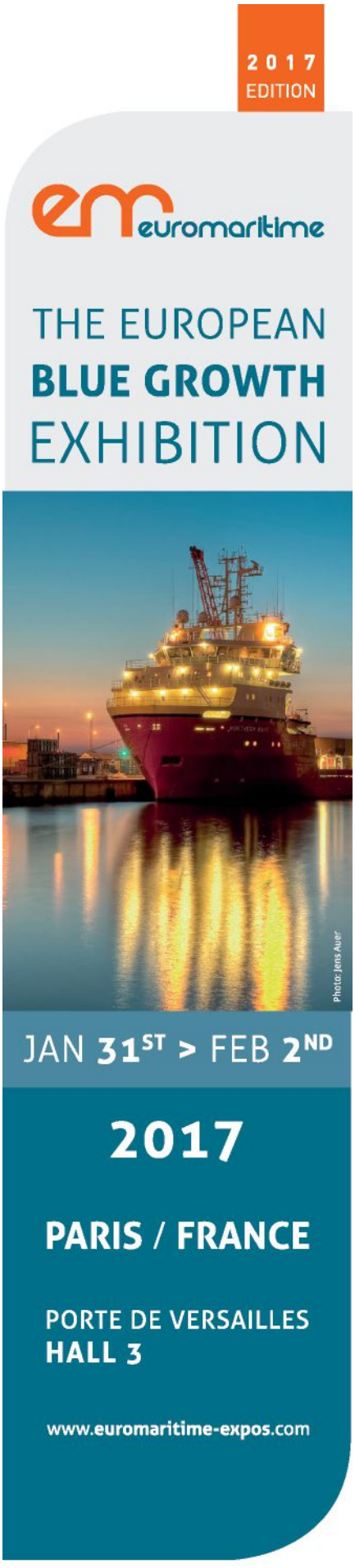
It also contains SA Instrumentation's own data acquisition (DAQ) card, a revolutionary solution for acoustic processing, including marine mammal research and noise monitoring. It can record high volumes of data for later analysis and displays real-time data to the operator using PAMGuard software. Easy to integrate, the DAQ allows for the detection of acoustic data over a wide frequency band width that allows user control over the gain and filtering on all its analogue inputs combined with small size and power requirement.

For more information, visit www.sa-instrumentation.com.

Saipem upgrades to Sonardyne autonomous monitoring transponder technology

International oil and gas turnkey contractor, Saipem, has extended the capability of its Sonardyne sixth generation (6G) acoustic positioning transponders, adding functionality that makes the equipment now suitable for a wide range of subsea autonomous monitoring tasks.

The work to convert the Compatt 6 instruments into Autonomous Monitoring Transponders (AMTs) was undertaken by engineers based at Sonardyne's Brazilian headquarters in Rio das Ostras as part of a wider scope of work to inspect, service and re-cali-



brate Saipem's inventory of Long BaseLine (LBL) acoustic technology located in the region.

Sonardyne's AMT enables users to conduct long endurance, remote monitoring surveys without the need for a surface vessel and ROV to be present throughout the project. Applications for it range from a single instrument deployed to measure tidal variation to a large, field-wide network capable of detecting subtle trends in structure movement, pipeline creep and seabed settlement.

The autonomous functionality built into every AMT enables it to operate for several years without operator intervention. Measurements from its suite of onboard sensors are logged in the unit's memory and can be recovered at any time by an AUV, ROV or vessel-of-opportunity using high-speed wireless communications.

For more information, visit www.sonardyne.com.

New Teledyne PDS LiteView freeware 3D viewer released

Teledyne PDS has released a newly enhanced version of Teledyne PDS LiteView freeware 3D viewer for hydrographic applications.

LiteView can be used to quickly access Teledyne PDS data files, such as PDS logdata files, grid model files, 3D design model files and GeoTIFF files to view and easily navigate multibeam bathymetric, water column and laser-scanner data. The Teledyne PDS LiteView 64-bit Windows version offers faster performance, optimized memory management and better feature utilization. No dongle is required to run Teledyne PDS LiteView, allowing users immediate, unencumbered access to this valuable tool.

Teledyne PDS LightView Freeware can be downloaded free of charge at www.teledyne-pds.com/product/pds-liteview/.

Trelleborg launches new ISO17357-1:2014 compliant pneumatic fender

Remaining true to its principle of innovation, Trelleborg's marine systems operation has launched a new ISO17357-1:2014 compliant, high-performance pneumatic fender designed to address the evolving needs of ports, terminals and offshore ship-to-ship transfer applications.

Trelleborg's new quality assured fender features a thinner, lighter body for easier transportation and handling, improved netting and hemispherical ends designed to offer superior functional performance and enhanced continuity of end fittings for optimum deflection capability.

Unlike other manufacturers who use synthetic tire cords for only the body of the fender and chafer fabric at both hemispherical ends, Trelleborg now uses 100% synthetic tire cord for the construction of the entire fender. This directly enhances the fender's operational ability because synthetic tire-cord has a higher tensile strength than chafer fabric. By incorporating the synthetic tire cord into the entire fender, the stability, longevity, and shape retention of the fender are all significantly enhanced.

Trelleborg not only meets but exceeds the demands of the ISO17357-1:2014 standard with quality assurance documents and test results shared in a comprehensive, fully authenticated supporting document package. Proof data, inner and outer rubber material specifications and pressure test data are all included as standard for even greater peace of mind.

For more information, visit www.trelleborg.com.

Offshore Sensing delivers Sailbuoy to PLOCAN

Offshore Sensing has announced the successful delivery of the Sailbuoy autonomous surface vehicle (USV), "SB Plocan" to The Oceanic Platform

of the Canary Islands (PLOCAN).

The USV capability provided by Offshore Sensing has been proven and validated at sea through a number of sea trials covering thousands of miles at sea. Testing has been conducted from the ice edge in the Arctic to the warm waters of the Gulf of Mexico. The vehicle was showcased at Oceanology 2016 and has full autonomous capability and survivability validated through extensive testing in varying conditions from flat calm to hurricane force winds.

This Sailbuoy USV is equipped with meteorological and oceanographic sensors needed for environmental monitoring in the Atlantic Ocean. The sensor package measures the atmospheric parameters (air temperature, air pressure, wind speed and direction, humidity) and the oceanographic parameters (dissolved oxygen, water temperature, conductivity, chlorophyll, turbidity, crude oil and refined oil).

Offshore Sensing's Spanish distributer Grafinta SA was responsible for the sale.

For more information, visit www.sailbuoy.no.

DNV GL launches new stability analysis tool that puts engineers in control seat

With the latest release of Sesam HydroD software for floating structures, DNV GL is now offering a completely new and pioneering stability analysis solution that allows for hydrodynamic and stability analysis on one common model, giving naval and offshore engineers unprecedented control over their projects.

The design and engineering of floating structures relies heavily on both hydrodynamic and stability analyses, which are necessary to optimize safety in various environmental conditions. These two types of analyses have usually been performed with separate models and

software system. This common way of working actually causes inefficiencies and raises the cost of the design process, possibly leading to errors or inaccuracies during the analyses.

DNV GL has now launched the new Sesam HydroD version 5, making it possible for naval architects and offshore engineers to run a stability analysis in a user-friendly interface, on the same model that they are using for hydrodynamic analysis. Sesam HydroD 5 empowers them to save time and cost, reduce errors, and also gives them unparalleled oversight over their data with a powerful solver and many options that increase flexibility and control with tailored solutions.

For more information, visit www.dnvgl.com.

KRISO cuts the tether and selects Sonardyne BlueComm for underwater communications

Underwater communications equipment that enables video to be transmitted through the water and unmanned vehicles to be controlled without a tethered link to the surface, has been supplied to the Korean Research Institute of Ships and Ocean Engineering (KRISO) by Sonardyne Asia Pte. Ltd. in Singapore, and its Korean agent, Insung.

The BlueComm 100-series optical modems will be used to stream high-definition imagery from cameras installed on seafloor sensor platforms and command Crabster, an autonomous walking and flying crab-like robot being developed by KRISO's ocean systems engineering department.

Transferring data using subsea modems provides a reliable alternative to using cables underwater, which can be expensive to install and vulnerable to damage. However, unlike conventional acoustic-based devices that use pressure waves to send and receive relatively small packets of data at low bandwidths, Sonardyne's BlueComm uses rapidly modulated light emitting diodes (LEDs) and high-power lasers to quickly deliver very high volumes of data.

Typically operating in the 450 nm Blue Light region of the spectrum, data rates of up to 500 Mbps are achievable making the technology suitable for a wide range of underwater applications that require a high bandwidth, low latency, bi-directional communications link. These include harvesting data from seabed landers using AUVs, remote video monitoring of science operations and piloting unmanned vehicles without the need for a control umbilical.

When deploying battery-powered subsea instruments and vehicles, operating life is always a major consideration for users. BlueComm's unique method of optical data transmission is, however, also highly efficient, enabling for example, 1 GB of data to be transmitted with the energy contained within a single lithium D-sized cell over distances greater than 150 m.

The BlueComm modem family is currently made up of three variants, and to support its work, KRISO has selected the BlueComm 100 model. Featuring Ethernet connectivity and a deep depth rating, the design is optimised to offer a good balance between data rate and range in all conditions, including high ambient light.

For more information, visit www.sonardyne.com.

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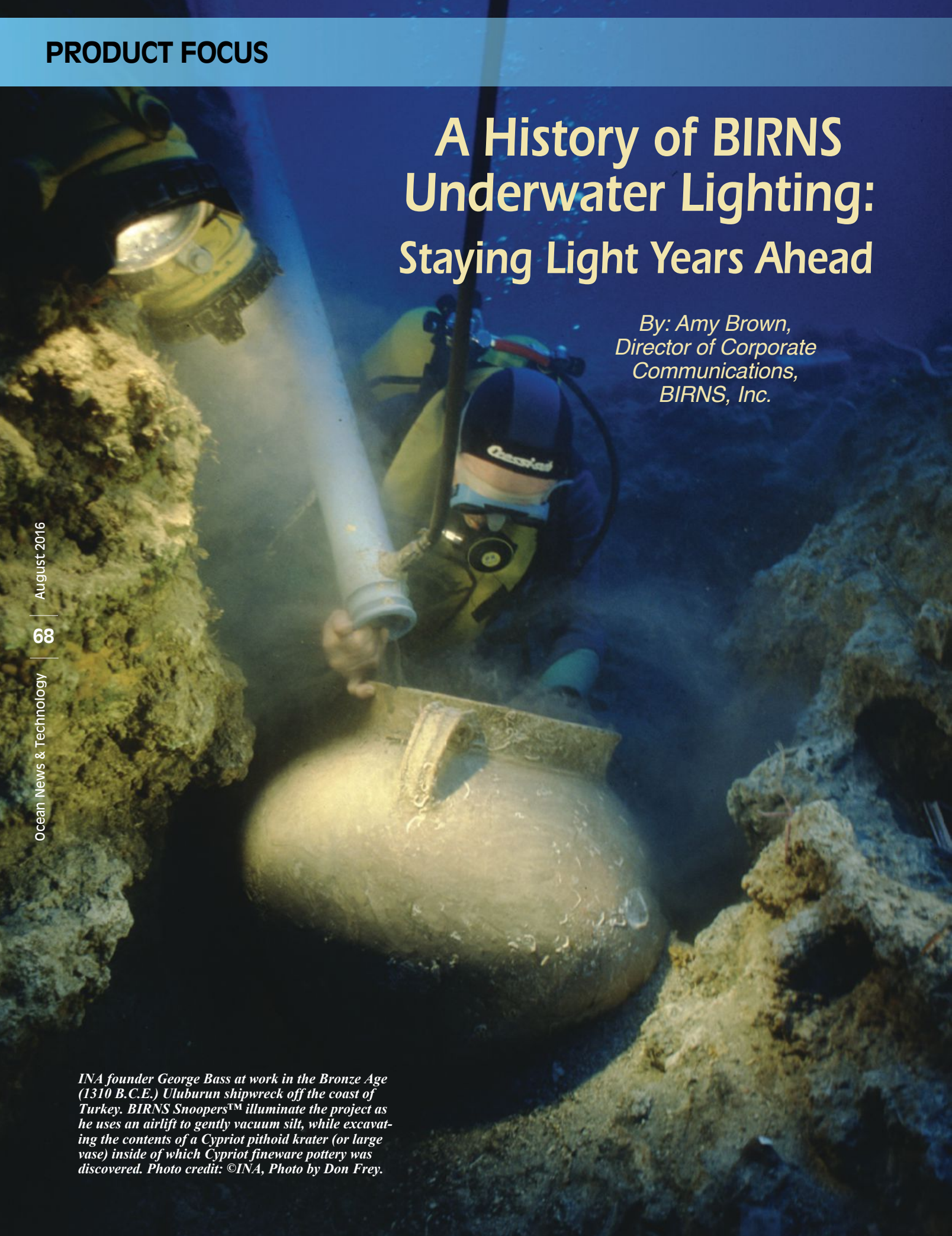
A History of BIRNS Underwater Lighting:

Staying Light Years Ahead

By: Amy Brown, Director of Corporate Communications, BIRNS, Inc.



INA founder George Bass at work in the Bronze Age (1310 B.C.E.) Uluburun shipwreck off the coast of Turkey. BIRNS Snoopers™ illuminate the project as he uses an airlift to gently vacuum silt, while excavating the contents of a Cypriot pithoid krater (or large vase) inside of which Cypriot fineware pottery was discovered. Photo credit: ©INA, Photo by Don Frey.

Underwater lighting for the marine industry provides a diverse suite of advanced capabilities—from illuminating the depths for manned and unmanned vehicles and providing divers with brilliance that can pierce murky waters to delivering reliable lighting performance for security and salvage applications. Today's subsea lighting systems are incredibly powerful and robust and are trusted in demanding oceanic environments. The industry has grown and, in doing so, has become more sophisticated as lighting technology and capability has developed. BIRNS, Inc. has been at the forefront, driving lighting technology for the marine industry for more than 60 years. The company has a rich heritage of setting milestones in subsea lighting technology, many of which included enabling some of the most well-known marine projects and archaeology discoveries in history.

Some of the earliest marine lighting systems were tungsten halogen. When tungsten halogen lamps were first patented in 1958 by Elmer Fridich and Emmett Wiley, they introduced a small amount of halogen into the design of existing tungsten filament lamps initiated and patented by Edison; their new approach halted the migration of the tungsten particles, resulting in both longer lamp life and brighter illumination. The design offered additional advantages such as a smaller footprint along with the chemical reaction of the halogen cycle—the filament cools and is renewed when the lamp is switched off. Thus, tungsten halogen was poised to light the way to significant advancements in marine lighting and oceanic exploration.

Just a few years before this breakthrough, BIRNS opened its doors (in 1954) and initially began in the underwater industry by creating professional underwater camera housings. In 1956, the company was asked to provide such housings with 400-ft magazines for the U.S. Naval Ordnance Test Station in Pasadena to film the first ejection mechanism from the secret Polaris Missile Firing Submarine project. Shortly thereafter, the Navy asked BIRNS to develop underwater lighting systems for a range of subsea projects, including the U.S. Man-In-The-Sea program. BIRNS created custom tungsten halogen lights that were used for Sea Labs I, II and III. Sealab I was a 40-ft x 9-ft windowless habitat that housed four aquanauts in 1964 for 11 days at a depth of 200 ft. The groundbreaking project was initiated to test the viability of saturation diving.

The BIRNS SeaQuartz Mark IX lights chosen by the Sealab designers had a depth rating of 9,000 ft and had 1,000-W quartz iodine bulbs, with 65,000 center-beam candle power and a 3,200° Kelvin rating. They were capable of a record 30 days of continuous use without lamp burnout, well over other commercially available options at the time that had only 8 hours of lamp life. The lighting systems were also used during an extensive search by the U.S. Navy to find a "Broken Arrow" (a missing hydrogen bomb off of the coast of Spain in 1966) and to illuminate the construction of a nuclear power plant in Antarctica. In 1965, Sea Lab II was designed to house 11 aquanauts for 30 days at a depth of 200 ft. It was 50 ft long and 12 ft in diameter; in this iteration, more extensive work was done—from testing undersea tools and mining ore samples to studying the ocean floor. Sealab III was created in 1969 for operation at a depth of 600 ft, with teams of 45 aquanauts living and working for successive 12-day periods during what was to be a 2-month project. In total, Sealab III had more than 40 BIRNS SeaQuartz lights installed on its exterior. After the accidental death of one of the divers, the Navy terminated the program.

One of the early subsea lighting models was the BIRNS Snooper™, a 3-km rated 33,000-lumen tungsten halogen floodlight that could be handheld or mounted on diving bells or vehicles. It was engineered with 3,200 K illumination and had a highly polished internal parabolic reflector and a high output lamp in its focal point. The system had a bulletproof tempered borosilicate glass lens; in fact, during the Vietnam War, the U.S. Navy mounted the lights around a dock in Cam Ranh Bay where 30 Snoopers™ withstood 1,440 grenade explosions over a period of 30 nights, with only three suffering lens damage. The system also had a reinforced, tempered cast aluminum body with mechanical impact protection and four sealing operations. It should also be noted that by this time, the humble but incredibly important O-ring seal had been invented by Niels A. Christensen and was beginning to be widely used in the marine and diving industry.

BIRNS Snoopers™ were used in pivotal submarines, salvage vessels, and offshore oil exploration systems during key oceanic projects in the 1960s and 1970s—from Vickers Oceanics Pisces sub in 1968 and Oceaneering vehicles to the two-person Clelia submersible. BIRNS Snoopers™ were also used by Intersub on the vehicles PC1201 and PC1202 and the Pisces class boat of Vickers Ltd. and the Oceaneer I as well as Perry submarines Seatask and Submersible Work Chambers operated by Divcon International. The U.S. Navy assigned a Federal stock number and a Navy stock number to Snoopers™ in the 1980s. Peter Gimbal and Oceaneering International successfully salvaged the Bank of Rome from the wreck of the Andria Doria using handheld Snoopers™ in 1981. The Italian luxury liner sank in 1956 and was ultimately found at a depth of 225 ft in the murky waters of the Atlantic. The safe contained packs of American and Italian currency and travelers checks.

The Institute of Nautical Archeology (INA) used these powerful lights in 1985 when finding, at 3,500 years old, the oldest shipwreck ever discovered, off the coast of Turkey. The Uluburun shipwreck was from the Bronze Age and had been a trade ship that sunk during the 14th century BCE. The INA and Texas A&M filmed the salvage operation and used 1,000-W Snoopers™ for the 2-month project. The wreck yielded gold, silver, bronze, and pottery as well as illuminating new information about trader routes and nautical capabilities of that era.

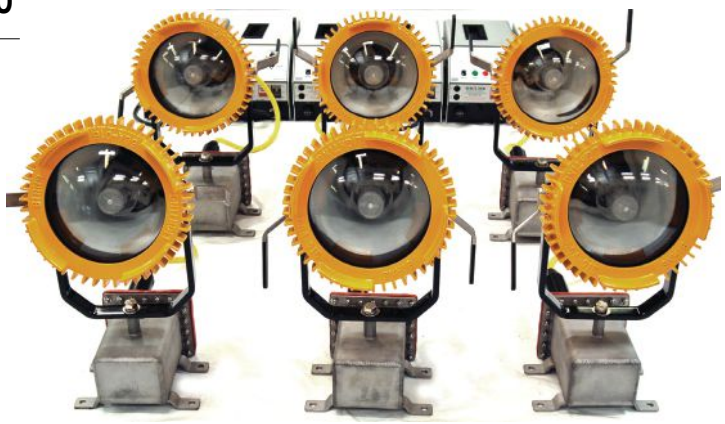
Based on industry demand, BIRNS created the BIRNS Snooperette™, a compact tungsten halogen light with a depth rating of 2,461 m. It was created for both helmet-mounted use and for vehicle use. The Harbor Branch Johnson-Sea-Link research sub explored the wreck of the ironclad civil war ship the

Harbor Branch Johnson-Sea-Link II, circa 1975 with BIRNS Snoopers and BIRNS Snooperettes. Photo: Harbor Branch Foundation, by Tom Smoyer.

Monitor off the coast of North Carolina in 1977 with Snoopers™ and Snooperettes™. In 1982, the National Geographic Society found the warship Hamilton and the USS Scourge (lost in 1813) in Lake Ontario at a depth of 300 ft with Snooperettes™.

In 1979, BIRNS developed the BlackBIRN, the world's first self-contained underwater non-destructive testing (NDT)/Magnetic Particle Inspection (MPI) system, allowing a single diver to detect oil leaks, cracks, or weld defects in underwater steel structures. In 1980, divers using the system saved the U.S. Navy $180,000 in dry docking costs on a single project. This system included a powerful hand-held Hg-vapor High Intensity Discharge (HID) lamp as its ultraviolet source, an integral BIRNS Snooperette™ and a powerful articulating electromagnet with a 150-m power cable. BlackBIRN products went on to be highly successful in commercial diving, military, and offshore oil and gas markets.

LEDs were first developed in the 1960s, a lighting source that created light through electroluminescence in a semiconductor material. This illumination was generated from the movement of electrons in the semiconductor material and subsequently offered huge lighting advantages to a variety of industries. LED lights were able to provide enormous light output while remaining cool as well as provide extended lamp lives while using very little energy. By the mid-2000s, the first LEDs were produced that could generate 100 lumens/watt, making them comparable with the level of efficiency matched only by gas discharge lamps. By 2010, BIRNS expanded its popular lines of commercial diving and subsea lighting products to include new LED options, including chamber lights and helmet and vehicle work lights, all with long lamp lives and brilliant illumination. In addition to extensive use with underwater vehicles, the company's LED chamber lights offered significant advantages, especially in that they did not generate noticeable levels of heat inside cramped diving bells and hyperbaric chambers.



BIRNS developed custom HMI lighting systems for the Costa Concordia salvage project. These 380,000 lumen, 4-kW systems were used during the complex and several month long project to provide underwater illumination of up to 50 ft away at night.

Despite the popularity and efficiency of LED systems, there were and still are numerous applications for which gas discharge lighting systems are ideal and widely used. In 1986, the UK division of BIRNS developed the SuperEx, a CID (Compact Iodine Discharge) light with a 25-kV hot-restrike ignitor used by ONGC (Oil and Natural Gas Commission of India) on platforms in the Bay of Bombay. In 2012, BIRNS created a new system with high-pressure sodium vapor lamps that operated in a dry, one atmosphere chamber and, in concert with its high-reflectivity mirror-finish reflector, provided intense light output. BIRNS delivered 15 of these new HPSV BIRNS Pisces™ lighting systems in 2013 to Noble Energy. They were ordered for security use in the Tamar offshore gas field platform that came online in the Mediterranean Sea off of

A technician relamps a 130,000 lumen BIRNS Pisces 1-kW HPSV security light.

Israel that year. BIRNS supplied these unique 1-kW HPSV lights with 130,000 lumens and 24,000 hour lamp lives for extended underwater security usage for Tamar. This high-intensity gas discharge lamp had no filament, making it nearly impervious to shock and vibration. The systems were created with an especially robust construction, which included a housing fabricated with 63AA-electropolished AISA type 316 stainless steel and with a tough 1.06" thick tempered glass lens further supported by stainless steel reinforcing bars.

The company created the world's first deep-submergence 575-W hydrargyrum medium-arc iodide (HMI) light in 1993. This amazing system, on the cutting edge of underwater lighting technology at the time, was made entirely of titanium and produced 49,000 lumens (85 lumens/watt). By 2013, BIRNS developed the BIRNS Titan™, a custom, rugged 4,000-W HMI lighting system that delivered 200,000 lumens. The powerful lamp featured a high Color Rendering Index (CRI) of Ra >90 and 6,000 K color temperature. It provided massive light output, mixing mercury vapor with metal halides in a quartz-glass envelope and energizing the resulting mixture with two tungsten electrodes of medium arc separation. The BIRNS Titan™ was created specifically for the salvage efforts of the Costa Concordia where divers worked around the clock to raise the wrecked ship. The crews needed to parbuckle the Costa Concordia and, in doing so, create a flat surface for the ship to rest on once it was righted. The seafloor would need extensive grouting to achieve that flat surface, necessitating many hours of continuous operations. It was during the nighttime operations in particular that powerful and robust lighting was essential. Divers needed lights that could light large areas during grout bag installation, and since the 24/7 operation was planned to last several months, lights that were rugged as well as easily maintained were necessary.

Once grouting was complete, the BIRNS Titan™ lights were particularly key in monitoring the vessel during parbuckling. The lights were used in clear water for several months at a time so the dive supervisors could ensure a wider area view of the status operations. Because of the scale of the salvage effort, the crews needed to see the results of the work and divers needed to be able to back up 50 ft away and see the whole area at once, even at night. This salvage project was in a very demanding, dangerous environment, with a great deal of incredibly heavy equipment; therefore, lightweight, delicate lights would never have survived. Plus, the salvage company planned to use the BIRNS Titan™ lights for many future salvage projects once the Concordia project was completed.

Marine lighting has advanced so significantly in just a few decades—from early tungsten halogen systems to today's immensely bright LED and HMI options—and this advancement has brought to light a wealth of new information about the ocean and human history. There are exciting promises of what the future of subsea exploration will reveal with the increasingly powerful innovations in which marine lighting technology will likely evolve.

The International Marine Contractors Association (IMCA) has appointed **John Bradshaw** as policy and regulatory affairs manager to lead on worldwide policy and legislative issues, with responsibility for developing and delivering the international trade association's policy and regulatory strategy, including representing members with regulators and other third parties. Bradshaw joined the IMCA Secretariat as one of its strong team of technical advisers in early Autumn 2015. This followed 4 years at Lloyd's Register as principal technical specialist and a career at sea. He has a strong track record as a specialist in the field of marine engines and emissions as well as an advocate of policy development in the marine industry.


Bradshaw

The OceansAdvance Board is pleased to announce the appointment of **Cathy Hogan** as interim executive director. She has been with OceansAdvance since its inception in April 2003, fulfilling various roles including administrative officer, contract administrator, communications officer, and event manager. In 2013, she accepted a 15-month secondment to assume the role of project manager of OCEANS'14. There, she lead a team of 22 local cluster members that organized the largest industry conference held in St. John's, as well as one of the top three IEEE-MTS OCEANS events ever held in North America.

Subsea IMR provider, N-Sea, has appointed **Rienk De Vries** as chief commercial officer. Currently based near Rotterdam, De Vries joins N-Sea with more than 20 years' experience in the energy industry. Having spent a significant amount of time with Applus+ RTD, one of the world's leading testing, inspection and certification companies, he has experience of global leadership, driving businesses strategies and new product and technology innovation.


Curran

WFS Technology has appointed **Christopher Curran** as a project director for the Americas region. He recently retired from BP where he was an advisor with the upstream facilities technology group. Curran brings considerable experience in all aspects of the subsea sector as well as an insight into how best to apply Seatooth® products and technology. He has particularly worked in the areas of subsea condition monitoring and integrity management, and has been active in developing and promoting subsea wireless communication technology.

OceanGate Inc. has hired two key team members as it expands to do more deep sea expeditions and build a fleet of manned submersibles. **David Lochridge** joins OceanGate as director of marine operations with a diverse 25-year career in marine operations around the world as a manned submersible pilot, commercial diver, ROV pilot and marine engineer. **Tony Nissen** joins OceanGate as director of engineering to provid leadership in the research and development, operation, design and troubleshooting of all OceanGate manned submersibles and their supporting assets, including launch and recovery equipment.

Klein Marine Systems, Inc. announced that **Giuseppe Di Stefano** has joined Klein as director of sales and marketing. Stefano brings a broad range of international business development experience to Klein, having been highly effective in various roles of leading global product development teams within Europe, Asia and the U.S.


Di Stefano

GEOxyz Group has launched a new UK HQ for offshore geophysical, geotechnical and ROV survey headed by **Sarah Cashmore**. The new UK base will be focused on global Oil and Gas exploration and maintenance in addition to home markets. Cashmore, who launched her career as an offshore geophysicist at Gardline in 1996, has held senior positions at UTEC Survey, RPS Energy and most recently as operations director at Calecore and survey manager at Alcatel Submarine Networks.

In the scope of its development, RTsys appoints **Anne-Laure Milhe** as marketing & communications manager. Milhe graduated in management, sales & marketing from Brest Management & Business school in France. She has 17 years' experience in international marketing of marine industry, especially in the marine energies, research, offshore and defense businesses. She previously held the position at Mors Environment in 1997, becoming Oceano Technologies and then iXsea after merger in 2002.

ValvTechnologies announced the appointment of **Bryant Holt** as industry director for the company's fossil power division. Based in Houston, Holt will have global management responsibility for ValvTechnologies' fossil power group and sales activities worldwide as well as developing long-term strategies for business growth and customer performance in the global fossil power severe service marketplace.

Subsea IMR provider **N-Sea** has announced the opening of a new office in Dubai, with operations due to commence as early as August 2016. The new base will support N-Sea's increased presence in the region, allowing the company to conduct diving, ROV and survey projects in the civil engineering and offshore markets throughout the UAE. The company has appointed **Asa Gamble** as managing director for the Middle East region, who will be responsible for the establishment and growth of all N-Sea services and products in the region.

Aquatec Group has announced a new representative agreement with **UVS Pty Ltd** for distributing Aquatec's established products for ocean and environmental monitoring to customers in Australia. Technologies include the AQUAscat acoustic suspended sediment profilers, AQUAlogger temperature and depth loggers, AQUAlogger 210TY turbidity logger and AQUAmodem Op1L optical modem.

MacArtney is expanding the existing operations in Northeast USA with workshop services. The new workshop will feature moulding and termination capabilities designed to support customers and empower MacArtney's ability to provide custom cable assemblies and turn-key connectivity solutions with short lead times to the local marine community in North America.

Australian-headquartered company **Blue Ocean Monitoring**, experienced global provider of ocean monitoring services, is expanding its offices and taking space in the Marine Robotics Innovation Centre at the National Oceanography Centre (NOC) in Southampton.

Clariant announced the acquisition of **Carboflex's** 50% stake in the consortium that built and operates the Guanabara Bay plant. The facility, located in Rio de Janeiro, Brazil, produces chemicals used in oil and gas wells. The acquisition is part of the investment strategy of Clariant's Business Unit Oil and Mining Services and allows the company to take full control of the plant to further expand its chemical offering to offshore customers, while optimizing delivery times.

Unique Group, through its subsidiary Unique Maritime Group (SEA) PTE Ltd, completed the acquisition of **Oceanvision PTE Ltd** and **Oceanvision Equipment Services PTE Ltd.** Oceanvision will now be part of the Unique Group of companies and is the third acquisition that Unique has made in the last 9 months.

Subsea Technology & Rentals Ltd are pleased to announce a partnership agreement with Aberdeen-based **Subsea Tooling Services** to hire, service and support their high-performance range of subsea dredging systems held mobilisation ready at STR offices.

CALENDAR & EVENTS

August 9-11, 2016
Deepwater Intervention Forum
Galveston, TX
www.deepwaterintervention.com

August 11-12, 2016
Hypack Multibeam Training
Vancouver, Canada
www.hypack.com

August 29 - September 1, 2016
Offshore Northern Seas
Stavanger, Norway
www.ons.no

September 19-23, 2016
Oceans '16 MTS/IEEE
Monterey, CA
www.oceans16mtsieeemonterey.org

September 27-29, 2016
Wind Europe
Hamburg, Germany
www.windeurope.org/summit2016

October 10-12, 2016
DP Conference
Houston, TX
www.dynamic-positioning.com

October 11-13, 2016
Oil Comm
Houston, TX
www.oilcomm.com

October 17-19, 2016
Submarine Networks World
Singapore
www.terrapinn.com

October 19-20, 2016
Offshore Well Intervention GoM
Houston, TX
www.interventiongom.offsnetevents.com

October 24-26, 2016
OTC Arctic Technology Conference
St. Johns, Newfoundland
ww.arctictechnologyconference.org

October 25-26, 2016
AWEA Offshore Windpower
Warwick, RI
www.awea.org

October 25-26, 2016
Offshore Energy '16
Amsterdam, The Netherlands
www.offshore-energy.biz

November 1-3, 2016
Clean Gulf
Tampa, FL
www.cleangulf.org

November 6-9, 2016
IEEE AUV 2016
Tokyo, Japan
http://www.auv2016.org

November 30 - December 2, 2016
International Workboat Show
New Olreans, LA
www.workboatshow.com

November 30 - December 2, 2016
WOC Sustainable Ocean Summit
Rotterdam, The Netherlands
www.ilago.ovh/sustainableoceansummit/

December 2016
Offshore & Deep Sea Mining
London, UK
www.ibcenergy.com

December 12-16, 2016
AGU Fall Meeting
San Francisco, CA
https://fallmeeting.agu.org/2016/

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Editorial: Underwater Navigation; Manned Submersibles
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Product & Services Focus: Multibeam & Side Scan Sonars; Research & Development Services

FEBRUARY
Editorial: Oceanology & Meteorology; Decom & Abandonment
Distribution: Decommissioning and Abandonment Summit; Oceanology International
Product & Services Focus: Buoys & Monitoring Instrumentation; Environmental Monitoring/Testing Services

MARCH
Editorial: Subsea Fiber Optic Networks; Maritime Security
Distribution: Canadian Underwater Conf & Expo; SubOptic
Product & Services Focus: Connectors; Cables & Umbilicals; Diver Detection Systems

APRIL
Editorial: Offshore Technology; Ocean Mapping & Survey
Distribution: OTC; AUVSI-Xponential; Deepwater Decommissioning Workshop Canadian Hydrographic Conference
Product & Services Focus: Subsea Tools & Manipulators; Batteries; Training/Safety

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Special Focus Section: *Executive Profiles*
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Special Focus Section: *Company History Profiles - Then and Now*
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NOVEMBER
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Distribution: International Workboat
Product & Services Focus: Ship Protection Systems; Cranes, Winches & Control Systems; Vessel Charter/Leasing Services

DECEMBER
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Product & Services Focus: Diving Equipment & Services; Buoyancy Materials; Construction & Repair Services

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Contact: Ray Mahr

Rowe Technologies Inc. [RoweTech] specializes in the design and manufacture of underwater acoustic Doppler products and imaging systems for the oceanographic, hydrographic and hydrologic markets. Founded in 2009, Rowe Technologies is a technology-based private company with the main office located in Poway CA, USA. Rowe's ADCP/DVL electronics suite is superior to others due to a powerful compact single-unit configuration which allows simultaneous current profiling and bottom tracking.

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Contact: Dan Cote, Sales Manager

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Tel: (713) 818-6150
Email: tdavis@hydraoc.com
Website: www.hydraoc.com
Contact: Trevor Davis

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Contact: Bill New

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Contact: Graham Lester

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Website: www.iver-auv.com
Contact: Jim Kirk

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UNDERWATER VEHICLES/ROVS

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E-mail: info@oceaneering.com
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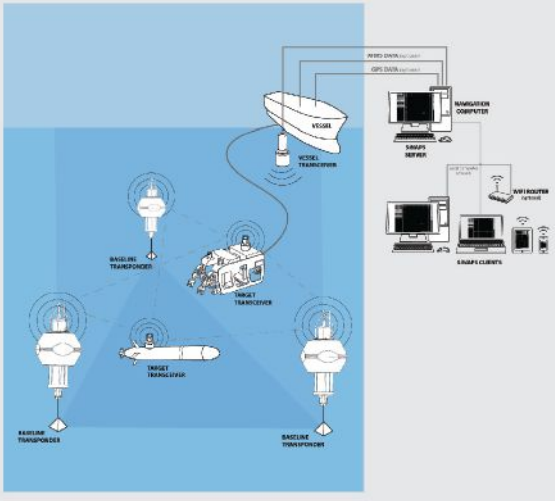

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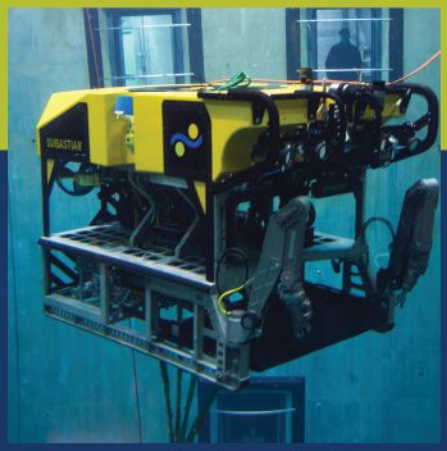

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