

# OCEAN NEWS

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April 2015      [www.oceannews.com](http://www.oceannews.com)      & TECHNOLOGY



**Lockheed Martin**  
**AUV-Based 3D Laser Imaging for**  
**Structural Integrity Management**

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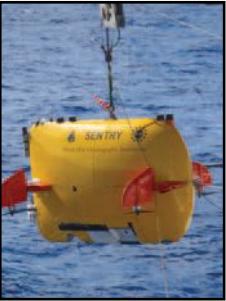
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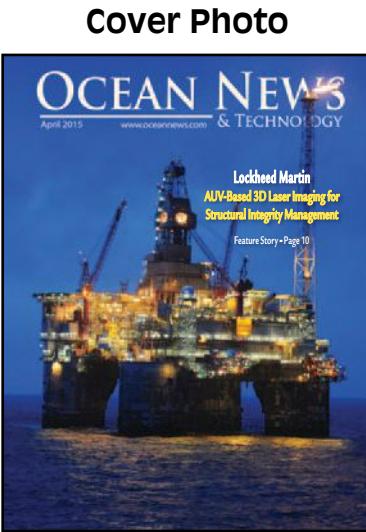
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The Heidrun platform in the Norwegian Sea – Photo Credit: Harald Pettersen, Statoil.

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# EDITORIAL



By Ray Tyson

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# Deafening silence blankets critics as oil prices collapse

You can safely bet your shiny new SUV guzzler on this irrefutable observation: whenever gasoline spikes, politicians are certain to launch a congressional investigation into the cause, always attempting to pin the blame on an industry conspiracy to boost oil prices through market manipulation. There have been dozens of these pointless inquiries during my long tenure as an oil and gas journalist. And, as I have, you no doubt concluded long ago – Nada!

Sadly, we hear no public words of concern or encouragement from these same critics when oil prices collapse. Worse, as today's prices scrape the bottom of the barrel, they continue to call for more industry taxes and the elimination of drilling incentives while implementing more questionable and costly regulations and putting more federal acreage off limits to exploration and development.

Barack Obama recently used his presidential powers in a controversial move to permanently close Alaska's salmon-rich Bristol Bay to exploration, without soliciting a single public comment on the years-long divisive issue. The president's statement justifying his action speaks volumes of his attitude toward an industry that provides indispensable services and products, including the jet fuel that keeps Air Force One aloft and headed thousands of miles over the Pacific to the commander-and-chief's favorite golf courses in Hawaii.

"It's something that's too precious for us to be putting out to the highest bidder," Obama said of Bristol Bay, noting correctly the bay supports a \$2 billion-a-year commercial fishery. Well, no one is arguing Bristol Bay is an important fish habitat, and \$2 billion is a lot of money.

But before Obama's press writers committed that \$2 billion figure to paper, I doubt whether they considered for a moment the many billions generated yearly from taxes and royalties on Alaska oil, even though production is far less than it was back in the 1980s. Put another way – less than 5% of state revenue comes from taxes and royalties on non-petroleum resources, including fishing and mining. On the national level, commercial and recreational salt water fishing combined represents about a fifth of the roughly \$1 trillion contributed annually to the economy by the oil and gas industry. Mr. President, oil and gas are also precious natural resources.

Meanwhile, as you would expect, depressed oil prices are taking their toll

on industry worldwide, with prices by Christmas down more than 40% since June. Citigroup has cut its estimate for global oil prices to average \$63/bbl in 2015, down from \$80, and for the U.S. benchmark to average \$55/bbl this year. They see a confluence of factors – including continued surging U.S. production, Saudi resistance to cutting output, and a weakening global economy – conspiring to push prices even lower before recovering somewhat in the second half of 2015 and into next year.

The first thing to suffer in this kind of bleak pricing environment is always company investment in exploration and development. Jobs generally follow. Spending reductions in 2015, once announced, could be the biggest in years, prompting energy companies to cut investments in new projects by 25% or more this year, analysts speculate. But the U.S. government still expects output to be the highest in decades as productivity for new wells rises, spurred by the shale boom.

If benchmark Brent crude oil was at \$80 per barrel, then global exploration and production spending would fall 20% to \$640 billion, reported Bernstein Research, adding that if Brent were at \$65/bbl, then spending would fall by 30%. Bernstein said that a decline of 35% in North American capital spending would be likely if benchmark West Texas Intermediate (WTI), which trades at a discount to Brent, averages \$65/bbl.

Wood Mackenzie said the top 40 oil companies would collectively need to slash spending \$170 billion, or 37%, to keep net debt flat if global oil were at \$60/bbl. In total, there are about \$127 billion of global industry greenfield projects at risk of deferment, Wood Mackenzie said.

The rig count also is taking a beating. U.S. oil drillers laid down the most rigs in the fourth quarter of 2014 since 2009. And things were expected to get much worse. About 200 more were to be idled over the next quarter as U.S. oil explorers make good on their promises to curb spending, according to Moody's Corp.

By the beginning of the second week in January, drillers were already running the fewest rigs in 9 months after a 46% drop in WTI oil in 2014, the steepest decline in 6 years and the second-worst since the commodity began trading in 1983. The price slipped below \$50/bbl, as U.S. producers and OPEC remained in a standoff over market share.



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# AUV-Based 3D Laser Imaging for Structural Integrity Management

*By: John Jacobson  
Lockheed Martin Corporation*



*Figure 1. Lockheed Martin's Marlin® Mk2 AUV.*

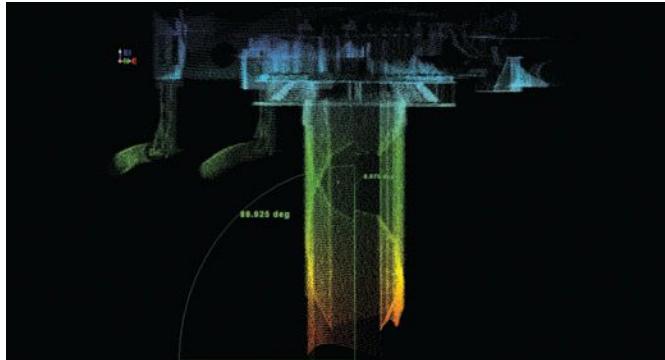
Recent developments in AUV-based 3D laser imaging are bringing powerful new capabilities for structural integrity management to the offshore industry. Underwater 3D laser sensors now offer the angular resolution, range, and scan rate to deliver dense 3D point cloud images of subsea structures with millimeter resolution at tens of meters of standoff distance while also opening the door for the application of a wide range of software tools from the terrestrial survey industry. At the same time, the state-of-the-art technology in AUVs now includes real-time 3D modeling and change detection using high-resolution 3D sonar.

Lockheed Martin has merged these two technologies and has demonstrated an AUV-based 3D laser imaging capability that will become a valuable tool for subsea structural integrity management. It will enable autonomous, real-time, millimeter resolution 3D modeling, change detection, and structural integrity assessment and will deliver these results while offering improved safety, higher operating efficiencies, and reduced costs to the Field Operator.

Using an underwater 3D laser developed by 3D at Depth LLC and supported by funding from the Research Partnership to Secure Energy for America (RPSEA), Lockheed Martin has completed a 2-year, four-phase development project that has extended its revolutionary AUV-based 3D sonar modeling and change detection to employ a 3D laser sensor, thereby improving model resolution and accuracy by an order of magnitude.

Project objectives included performance of high-resolution 3D laser imaging of underwater structures from a moving AUV, generation of high-resolution, geo-registered 3D models of subsea structures in real time, and detection of changes against “a priori” structural models.

A critical aspect of this development was the real-time fusion of the 3D laser and sonar data with the vehicle’s navigation and control systems to produce high-quality, motion-com-

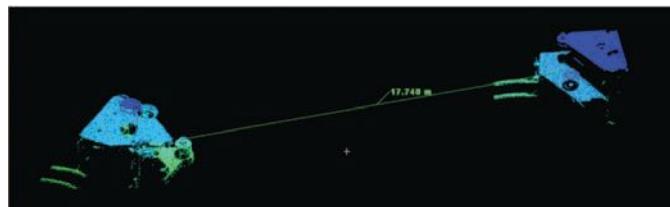


**Figure 2. Simulation of wellhead verticality measurement from moving AUV.**

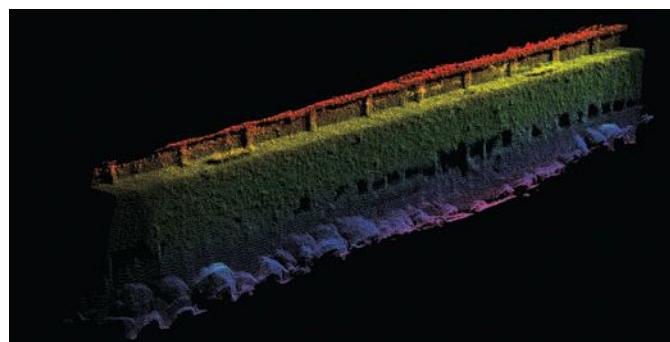
pensated 3D models from a moving vehicle. In order to verify proper performance of this capability prior to offshore testing, extensive high fidelity simulation of 3D laser imaging from a moving Marlin® AUV platform was conducted in Lockheed Martin’s state-of-the-art Simulation Laboratory located in the company’s Palm Beach, Florida facility. Simulation was conducted against a range of operational scenarios developed in conjunction with a Project Working Group consisting of members from six major deepwater operators. Simulation testing included the following scenarios that were deemed to be of high interest by the Working Group:

- Measurement of wellhead verticality;
- Performance of jumper metrology;
- Measurement of anode depletion on manifolds and pipelines;
- Detection and measurement of pipeline dents, pitting and concrete coating damage;
- Measurement of spoils volume;
- Performance of structural inspection against a baseline model; and
- Detection and measurement of mooring chain pits and chain link wear.

The laboratory simulation testing resulted in an impressive degree of accuracy. For example, a simulation test case in which an AUV swimming at 2 knots at approximately a 5-m standoff from the target conducted jumper metrology that



**Figure 3. Simulation of jumper metrology from moving AUV.**



**Figure 4. Point cloud resulting from a single pass 3D laser imaging scan of a sunken barge by the Marlin® AUV conducted at 1 knot and at a 5.25-m standoff range.**

yielded results less than 13 mm from “ground truth” along a 17-m jumper span (<0.08% error) after insertion of simulated noise for timing, sensor calibration, sensor errors, and representative navigation errors. Excellent results were also obtained for simulated measurement of angular/dimensional and/or volumetric parameters for wellhead verticality (less than 0.08 degrees from ground truth), anode depletion (2% to 4% error), and spoils volume (<2% error), which all fall well within the desired operational accuracies for such inspections.

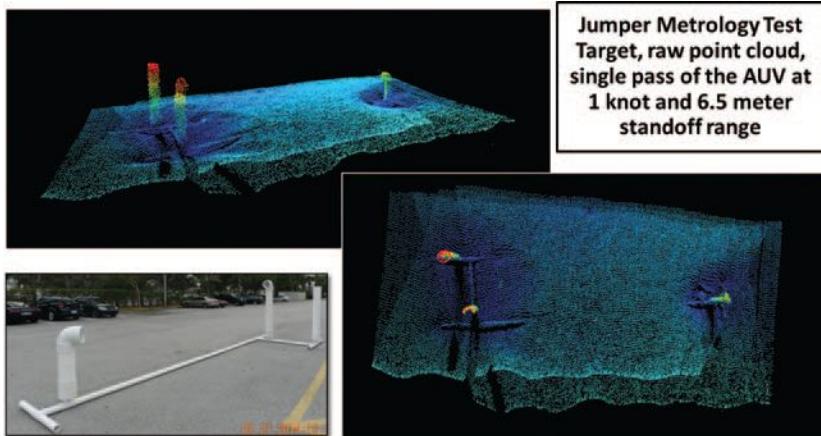
The final phase of Lockheed Martin’s AUV-based 3D laser development project was completed in October 2014. During this phase, offshore testing of the prototype 3D laser imaging hardware and software were conducted in local offshore waters adjacent to Lockheed Martin’s Palm Beach facility. Testing included AUV-based laser imaging of a sunken barge to evaluate results of macroscopic 3D laser structural survey as well as laser imaging of mock-up test fixtures to evaluate detailed dimensional measurement capabilities.

Figure 4 provides the point cloud resulting from a single pass 3D laser imaging scan of a sunken barge by a Marlin® Mk2 AUV conducted at approximately 1 knot and at a 5.25-m standoff range. The barge structure, approximately 72 ft in length, was scanned in approximately 45 seconds, and the geo-registered point cloud yielded dimensional accuracies consistent with simulation results.

Figure 5 shows the point cloud model resulting from a 3D laser scan of a jumper metrology test target by the AUV at 1 knot and 6.5-m standoff range. The single pass scan was completed in approximately 7 seconds and yielded a primary longitudinal dimensional measurement with less than 2% error from ground truth. Future testing will include multiple imaging passes by the AUV at slower survey speeds and at closer standoff ranges, which are expected to result in denser point clouds and higher measurement accuracy.

The results of these trials demonstrated that 3D laser imaging from a moving AUV can produce geo-registered 3D models with sub-centimeter resolution and that AUV-based 3D laser imaging is a viable alternative for inspection of subsea structures such as trees, jumpers, PLETs, manifolds, pipelines, flowlines, risers, and mooring lines.

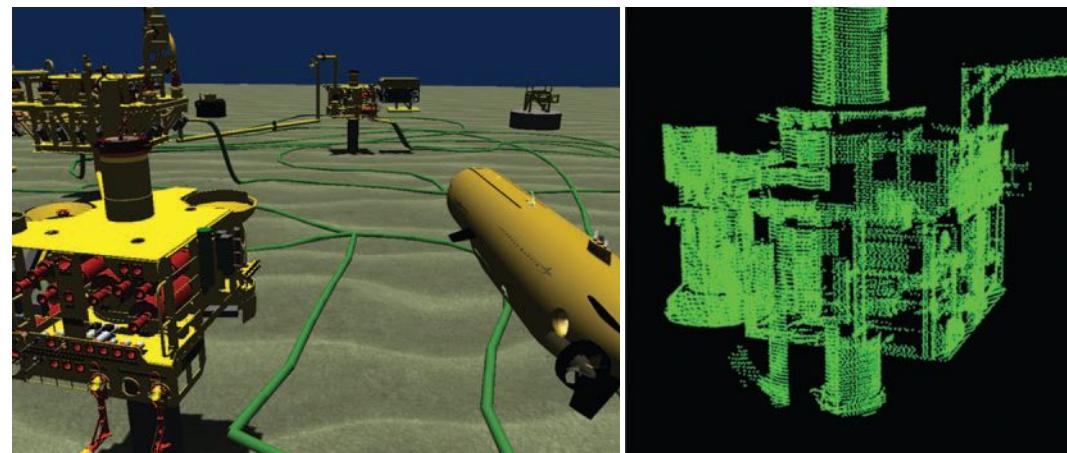
# FEATURE STORY



**Figure 5. Point cloud model resulting from a 3D laser scan of a jumper metrology test target by the Marlin® AUV.**

When combined with the power of Lockheed Martin's feature-based navigation, real-time 3D modeling, and change detection, AUV-based 3D laser imaging can perform a wide range of inspection tasks with truly remarkable results. Capabilities include generation of geo-registered "as-built" models of structures on the seabed or in the water column, periodic survey of subsea infrastructure and comparison against a baseline model, and autonomous detection of structural defects or other out-of-spec conditions that exceed threshold values.

Once an out-of-spec condition is detected by the AUV's onboard perception autonomy software, a pre-programmed "revisit" maneuver can be invoked to reposition the AUV and obtain more video, sonar, and/or laser data. Additionally, such conditions can be automatically flagged to the operator upon completion of the inspection mission. This provides the dual benefit of more rapid and accurate identification and review of critical conditions by integrity management engineers as well as a reduction in operator fatigue and subsequent operator errors caused by long hours of monotonous review of inspection data.



**Figure 6. AUV-based 3D laser imaging has the potential to become a powerful tool for structural integrity management.**

There are a wide range of potential applications in deepwater fields. For example, imagine an AUV pipeline inspection conducted with 3D laser imaging, feature-based navigation, and real-time 3D modeling and change detection. Using a reference model of the pipeline and seabed obtained from a previous baseline survey, a new survey would be able to autonomously

detect and measure movement of the pipeline, changes in pipeline contour (potential buckling or over-bending), changes in scour, berm and freespan conditions, anode depletion since the last survey, changes to pipeline surface conditions (pits, cracks, dents), and new anomalies or debris that may impact pipeline safety.

When combined with an AUV that conducts pipeline surveys at 3 to 4 knots and has full hover and "revisit" capabilities as well as enhanced navigational capabilities, the resulting efficiency and accuracy of inspection will exceed anything available today. Similar results and efficiencies could be expected for AUV-based laser inspection of risers, mooring lines, and other subsea infrastructure. In addition, the ability to conduct subsea installation and construction tasks such as high-accuracy seabed bathymetry, jumper metrology, and wellhead verticality measurements from a moving AUV offers significant advantages over current methods.

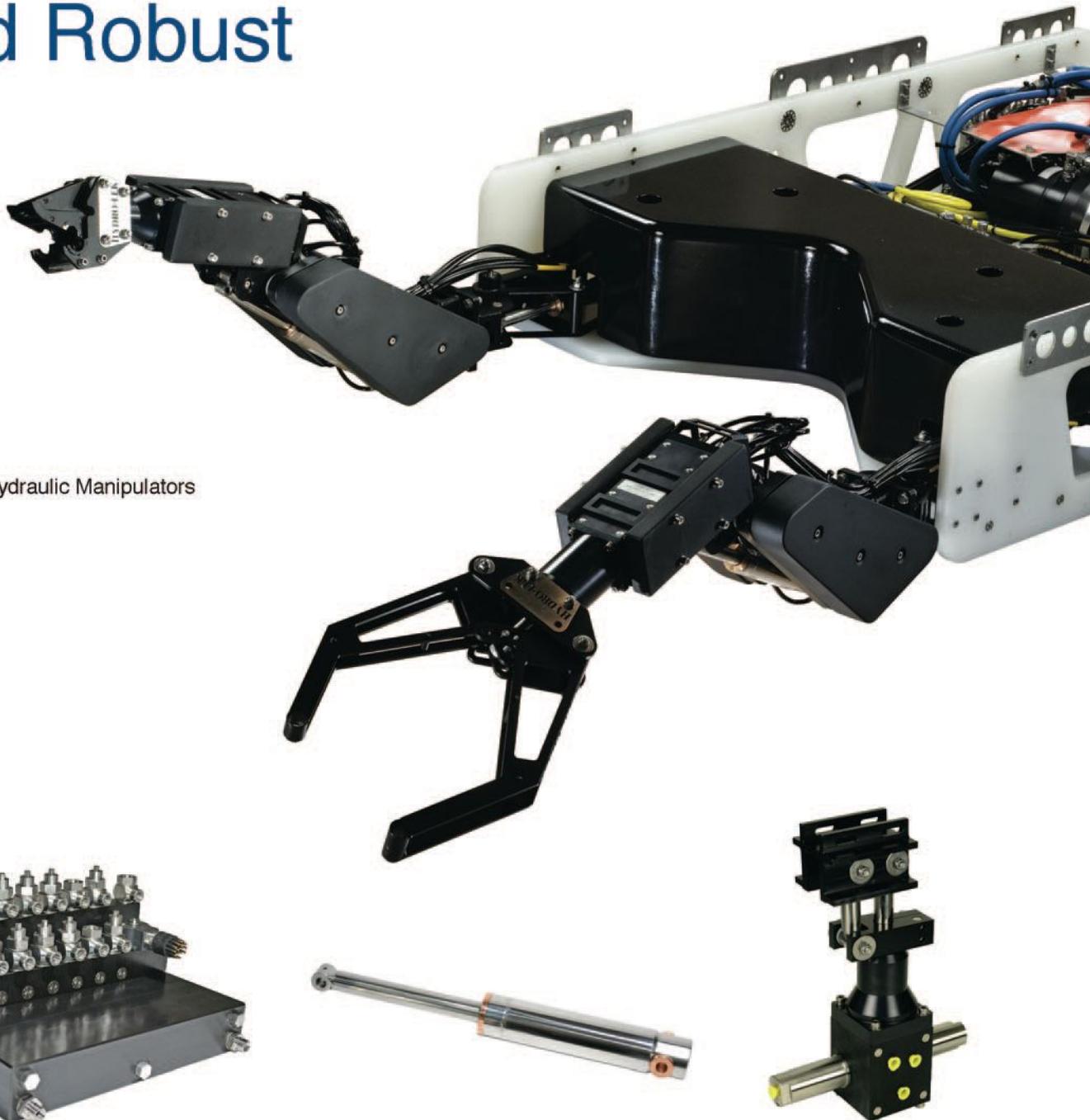
Lockheed Martin is currently developing a new Marlin® variant, the Mk3, which will be capable of operations in water depths up to 4,000 m. In addition to carrying a full suite of conventional survey and inspection sensors such as multi-beam sonar, side-scan sonar, and HD video, the Marlin® Mk3 will employ high-resolution 3D sonar and 3D laser sensors to perform autonomous pipeline inspection and deepwater facility inspection. When completed, the Marlin® Mk3 is expected to provide deepwater operators with 3D laser imaging capability that will provide a "next generation" tool for structural integrity management.

The long-term benefits of this technology for structural integrity management are significant. First, the field operator reaps the benefits that AUV inspections can offer over current ROV inspection methods for deepwater fields, including smaller vessels, smaller crew, and elimination of the ROV umbilical—resulting in safer, faster, and more efficient operations. These benefits translate to lower overall "life of field" costs for structural integrity management and will enable more frequent inspections at an affordable cost. Add into this equation the efficiency

and accuracy provided by autonomous 3D modeling and change detection, and operational efficiency skyrockets. In addition to inspections becoming more efficient, factors such as human fatigue and inspection data overload are eliminated from the equation. The availability of detailed 3D models from prior surveys will provide significant benefits for structural analysis and defect evaluation, and the application of 3rd party software tools from other industries such as terrestrial survey will be an additional enabler for more operational efficiency.

In conclusion, AUV-based 3D laser imaging has the potential to become a powerful tool for structural integrity management, enabling autonomous, real-time, high-resolution 3D modeling, change detection, and structural integrity assessment while offering significantly improved safety, higher operating efficiencies, and reduced costs to deepwater field operators.

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# OCEAN INDUSTRY

## Team led by Paul G. Allen locates one of the largest battleships ever constructed



Photo: Paul G. Allen.

A research team led by Paul G. Allen has located the Musashi, one of the world's largest and most technologically advanced battleships. The ship was sunk during World War II and, despite numerous eyewitness accounts, the exact location of the ship was unknown.

Using historical records from four different countries, detailed topographical data and advanced technology aboard his yacht, M/Y Octopus, Mr. Allen and his team discovered the wreckage in the Sibuyan Sea off the Philippines on 2 March 2015.

Musashi was sunk by American forces on 24 October 1944 in the lead up to the Battle of Leyte Gulf. The discovery of the ship marks an important milestone in the annals of World War II naval history. The Musashi, and its sister ship Yamato, were the heaviest and most powerfully armed battleships ever constructed.

Commissioned in 1942, Musashi weighs 73,000 tons fully loaded. It featured 18-in. armor plating and was armed with nine 18-in. guns, the largest ever mounted on a warship. Roughly half of the crew members were killed when the ship sank. Additionally, the United States lost 18 aircraft during the attack on the Musashi, though we do not have an accurate number of American losses from those aircraft.

Mr. Allen's passion for preserving and sharing historic military technology is inspired by his father's service in WWII. His Flying Heritage Collection showcases military artifacts that have been restored and preserved to illustrate the sacrifice and bravery of those who served. Mr. Allen has been searching for the Musashi for more than 8 years, and its discovery will not only help fill in the narrative of WWII's Pacific theater, but bring closure to the families of those lost.

For more information, visit [www.paulallen.com](http://www.paulallen.com).

### Sir Richard Branson joins Guy Harvey in The Great Shark Race

Renowned marine wildlife artist and conservationist Dr. Guy Harvey and Sir Richard Branson are calling on individuals and corporations to sponsor shortfin mako sharks that will be tagged and released.

Dr. Harvey and his foundation, Guy Harvey Ocean Foundation, along with the Guy Harvey Research Institute at Nova Southeastern University, have created an innovative race that allows businesses and/or individuals to sponsor sharks through

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### Jack W. Fisher passes away

Jack W Fisher, president of JW Fishers Mfg., passed away at home after a brief illness on 20 February 2015. He was 73 years old. The business was started because Mr. Fisher, an avid diver, needed an underwater metal detector to use on a salvage project in the mid 1960s. He discovered there was no such device available. Over the next several years he designed and constructed his own underwater metal detector. JW Fishers Mfg. was formed and Jack began building and selling his detectors to other divers. Over the next 50 years, the company developed into a significant enterprise by designing, manufacturing and marketing the most extensive line of underwater search equipment offered by any single manufacturer. Traveling the world for business and pleasure, Jack never tired of meeting new people and seeing old friends. He always said there was nothing better than being with family and friends. He will be greatly missed by all.

### Career opportunities in the ocean technology, marine science and offshore industries at Ocean Careers

Ocean Careers is a 3-day event running alongside Ocean Business on 14-16 April 2015 at the National Oceanography Centre in Southampton, UK. The event provides career information within the ocean technology, marine science and offshore industry sectors. Graduates and students studying engineering, science or mathematics, as well as students that have already opted to study marine related subjects, can learn more about the global career opportunities on offer in this vast, exciting, forward-thinking and diverse industry. In recent years, the industry has seen continued growth and rapid development of technologies applied to ocean technologies and research. Ocean Careers will help students realize how skills can be utilized and gain an understanding of what employers are looking for. The event is made up of a combination of inspiring industry presentations from professionals in the industry and a series of one-on-one speedy meetings. The meetings are on a first come, first served basis and provide industry experts and potential employees with the opportunity to meet face to face. Ocean Careers and Ocean Business are FREE to attend. Visitors are encouraged to register online in advance. For more information and to register, please visit, [www.oceancareers.org.uk](http://www.oceancareers.org.uk).



the purchase of satellite tags. The tags enable researchers and the public to follow these animals via the Internet as they travel in near real-time.

The Great Shark Race consists of two "divisions" – the Shortfin Mako Shark Division and the Oceanic Whitetip (OWT) Shark Division. Participants sponsor satellite tags (\$5,000 each), which are affixed to either a mako shark or an oceanic whitetip shark in the Caribbean. Then the shark in each division that travels the furthest in 6 months wins.

The winning sponsor will receive an incredible prize, including diving and/or a fishing expedition at the Guy Harvey Outpost in Islamorada, Florida and Guy Harvey original artwork. Existing sponsors are Virgin Unite, AFTCO, Guy Harvey Ocean Foundation, Florida Sea Grant and Guy Harvey Outpost.

To register, please visit [www.greatsharkrace.com](http://www.greatsharkrace.com).

### **ABS gathers expert guidance to improve offshore equipment safety**

As part of its mission to serve the public interest as well as the needs of members and clients by promoting offshore safety and security, ABS, the leading provider of classification services to the global offshore industry, recently convened the inaugural meeting of the ABS Offshore Equipment Advisory Committee.

A group of technical advisors gathered on Wednesday, 4 March 2015 at the ABS Energy Corridor office to exchange information for rule development and enhancement of classification services for offshore equipment. One of the primary focuses of the Committee is to

gather information from offshore experts to guide changes and additions to publications such as the ABS Guide for the Classification of Drilling Systems.

"The ABS Offshore Equipment Committee plays an important role in bringing together key stakeholders to provide critical expertise to improve standards for equipment safety," says ABS Chairman and CEO Christopher J. Wiernicki. "ABS will continue to work with industry, academia and government to develop a robust offshore safety regime that safeguards assets, the environment and most importantly people."

Recognized as a technology leader, ABS is the class society of choice for next-generation units operating in remote and challenging environments and drilling deep, high-temperature, high-pressure wells. ABS classed the first mobile offshore drilling unit (MODU) in 1958 and continues to be the classification leader for the high-specification units that will support the energy needs of future generations.

For more information, visit [www.eagle.org](http://www.eagle.org).



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## Global Ship Lease takes delivery of 8,063 TEU vessel

Global Ship Lease, Inc., a containership charter owner, announced that it took delivery of a 2004-built, 8,063 TEU containership, the OOCL Qingdao. Upon delivery, the vessel commenced a timecharter back to Orient Overseas Container Line (UK) Limited, an affiliate of the seller, for 36 to 39 months at a rate of \$34,500 per day. With this addition, the Company's fleet stands at 19 vessels with a total capacity of 82,475 TEU. Ian Webber, chief executive officer of Global Ship Lease, stated, "Delivery of this vessel marks another important step for Global Ship Lease, expanding our annual EBITDA by \$9.4 million and increasing our contracted revenue stream by between \$37.7 and \$40.9 million, while strengthening our existing relationship with a world-class liner company in OOCL. The successful execution of our growth strategy has added more than 20% to GSL's EBITDA capacity since the third quarter of 2014. We continue to evaluate further opportunities to accretively grow the fleet during a time of cyclically low asset values. We also remain focused on securely passing the relevant financial test in 2015 that will enable us to initiate a dividend."

## MSC Oscar calls at port of Wilhelmshaven

MSC Mediterranean Shipping Company's largest container ship ever built, the MSC Oscar, made her maiden call at Port of Wilhelmshaven. Since its inauguration in January at Daewoo's Shipbuilding and Maritime Engineering (DSME) Shipyard in South Korea, record-breaking MSC Oscar represents the first in its class and will be followed by additional vessels in the same class during 2015-2016. In true MSC family tradition, the vessel was named after Oscar, the son of Diego Aponte, MSC's President and CEO. The 45,300 ton steel MSC Oscar, which cost US\$140 mil to build, is 395 m long, 59 m wide with a draught of 16 m. The super-size MSC Oscar is equivalent to the size of four combined football fields and is now servicing the Albatross string on the new East-West trade routes between Asia and Europe.

## AVEVA inspires next generation of Korean ship designers

AVEVA announced that AVEVA Marine and AVEVA Bocad software licences will be deployed in Korean Universities and schools to encourage the ongoing development of the local marine industry. Students will be introduced to the ship design process through hands-on experience with essential engineering and design disciplines. Students will be able to use the software in classes including computer-aided ship design, ship detailed design & modeling and fabrication technologies based on ship structures. There are over 20 academic institutions involved in this initiative including Seoul National University, Korea Advanced Institute of Science and Technology (KAIST), Pohang University of Science and Technology, and Pusan National University.

## Wärtsilä and VTT the main contributors to new propulsion technology research programme

A new technology research program aimed at developing propulsion products specifically for operating in arctic conditions has been implemented with Wärtsilä and VTT, the Technical Research Centre of Finland, as the main contributors. The ArTEco (Arctic Thruster Ecosystem) project will altogether be supported by 10 industrial and academic partners from Finland and other countries. ArTEco is a 3 year program, commencing in 2015 and ending in 2017. Its primary aim is to foster new technology for propulsion solutions in an arctic operating environment. The platform will consist of developing state-of-the-art simulation and load determining methods for dynamic loading conditions; researching possibilities for dampening dynamic loads; researching the use of Environmentally Acceptable Lubricants in propulsion products; and researching new sensor technology for components used in propulsion products. The new technology that is expected to emerge from this project will have the potential to significantly improve the competitiveness of solutions, in terms of cost, size and reliability, compared to products currently available.

## VSTEP Class A simulator for Ho Chi Minh Maritime College



A DNV Class A certified full mission bridge simulator was delivered and installed by VSTEP at the Ho Chi Minh City Maritime Vocational College in Vietnam.

The simulator delivered is a NAUTIS Class A full mission bridge simulator with a 270° field of view through projection. A NAUTIS Instructor Station was also installed. The Maritime Vocational College is a well-known higher education institution in Ho Chi Minh City. The simulator will be used for training and education of maritime students at the vocational college and will be implemented in the existing courses curriculum.

To allow students maximum familiarization with the Vietnamese waters, three additional environments were added to the extensive environments library. The new environments include the approach of Ho Chi Minh City and its harbor, as well as the approach and harbours of Hai Phong and Da Nang. All environments were recreated in detail for use in the simulator.

Robin Lim, Business Development Manager, VSTEP Asia Pacific said, "With the integration of the Vietnamese environments, the NAUTIS DNV Class A simulator will provide the Ho Chi Minch Maritime students with a realistic educational tool to prepare themselves for a successful seafarers career. The cooperation with our Vietnamese partner Tecotec and the Maritime Vocational College has been excellent and we look forward to continue this relationship in the future."

For more information, visit [www.vstepsimulation.com](http://www.vstepsimulation.com).

## Damen Yichang Shipyard enters new era

The Damen Yichang Shipyard in China is poised to enter a new era. Commencing operations in 1999, the joint venture between Damen Shipyards Group and Sinotrans CSC has had a successful history of delivering cargo vessels from the Damen portfolio. Now, the yard is rolling out an increased portfolio of vessels to a wider market audience.

"Over the years we have achieved a good reputation for delivery time, reliability and quality," says executive director at Damen Shipyards Group Hans Voorneveld about the yard on the Yangtze River. The Yichang yard has always excelled in the construction of cargo vessels up to 15,000 dwt. While it will continue to build such vessels, from now on, there will be an additional focus on other, high-tech vessel types.

"We're looking at dredgers, pontoons and barges, LNG/LPG tankers and offshore support vessels, such as platform suppliers," explains Mr. Voorneveld. Since the decision was taken to increase the range, things have moved fast. The yard is already building a number of specialized pontoons, while plans for dredgers are now being finalised. Additionally, finalization of plans for LPG tanker construction is expected imminently.

As the yard's product portfolio expands, so too will its geographical reach. Damen Yichang Shipyard's cargo vessels have mainly aimed for the Western European marketplace. The wider product range, however, will be going global. "Already we are building pontoons for specialized projects in the Far East and Latin America, as well as for stock. The dredgers also have an international market," Mr. Voorneveld states.

Damen and Sinotrans are investing in developing the building and design process for complex vessels at the yard; however, pre-existing infrastructure has enabled it to embark smoothly upon this new venture, as Mr. Voorneveld indicates. "Everything is already in place,

the yard is completely up and running. There's an experienced workforce of around 1,000 personnel. We have been building high quality vessels at Damen Shipyards Yichang for a long time, this is more about adjusting the organization to new products."

For more information, visit [www.damen.com](http://www.damen.com).

### **CTruk MPC22 enhanced with Volvo IPS**

Since the launch of its first-of-class CTruk MPC22 late last year, CTruk has incorporated performance feedback into future builds to enhance seaworthiness, while ensuring that the vessel remains cost effective.

The second CTruk MPC22, due for delivery in June, will feature the Volvo IPS system for optimal bollard pull and service speeds, significantly increasing the already renowned fuel efficiency of CTruk's lighter weight composite catamarans and yet still allowing the boat to take the ground and dry out at low water.

The 22 m multi-purpose catamaran with 7.5 m beam and 1.25 m draft is constructed from advanced composite for weight-saving strength. With a 20



tonne flexible payload capability and the ability to carry 24,000 litres of fuel, she is designed to deal with rougher seas, longer transits and tougher assignments whilst maximizing passenger and crew comfort. CTruk's patented moveable wheelhouse and modular deck pod system give the workboat multi-role capability.

Working with Volvo IPS has proven successful for CTruk, with Netherlands-based Sima Charters' vessel 'SC Falcon' (a CTruk MPC19) currently transiting 60 mi out in the North Sea and giving larger vessels in the field a run for their money.

For more information, visit [www.ctruk.com](http://www.ctruk.com).

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[www.km.kongsberg.com/underwatermapping](http://www.km.kongsberg.com/underwatermapping)

## Shipping industry must support CO<sub>2</sub> target, say transport groups

The Clean Shipping Coalition (CSC) is calling on shipping industry leaders to support a carbon emissions reduction target for their sector as ship owners and stakeholders gather in Brussels for European Shipping Week. The CSC, the global NGO coalition campaigning for cleaner shipping, said that as the only remaining major economic sphere yet to tackle its carbon emissions, shipping must act urgently to do their part to keep the global temperature increase below 2 degrees.

Last year's third International Maritime Organisation study on greenhouse gas (GHG) emissions predicted shipping emissions to grow up to 250% by 2050, threatening to undermine other initiatives to keep global warming below dangerous levels. The CSC wrote to seven industry groups, and in addition to a target, is calling on them to work with EU member states and others attending the IMO's environment committee (MEPC68) session in May this year for an early agreement on mandatory fuel-burn reporting for ships.

The CSC also called on industry

groups to push for transparent reporting of ships' energy performance. This information will enable shipping users in Europe and worldwide to identify the most efficient ships and practices, leading to increased competition, fuel savings and emissions reductions, and a level playing field for all players.

Last year's GHG study by the IMO found that projected growth in demand for shipping will wipe out any improvements in ship efficiency. The European Commission last month said a climate deal in Paris later this year must cover 100% of emissions in all sectors, including shipping.

For more information, visit [www.cleanshipping.org](http://www.cleanshipping.org).

## Port of Houston is ready for increased demand

The Port of Houston Authority is ready to provide cost-efficient and consistent solutions to cargo owners and logistics companies, executive director Roger Guenther said in his monthly report to the Port Commission.

"We continue to receive many inquiries about moving freight from East Asia via the Panama Canal and through our port."

Emphasizing the Port Authority's readiness to capture increased container cargo demand through the region, Guenther cited four new wharf cranes destined for the Barbours Cut Container Terminal. At the meeting, the Port Commission also approved the purchase of nine new rubber tired gantry cranes for the Bayport terminal.

Guenther reported that dredging is progressing well at the Bayport and Barbours Cut channels. With much of the disposal site and preparatory work complete, plans call for adding two dredges to the project so that in the coming months one dredge will work at Barbours Cut and two dredges will operate at Bayport.

In his financial report to the Port Commission, Guenther said tonnage continues to be strong. In January, import steel was up by 35% over the same month in 2014, but Guenther noted high steel volumes are expected to taper off. Container cargo volume has continued to strengthen as well, with a constant upward trend in full import boxes. PHA attained a healthy overall 2.9 million tons for the first month of the year.



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# COMPANY SPOTLIGHT

[www.hydro-lek.com](http://www.hydro-lek.com)

## Hydro-Lek: Leading Providers of Deep Sea and Remote Tooling for the Subsea, Nuclear, and Defense Industries

### Simple, Compact, and Robust Tooling

Hydro-Lek is a leading supplier of remote handling systems for the subsea, nuclear, and defense industries. Products range from simple hydraulic components to fully integrated, telemetry-controlled remote manipulator systems for remotely operated vehicles (ROVs) and remote-access platforms. Our extensive engineering experience and operations-led approach has positioned Hydro-Lek as the supplier of choice for compact, simple-to-operate, and highly robust remote handling systems. With the general increase in demand for more robust and cost-effective tooling, Hydro-Lek's products are used reliably and extensively in some of the most hostile environments worldwide by a wide range of major ROV manufacturers. To date, Hydro-Lek has built and delivered almost 1,000 manipulator systems worldwide.

Founded in 1996, Hydro-Lek was acquired by Saab Seaeye in 2013 and is committed to a continuous program of delivering innovative tooling products as quickly as possible to the highest standards of customer service and product reliability.

### Manipulators

Hydro-Lek designs and manufactures a wide range of compact hydraulic manipulators for small-class and medium-class ROVs and other remote platforms.

Ranging from a lightweight 5-function arm weighing less than 5 kg in water to a rugged work-class 7-function manipulator, Hydro-Lek has become the supplier of choice for many remote intervention tasks where versatility, reliability—and cost effectiveness—are critical.



A selection of Hydro-Lek's range of ROV tooling and hydraulic system components.



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REMOTE HANDLING SPECIALISTS  
A SAAB SEA EYE COMPANY

### Hydraulic System Components

Our range of system components include rotary actuators, hydraulic cylinders, HPUs, valve packs, fittings, and telemetry control systems. Hydro-Lek continually develops our product line in a modular format so that bespoke solutions can be produced readily and cost effectively to suit customer requirements without the need for extensive redesign.

### ROV Tooling

Hydro-Lek manufactures a range of cutters, camera booms, pan and tilts, and cleaning tools for subsea inspection, cleaning, and salvage operations.



Hydro-Lek's deep ocean interaction platform, HyBIS.

### Special Projects

In addition to providing specialist tooling, Hydro-Lek offers a bespoke design and build service. With a reputation spanning over 20 years, Hydro-Lek understands the challenges presented by working in remote and inhospitable environments and can draw on this expertise with a sound and trusted product base to deliver the best solution within clients' timescales and budgets. An example of Hydro-Lek's project engineering expertise is HyBIS, our deep-ocean surveying and sampling vehicle. Capable of operating to depths of up to 6,000 m, HyBIS has been deployed for missions of bulk sampling; pick and place applications on the seafloor; OBS and OBEM positioning and orientation; instrument recovery; and to discover, film, and sample the world's deepest hydrothermal vents. HyBIS is designed to operate in conjunction with existing deck handling and cable systems used on towed sonar arrays, thereby eliminating the need for additional and costly deck handing equipment.

Some of the many other applications Hydro-Lek has supported include deep-sea salvage, nuclear decommissioning, connection of power supply to subsea turbines, marine archaeological retrieval, scientific research, and manned and unmanned submarine tooling.

Hydro-Lek maintains high stock levels of all standard products and spare parts to ensure fast deliveries for new orders and after-sales. Our close proximity to London Heathrow Airport provides us with a first-rate equipment despatch point to deliver quickly and efficiently to anywhere in the world. We are also able to provide full maintenance support and comprehensive training worldwide on all our products.

To find out more about Hydro-Lek products and services, visit our website [www.hydro-lek.com](http://www.hydro-lek.com) or e-mail [enquiries@hydro-lek.com](mailto:enquiries@hydro-lek.com).

**Alvin Completes Depth Certification to 4,500 M**

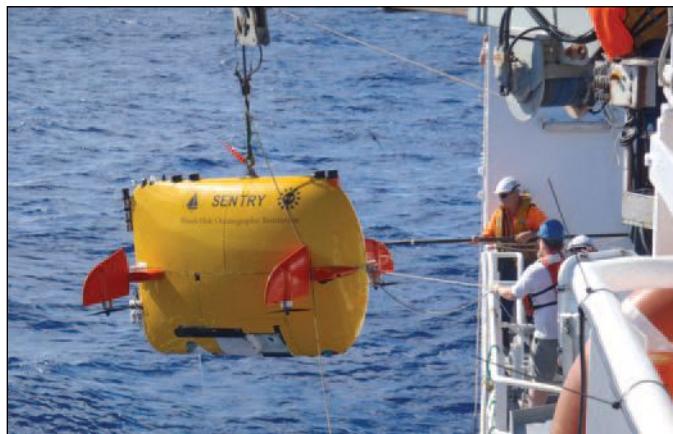
The Woods Hole Oceanographic Institution (WHOI) announces that the Human Occupied Vehicle (HOV) Alvin has achieved certification from the U. S. Naval Sea Systems Command (NAVSEA) for operations to its rated depth of 4,500 m (approx. 2.8 mi). Two certification dives were conducted in the waters off Arica, Chile on 26-27 January from the research vessel Atlantis to demonstrate vehicle performance. Navy representatives were on hand to monitor the process and participate in the dives. Certification of Alvin to 4,500 m represents the successful culmination of the \$41-million, multi-year upgrade of the submersible funded by the National Science Foundation with a significant cost share by WHOI. In January 2014, NAVSEA certified Alvin to a depth of 3,800 m, clearing the vehicle to return to service. In March 2014, a group of scientists put Alvin through its paces in the Gulf of Mexico, test-driving the upgraded vehicle and its new sampling, imaging, surveying and navigation systems. Alvin has subsequently made 99 dives during missions to the Gulf of Mexico, Juan de Fuca Ridge, and East Pacific Rise. Alvin was positioned in early 2015 off Chile, where depths of 4,500 m were readily available to complete the certification trials to its full design depth.

**NOAA tool useful for protecting corals from runoff**

Local officials are using National Oceanic and Atmospheric Administration's (NOAA's) OpenNSPECT, the Nonpoint Source Pollution and Erosion Comparison Tool, to estimate the amount of runoff, sediment, and pollutants that drain into coastal waters where corals reside and to explore how various restoration and land use activities might impact corals. Land use activities such as timber management, agriculture, and development produce byproducts that can contaminate waterways inhabited by coral communities. Land-based sources of pollution can disrupt growth and cause disease or death in corals. OpenNSPECT users can enter land cover, soil, rainfall, and elevation data to generate estimates on how various land use and climate scenarios impact water quality. The results are used to identify areas that might benefit from changes to proposed development strategies. Puerto Rico offers a good example. Coral managers in Puerto Rico used OpenNSPECT to evaluate the effectiveness of protecting corals by restoring highly erodible, exposed lands through hydroseeding, a planting process that uses a slurry of seed and mulch. OpenNSPECT showed that hydroseeding reduced sediment runoff from treated areas into the Guánica Bay – Rio Loco watershed by greater than 80%. The January 2015 technical report provides details on the process used to compare before and after scenarios.

**New tool aids U.S. conservation and management of whales, dolphins and porpoises**

Researchers have identified more than 100 areas within U.S. waters that should be considered biologically important when making management and regulatory decisions about human activities that could affect whales, dolphins and porpoises. The creation of Biologically Important Areas (BIAs) are described in a special issue of the journal Aquatic Mammals. Expert judgment was combined with published and unpublished data to identify 131 BIAs covering 24 species, stocks or populations in seven regions of the U.S. It is the first time so much information has been brought together for these species in one place and made available to scientists, managers, policymakers and the general public. "The goal was to identify when and where cetaceans—whales, dolphins and porpoises—engage in activities that are important to the animal's physical health and fitness, reproduction and ability to survive as a population," said Sofie Van Parijs, who heads the passive acoustics group at NOAA's Northeast Fisheries Science Center (NEFSC) and is guest editor of the special issue. "Scientists and managers can use the information provided about BIAs to help with planning, analyses and decisions regarding how to reduce adverse impacts on cetaceans resulting from human activities." BIAs are region, species and time specific and include reproductive and feeding areas, migratory corridors, and areas in which small and resident populations are concentrated. Each BIA includes a written narrative, a map, a list of references, and a table of data that details the type and quantity of information used to define the BIA.

**Scientists zero in on submarine volcanoes**

*WHOI Sentry (Photo Julian Thomson, GNS Science).*

New Zealand and American scientists will use one of the world's most sophisticated unmanned submarine vehicles during the next 3 weeks to investigate two seafloor volcanoes in the Kermadec Arc, northeast of Bay of Plenty.

The project is a collaboration involving GNS Science, the Royal New Zealand Navy, and U.S.-based Woods Hole Oceanographic Institution, which owns and operates the autonomous underwater vehicle Sentry.

The multi-purpose 18-day voyage is built around a regular Navy supply trip to Raoul Island on HMNZS Wellington. This particular voyage will support GNS Science, the Department of Conservation, and the Meteorological Service.

The Sentry will be deployed from the Royal New Zealand Navy patrol vessel for its day-long missions to skim over the seafloor and gather data. The target seafloor volcanoes—Macauley Caldera and Giggabach—are actively venting hot water and gases on the seafloor and are within 100 km of Raoul Island. Both volcanoes have been investigated by surface ships on previous voyages, but this will be the first time they have been explored extensively at close range.

Sentry will travel over the volcanic structures at walking speed and at a pre-determined height above the seafloor. It will build detailed three-dimensional maps and measure up to 12 different chemical and physical parameters of the ocean and seabed.

Project leader Cornel de Ronde said the voyage was part of a long-term GNS Science program to build detailed maps and collect geological data, including hydrothermal venting, at about 30 major submarine volcanoes in the Kermadec Arc, which runs between Bay of Plenty and Tonga.

For more information, visit [www.gns.cri.nz](http://www.gns.cri.nz).

**Great Barrier Reef corals eat plastic**

Researchers in Australia have found that corals commonly found on the Great Barrier Reef will eat micro-plastic pollution. "Corals are non-selective feeders and our results show that they can consume microplastics when the plastics are present in seawater," says Dr. Mia Hoogenboom, a chief investigator with the ARC Centre of Excellence for Coral Reef Studies at James Cook University.

"If microplastic pollution increases on the Great Barrier Reef, corals could be negatively affected as their tiny stomach-cavities become full of indigestible plastic," Dr. Hoogenboom says.

Microplastics are tiny fragments of plastic in the environment and are a widespread contaminant in marine ecosystems, particularly in inshore coral reefs.

"Marine plastic pollution is a global problem and microplastics can have negative effects on the health of marine organisms," says Dr. Hoogenboom. "We aimed to determine whether corals from inshore coral reefs consume microplastics, and whether there is potential for plastic pollution to affect coral reefs."

As part of the study the researchers put corals collected from the Great Barrier Reef into plastic contaminated water. After 2 nights they found that the corals had eaten plastic particles.

"Corals get energy from photosynthesis by symbiotic algae living within their tissues, but they also feed on a variety of other food including zooplankton, sediment and other microscopic organisms that live in seawater," says study lead author Nora Hall, a James Cook University Masters graduate. "We found that the corals ate plastic at rates only slightly lower than their normal rate of feeding on marine plankton," she says.

The plastic was found deep inside the coral polyp wrapped in digestive tissue, raising concerns that it might impede the corals ability to digest its normal food. The team also sampled the waters adjacent to inshore coral reefs on the Great Barrier Reef.

"During this testing we found microplastics, including polystyrene and polyethylene, although only in small amounts," says study co-author, Kathryn Berry, a Ph.D. student at James Cook University and the Australian Institute of Marine Science.

The researchers say the next step is to determine the impact plastic has on coral physiology and health as well as its impact on other marine organisms.

For more information, visit [www.coralcoe.org.au](http://www.coralcoe.org.au).

#### **Nova Southeastern University researchers discover hurricanes helped accelerate spread of lionfish**

Their names roll off the tongue like a rogues' gallery: Floyd, Frances, Irene, Wilma and Andrew. But these aren't the names of notorious criminals; rather, they are just a few of the hurricanes since 1992 that have helped spread invasive marine species throughout the Florida Straits.

Researchers at Nova Southeastern University's (NSU) Oceanographic Center have discovered that storms don't only have a dramatic impact on

land; they have an equally dramatic effect on ocean currents, which helps the spread of marine invasive species throughout a region. More specifically, NSU researchers looked at the distribution of lionfish in the Florida Straits.

"This is the first-ever study that shows hurricane-altered ocean currents are able not only to help, but actually accelerate the invasion of non-native marine species of any kind," said Matthew Johnston, Ph.D., one of the research scientists at NSU's Oceanographic Center who conducted the study. "Lionfish are pretty sedentary, so this is like creating express lanes on a superhighway—otherwise, that's a pretty long swim for lionfish babies."

The research, conducted by Johnston and NSU Oceanographic Center Professor Sam Purkis, Ph.D., focused on the explosion of lionfish populations in area waters. Their findings are being published in the journal Global Change Biology. Another NSU Oceanographic Center Professor, Richard Spieler, Ph.D., in the course of his research, was one of the first to see lionfish in Bahamian waters soon after their arrival.

Johnston said that the research focused on how large storms (i.e., hurricanes) affect the flow of water in the Florida Straits. Normally, the currents represent a potential barrier to the transport of lionfish eggs and larvae across the Florida Straits. The researchers found that as a hurricane passes, the flow of water shifts from a strong, northern flow to a strong, eastern flow.

It's these changes in flow direction and speed that likely carry lionfish larvae and eggs from Florida to the Bahamas and can explain how lionfish were able to cross the Gulf Stream so soon after their introduction to South Florida waters.

Johnston said that once they were established in the Bahamas, hurricanes allowed lionfish to spread quickly against the normal, northwestern direction of water flow in the area. In addition, the storms helped increase the spread of lionfish by approximately 45% and their population size by 15%.

Johnston indicated this research has two implications. First, we need to make a concerted effort to prevent marine introductions to begin with and second, we must implement vigorous, early-detection programs to remove these invasive species before they become a problem. Now the team wants to take this research concept and study similar situations in the South Pacific where typhoons are common.

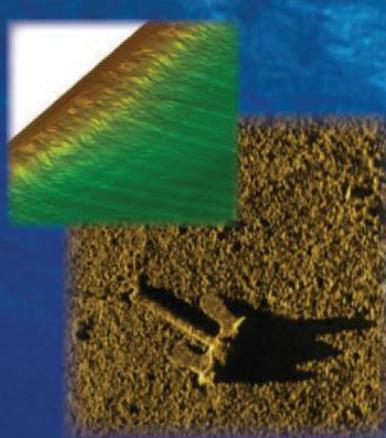
For more information, visit [www.nova.edu](http://www.nova.edu).

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## Gulf of Mexico marine food web changes over the decades

Scientists in the Gulf of Mexico now have a better understanding of how naturally occurring climate cycles—as well as human activities—can trigger widespread ecosystem changes that ripple through the Gulf food web and the communities dependent on it, thanks to a new study published recently in the journal *Global Change Biology*.

A team of NOAA scientists spent three years reviewing over 100 indicators derived from environmental, fishery, and economic data, including sea surface temperature, currents, atmospheric patterns, fishing effort, harvest, and revenues. Through extensive analysis, they found a major ecosystem reorganization that appeared to be timed with a naturally occurring climate shift that occurred around 1995.

The climate phenomenon is known as the Atlantic Multidecadal Oscillation (AMO), a climate signal in the North Atlantic Ocean that switches between cool and warm phases, each lasting for 20 to 40 years at a time. The AMO,

which was in a cool phase between 1965 until 1995 and has been in a warm phase since, influences global ocean and weather conditions in the northern hemisphere such as hurricane activity in the Atlantic ocean and the severity and frequency of droughts.

However, the AMO is not as extensively studied as other climate phenomena, such as El Niño, and this study is the first to investigate what scientists hope will be many future studies examining how the AMO influences ecosystem-scale change in the Gulf. Scientists hope this work will spur interest in further studying this phenomenon and its implications for the marine environment in this region.

“These major ecosystem shifts have probably gone unrecognized to date because they are not apparent when considering single species or individual components of the ecosystem,” said lead investigator Dr. Mandy Karnauskas of NOAA’s Southeast Fisheries Science Center. “Only when we put a lot of things together—including currents, hypoxia, fish abundances, fishing effort, and more—does a strong

climate signal emerge.”

Additionally, scientists observed shifts in many species around the late 1970s coincident with the advent of the U.S. Magnuson-Stevens Fishery Conservation and Management Act—a policy designed to set rules for international fishing in U.S. waters, make the expansion of certain fisheries more favorable for economic development, and ensure the long-term sustainability of the nation’s fish stocks.

Other human influences that are not as pronounced—or easily distinguishable—include coastal development, agricultural runoff, oil spills, and fishing. Natural phenomena like coastal storms and hurricanes play a role as well.

The scientists expect their study to be useful to resource managers throughout the Gulf region. While managers cannot control Earth’s natural climate cycles, they may need to consider how to alter management strategies in light of them, in order to effectively meet their mandates.

For more information, visit [www.aoml.noaa.gov](http://www.aoml.noaa.gov).

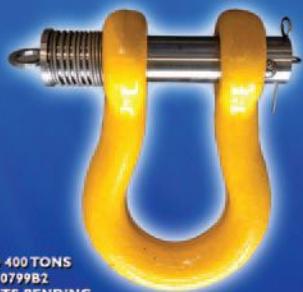
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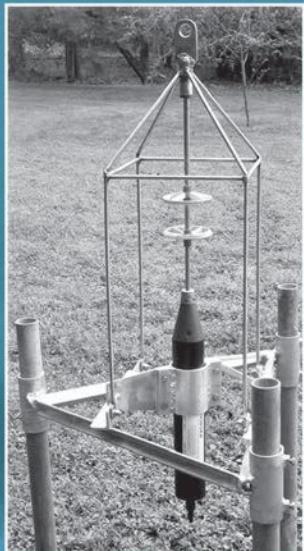
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| MAVS-4DL     | •       | •           | •        | •       | •      | •      | 6000 m. Logging       |
| MAVS-4WTG    | •       | •           | •        | •       | •      | •      | Directional Wave/Tide |
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## Tocardo acquires Swanturbines technology

Tocardo Tidal Turbines, producer of tidal and free-flow water turbines, has reached agreement for the acquisition of Swanturbines Intellectual Property, including the patented subsea tidal turbine technology and deployment methods. The transaction includes intellectual property, patents and technology as well as the trade name of Swanturbines. "For a long time, Tocardo has been impressed by Swan's technology, which is complementary to our own tested tidal energy technology. In particular, Swan's installation technology is an important addition to our portfolio and offering to our clients," said Hans van Breugel, CEO of Tocardo. Swanturbines generate electricity from ocean currents by way of a proprietary method of mounting the turbines to a support structure. Tocardo is one of the few companies in the world to be commercially manufacturing and marketing tidal turbines. The Netherlands-based company has closed deals to sell its technology in Nepal and to install tidal turbines in the UK, Canada and South Korea with a total capacity of over 50 MW. It was recently appointed as one of two preferred partners to supply tidal turbines for a major new renewable energy initiative near the Isle of Man. The takeover of Swanturbines Intellectual Property will accelerate the expansion of Tocardo's Dutch and international tidal energy business. Financial details of the transaction were not disclosed.

## Energy Institute hosts Crown Estate offshore wind knowledge portfolio

In a unique collaboration with the Energy Institute (EI), the Crown Estate, which manages the UK's offshore properties, have brought together over 100 reports and publications, produced as part of the Crown Estates' strategic offshore wind program, and made them more widely available through the EI Knowledge Service. This significant range of publications, developed over the last 5 years, aims to help mitigate, reduce, and manage risks and costs for the offshore wind sector. The EI Knowledge Service is an established online resource covering a number of energy sectors, including offshore wind. This collection has been categorized into 11 different themes covering asset management, construction, cost reduction, supply chain, skills, planning and consenting, health and safety, project economics and finance, grid, technology and innovation, and operation and maintenance. The EI has also added supplementary material from its own extensive online archives, enabling users to access a wide range of material, from good practice guidance and industry news, to feature articles and academic literature. The Crown Estate's offshore wind portfolio is available free of charge to the public, as is access to a significant proportion of the EI's accompanying material. Since 2013, the EI has supported the work of the G9 Offshore Wind Health and Safety Association and it is through this mutual interest that the EI and the Crown Estate have worked together to share their collection of offshore wind resources.

## Dogger Bank Creyke Beck granted consent

The first consent order for offshore wind energy at Dogger Bank in the North Sea has been granted—making it the largest renewable energy development ever to receive planning consent in the UK. The consent approval is the result of more than 4 years of comprehensive assessments, stakeholder consultation and planning by the Forewind consortium, owned equally by the four international energy companies—RWE, SSE, Statkraft and Statoil. This work included the most extensive study of an offshore area by a wind energy developer ever undertaken with more than £60 million spent on surveys, the vast majority going to UK-based contractors. Energy and Climate Change Secretary Ed Davey approved the application for the Dogger Bank Creyke Beck development, which was submitted to the Planning Inspectorate by the Forewind consortium in August last year. He said, "This is another great boost for Yorkshire and Humberside. This development has the potential to support hundreds of green jobs and power up to 2 million homes."

## Block Island Wind Farm now fully financed



Deepwater Wind Block Island, a wholly owned subsidiary of Deepwater Wind, has fully financed the Block Island Wind Farm, reaching financial close on more than \$290 million in project financing provided by Mandated Lead Arrangers Societe Generale of Paris, France and KeyBank National Association of Cleveland, Ohio. In addition to its role as Mandated Lead Arranger, Societe Generale also acts as Financial Advisor for Debt Raise, Bookrunner and Administrative Agent.

With these major agreements, Deepwater Wind has now secured all debt and equity funding needed to construct and operate its 30-MW Block Island Wind Farm—already under construction.

Deepwater Wind is the only U.S. offshore wind company to reach this critical milestone. The Block Island Wind Farm will be America's first offshore wind farm.

"We're ecstatic to reach financial close and thrilled to be partners with Societe Generale and KeyBank for this groundbreaking clean energy project," said Deepwater Wind CEO Jeffrey Grybowski. "We're full speed ahead and moving ever closer to 'steel in the water.'"

The financing from Societe Generale and KeyBank is in addition to more than \$70 million in equity funding already provided by Deepwater Wind's existing owners, principally an entity of the D.E. Shaw Group.

Construction is well underway on the wind farm.

- Alstom will supply five Haliade 150 6-MW offshore wind turbines for the project and has already completed the fabrication in Denmark of all 15 blades for the project.

- Gulf Island Fabrication, Inc., began fabrication work in January 2015 at its facilities in Houma, Louisiana on the wind farm's five steel jacket foundations. That work is scheduled to be complete in several months.

- Rhode Island-based Specialty Diving Services is expected to begin additional fabrication work on components of the foundation substructures at Quonset, Rhode Island in the coming weeks.

"Steel in the water" is planned for this summer, when all five foundations are scheduled for installation off the Block Island coast. The project will be in-service in the fourth quarter of 2016.

For more information, visit [www.dwwind.com](http://www.dwwind.com).

## Catapult leads project to improve tidal turbine powertrain reliability

The Offshore Renewable Energy (ORE) Catapult has launched the first phase of a three-stage collaborative industry project aimed at improving the reliability of tidal turbine powertrains by reducing risk at the design phase and aiding design optimization. Improved reliability will increase energy output and ultimately drive down the cost of marine energy.

Tidal turbines suffer similar operational issues to wind turbines, but the costs associated with retrieving and reinstalling a tidal turbine and the loss of income from power generation can be significant, driving up operation and maintenance costs and therefore the cost of marine energy.

Building on the existing turbine testing capability at ORE Catapult's 3-MW Drive Train facility in Blyth, Northumberland, the collaborative project with partners Ricardo and DNV GL will address the unique reliability issues faced by a tidal turbine powertrain in converting energy to electricity. The three phases of the project are:

1. Identify existing data on tidal turbine reliability and any data gaps and define a process and simulation methodology to better predict degradation or potential failure as well as the reliability of a tidal turbine.

2. Gather data through live testing and develop a range of tools that can be employed at the design stage.

3. Produce a recommended best practice guide on design optimization.

Collectively, these measures will increase confidence in tidal technology. Other leading tidal turbine developers and universities have also offered their support to further developing the project.

The project will draw on reliability data and generic lessons learned and from many industries including offshore wind, oil and gas, defense, automotive and rail. Until now, research into tidal turbine reliability has been segmented and product specific, lacking a systematic and industry wide approach. But fully understanding the key areas of reliability can help developers further optimize systems, thereby helping to bring down the cost of energy.

For more information, visit [www.ore.catapult.org.uk](http://www.ore.catapult.org.uk).

## Senvion delivers 18 turbines for Nordergründe

Senvion SE, a wholly-owned subsidiary of Suzlon, the fifth-largest wind turbine manufacturer in the world, is delivering 18 wind turbines for the Nordergründe offshore wind farm in Germany's North Sea. The project is being erected by wpd offshore GmbH within the 12-sea-mile zone at the mouth of the Weser, about 40 km northwest of Bremerhaven. The companies signed the contract for delivery, installation and commissioning of the 18 Senvion 6.2M126 on 20 February in Bremen. Each turbine has a rated power of 6.15 MW, enabling it to supply about 4,000 households with energy. After the planned completion in autumn 2016, the Nordergründe offshore wind farm will have an installed capacity of approximately 111 MW and be able to supply more than 70,000 households with power in a year.

Andreas Nauen, CEO of Senvion SE, said, "Successful energy turnaround needs offshore wind energy. Clear framework conditions will fill the order books again. We are very happy that our turbines and rotor blades from

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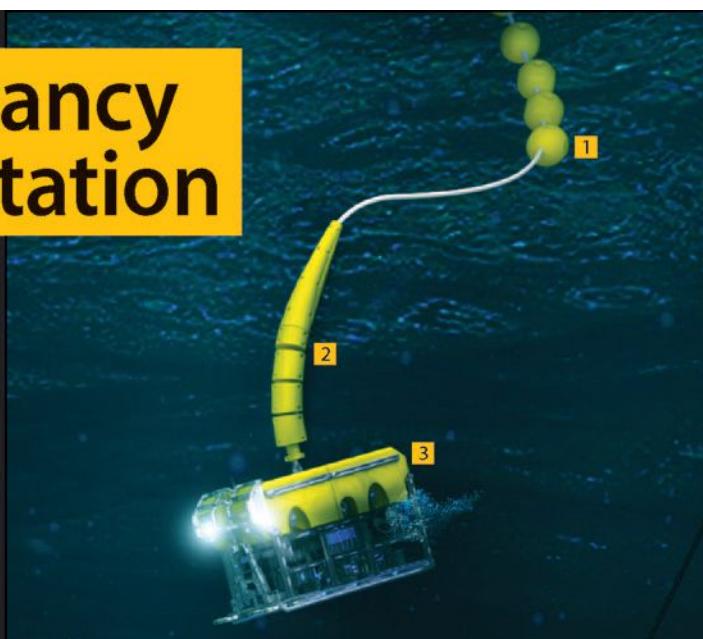
## 3 ROV buoyancy

Offering a full in-house service Balmoral Offshore Engineering designs and creates intricate ROV/AUV buoyancy profiles with virtually no size limitation. Balmoral's unique composite and pure foam systems are designed to operate at depths of 1000-10,000msw.

The company's refurbished ROV plant incorporates an end-to-end process that includes temperature controlled curing facilities and a state-of-the-art buoyancy block boring and milling plant.



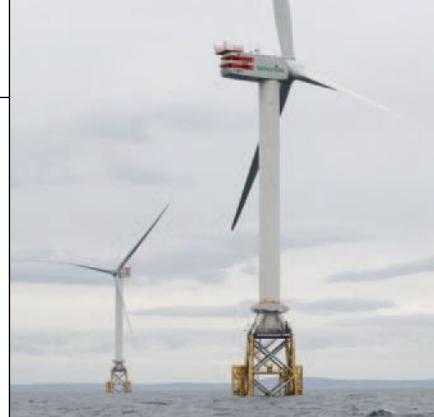
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Bremerhaven are being used for the wind farm of wpd, a Bremen company. This project will create a lot of value locally. Thanks to the clear compensation provisions of the EEG (Renewable Energy Sources Act), our clients will be able to plan reliably, but the German offshore sector will soon need clear indicators for the years after 2019. The preparations for EEG 3.0 are the next step and must start already this year."

Martin Günthner, Senator of Economic Affairs, Labour and Ports of the Free Hanseatic City of Bremen, said, "We are pleased that the new contract means that PowerBlades can return to production. It's an important message to the offshore sector and the region of Bremerhaven. Today, it is clearer than ever that short-time working was the right tool chosen for the transitional period. Most of all I would like to express my thanks for the constructive cooperation with Senvion; thanks to them, we can continue on a path with a long-term perspective."

The turbines and rotor blades are produced by Senvion and PowerBlades in Bremerhaven. From there, the components can be transported directly to



their destination by sea. The nacelle alone is as big as two single-family houses and will be assembled offshore at a hub height between 97 and 100 meters. Each rotor blade is more than 60 m long and weighs about 23 tons. The rotor star has a diameter of 126 m, with the rotors sweeping an area larger than two football pitches.

To date, the Senvion 6.2M126 is the world's most powerful offshore wind turbine to be produced in series. Senvion got started in the multi-megawatt category back in 2004 and since then, has achieved a great deal of success. No other manufacturer today has the experience that Senvion has, with more than 140 turbines from the 5 and 6 MW class installed on the high seas.

For more information, visit [www.senvion.com](http://www.senvion.com).

### Denmark gets cheaper power from offshore wind

With a price of 10.31 Eurocent per kWh, the new offshore wind farm Horns Rev 3 will provide power much cheaper than other recently established offshore wind farms in Denmark and abroad.

The winning tender for the wind farm Horns Rev 3 came from Vattenfall Vindkraft A/S who have agreed a price of 10.31 Eurocent per kWh. In comparison with previous price assumptions, this means that Danish consumers will experience a saving of approximately 295 million Euros over the next 11 to 12 years, which is the period during which the offshore wind farm will be in receipt of subsidies. Thereafter, the Horns Rev 3 facility will produce electricity at the market price and will no longer receive any form of subsidy.

The winning bid is well below the 14.07 Eurocent (15.15 Eurocent in fixed 2015-prices), which is the price being charged by Anholt Offshore Wind Farm. Horns Rev 3 is thus 32% cheaper than the last time Denmark built an offshore wind farm. This makes it the cheapest offshore wind park in Europe at the moment.

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Compared to other wind farms abroad, this represents a very low price. Though a direct comparison is not possible, in the UK—the largest market for wind turbines—the cheapest parks currently being built cost 15.33 Eurocent / kWh in 2015. In addition to this the subsidies are adjusted for inflation and, in contrast to Denmark, the subsidy period is 15 years instead of the 11 to 12 years afforded in Denmark.

The low price is due in large part to technological developments throughout the wind turbine industry combined with a very successful tendering process. Through extensive dialogue and subsequent negotiations with the bidders, the DEA have managed to lower the price considerably. At the same time, a good, competitive environment was fostered around the windmill tendering process in which four companies were pre-qualified to participate.

The successful bid has already been approved by the signatories of the Energy Agreement 2012 and must now be adopted by parliament and signed into law. The government will present the bill on March 18 and the proposal is expected to be adopted during April with the backing of a large political majority in parliament.

For more information, visit [www.ens.dk](http://www.ens.dk).

## Tocardo installs three turbines in Dutch Afsluitdijk

Tocardo Tidal Turbines, producer of tidal and free-flow water turbines, has installed three of its T1 tidal turbines in the Dutch Afsluitdijk, a 32-km long primary sea defense. The three turbines are the first to be installed closely together in an array. Dutch Tidal Testing Centre, a long-standing partner of Tocardo, will manage the project. All electricity produced will be fed into the grid.

The turbine array is the latest for Tocardo in the area in addition to its existing tidal turbine that has already been producing electricity for more than 6 years at a site near the Afsluitdijk, which is also managed by the Tidal Testing Centre. The array will have a capacity of more than 300 kW, producing electricity for about 100 households. Dutch energy company Greenchoice will buy and distribute the electricity. Once the array's operations have been fine-tuned and evaluated, the project partners plan to implement additional tidal installations, with a capacity of up to 2 MW, in the Afsluitdijk.

Tocardo and Tidal Testing Centre have installed the three-turbine array as part of a recent agreement to cooperate for 3 to 5 years to expand the tidal test facility in the Afsluitdijk, where outflow of fresh water into the Wadden Sea creates powerful tidal flows.



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The array's installation is supported by the Waddenfonds, a not-for-profit organization promoting sustainable development in the Dutch Wadden Sea region. The project is also backed by the national and local Dutch governments, which are focused on strengthening the country's sea defense. This has led to regional governments launching several innovative projects to generate renewable energy in the Afsluitdijk. In addition to Tocardo's turbine technology, other techniques to generate clean energy in the Afsluitdijk are being tested.

For more information, visit [www.tocardo.com](http://www.tocardo.com).

## 'Ecosystem services' help assess ocean energy development

In a new paper, Brown University environmental scientists suggest that the way to fill vast gaps in knowledge about the ecological and socioeconomic impacts of ocean energy development is to consider how the benefits provided by ocean ecosystems change before and after the placement of ocean energy infrastructure. The authors examine the case of Muskeget Channel in Massachusetts as an example.

With many projects under development in coastal regions such as New England, tidal power — which extracts "hydrokinetic" energy from marine environments — seems poised to join other U.S. commercial power sources. A new study finds that little is known of the impacts that tidal power projects may have on coastal environments and the people who depend on them, but that the perspective of "ecosystem services" could provide a promising framework for evaluating impacts.

"Ecosystem services are the benefits provided by functioning ecosystems to people," wrote environmental scientist Heather Leslie, the Peggy and Henry D. Sharpe Assistant Professor of Environmental Studies and Biology, in the current edition of the Marine Technology Society Journal.

The study, written with former undergraduate student Megan Palmer, who is now with the Nature Conservancy, begins with a review of nearly 300 papers on marine and hydrokinetic (MHK) power systems. Only 36 focus on tidal power and of those only a handful specifically address ecosystem concerns, the authors found.

While developers are required to perform environmental studies before installing tidal energy harvesting devices, those wouldn't necessarily encompass the full range of connections between people and marine environments.

"The ability to explicitly link ecosystem health (or functioning, as ecologists often refer to it) and benefits to people is one of the notable differences between an ecosystem services analysis and a typical environmental impact statement," Leslie said.

To illustrate how ecosystem services might be applied to a project, Leslie and Palmer looked at the Muskeget Channel Tidal Energy Project, which is planned for a site south of Cape Cod, between Martha's Vineyard and Nantucket. After some analysis, the pair identified biodiversity, tourism and recreation, and food provision as the most important ecosystem services to assess.

Drawing on public data sources available through interactive Northeast Ocean Data portal, they illustrate that while the area of the channel where the power project is planned is likely an important area for coastal birds, such as terns and gulls, it might not be especially

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ly crucial for tourism and recreation or food provision.

The case study therefore suggests that the project would benefit from studying how the tidal energy infrastructure may affect the birds and their food resources in order to better assess how the area's ecosystems and the services they provide to people are likely to be affected by the development. For instance, if the energy infrastructure enhances local fish populations, it could in turn enhance bird populations, which could have effects on both the coastal marine food web and nature-dependent recreational activities like bird-watching.

For more information, visit [www.brown.edu](http://www.brown.edu).

#### Australia's first renewable energy from a wave power array

The Australian Renewable Energy Agency (ARENA) joined Minister for Industry and Science Ian Macfarlane to officially switch on the Carnegie Perth Wave Energy Project's power station.

Following successful testing last year, the project is now up and running, feeding renewable energy into HMAS Stirling, Australia's largest naval base.

ARENA CEO Ivor Frischknecht said the occasion marked an important point in the history of wave energy and is the culmination close to a decade of work.

"This is the first array of wave power generators to be connected to an electricity grid in Australia and worldwide," Frischknecht said. "During the testing phase, the first 240 kW peak capacity CETO 5 wave unit operated successfully for more than 2,000 hours. The innovative CETO technology moves with the waves to drive tethered seabed pumps and operates under water, providing protection from storms and corrosion. These pumps feed high pressure water onshore to the hydroelectric power station and desalination plant, supplying renewable energy and fresh water."

Frischknecht said Carnegie is already taking the next steps to move its technology towards competitiveness with other sources of power generation.

"Planning and design work has begun on Carnegie's next generation CETO 6 technology, supported by \$13 million ARENA funding," Frischknecht said. "These larger units are aiming to deliver around four times the capacity



of CETO 5 units, improving efficiency and reducing energy generation costs. This progress is a clear example that given time, and with the right government support, emerging renewable energy technologies can progress along the innovation chain towards commercialization. The lessons learned through Carnegie's ARENA supported projects are being shared with the renewable energy industry to help reduce the hurdles facing other wave energy projects."

ARENA is providing \$13 million funding support towards the \$32 million Perth Wave Energy project.

For more information, visit [www.carnegiewave.com](http://www.carnegiewave.com).



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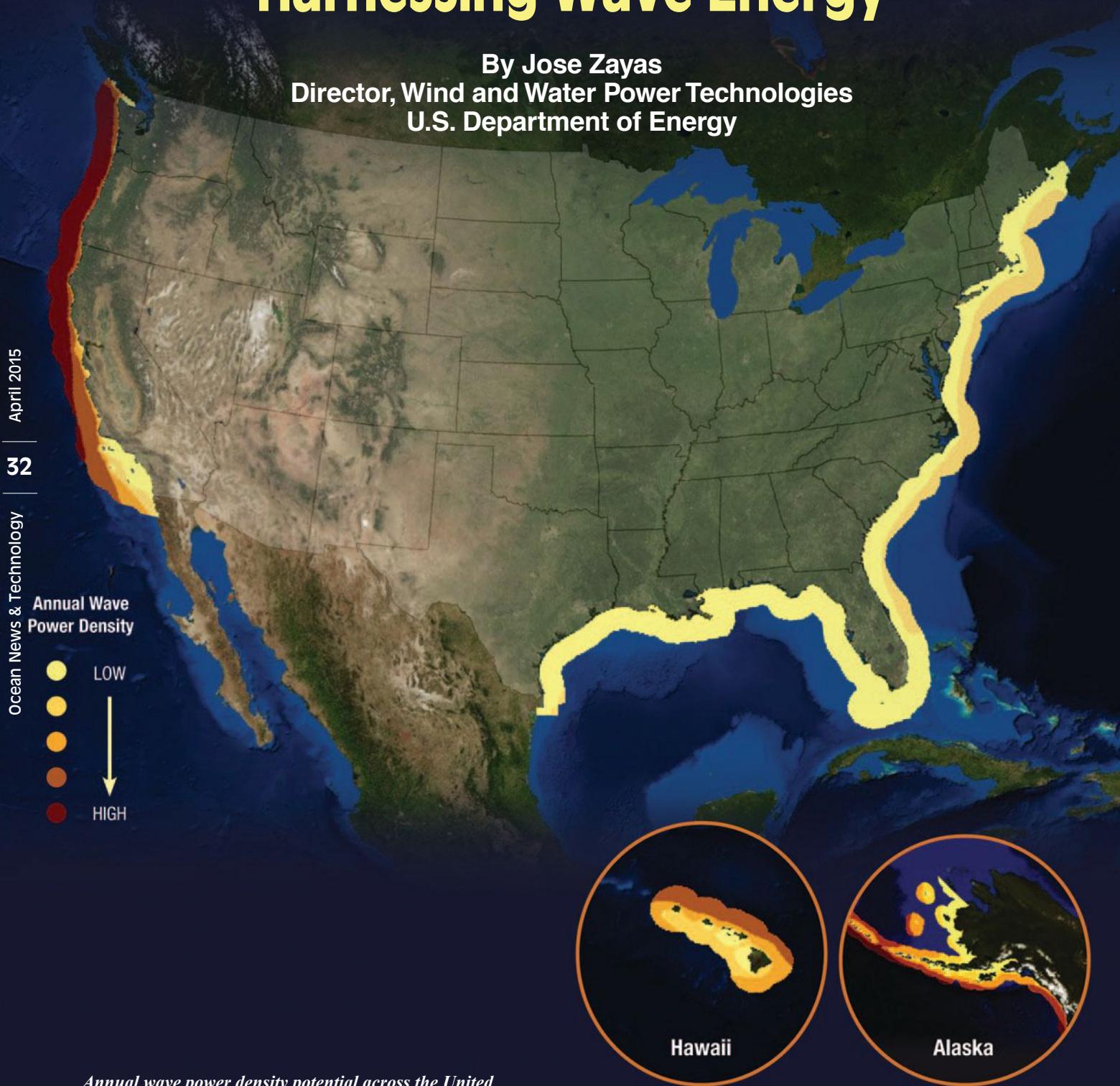


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# U.S. Department of Energy Looks to Revolutionary Innovation for Harnessing Wave Energy

By Jose Zayas  
Director, Wind and Water Power Technologies  
U.S. Department of Energy



*Annual wave power density potential across the United States. Credit: U.S. Department of Energy.*

Within its varied topographies and climates, the United States offers an abundant and diverse set of renewable energy sources for innovative technology developers to harness. One such emerging renewable energy industry is marine and hydrokinetics (MHK)—energy generated by waves, tides, currents, and ocean thermal resources. While researchers are only beginning to learn how to efficiently and cost effectively harvest MHK energy sources at a commercial scale, a recent assessment indicated that the United States has vast wave resources that, if harnessed, could provide significant energy generation.

## Wave Energy has the Potential to Power 5 Million American Homes

The 2013 resource assessment by the Electric Power Research Institute, created with support from the U.S. Department of Energy's (DOE's) Water Power Program, analyzed ocean wave energy potential along U.S. coasts. The report found that the technically recoverable resource for electric generation from waves is approximately 1,170 terawatt-hours per year (TWh/year), which is almost one third of the 4,000 TWh/year of electricity used in the United States.

Although the assessment's technical resource potential does not factor in "practical constraints" such as economic, environmental, and regulatory considerations, developing just a small fraction of this resource could allow for millions of American homes to be powered with this clean, reliable form of energy. For context, approximately 90,000 homes can be powered by 1 TWh/year. Extracting just 5% of the approximate 1,170 TWh/year of gross resource potential could result in wave energy powering for 5 million American homes.

This enormous wave energy resource has characteristics that will help it become a price-competitive, low-carbon energy supplier in the United States. For example, with more than 50% of the U.S. population living within 50 miles of the nation's coastlines, wave energy's close proximity to coastal load centers reduces transmission costs and challenges. And these coastlines' higher-than-average electricity prices bring the levelized cost of wave energy generation closer to the costs of conventional energy generation, which will help wave energy become price competitive.

With all of these considerations, DOE sees wave energy as an opportunity for the United States to engage directly in an emerging area of energy science while developing a new suite of renewable energy technologies that will stimulate a new industry, help reduce emissions, and meet energy and climate objectives. DOE is pursuing this opportunity by cost-sharing some of the initial financial risk for targeted wave energy technology research, development, demonstration, and deployment projects as well as environmental impact and siting research. By accelerating project deployment, evaluating early stage technologies' viability, and addressing market barriers, DOE is working to drive down wave energy technology costs and attract private-sector financing for future commercialization.

## How Does Wave Energy Generation Work?

Not unlike wind energy's status 20 to 30 years ago, wave energy is in the early stages of commercial technology development, and wave energy devices today are diverse in form and function. As such, DOE funds a wide range of emerging wave energy technologies so that researchers and developers have space to make dramatic and radical innovations that will revolutionize marine energy production. A comprehensive list of marine and hydrokinetic device configurations, current projects, and development companies is provided by the Marine and Hydrokinetic Technology Database on OpenEI.org.

## DOE's Wave Energy Technology Research, Development, and Demonstrations

Over the past 6 years, DOE has awarded over \$110 million to fund technology R&D projects related to MHK energy systems, infrastructure, and instrumentation, many of which have directly benefited wave energy development. In 2014 alone, DOE supported \$29.5 million in competitive awards to industry and university R&D efforts, including the several notable examples below.

**Augmenting R&D Capabilities:** The nation's universities contain a wealth of R&D expertise and intellectual capital that can help advance MHK technologies. With \$4 million in DOE funding, a new university consortium was formed in 2014 that will support the advancement of wave and tidal energy technologies by leveraging existing resources at the Northwest National Marine Renewable Energy Center. Oregon State University, the University of Washington, and the University of Alaska Fairbanks will combine their field-focused R&D capabilities to develop autonomous robotic devices for MHK operations, design arrays with improved performance, and standardize approaches for wildlife monitoring at MHK projects.

**Department of Defense (DoD) Partnership:** DOE is partnering with DoD to leverage the Navy's Wave Energy Test Site (WETS) off the waters of Marine Corps Base Hawaii—the nation's only grid-connected open-water test site—for testing of wave energy conversion (WEC) devices. Northwest Energy Innovations' Azura™ device (previously WET-NZ), which was first awarded funding from DOE in 2010, is now at an advanced stage of development; a full-scale, pre-commercial prototype device was deployed at WETS in March 2015. Additionally, in 2014, DOE selected funding recipients to design, build, and test advanced WEC systems in the ocean environment at WETS berths located at depths of 60 m and 80 m in Kaneohe, Hawaii.

**Addressing Environmental Concerns:** To support the development of cost-effective environmental monitoring technologies, in 2014, DOE provided a total of \$2.75 million to five new technology development projects that address a variety of environmental concerns, including noise produced by devices and the behaviors of fish and marine mammals near devices.

## The Wave Energy Prize

The DOE is kicking off a new MHK technology initiative called the Wave Energy Prize. This public prize challenge will encourage the development of new WEC devices that demonstrate an ability to convert twice as much energy from ocean waves into electricity as current WEC technologies.

By implementing a public prize, DOE aims to attract newcomers to wave energy technology development in addition to meeting the Prize's objective of developing revolutionary WEC devices. The nature of a prize challenge levels the playing field significantly, allowing new participants to bring forward ideas that may not otherwise have made it. For example, the compressed timetable of a prize challenge, in this case just over a year and a half, favors lean and agile entities, which is characteristic of many newcomers. Thus, the Prize will create opportunities for all developers—new and experienced—who can step outside the box and depart from traditional R&D methods to showcase novel approaches.

By attracting new participants while also encouraging new technologies from existing companies, DOE is engaging a broad range of viewpoints with very little risk. The investment on the part of the government is based on performance; those participants whose technologies perform well will receive seed money, and the winner will receive a prize purse. This approach enables R&D to accelerate the speed of innovation.

## Catching the Wave

Teams participating in the Wave Energy Prize have an opportunity to benefit on many levels. Qualified teams will have a chance to take part in two rounds of testing. In the second round of testing, finalists will test their scaled WEC prototypes at the nation's most advanced wave-making facility, the Naval Surface Warfare Center's Maneuvering and Seakeeping (MASK) Basin in Carderock, Maryland, beginning in the summer of 2016. Additionally, DOE will give seed money to finalist teams to lower the barriers to entry encountered by many innovators and provide an additional prize for the winning team(s).

The Wave Energy Prize is open to U.S. entities, including U.S. persons and companies as well as foreign companies that are incorporated in and maintain a primary place of business in the United States. To learn more or to register your team, visit [www.waveenergyprize.org](http://www.waveenergyprize.org). Registration is scheduled to close on June 15, 2015.

DOE and its partners will continue to make key investments to ensure that a cutting-edge research portfolio will produce the next generation of wave energy technologies and jump-start private sector innovation, providing clean energy sources that can contribute to our nation's energy independence. More information on DOE's current wave energy activities is available at <http://water.energy.gov>.



*Wave Energy Prize finalists will have the opportunity to test their designs at the nation's most advanced wave-making facility, the Naval Surface Warfare Center's Maneuvering and Seakeeping (MASK) Basin at Carderock, Maryland in the summer of 2016. Credit: Naval Surface Warfare Center.*

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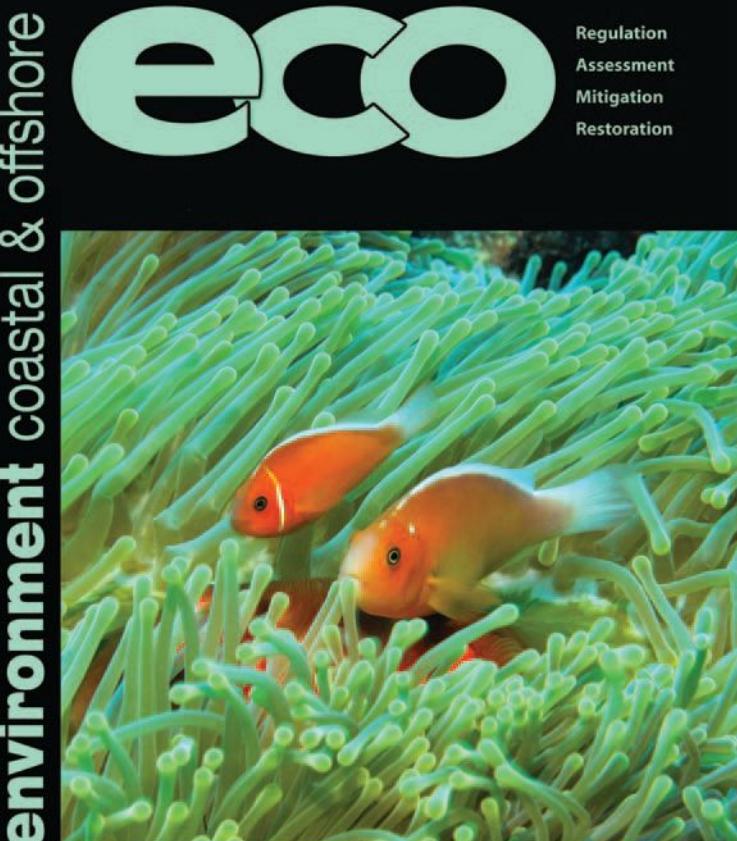
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**Huntington Ingalls awarded \$23 M for CVN 79 work**

Huntington Ingalls Inc., Newport News, Virginia, is being awarded a \$23,150,000 modification to previously awarded contract (N00024-09-C-2116) to continue construction preparation efforts for the USS John F. Kennedy (CVN 79). This modification allows continuation of ongoing planning, construction and material procurement that are aligned with the optimal build plan for the ship, and it affords an opportunity for the shipbuilder to incorporate further construction process improvements into the construction plan. Work will be performed in Newport News, Virginia and is expected to be complete by October 2017. Fiscal 2015 shipbuilding and conversion (Navy) and 2015 research, development, test and evaluation funding in the amount of \$23,150,000 will be obligated at time of award and will not expire at the end of the current fiscal year. The Naval Sea Systems Command, Washington Navy Yard, Washington, District of Columbia, is the contracting activity.

**Saab wins orders for lightweight torpedo**

Saab has received orders from the Swedish Defence Materiel Administration (FMV) for continued development of the New Lightweight Torpedo plus maintenance agreements for underwater weapon systems and the Hydra sonar system. The total order value amounts to approximately SEK 175 million. The orders come under the terms of the Letter of Intent (LoI) between Saab and FMV that was announced on 9 June 2014. The LoI supports the Swedish Armed Forces' underwater capabilities for the period 2015-2024. "The New Lightweight Torpedo order represents another important step in developing a new generation underwater weapon, in collaboration with FMV and the Swedish Navy," said Görgen Johansson, head of Saab business area Dynamics. "Based on the proven Torpedo 45 with its outstanding shallow-water anti-submarine warfare capability, the New Lightweight Torpedo will deliver significant performance improvements to deal with evolving threats in international scenarios." Saab possesses a unique competence in developing underwater systems for the complex environment in the Baltic Sea, including customized propulsion systems, communication systems and homing devices. Saab's underwater systems are world-leaders in their market segment. The contracts for maintenance of underwater weapon systems and the Hydra sonar system cover system support and maintenance for relevant operational systems.

**SeeByte to provide UK MOD with autonomy demonstration system**

SeeByte, the global leader in creating smart software for unmanned maritime systems, is pleased to announce that it has received an order from the United Kingdom's (UK) Ministry of Defense (MOD) Defense Equipment and Support (DE&S) to deliver a maritime autonomy demonstration system. The demonstration system will consist of UUVs equipped with SeeByte's SeeTrack Neptune software, an open architecture enabling autonomous multivehicle collaboration. The systems will be integrated with the UK's Maritime Autonomy Framework (MAF) developed under Dstl funding. They enable the UK to develop next generation over-the-horizon capabilities. Delivery will be to the Royal Navy Maritime Autonomous Systems Trials Team (RN MASTT). The order consists of three Iver3 UUVs manufactured by OceanServer Technology Inc. and equipped with L-3 Klein 3500 bathy and side-scan sonars. They will also be equipped with WHOI Micro Modem 2 systems. The navigation will be provided by Teledyne RDI DVLs and KVH Fibre Optic Gyros. Each AUV will be equipped with SeeByte's SeeTrack Neptune and on-board Automatic Target Recognition (ATR). The ATR software can be tuned to recognize new targets, effectively adapting to challenges faced by Mine Countermeasure (MCM) task groups. SeeTrack Neptune can be run through SeeTrack Military, the leading technology used by Explosive Ordnance Disposal (EOD) and Clearance Divers around the world, to achieve success in managing their off-board assets during dangerous and demanding missions.

**Future USS Gabrielle Giffords (LCS 10) launches**

The future USS Gabrielle Giffords (LCS 10), launched from the Austal USA shipyard 25 February, marking an important production milestone for the Littoral Combat Ship (LCS) program.

"This third Independence variant ship of the block buy is the first ship constructed fully utilizing Austal's LCS Modular Manufacturing Facility and is launching at the highest level of production completion to date," said Capt. Tom Anderson, Littoral Combat Ship program manager, "a sign that facility investments are now paying off in schedule and cost performance."

The ship is named after former United States Rep. Gabrielle Giffords. LCS 10 will be the 16th U.S. naval ship to be named for a woman and only the 13th ship to be named for a living person since 1850.

Gabrielle Giffords was rolled out of her assembly bay onto a barge for transfer down the Mobile River to a floating drydock. The ship entered the water for the first time the following day when the drydock was flooded for the ship launch. The ship will return to the shipyard to continue final outfitting and activation until her christening later this year. She is expected to deliver to the fleet in 2017.

Gabrielle Giffords is the third ship in a block buy contract with Austal to build 10 Independence-variant LCS ships. Sister ship Jackson (LCS 6) is preparing for builder's trials, and Montgomery (LCS 8) was christened in November 2014. The LCS program is ramping up in 2015 to deliver two ships per year from the Austal shipyard as well as two Freedom-variant ships from the Marinette Marine shipyard in Wisconsin.

The Navy is leveraging competition, fixed-price contracting and ongoing production efficiencies to reduce construction time and costs on littoral combat ships. Lessons learned from the lead ships have been incorporated into both Freedom variant (odd-numbered) and Independence variant (even-numbered) hulls.

For more information, visit [www.navy.mil](http://www.navy.mil).

**U.S., Canada participate in joint exercise**

Royal Canadian and U.S. Navy ships participated in a Task Force Exercise (TFEX) off the coast of Virginia and the Carolinas that began 23 February.

Exercise participants from the Royal Canadian Navy include Commander, Canadian Fleet Atlantic, the Tribal-class destroyer HMCS Athabaskan (DDG 282), and the Halifax-class frigate HMCS Montreal (FFH 336).

U.S. Navy units include Commander, Destroyer Squadron (CDS) 26 and the Arleigh Burke-class destroyers

USS Porter (DDG 78) and USS Bainbridge (DDG 96).

Led by Carrier Strike Group (CSG) 4, TFEX serves as a deployment certification exercise for Porter, Bainbridge and Montreal and includes realistic training scenarios that test the ability of the ships to react to perform as an integrated unit.

"The exercise serves to train independently-deploying units in air defense, anti-submarine warfare, surface warfare and maritime interdiction operations," said Rear Adm. Richard Butler, commander of CSG-4. "More importantly, this is a valuable opportunity to gain experience operating with the Royal Canadian Navy."

CSG-4 is a team of experienced sailors, marines, government civilians and reservists, who mentor, train and assess Atlantic Fleet combat forces to forward deploy in support and defense of national interests. CSG-4's experts shape the readiness of Atlantic Fleet carrier strike groups (CSG), expeditionary strike groups (ESG), amphibious readiness groups (ARG) and independent deploying ships through live, at-sea and synthetic training as well as academic instruction.

CSG-4, along with subordinate com-



mands, Tactical Training Group Atlantic (TTGL) and Expeditionary Warfare Training Group Atlantic (EWTGL), prepare every Atlantic-based CSG, ARG and independent deployer for sustained forward deployed high tempo operations.

For more information, visit [www.navy.mil](http://www.navy.mil).

#### **U.S.C.G. Commandant delivers State of the Coast Guard Address**

U.S. Coast Guard Commandant Adm. Paul Zukunft delivered the 2015 State of the Coast Guard Address at U.S. Coast Guard Headquarters in Washington, D.C. on 24 February.

"Countries in our hemisphere are on the cusp of instability," said Zukunft. "The U.S. leads the world in oil and gas production. The cyber domain is trans-

forming industries and governments at an astonishing rate. Arctic waters continue to open. There is no question: the U.S. Coast Guard is operating in a world unlike ever before."

The commandant outlined how America's Coast Guard will meet today's challenges while preparing for complexities that remain ahead.

"I will take decisive action to alleviate the strain of an austere budget environment and will make tough decisions in the face of our increasing demands," said Zukunft. "Through investing in our people, the recapitalization of our aging cutter fleet, including acquisition of the Offshore Patrol Cutter and sustainment of front-line operations, the Coast Guard will return more operational value on every dollar."

The commandant stated that the service's increasing demands in the areas of drug interdiction, Arctic operations, cybersecurity in the maritime domain, and transportation of energy resources are converging with its daily operations and limiting the Coast Guard's ability to respond to major contingencies.

"I am committed to ensuring that our budget priorities are driven by a Coast Guard strategy aligned with national priorities to ensure our people have the

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Ocean News & Technology

## M3 BATHY

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platforms they need to serve the nation now and into the future," said Zukunft.

The commandant also spoke of the duty to the people of the Coast Guard and investing in the future of its workforce. Among the actions to be taken are reinforcing a culture of respect that is inhospitable to sexual assault and the behaviors that enable it; completing a human capital plan that will provide guiding principles to enable the human resources directorate to build an adaptive, specialized and 21st-century workforce; revision of the service's diversity and inclusion strategic plan; review of civilian career management processes to eliminate barriers and improve upward mobility; and build proficiency by continuing to specialize within the officer and enlisted communities and extend tour lengths where it makes sense.

A video of the speech can be found at [www.uscg.mil/coastguard2015](http://www.uscg.mil/coastguard2015).

#### **CMF and NATO warships meet**

Officers from Japanese warship Harusame, supporting the Combined Maritime Forces (CMF) counter-piracy task force, were welcomed onboard Turkish warship TCG Buyukada recently, which is operating as part of

NATO's counter-piracy mission, when the two ships were sailing in close proximity to each other in the Gulf of Aden.

Captain Masatoshi Kashihara, commander of the 20th Deployment of the Surface Force for Piracy Enforcement, along with officers from the Japanese ship, took the opportunity to visit TCG Buyukada. The delegation was welcomed onboard by Lieutenant Commander Ali Tuna Baysal, the ship's Commanding Officer, while his second in command and other officers transferred across to the Harusame. Both visits were extremely beneficial, with shared discussions about current counter-piracy issues in the area, and enhanced the already strong bonds that exist between the two counter-piracy organizations.

Captain Kashihara said, "The visit at sea was great opportunity to see how we each do business. The exchange of information about maritime security in the area of operations is fundamental to building trust and confidence between our ships and wider organizations."

Rear Admiral Pakorn Wanich from the Royal Thai Navy and Commander of CTF-151, said, "This sort of exchange between two counter-piracy warships

can lead to great benefits for both CMF and NATO. It provided an opportunity for each ship to update the other on the security situation in their area of operations, thus creating ever-better situational awareness. Clearly it is also fundamental to ensuring mutual cooperation in countering piracy together."

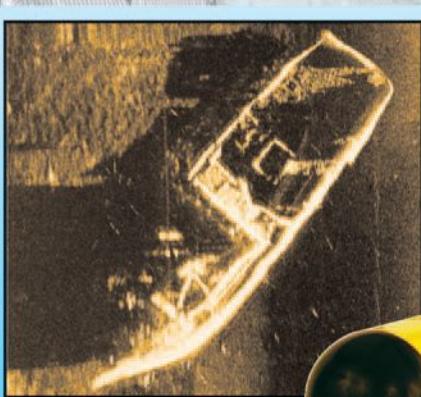
For more information, visit [www.combinedmaritimeforces.com](http://www.combinedmaritimeforces.com).

#### **U.S. and Japan increase warfighting capabilities through fleet synthetic training**

U.S. and Japan forces participated in a 4-day Fleet Synthetic Training-Joint (FST-J). FST-J provided training to personnel from Commander, Task Force 70, U.S. Army and Air Force and Japan Maritime Self-Defense Force (JMSDF) and Japan Air Self-Defense Force (JASDF) in strike force level proficiency, operations, joint interoperability and mission rehearsal for ships, aviation, and submarine simulators.

"This is a joint and bilateral synthetic training exercise," said Lt. Cmdr. Phillip Moore, CTF 70's ballistic missile defense (BMD) officer. "We're working very closely with our regional ally, Japan, and are currently practicing and conducting

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our periodic certifications of BMD—tactics, techniques and procedures in a realistic, multi-warfare environment."

Training exercises are conducted using models and simulations to replicate real-world command and control systems, which allow units to develop operator-level proficiency and validation of tactics, techniques and procedures prior to participation of real-world events or joint training exercises.

The U.S. and Japanese forces encountered computer-generated environmental conditions, political state of affairs and foreign military provocations without having to operate at sea.

"In the past, FST-J training has been more focused on executing the BMD mission from a ship's perspective," said Moore. "We have expanded BMD training this year to include as many of the players who we have to interact with when we execute an actual mission."

FST-J enables the Navy and its allies in different geographical areas to gain training efficiencies at sea by conducting training exercises and synthetic pier-side scenarios, and plays a vital role in the qualification, readiness and interoperability of the strike group and its host nation.

CTF 70 (Carrier Strike Group 5) is embarked aboard the aircraft carrier USS George Washington (CVN 73) and includes Carrier Air Wing 5, Aegis cruisers USS Shiloh (CG 67) and USS Antietam (CG 54) and Destroyer Squadron 15. Together, these units form the U.S. Navy's only continuously forward deployed (and largest) carrier strike group and are critical combat elements of the U.S. 7th Fleet.

For more information, visit [www.navy.mil](http://www.navy.mil).

#### **International Ice Patrol opens annual ice season**

The U.S. Coast Guard International Ice Patrol (IIP) opened the annual ice season 3 February to detect and track icebergs in the North Atlantic Ocean.

The IIP deployed its first Ice Reconnaissance Detachment (IRD) to Newfoundland, Canada to meet with Canadian partners and to conduct the initial aerial patrols of the season.

The IIP conducts iceberg reconnaissance using HC-130J Hercules aircraft from U.S. Coast Guard Air Station Elizabeth City, North Carolina. The IRD detected 156 icebergs on this first

deployment. The IIP will continue to monitor the risk of iceberg collision in the North Atlantic Ocean and distribute daily iceberg warnings to the maritime community throughout the season. IRDs will deploy to Canada until late in the summer.

The 2014 ice season was the sixth most severe season on record where more than 1,500 icebergs drifted into the transatlantic shipping lanes. The severity of an ice season is measured by two factors: the number of icebergs passing south of the 48th parallel North, which marks the nominal northern boundary of the transatlantic shipping lanes, and the number of days that icebergs are present south of this latitude.

The IIP was established by the International Convention for the Safety of Life at Sea following the sinking of the RMS Titanic on 15 1912 after it collided with an iceberg just south of the Grand Banks of Newfoundland, Canada. During the last 102 years, no ship heeding IIP warnings has collided with an iceberg.

For more information, visit [www.uscg.mil](http://www.uscg.mil).

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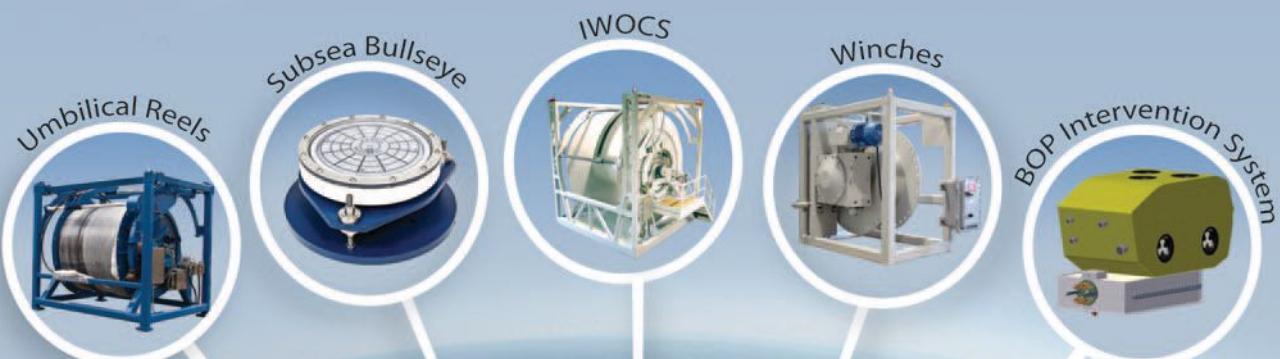
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# OFFSHORE INDUSTRY

## U.S. oil storage crunch could put downward pressure on prices

U.S. oil supplies last month were at their highest level in more than 80 years, approaching 70% of the nation's storage capacity. Some analysts say prices, already down 50% since June, could move even lower as producers sell oil at a discount.

During an interview on CNBC, Goldman Sachs President Gary Cohn said he's concerned America is running out of storage, particularly as refineries



enter their seasonal maintenance period to prepare for the summer driving season. Around this time they usually cut the amount of crude they buy. Cohn said prices could go as low as \$30/bbl.

Even with prices less than half what they were last summer and storage capacity growing scarcer, U.S. oil output has continued to rise. Through February, U.S. daily crude production reached 9.3 mmbbl, about 1 mmbbl more than a year ago.

## CEOs expect short-term growth threats, see long-term optimism

Rising tax burdens, over-regulation and geopolitical uncertainty top the list of concerns of oil and gas chief executives surveyed in PricewaterhouseCoopers International Limited's (PwC) 18th annual Global CEO Survey. Nearly two-thirds of the CEOs surveyed said their companies face more threats to growth than they did 3 years ago, given the decline in global oil prices and oversupply of oil versus demand, according to PwC.

A number of oil and gas companies have slashed their 2015 capital spending plans while oilfield service firms have reduced their headcounts. Some industry CEOs already see clouds on the horizon, with 26% expecting the global economy to decline over the next 12 months, up

from 10% last year. However, another 35% of CEOs expect an improved outlook. "When it comes to their own prospects, 29% of oil and gas CEOs are very confident of revenue growth over the next 12 months, down from 39% last year," PwC noted.

More CEOs are optimistic for the economic outlook 3 years from now, with 43% "very confident of growth." Almost 80% of energy CEOs agree that digital technologies are creating value for their organizations when it comes to data analysis and operational efficiency.

CEOs surveyed rated cybersecurity, battery and power technologies such as energy storage, as well as data mining and analysis technologies, as the most strategically important. "These are all areas where energy companies are investing, despite tight budgets, to better manage risk and improve operations," PwC said in a statement.

## New Infield report sees possible subsea capex growth to 2019

There's a potential for growth in the subsea market over the next 5 years, according to Infield Systems' new Interim Subsea Market Report to 2019. If oil prices recover, Infield explained, subsea capital spending could grow at a compound annual growth rate of 11.1% from 2015-2019.

Historical high oil prices and advances in technology have allowed for increasing oil and gas activity in deeper, more remote waters, where economics previously made developing prospects challenging. These trends have had a positive effect on the subsea market in recent years. However, market conditions created by the current uncertainties in global oil prices could put some subsea projects at risk, particularly those associated with field developments with high costs and high risks, according to the report.

Subsea demand is likely to continue to be dominated by developments in Africa, Latin America and North America, influenced largely by their continued focus on deepwater activity. Infield Systems' subsea market forecast expects these three regions combined to account for 75% of global subsea capital spending demand and 59% of subsea tree installations over the next 5 years. The global subsea market is also likely to be supported by developments in Europe and Asia-Pacific.

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### First LNG bunkering of offshore support vessel in North America

Harvey Gulf International Marine LLC has made maritime history in North America by being not only the first owner-operator of a dual fuel offshore support vessel to bunker LNG as a marine fuel but to also successfully complete the first truck to vessel transfer of LNG and to power the M/V Harvey Energy on LNG.

This historic bunkering took place at a shore-based terminal owned by a subsidiary of Martin Midstream Partners L.P. in Pascagoula, Mississippi. Participating in the activities alongside the crew of the Harvey Energy was the U.S. Coast Guard, the ABS, Wartsila, Martin Energy Services LLC, State and Local Agencies and GCSG. The cool-down process took approximately 12 hours to achieve the desired tank temperature and pressure utilizing 3,800 gallons of nitrogen. The LNG bunkering was successfully completed within a few hours of cool-down. The Harvey Energy was to proceed to LNG trials before delivery.



M/V Harvey Energy powered on LNG.

"Today's historic event is an example of Harvey Gulf's commitment to their customers and the environment to provide the most affordable, innovative, environmentally friendly technology solutions to meet their business demands," said Shane Guidry, Harvey Gulf's chief executive officer.

In concert with the Harvey Energy, Harvey Gulf is preparing to operate the first LNG marine fueling facility in the United States, located at its vessel facility in Port Fourchon, Louisiana. The fueling facility will be a vital addition to the growing national LNG supply infrastructure, supporting critical operations of the oil and gas industry's offshore support vessel fleet operating on clean burning LNG.

# OFFSHORE INDUSTRY HEADLINES

Research & Development • Environmental Assessment • Discovery

## UK urged to act in wake of declining investment in oil and gas projects

A recent study by Oil & Gas UK has estimated that investment in new North Sea oil and gas projects will decline by a third in 2015 due to an increase in costs and fall in oil prices. Capital investment on new fields is expected to decline to between \$14.6 billion and \$17.4 billion in 2015 from \$22.8 billion in 2014. Annual investment in approved projects alone is estimated to decline rapidly and could fall to \$3.8 billion by 2018.

The survey reported that 6.3 Bboe are approved or under development and there are another 3.7 Bboe of potential investment opportunities. However, companies indicated at the end of 2014 that less than 2 Bboe of those were likely to be developed. Even though drilling of 25 wells was anticipated in 2014, only 14 took place, continuing a downward trend.

Oil & Gas UK said the bleak picture emphasized the need of government action to secure the industry's long-term future.

"Without sustained investment in new and existing fields, critical infrastructure will disappear, taking with it important North Sea hubs, effectively sterilizing areas of the basin and leaving oil and gas in the ground," Oil & Gas UK chief executive Malcolm Webb said.

"Even at \$110 per barrel, the ability of the industry to realize the full potential of the UK's oil and gas resource was hamstrung by escalating costs, an unsustainably heavy tax burden and inappropriate regulation. At current oil prices, we now see the consequences only too clearly."

Oil & Gas UK said one positive finding of this year's survey is that output in 2014 had its best year-on-year performance since 2000, dropping just 1% since 2013 to 1.42 mmboe per day.

## Caspian region operators to rein in costs on lower revenues: report

Wood Mackenzie said the combination of the low oil price and Russia's economic issues will make this a year of great uncertainty for the Caspian region. State budgets will have to adjust to lower revenues, operators will look to optimize expenditure, and exploration activity is likely to remain subdued, the analyst claimed.

Operators will probably favor low cost activity over higher-cost programs. BP and SOCAR are due to shoot 2D seismic on the shallow-water Absheron contract area in the Azeri sector. Both parties signed a production-sharing contract last December.

However, some planned major projects should continue, the analyst said, including the start of construction of the



Trans-Anatolian Pipeline (TANAP) and Trans Adriatic Pipeline (TAP) transporting gas from the Caspian Sea (the Shah Deniz field in the Azeri sector) to markets in Europe.

Phase One gas production capacity at Shah Deniz is expected to reach 1,040 mmcf per day following debottlenecking of the onshore reception plant at Sangachal. Also in the Azeri offshore sector, the ramp up at the ACG's West Chirag platform should alleviate Azerbaijan's oil production decline, while replacement of the damaged pipeline serving the Kashagan field offshore Kazakhstan is expected to get under way during the second half of the year, allowing production to resume in 2017.

## International association urges EU to encourage offshore E&P

Europe should support exploration and production (E&P) of oil and gas both domestically and across its neighboring regions, according to the International Association of Oil & Gas Producers (IOGP). The association's new position paper on the proposed Energy Union—released ahead of publication of the European Commission strategy on the issue—asserts that oil and gas E&P, supported by policies to improve market competition, can help the European Union face its energy challenges.

"There is an abundance of natural gas in and around Europe: the North Sea, the Black Sea, the Caspian, the Mediterranean, the Arctic, and shale gas," said Roland Festor, IOGP's EU affairs director. "The EU should take the full benefit of this potential, which can bring royalties, cleaner fuel, jobs, and innovation."

The Energy Union will need a fully-functioning internal energy market, and strong wholesale energy markets will help deliver security of supply and trigger required investment in infrastructure and innovation IOGP said, adding that experience shows that domestic oil and gas production fosters development.

## Trio to examine concrete mattress removal options for UK North Sea

Decom North Sea (DNS) is collaborating with Zero Waste Scotland (ZWS) and subsea engineering company Jee to develop solutions for the recovery of concrete subsea mattresses and subsequent re-use. Concrete mattresses provide pipelines, cables, and umbilicals with protection from dropped objects and add weight and stabilization.

"Mattresses were not specifically designed to be removed. Unfortunately, they can degrade underwater over time, leading to a complicated and costly removal process during decommissioning," said Nigel Jenkins, chief executive officer of DNS. "What to do with mattresses as part of an efficient decommissioning solution is an often discussed thorny issue."

The trio will engage with operators and suppliers across the oil and gas industry, with DNS and Jee's engineers conducting an economic and environmental assessment of the condition of the mattresses and identifying the best techniques for their recovery. DNS will report on the findings later this year.

Jee will investigate efficient removal methods that can reduce costs and maximize the benefits to the decommissioning sector, or retaining materials within productive use, and in a high value state, for as long as possible. The company will also develop guidance on best practice for recovery and key points for deroga-

tions cases to leave in situ.

"Millions of pounds are being spent on UKCS (continental shelf) decommissioning each year, and this will continue for several decades," said Dean Kirby, senior engineer at Jee. "As with the majority of decommissioning projects, the recovery and disposal of subsea mattresses presents a significant obstacle and financial burden to operators and contractors globally."

## U.S. petroleum product exports rise for 13th consecutive year: EIA

U.S. exports of petroleum products averaged a record 3.8 mmbbl per day in 2014 – an increase of 347,000 bbl per day from 2013 – based on information from the U.S. Energy Information Administration's Petroleum Supply Monthly. In particular, exports of motor gasoline, propane, and butane increased, offsetting a decrease in exports of distillate, EIA said. EIA noted that the combination of record-high U.S. refinery runs, which averaged 16.1 mmbbl per day in 2014, and increased global product demand allowed U.S. product exports to rise for the 13th consecutive year.

## World energy demand expected to continue despite market weakness

Despite the dramatic recent weakening in global energy markets, ongoing economic expansion in Asia, particularly China and India, will drive continued growth in the world's demand for energy over the next 20 years. According to the new edition of the BP Energy Outlook 2035, global demand for energy is expected to rise by 37% from 2013 to 2035, or by an average of 1.4% a year.

The Outlook looks at long-term energy trends and develops projections for world energy markets over the next two decades. The new edition was launched recently in London by Spencer Dale, BP's group chief economist, and Bob Dudley, group chief executive.

"After 3 years of high and deceptively steady oil prices, the fall of recent months is a stark reminder that the norm in energy markets is one of continuous change," Dale said.

"It is important that we look through short term volatility to identify those longer term trends in supply and demand that are likely to shape the energy sector over the next 20 years and so help

inform the strategic choices facing the industry and policy makers alike."

The Outlook projects that demand for oil will increase by around 0.8% each year to 2035. The rising demand comes entirely from the non-OECD countries; oil consumption within the OECD peaked in 2005 and by 2035 is expected to have fallen to levels not seen since 1986. By 2035 China is likely to have overtaken the U.S. as the largest single consumer of oil globally.

The current weakness in the oil market, which stems in large part from strong growth in tight oil production in the United States, is likely to take several years to work through, according to Outlook. In 2014, tight oil production drove U.S. oil output higher by 1.5 mmbbl a day, the largest single-year rise in U.S. history. But further out, the growth in tight oil is likely to slow. By the 2030s, the United States is likely to have become self-sufficient in oil, after having imported 60% of its total demand as recently as 2005.

"The energy industry works on strategies and investments with lifespans often measured in decades," Dudley said. "This is why an authoritative view of the key trends and movements that will shape our markets over this long term is essential and is precisely why this Outlook is so valuable."



*Spencer Dale*

## Aker Solutions develops capping technology to limit deepwater drilling risks

Aker Solutions has delivered the key subsea component for the system being developed by Marine Well Containment Company to limit environmental risks from oil and gas production in the U.S. Gulf of Mexico, the company said.

The Subsea Containment Assembly, or SCA, is designed to contain a well-control incident by connecting and creating a seal to prevent oil leaks. It can also be used in a cap-and-flow plan to direct fluid to vessels on the surface. The technology works under pressures as high as 15,000 psi.

The equipment was delivered to Marine Well Containment Company's team in Ingleside, Texas. It weighs 170 tons and consists of a stack of adapters and connectors assembled on a steel base. Aker Solutions developed the technology over 3 years, involving designers and engineers at the company's hub in Houston.

"This has been a collaborative effort involving 10 oil companies and is a great example of how the offshore industry can pull together," said Alan Brunnen, head of Aker Solutions' subsea business. "Aker Solutions is pleased to have contributed its unique knowledge and experience in high-pressure subsea technology."

The SCA stands 34 to 40 ft tall (depending on its configuration) and can be disassembled into two sub-assemblies, which provides flexibility in handling, transportation and installation if deployed.



*The SCA stands 34 to 40 ft tall.*

## EIA predicts continued growth in U.S. Gulf of Mexico oil production

Oil production in the Gulf of Mexico is expected to continue increasing through 2016, the U.S. Energy Information Administration said. Because of the long lead times associated with U.S. Gulf projects, EIA explained, the recent downturn in oil prices should have minimal direct impact on crude oil production.

EIA projected that U.S. Gulf production will reach 1.52 mmbbl per day in 2015 and 1.61 mmbbl per day in 2016, or about 16% and 17% of total U.S. crude oil production during those 2 years, respectively. The forecasted production growth is driven both by new projects and the redevelopment and expansion of older producing fields.

The relatively high number of fields that came online in 2014 and are scheduled for 2015 and 2016 production start-ups reflects the revival of interest and activity in the U.S. Gulf following the moratorium on deepwater drilling after the 2010 Deepwater Horizon incident, EIA said. There were relatively few field

start-ups in 2011 through 2013. But 13 fields are expected to start up in the next 2 years: eight in 2015 and five in 2016. More than half of the projects starting up in 2015 and 2016 will be subsea tiebacks to existing production platforms. These new projects, combined with continuing production from the developments brought online in late 2014, are forecast to add 265,000 bbl per day by the end of 2015.

However, the current low oil price does add uncertainty to the timelines of deepwater U.S. Gulf projects, with projects in early development stages exposed to the greatest risk of delay, EIA said.

In an effort to reduce this risk, EIA added, producers are collaborating to develop projects more cost effectively, to shorten the time to final investment decision and first production, and by sharing development costs. For instance, Chevron, BP, and ConocoPhillips recently announced a collaborative effort to explore and appraise 24 jointly held offshore leases in the northwest portion of the Gulf of Mexico's Keathley Canyon.

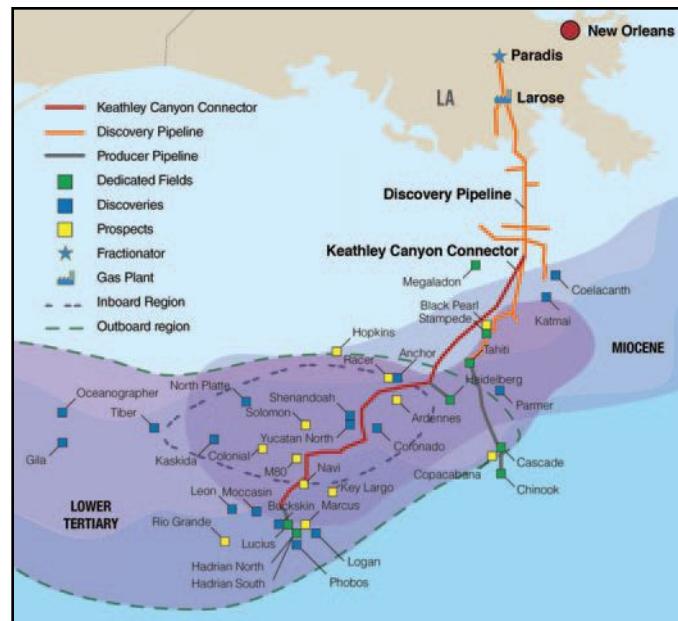
**Swiber secures \$310 M EPCIC contract in South Asia**  
 Swiber has won a \$310 million engineering, procurement, construction, installation and commissioning (EPCIC) contract from a national oil company in South Asia. The deal requires Swiber to deliver a range of EPCIC services for eight new platforms and related pipelines needed to develop a new offshore gas field located in South Asia. The engineering work was to start immediately with the project expected to be completed in March 2017. Swiber will use its construction and support vessels, as well as project management team for the work. Swiber said it has continued to secure new projects despite the prevailing headwinds occurred by the decline in oil prices. In December 2014, the company secured a \$710 million EPCIC project in West Africa.

**Saipem gets \$1.8 B contract for Kashagan pipeline project**  
 The North Caspian Operating Co. has awarded Saipem a \$1.8 billion engineering and construction contract for the Kashagan field project in the Kazakh waters of the Caspian Sea. The contract covers construction of two 59-mi pipelines to connect D Island in the Caspian Sea to the Karabatan onshore plant in Kazakhstan. The scope of work includes the engineering, welding materials, conversion and the preparation of vessels, dredging, installation, burial, and pre-commissioning of the two pipelines. Some of the scope will be executed with specialized subcontractors. The two pipelines, with a diameter of 28 in., are made of carbon steel, internally cladded with a corrosion resistant alloy layer, and will each have an offshore length of about 40 mi. Construction is to be completed by the end of 2016.

**Technip wins subsea contract for Glenlivet project in UK**  
 Technip has secured a subsea contract from Total E&P UK for the Glenlivet project, west of Shetland. The contract builds on an earlier award by Total for the Edradour subsea development that is situated about 75 km northwest of Shetlands in UK waters. It will involve the parallel development of the Glenlivet field, which is located in Block 214/30a, in about 435 m of water, 90 km northwest of the Shetlands. The latest contract requires Technip to fabricate and install a 12-in. production pipeline and a 6-in. monoethylene glycol pipeline, complete with a 2-in. piggy-backed service line. Technip will fabricate the pipelines at its spool base at Evanton, UK, and install them by using its Deep Energy vessel. The deal also requires Technip to deliver and install steel tube umbilical, which will be manufactured at its facility in Newcastle. Technip will fabricate and install pipeline end manifold, flowline end terminations, flexible tails and rigid well tie-in spools, as well as the install company-provided item templates and manifolds.

**TGS extends Declaration project survey in Gulf of Mexico**  
 Norway-based geoscience data firm TGS has extended its Declaration Multi-WAZ survey in the Mississippi Canyon and DeSoto Canyon protraction areas of the Gulf of Mexico. The extension will see CGG acquire a minimum 2,000 sq. km of further data utilizing the single pass vessel configuration derived from its StagSeis technology. TGS said the technology will better image deep structural elements and enhance subsalt, as well as salt flank illumination. Acquisition of the extension was anticipated to be completed in the second quarter of 2015, followed by fast track deliverables and final imaging products in 2016. "Expanding the survey to cover the extent of the current Lower Tertiary Norphlet fairway will provide industry-leading data for current and future exploration and development objectives," TGS COO Kristian Johansen said.

## First gas flows from extended Discovery pipeline in U.S. Gulf



Williams and DCP Midstream Partners have started natural gas flows from the new extended Discovery gathering pipeline system. The Keathley Canyon Connector gas gathering pipeline system and the South Timbalier Block 283 junction platform are serving producers in the central ultra-deepwater Gulf of Mexico.

The 209-mi Keathley Canyon Connector has the capacity to gather more than 400 mmcfd per day of natural gas. It starts in the southeast part of the Keathley Canyon protraction area and terminates into Discovery's 30-in. diameter mainline at the new junction platform.

The pipeline was built in depths of about 7,200 ft of water, around 300 mi south-southwest of New Orleans.

The extension has long-term agreements with the Lucius and Hadrian South owners, as well as the Heidelberg and Hadrian North owners, for natural gas gathering, transportation and processing services for production from the fields.

As well as the offshore gathering system, the Discovery system includes the 600 mmcfd per day Larose natural gas processing facility, which links to six interstate-intrastate gas pipelines, and the 35,000 bbl per day Paradis fractionation plant.

Williams Partners operates and holds 60% of the Discovery system. DCP Midstream Partners owns the remaining 40% stake.

"With the start-up of the Keathley Canyon pipeline, the Discovery joint venture is now ready to serve the growing production needs of our deepwater producers," DCP Midstream Partners President Bill Waldheim said.

Williams Partners owns and operates more than 33,000 mi of interstate gas pipeline and its gathering and processing operations, spanning the deepwater Gulf of Mexico to the Canadian oil sands. DCP Midstream Partners, LP is managed by its general partner, DCP Midstream GP, LP, which in turn is managed by its general partner, DCP Midstream GP, LLC, which is 100% owned by DCP Midstream, LLC, a joint venture between Phillips 66 and Spectra Energy.

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*Artist's conception of the Rowan Reliance, a GustoMSC 10,000 class rig.*

### ABS certifies software integration on another Rowan Cos. drillship

Completion of the Rowan Reliance drillship marks the third delivery of high-specification units built at Hyundai Heavy Industries (HHI) using the ABS ISQM process.

This newbuild, the third in a series for global offshore drilling contractor Rowan Companies built in the HHI yard in Ulsan, South Korea, joins sister ships Rowan Renaissance and Rowan Resolute as the next high-specification drillship to earn the ABS Integrated Software Quality Management (ISQM) notation.

ABS said ISQM addresses the challenge of making sure the many pieces of software that enable efficient operations of the rig are able to maintain reliable communications by providing a framework for coordinating and controlling the way software development, integration, and maintenance are managed throughout the life of the equipment.

HHI will follow the ISQM process in the construction of the final drillships in the four-unit series, the Rowan Relentless, which is to be completed in the second quarter of 2015.

"ABS is the only class society that has classed drilling equipment and other essential marine equipment with a software notation that addresses software quality during construction, at delivery and into operations," ABS manager Paul Walters said.

"Working with ABS and Rowan Companies on this project has allowed HHI to develop a knowledge base that allows us to offer experience with a new process that will benefit not only Rowan but other clients that choose to take advantage of the ISQM process," added Sang-Sik Yoon, ISQM team leader, HHI.

Rowan is a first mover among drilling contractors in applying a structured software quality management approach.



### Eni Ghana E&P inks \$545M deal for newbuild drillship Maersk Voyager

Maersk Drilling has secured a \$545 million contract from Eni Ghana Exploration and Production for use of its newbuild drillship Maersk Voyager on the \$7 billion Offshore Cape Three Points (OCTP) project, offshore Ghana. The firm contract period is 3.5 years with an option to extend by 1 year.

The Maersk Voyager is the last in a series of four ultra-deepwater drillships in its rig fleet. It was delivered in February from the Samsung Heavy Industries shipyard in Geoje-Si in South Korea.

"West Africa has been a strategic focus area for Maersk Drilling since we embarked on our deepwater expansion, and with this contract we expand our presence in the promising West African deepwater market," said Claus Hemmingsen, chief executive officer in the Maersk Group.

Located about 60 km from the Ghanaian Western Region's coast, the OCTP project features oil and non-associated gas fields and will access approximately 41 Bcm of gas and 500 mmbbl of oil. First oil is expected in 2017 and initial gas in 2018, with peak production planned to be 80,000 boe per day in 2019.

The project will provide domestic gas supply to Ghana's thermal power plants



*The newbuild drillship Maersk Voyager.*

for more than 15 years. Eni, via its own subsidiary Eni Ghana, operates OCTP with a 47.22% interest, while Vitol and Ghana National Petroleum Corporation own 37.77% and 15% stakes respectively.

### Keppel FELS delivers jack-up rig Maersk Integrator ahead of schedule

Keppel FELS Ltd. has completed and delivered the ultra-harsh jack-up rig Maersk Integrator to Maersk Drilling 30 days ahead of schedule, on budget, and with a perfect safety record, according to the company.

Maersk Integrator is an XL Enhanced harsh environment jack-up and the third in the XLE series delivered to Maersk Drilling. It has been customized for the North Sea and has been chartered for 4 years by Statoil for development drilling in the Gina Krog field in the Norwegian



*Keppel FELS delivers Maersk Integrator.*

sector of the North Sea. The XLE rig has a leg length of 678 ft and is designed for year round operations in the North Sea in water depths up to 492 ft.

"With Maersk Integrator, we now have three of the world's largest, ultra-harsh environment jack-up rigs, which enables us to offer a suite of strong solutions to the Norwegian jack-up market," said Claus V. Hemmingsen, chief executive officer of Maersk Drilling. "The XLE rigs we have in operation now are performing very well – Maersk Intrepid at the Martin Linge field for Total Norway and Maersk Interceptor at Ivar Aasen for Det norske oljeselskap ASA."

### Crowley adds five tankers to its global ship management portfolio

Crowley Accord Management Pvt. Ltd., the international ship management venture managed globally by Crowley Maritime Corp.'s ship management group, was awarded full technical management contracts for five new tankers. These tankers will be joined in the coming weeks by three more, bringing Crowley's international ship management fleet to more than 70.

The five products tankers brought under Crowley Accord management are the MT Dawn Haridwar, MT Dawn Mansarovar, MT Dawn Mathura, MT Dawn Madurai, and MT Portland Pearl. The first four are owned by Arya Tankers and will operate along the Indian Coast, while the fifth is owned by Union Maritime Ltd. and will operate in the Europe-to-Nigeria trade. Combined, these tankers represent over 130,000 gross tons in the market.

The Crowley Accord acquisition, which took place in April 2014, immediately increased the size and scope of Crowley's technical ship management group and supported the company's expansion into the international ship management market with a foreign crewing presence. The acquisition also made Crowley a rare U.S. company—one that provides third-party international crewing and technical ship management.

## Norskan sells five offshore service vessels in Brazil

DOF subsidiary Norskan Offshore has agreed to sell five ships operating in Brazil. The buyers are companies owned by a Brazilian private equity fund managed by Mantiq Investimentos and Mare Investimentos.

The ships included in the agreement are Skandi Copacabana built in 2005, Skandi Leblon built in 2004, Skandi Flamengo built in 2003, Skandi Yare built in 2001, and Skandi Stolmen built in 1997.

According to DOF, Norskan Offshore will be responsible for the operation of the ships until the current charter contracts are terminated. Two of the vessels, Skandi Leblon and Skandi Flamengo, have firm contracts up for renewal in 2015.

## CBO orders news Ulstein platform supply vessel (PSV) of PX105 type

Brazilian ship owner CBO has ordered a design and equipment package for a platform supply vessel (PSV) of the PX105 type from Ulstein. The contract also includes an option for two more vessels, the companies said.

This will become the 11th Ulstein design in the CBO fleet, nine of which are with the ULSTEIN X-BOW. The

new vessel will be built at Aliança shipyard in Rio de Janeiro and is scheduled for delivery in the third quarter of 2016.

“DeepOcean has for several years looked for a suitable contract to support the establishment of our installation and ROV intervention services in the West African region,” said Mads Bårdesen, DeepOcean executive vice president of international affairs. “With the current contract and associated scope of work, we have the right foundation to develop a strong presence in the region, building upon our current extensive track record from the North Sea.”

The Jubilee field was discovered in June 2007. It is located 60 km offshore between the Deepwater Tano and West Cape Three Points blocks in Ghana. The field’s recoverable reserves are estimated to be more than 370 mmbbl, with an upside potential of 1.8 Bbl.

The Tweneboa, Enyenra and Ntomme (TEN) development project includes the collective development of three hydrocarbon accumulations, Tweneboa, Enyenra (formerly Owo) and Ntomme. The fields lie in water depths of 1,000 to 2,000 m and the development is located 25 km away from the Tullow Oil-operated Jubilee field.

## West Telesto jack-up arrives in Melbourne to drill VIC/P57 permit

Hibiscus Petroleum subsidiary Carnarvon Hibiscus said exploration drilling was to begin soon on the VIC/P57 permit offshore southeast Australia. In October, the company signed a rig share agreement with Origin Energy Resources for the cantilever jack-up West Telesto.

The rig arrived at Port Philip Bay in Melbourne on a heavy-lift vessel and has since been offloaded and towed to Western Port Bay. West Telesto was then to be towed to the Yolla field to begin Origin’s well program.

It would then be transferred to Carnarvon Hibiscus to drill the Sea Lion exploration well. Prospective resources are estimated at 11 to 15.3 mmbbl.

## Noble to retire semi-submersible drilling rigs on ‘future marketability’

Noble Corp. has decided to retire the semi-submersible drilling rigs Noble Paul Wolff, Noble Driller, and Noble Jim Thompson. David W. Williams, chairman, president and chief executive officer, said the decision was based on revised assumptions on the rigs’ future marketability in light of their age, technical features, and capital requirements in the context of the future supply of competitive rigs.

“These rig retirements will reduce the average age of a fleet whose concentration of premium assets is already among the industry’s highest,” he said. “We will con-



*Drilling contractor Noble Inc. plans to retire four semi-submersible rigs, including the Noble Jim Thompson (above).*

tinue to evaluate the fleet in 2015 as we work to opportunistically position the company ahead of the next cyclical upturn.”

The client for the Noble Jim Thompson has agreed to take instead the semi-sub Noble Paul Romano to execute a contract comprising four wells or a primary term of up to 1 year in the U.S. Gulf of Mexico.

Noble Paul Romano will mobilize from its current location in the Canary Islands and should start operations in early September. The day rate for the primary term of the contract will remain at \$300,000.

## Dev takes delivery of second Lamprell jack-up Jindal Pioneer

Lamprell has delivered its second newbuild LeTourneau Super 116E (Enhanced) Class drilling jack-up to Singapore-based Dev Drilling, a subsidiary of D.P. Jindal Group. The fabricator signed the contract for the Jindal Pioneer in January 2013. Later that year it delivered the Jindal Star, which is operating on the Mumbai High oil field off western India for ONGC.

Jindal Pioneer was officially named during a recent ceremony at Lamprell’s Hamriyah facility in the UAE. This is the twelfth Super 116E jack-up that the company has delivered to various clients over the past 7 years. It is currently building seven new jack-ups at Hamriyah and should soon start work on two more new-builds recently awarded by another client.

D.P. Jindal said Jindal Pioneer is the fifth new generation rig in the group’s expanding fleet of high-spec jack-ups.

Meanwhile, P/F Thor has taken delivery of the first of four newbuild seismic support vessels from Besiktas shipyard. The Thor Magni has a long-term charter with PGS, according to Thor Ltd. The Skipsteknisk ST-204 SSV design vessel is owned by P/F Thor.



*Ulstein supply vessel to be built in Rio.*

new vessel will be built at Aliança shipyard in Rio de Janeiro and is scheduled for delivery in the third quarter of 2016.

The PX105 design is a large PSV with accommodation for 23 people. The vessel will be 292 ft long and 62 ft wide and has a cargo deck area of about 10,118 sq ft.

## DeepOcean to provide construction vessel for two offshore Ghana fields

DeepOcean has secured a contract from Tullow Oil to provide a multi-purpose subsea construction vessel on Jubilee and TEN fields, offshore Ghana. The deal includes subsea tree and jumper installations in about 1,100 to 2,000 m water depth.

DeepOcean Ghana is mobilizing the Rem Forza subsea construction vessel for a 6-months charter from March to August



The Oseberg Delta field complex in the Norwegian North Sea.

## **Oil production begins at Norway's Oseberg Delta 2 field**

Statoil has started oil production at Oseberg Delta 2 field in the Norwegian North Sea. The company operates the field with a 49.3% interest. Petrobras, Total and ConocoPhillips hold 33.6%, 14.7% and 2.4% respectively.

Tied back to the Oseberg Field Centre, the field is expected to produce about 77 mmbbl of oil during an estimated life of 20 years. The first phase includes three oil producers and two gas injectors. The field has a capacity for eight wells.

An earlier two-well development from an existing template has been producing oil from the Delta terrace since 2008. The Oseberg Delta reserves are 3,100 m below the seabed.

"Delta 2 is an important element in extending the lifetime of Oseberg," Statoil vice president Arild Dybvig said. "It provides a good example of how we can make lesser discoveries profitable by using existing infrastructure while it is still available."

The Oseberg Field Centre includes three platforms—Oseberg A, B and D-linked to each other with bridges, in the southern part of the field and the Oseberg C platform.

Gas export began from the Oseberg Field Centre in October 2000. Oil from the Oseberg area is transported via the Oseberg Transport System to the Sture terminal. The gas is transported to market through the Oseberg Gas Transport pipeline and into the Statpipe and Vesterled systems via the Heimdal Gas Centre.

## **Statoil tastes success in two-well Krafla exploration**

Operator Statoil has together with PL035 partners completed a two-well program in the Krafla area located 25 km southwest of Oseberg South in the North Sea.

Since 2011 significant new recoverable resources have been proven in the area. The Krafla Main Tarbert appraisal well and the small oil discovery in the Krafla North prospect in December has increased the robustness of the Krafla field development project.

There have been five discoveries in the Krafla area since 2011, bringing combined recoverable resources in a range of 140 to 220 mmboe.

"These are very substantial volumes for a mature area of the shelf," said Irene Rummelhoff, Statoil senior vice president for exploration on the Norwegian continental shelf.



North Sea Krafla area.

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### **U.S. releases updated analysis of controversial Chukchi Sea lease sale**

The U.S. Department of the Interior has released a final supplemental environmental impact statement (FSEIS) for Chukchi Sea Lease Sale 193, offshore Alaska. The FSEIS likely will play an important role in resolving federal court issues on the 2008 oil and gas leases.

It updates the Bureau of Ocean Energy Management's (BOEM's) estimates of the entire range of production levels from offshore oil fields that could be developed in the Chukchi Sea and the associated environmental effects of the lease sale.

The original environmental impact statement was unveiled in 2007, and the lease sale took place in 2008. BOEM was forced to carry out additional analysis due to the legal challenges and federal court decisions.

The recent decision from the Ninth Circuit Court of Appeals was associated to the agency's estimates of production levels from offshore oil fields. The FSEIS will estimate the highest amount of production that could result from Lease Sale 193. A waiting period of 30 days was in place before a final decision on the sale.

"Alaska is a critical component of our

nation's energy portfolio, and the Chukchi Sea has substantial oil and gas potential as well as sensitive marine and coastal resources that Alaska Native communities depend on for subsistence," Secretary of the Interior Sally Jewell said.

"The updated analysis is a major step toward resolving the 2008 oil and gas leases that have been tied up in the courts for years. We remain committed to taking a thoughtful and balanced approach to oil and gas leasing and exploration in this unique, sensitive and often challenging environment."

### **BOEM, BSEE issue proposed U.S. Arctic OCS exploration drilling rules**

The Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM) have released proposed regulations for exploratory drilling on the U.S. Arctic outer continental shelf.

The proposed Arctic-specific regulations focus only on offshore exploration drilling operations within the Beaufort Sea and Chukchi Sea Planning Areas.

Using a combination of performance-based and prescriptive standards, the proposed regulations codify and further develop current Arctic-specific opera-

tional standards that cover offshore exploration in the Arctic, including mobilization, drilling, maritime transport and emergency response, and conduct of safe drilling operations. The proposed regulations codify requirements that all Arctic offshore operators and contractors are "appropriately prepared for Arctic conditions and that operators have developed an integrated operations plan that details all phases of the exploration program for purposes of advance planning and risk assessment."

The proposed rule also would require operators to submit region-specific oil spill response plans, have prompt access to source control and containment equipment, and have available a separate relief rig to timely drill a relief well in the event of a loss of well control. The proposed rule allows for technological innovation, as long as the operator can demonstrate that the level of its safety and environmental performance satisfies the standards set forth in the proposed rule.

The public may submit comments on the proposed Arctic regulations during the 60-day comment period that begins when the proposed rule is published in the Federal Register.

April 2015

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## Mexico's bidding round for shallow water kicks off new energy reforms

The Mexican National Hydrocarbons Commission recently published the bidding and contract terms for the first 14 oil and gas areas in shallow waters, kicking off the first phase of Mexico's bidding round for exploratory oil and gas blocks in the Gulf of Mexico. Mexico recently opened its energy sector to foreign investment for the first time in more than 70 years.

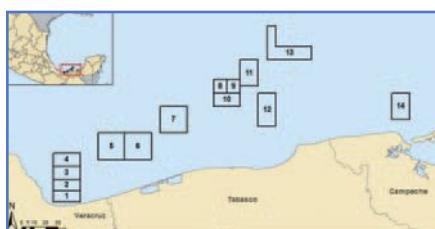
Meanwhile, the Mexican government has approved eight more companies to receive access to data to the 14 shallow-water oil drilling sites in the Bay of Campeche. Some 34 companies showed interest in the shallow water sites, and 23 of them asked for access to databases about those sites, according to a website maintained by Mexico's National Hydrocarbons Commission.

Of those 23 companies that expressed interest, eight more companies have now been authorized to pay the \$350,000 fee to access the geological data: Cobalt International Energy, Sierra Oil & Gas, ONGC Videsh Ltd., Eni International, Diavaz Offshore, INPEX Corp., Pacific Rubiales E&P, and NBL Mexico Inc.

Several major companies, including ExxonMobil, Chevron Corp., Shell,

Ecopetrol SA, and BG Group earlier paid their \$350,000 fee (on top of a \$18,600 registration fee) for access and authorization to the data room that houses seismic and geological data that has been the exclusive preserve of state oil company Pemex for nearly eight decades.

Companies are scheduled to review the material, which will open up to the



*Mexico contract areas for bid round.*

bidding and contract terms for the first 14 oil and gas areas in shallow waters in the first phase of round one.

According to Mayer Brown's report: "Mexico's E&P Round One Kicks Off: Bidding Terms for Shallow Water Areas Released," these exploratory areas, located off the coast of the states of Veracruz, Tabasco, and Campeche in southeast Mexico, hold prospective resources that

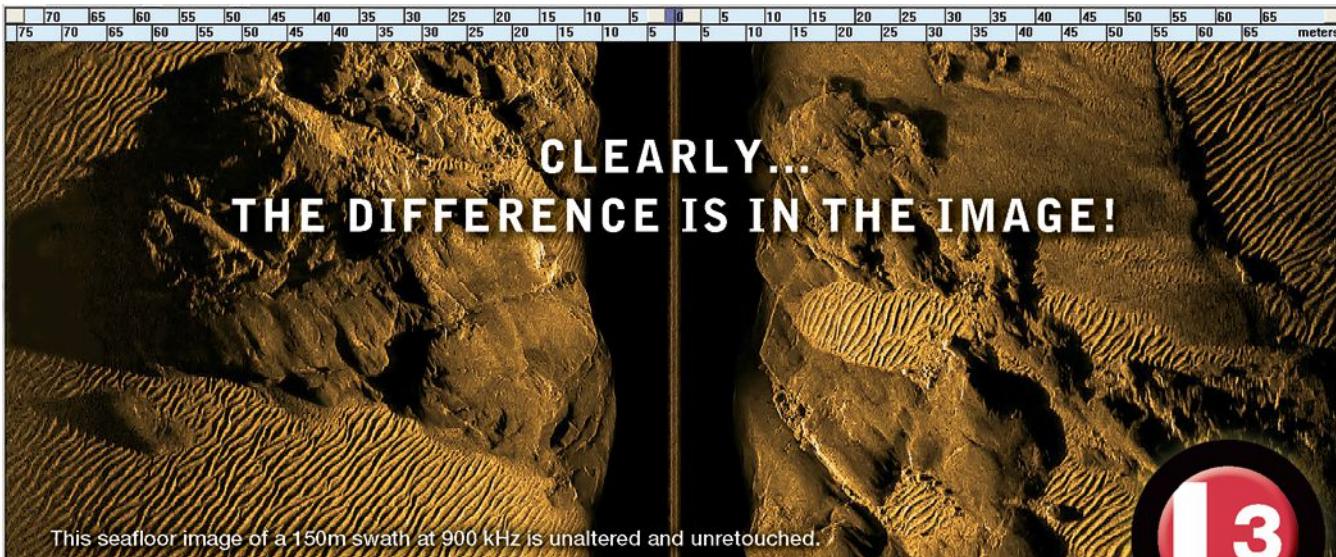
are expected to contain light crude oil with low production costs. Each contract area is subject to different minimum investment obligations.

The first deepwater Mexican prospects due to be auctioned later this year are said to remain attractive even in the current low oil-price environment because production is at least 8 years away, meaning current prices are less relevant to exploration budgets for companies assessing their existing portfolios.

## U.S. oil, gas lease sale of Western Gulf of Mexico tracts set for August

A U.S. federal lease sale offering 21 million acres in the Western Gulf of Mexico for exploration and development is set for August in New Orleans, Louisiana. Sale 246 leases offshore Texas will include about 4,000 blocks, from 9 to 250 mi offshore, in depths ranging from 16 to almost 11,000 ft.

The government estimates the lease sale could result in the production of up to 200 mmbbl of oil and 938 Bcf of natural gas. The August sale of leases for Western Gulf tracts will follow a planned 18 March sale of leases for 40 million acres off the coasts of Louisiana, Mississippi and Alabama.



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## Karoon Gas confirms oil column at Kangaroo-2 appraisal well in Brazil

Karoon Gas Australia has confirmed an oil pay zone at its Kangaroo-2 appraisal well in Brazil's offshore Santos Basin. The well is situated in exploration Block S-M-1165, about 300 m up-dip and 4 km south of Kangaroo-1.

It is the first well in Karoon's Santos Basin exploration and appraisal drilling campaign. The well encountered a 250 m gross oil column in Paleocene and Maastrichtian aged reservoirs.

Two separate extended production tests in the Kangaroo-2 appraisal wellbore flowed 31-38 degrees API light oil at maximum rates of between 2,500 and 3,700 bbl per day.

The Olinda Star rig will now start drilling at the Kangaroo West-1 exploration well, the second firm well in the program. It will identify the salt-flank prospect on the western side of Kangaroo salt structure, which is roughly 4.5 km from Kangaroo-2.

Karoon Gas said because of large size and proximity to Kangaroo, a successful outcome at Kangaroo West-1 may materially add to any potential development of the Kangaroo oil field. The exploration and appraisal drilling campaign is anticipated to continue through first half 2015.

Karoon Gas operates and has a 65% interest in the Block S-M-1165. Pacific Rubiales Energy owns the remaining 35% stake.

"With the first appraisal and sidetrack program at Kangaroo-2 complete, the joint venture has taken a significant step forward in understanding the field," Karoon managing director Robert Hosking said. "Well data indicates a number of separate accumulations make up the field, and there is no significant gas cap as originally prognosed."

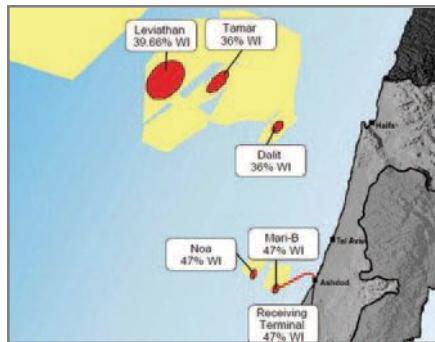
## Winter demand drives increase in gas output from Israel's Tamar field

Gas sales from the deepwater Tamar field offshore Israel exceeded 1 Bcf per at various times early this year, according to operator Noble Energy. These volumes were driven by increased electricity demand in Israel due to cold weather and coal plant maintenance.

Noble said the Ashdod onshore terminal compression project is more than 90% complete. The expansion is expected to increase deliverability at Tamar to 1.2 Bcf per day by mid-2015.

The Tamar partners have executed a non-binding letter of intent (LOI) for interruptible sales of up to 250 mmcf per day of natural gas from the field for 7 years to Dolphinus Holdings for supply to Egypt's domestic market.

Initial sales under the LOI could start later this year using existing Tamar production capacity and currently available pipeline infrastructure. Negotiation is under way of a final purchase and sale contract, after which the start of sales will be depend on regulatory approvals for regional export. However, further investments in the expansion of Tamar, as well as the initial development of the giant deepwater Leviathan gas field, have been suspended until the partners and Israel's government resolve regulatory issues.



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## BAM Nuttall secures contract for Dales Voe South quay extension

Lerwick Port Authority has awarded a \$18.4 million contract that will see the quay at Dales Voe South extended to 130 m long. The Scottish business unit of BAM Nuttall has secured the contract and the port authority said the developments in Lerwick Harbor will increase the deepwater facilities for the offshore oil and gas industry.

The extended quay will deliver deepwater, berthing and heavy load capacity to take an offshore structure in a single lift, with an expanded laydown area. BAM Nuttall will extend the quay by about 75 m, with a load-bearing capacity of 60 tons per sq. m.

It will have 12.5 m water depth, similar to the existing quay. The sheltered voe, situated between oil basins east and west Shetland has continuous access to the north.

"The contract marks an important step in further developing Lerwick's role as a leading center of offshore industry operations," Port Authority deputy chief executive and harbormaster Calum Grains said.

"Dales Voe South is another value-added expansion and reflects our confidence in future activity, including ongoing subsea projects, particularly west of Shetland, and the developing decommissioning and offshore renewable markets."

The Scottish Government Highlands and Islands Enterprise is providing \$3.7 million in grant for the project. Bank of Scotland is supporting the port authority's investment.

Work is due to start this month and is expected to be completed in April 2016. Lerwick has been serving the offshore industry for more than 50 years with reputation as a location for decommissioning.



### Indonesia okays proposals for offshore field cluster

Husky Energy said it is advancing development work on four shallow-water gas fields in the Madura Strait offshore Indonesia, in which it has a 40% interest.

The company has awarded a contract to build and lease an FPSO vessel to develop the liquids-rich BD field. Construction of a wellhead platform and pipeline infrastructure is under way for the same project, with first gas set for 2017.

The partners in the MDA and MBH natural gas fields have received government approval and a gas sales agreement is under regulatory review. Government regulators approved a plan of development for the MDK natural gas field.

Offshore Newfoundland & Labrador, Husky said development drilling has started at the South White Rose field. First oil is due in mid-2015.

At North Amethyst, a well targeting the deeper Hibernia formation beneath the main field is expected to come online this summer, the company said.

### CNOOC sees seven projects coming onstream in 2015

China's CNOOC Ltd. sees seven new projects coming onstream this year, including the recently started Jinzhou 9-3 development. At the same time, capital spending is expected to decline 26% to 35%. Capital spending for exploration, development, and production are anticipated to account for 21%, 67%, and 10%, respectively.

Within the year, the company plans to drill 162 exploration wells and acquire about 22,369 mi of 2D seismic data as well as about 5,405 sq. mi of 3D seismic data.

The company's net production target for 2015 is in the range of 475 to 495 mmboe, 67% from China and 33% from elsewhere. The net production targets set for 2016 and 2017 are around 509 mmboe and 513 mmboe, respectively. The estimated net production for 2014 is about 432 mmboe.

### Sea Lion design studies under way offshore Falklands

Work has started on assessing the FPSO design options for the first phase of the Sea Lion development in the offshore North Falkland basin. Operator Premier Oil had originally planned a TLP linked to an FPSO, but decided to scale back its plan last November following the drop in the oil price. Instead, it opted for a smaller initial development of just the northeast part of the Sea Lion field with a single subsea drill center using a leased FPSO.

Premier said the existing TLP topsides design and equipment lists are being modified for use with a smaller-capacity FPSO, and results from metocean studies are being assimilated into the FPSO design. The company is targeting sanction for the first development phase during the first half of 2016, depending on cost reductions achieved and the oil price outlook at that point.

Although the company could probably fund a project of this size itself, it will continue to seek a partner for the development. Subsequent phases will target a further 235 mmbbl of the discovered resource, plus any new discoveries that may result from this year's exploration.

### Intecsea to support Buckskin-Moccasin development

Chevron USA has awarded a contract to Intecsea to deliver engineering and long-lead procurement services for the front-end engineering and design (FEED) phase of the Buckskin-Moccasin project in the Gulf of Mexico. The contract requires Intecsea to provide the FEED and procurement services for a subsea tieback from the Buckskin and Moccasin fields to a nearby production facility situated on the outer continental shelf.

Intecsea will manage the project from its Houston, Texas office, with support from its office in Hyderabad, India. The Buckskin and Moccasin fields are situated in Keathley Canyon, an undersea canyon in the U.S. Exclusive Economic Zone in the Gulf of Mexico. The Buckskin prospect is located 190 mi southeast of Houston, and Moccasin is 12 mi away from it.

Chevron owns and operates the Buckskin field with a 55% stake. Repsol and Samson Offshore each own a 12.5% stake, while the remaining 20% interest is held by Maersk Oil. Moccasin field is also operated by Chevron with a 43.75% stake. BP and Samson Offshore own a 43.75% and a 12.5%, respectively. Chevron recently agreed to work with BP and ConocoPhillips to explore and appraise 24 jointly-held leases in northwest Keathley Canyon.

### NIOC commits \$7B to three Persian Gulf oil, gas fields

National Iranian Oil Company (NIOC) has approved \$7 billion of investments in three oil and gas fields in the Persian Gulf. NIOC head Saeed Hafezei told news service Shana the sums will be directed at the Resalat and Reshadat oil fields and the Salman gas field, all 11 mi offshore Lavan Island. The island currently handles production of 105,000 bbl per day of oil. Iranian Offshore Oil operates most of Iran's offshore oil output.

## Eni signs energy development, local growth pacts with Congo

Italy's Eni has signed two agreements with the Congo for energy development and local growth in the country.

The deals were signed by Eni chief executive Claudio Descalzi in the presence of the President of Congo Denis Sassou N'Gesso and Italian Prime Minister Matteo Renzi. Further details on the transactions were not known.

Eni has been operating in Congo since 1968 in the exploration and production of hydrocarbons, oilfield services, construction and engineering sector.

The company currently produces around 110,000 bbl per day of oil equity production in the country.

Eni has recently started production at the Nené Marine field, which is located in Marine XII Block, about 17 km from the Congo coast.

The company has discovered about 3.5 Bboe of resources in the Congolese Marine XII Block in recent years.

In October 2014, Eni discovered oil in the Minsala Marine exploration prospect, located in the Marine XII Block.

The company operates Marine XII with a 65% stake held by its subsidiary Eni Congo.

## Heavy lift record established at Arabyah-Hasbah project

The heavy lift barge Lan Jing completed the installation of the Hasbah tie-in platform (TP) using its 7,500-ton crane, carrying weight that reached about 5,000 tons, a new record for Saudi Aramco's heavy lift operation.

The new tie-in platform was installed as part of the ongoing work to complete the Arabyah-Hasbah Offshore Gas Fields Project, which will produce 2.5 Bcf of natural gas per day through the Wasit Gas Plant when completed. An intermediate injection platform was also installed.

The Lan Jing has also completed the installation of the Arabyah field tie-in platform, which weighs 4,600 tons, and the intermediate injection platform, which weighs 1,800 tons.

Nasir K. Al-Naimi, vice president of northern area oil operations, and Fahad E. Al-Helal, vice president of project management, conducted a recent site visit to the offshore project location at Hasbah TP. During the visit, Mohammed Al-Sadiq, senior project engineer from project management, presented the progress of the project completion and what has been achieved so far, and the project is said to be progressing as planned.

Among those taking part in the visit were Ali Al-Nojaim, general manager of Safaniyah area producing, and Mansour Al-Dossary, manager of the northern area gas producing department.



*The Arabyah-Hasbah gas fields.*

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## BASF, FoundOcean unveil new high strength grout

FoundOcean and BASF have launched an integrated material and service system for the provision of a new high strength grout, MasterFlow 9800, in Edinburgh, UK.

The high strength grout is the result of over 3 years of joint development, the primary purpose of which has been to deliver significant and quantifiable improvements in productivity and safety when grouting offshore structures.

"FoundOcean recognized a need among its customers for a material that could provide high early strength development and low temperature performance, yet also offer increased efficiency, safety and cleanliness," explained managing director Jim Bell on the motivation behind the new development. "MasterFlow 9800 will contribute to driving down the installed cost of offshore renewable energy."

MasterFlow 9800 is set to revolutionize offshore grouting by introducing a high strength grout with unrivalled operational advantages, the companies claim, adding that the material is able to be shipped and stored in silos rather than bags, facilitating quayside storage in all weathers, more flexibility in deck layout and no requirement for bag or container lifting during grouting operations and dockside resupplies.

The MasterFlow 9800 grout system uses an upgraded version of FoundOcean's Recirculating Jet Mixer (RJM). The delivery rates when using an RJM are upwards of 20 cu. m/hr and therefore faster grouting of the annulus can be achieved, saving valuable offshore operating days. The closed circuit between the cement silo and RJM mixer, along with the continuous mixing process, also minimizes overage, as well as reducing dust.

"Demanding offshore challenges have set extremely high



*Checking the mixture at a demonstration in the UK.*

requirements for the grout and grouting works in the development of MasterFlow 9800. Aligning the excellent properties of the new offshore grout with the operational advantages of FoundOcean's continuous mixing and pumping equipment will bring major health and safety improvements and installation cost reductions," said Luc Westhof, global key account manager at BASF Construction Chemicals.

The company said the material offers a number of superior properties, including early strength development, even at cold temperatures, and high fatigue resistance. When combined with its operational advantages, these properties have the potential to provide significant cost optimization for the foundation installation, while ensuring the durability of the grouted connection.

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### New insight into oil flow could pave the way to improved reservoir yields

The amount of oil recoverable from reservoirs in deep rock formations could be improved, following a new discovery by scientists at the University of Edinburgh and Heriot-Watt.

The research, published in Proceedings of the National Academy of Sciences, was carried out by scientists and engineers as part of the International Centre for Carbonate Reservoirs (ICCR) program which is sponsored by Petrobras and BG Group.

Researchers have identified a naturally occurring characteristic of oil that could be exploited to help improve its recovery from the subsurface.

About half of the world's remaining oil reserves are held in limestone reservoirs. Scientists have been using sophisticated X-ray technology to examine in three dimensions exactly how oil and other liquids flow within limestones.

Researchers found that in the complex pore structure of limestone, a previously unrecognized process allows oil droplets that are trapped in large pores to be broken up into smaller fragments by flowing water, allowing them to move more easily through the pore network.

Researchers say the findings could be applied to boost the yield from oil reservoirs by a few percent, which could account for significant volumes in the case of large reservoirs. This may be important for the recently discovered giant pre-salt carbonate oil fields in Brazil, which have very complex and multi-scale reservoir pore systems.

The phenomenon may also have applications in treating contamination in natural aquifers, which contain more than half of the world's groundwater resources.

It could also help develop techniques for use in carbon capture and storage, a technology that buries carbon dioxide emissions in former oil and gas fields, preventing the release of greenhouse gases to atmosphere.

"Thanks to new technology, we can see in detail how the fluids move within the rocks. Our new findings shed light on a natural process occurring in oil reservoirs and contaminated aquifers, and during carbon capture and storage. It could prove valuable in both oil recovery and environmental applications," said Tannaz Pak, formerly of the University of Edinburgh's School of GeoSciences, who took part in the study.

For the sponsors, another successful aspect of this research, in addition to the novel results, was the extensive knowledge interchange and technology sharing with Brazilian universities. BG Group and Petrobras have just kicked off the ICCR phase II program.

### Severn Glocon Group introduces dual-redundancy HIPPS system

The Severn Glocon Group has developed a high integrity pressure protection system (HIPPS) for oil and gas topsides and subsea applications. The subsea HIPPS will be the first to combine independent electronic and mechanical systems to provide a dual redundancy, pipeline pressure protection system, said Severn Glocon. The Severn Glocon subsea HIPPS adds a mechanical HIPPS alongside the electronic HIPPS, providing a second, independent, pressure protection system.

The mechanical HIPPS system is more resistant to hydrate and heavy wax build-up, and so is less likely to be impaired by such deposits, according to the company.

## Slashing Downtime with Innovative Seal Welding Technology

By Henk-Willem Sanders, Technical Manager Oil & Gas, Trelleborg Sealing Solutions

The offshore oil and gas sector has been going strong since the late 1940s; however, as the industry continues to move toward even more demanding offshore applications in order to drill deeper and reach further, the use of floating production, storage and offloading (FPSO) vessels have become particularly popular. Eliminating the need to lay expensive long-distance pipelines from the processing facility to an onshore terminal, the FPSO is suitable for remote or deepwater locations where seabed pipelines are not cost effective.

But while offshore facilities have opened the vast frontier of the world's oceans to oil and gas exploration and production, they have also resulted in new and unique challenges. For example, while FPSOs can provide an economically attractive solution for smaller oil fields that can be exhausted in a few years and do not necessitate the expense of installing a pipeline, maintaining those installations can often prove difficult and time consuming, especially as environments become more challenging.

With financial data suggesting that losses from an hour of downtime for an offshore production facility is among the highest of any industry, every moment saved in downtime means significant cost savings for the operator. This article considers why optimizing the design, operability, and safety of FPSOs has never been more important if downtime is to be combated and will focus on the development of new seal welding solutions that have been specifically designed to help operators do this.

While all oil platforms originally sat on the seabed, floating production systems were developed and introduced in the 1970s as exploration moved to deeper waters and more distant locations. A viable solution that brought with it significant advantages, including the ability to move production to a new location once the field became depleted, this technology quickly proved popular, and now over 200 vessels are currently deployed worldwide as FPSOs.

However, along with new benefits came new challenges—and it wasn't long before the maintenance of these facilities became a hot topic and set the offshore agenda. Maintenance is an issue because with a number of component failures able to easily cause an FPSO to a shutdown that requires onshore maintenance, the cost and traveling time required to return an FPSO to shore quickly adds up.

As such, reliability, safety, and flexibility are of key importance when securing maximum up-time for an FPSO facility and offshore operators are continually on the lookout for ways to reduce the chance of FPSO shutdown, avoiding the downtime associated with maintenance.

A critical element on board an FPSO facility, the swivel stack is the heart of the turret, mooring, and fluid transfer system. The swivel stack ensures that all fluids (liquids and gas), controls, and power are transferred safely from the geo-stationary components (wells, flowlines, manifolds, and risers) to the rotating vessel and its process plant under any environmental conditions.

Seals are vital when it comes to ensuring the continued efficient and safe operation of an FPSO swivel stack. Replacement of the seals in a swivel stack requires the FPSO to return to shore so that components can be completely disassembled and seals replaced. In fact, this whole operation is extremely time consuming and requires huge preparation time; typically, the FPSO would be down for between 6 and 12 weeks and the cost of that could rise to hundreds of millions of dollars.

With every second saved in downtime adding to the bottom line of the operator, cutting out the traveling time required to return an FPSO to shore for a seal replacement could provide operators with a huge financial savings.

The idea to solve this issue of offshore maintenance was an obvious one—remove and replace the seal *in situ* on the FPSO

offshore. However, to actually do this and create a viable technique was not so simple.

It would require the development of a technique that would bond the ends of a cut seal offshore, something that would prove extremely difficult. Adding to the challenge, seal welding has to be possible when other swivels are still in production—this could be extremely high risk without special safety features incorporated into the welding equipment. Furthermore, the equipment would need to be portable so it can be transported to the FPSO and a committed and fully trained service team would need to be put together that could go out to the FPSOs to replace the seal in the field.

A commonly used technique for leading manufacturers of seals is billets welding. However, dedicated to meeting the wants and needs of the offshore operators through innovation, some manufacturers have been working to provide an enhanced solution. Investing significant time and resources, they have been able to develop a viable, fully tested portable system that will replace seals *in situ* by optimizing the billets welding technique for a seal profile.

The latest in seal welding technology has more than met the challenge and is set to revolutionize the FPSO market. An example of this innovation can be found in Trelleborg Sealing Solutions' new seal.

Trelleborg has developed a new seal that, manufactured from its established seal material, can be welded on the platform without the need to return to shore. By using a well-established and proven material as opposed to a modified substance, Trelleborg has been able to avoid integrating something that has not been fully tested into the new system to ensure full compliance and reliability for the offshore operator.

In a controlled manufacturing area, Trelleborg starts the process by producing a seal that has been cut in one place using a specially designed tool. The product is then packaged so that it is well protected from any damage in transit.

Onboard the FPSO offshore, the seal is unpacked and installed onto the swivel by highly trained personnel from Trelleborg's service team; the skilled engineer installs it in the Weld Head Enclosure (part of the welding machine) that, certified to ATEX zone 1, is then pressurized so that the welding can take place. Fully enclosed, production on other swivel stacks can continue without risk or requiring downtime of the FPSO.

A Control Cabinet, which is purged and will also be certified to ATEX zone 1, ensures the smooth running of the process as well as monitoring and logging all data. After the process is finished, the seal is safely removed from the Weld Head Enclosure before being polished and checked. If the values from the recorded data are satisfactory, the seal will be released for installation.

Safety on FPSOs is of paramount importance and in the harsh offshore oil and gas industry, operators must take every precaution to minimize risk at every turn. But at the same time, spiraling maintenance costs and project downtime have proven to be real issues for the offshore sector.

With seal welding, a requirement for the smooth running of the FPSO swivel stack, a critical element of operations—replacement involving a melting process—has always had to be conducted offshore, resulting in extremely costly and time-consuming downtime for the facility as the FPSO has to be disconnected.

As such, for many years there has been a desire for a safe and reliable alternative to this process that can be carried out *in situ*. However, after years of development, Trelleborg Sealing Solutions has created a fully tested, portable system that is not only set to make life for the offshore operator safer and easier, but also dramatically improves the bottom line for the oil company.

## Cougar develops pioneering control system for Guara-Lula field project

National automations system provider, Cougar Automation, has developed and commissioned an innovative control system for Balltec to use on the first buoy supported riser (BSR) system installed on Brazil's Guara-Lula project. The system is a first in design and will support Petrobras in eventually reaching a projected total production capacity of over 300,000 bbl of oil per day.

The Guara-Lula project is the largest engineering, procurement, installation and commissioning (EPIC) SURF contract ever to be awarded in Brazil. Operated by Petrobras and located in Santos Basin about 100 mi off the coast of Rio de Janeiro, the BSR consists of



four submerged buoys, each weighing approximately 2,000 tons, which lie around 300 m below sea level.

Cougar Automation was commissioned by Balltec to design a dedicated control and automation system consisting of a surface-mounted primary control that would control the movement of the buoy support system via tether adjustment, using a linear chain tensioner. This was required in order to manage the tension in the risers.

The pioneering system allows surface control of the subsea tensioner system via a remotely operated vehicle. Once overboarded, the ROV facilitates establishment of the data pathway linking the surface control to the subsea control modules. The surface control is then used to

effect buoy movement as required.

This robotic like system enables the controller to make adjustments to the position of the buoy using the tensioners, via visual monitoring and control using surface-mounted touch-screen HMIs. The surface control system is also able to automatically interrogate and identify the exact tensioner it is connected to, as well as generate advanced statistical reporting, and operational and historical data for convenient trouble-shooting and audits.

The intuitive control system can also make rapid decisions in real-time to protect the equipment and facilitate safe operation, which a human could not do. This includes highlighting of any anomalies to the operator and the generation of events during normal operation. This ensures that the system can be protected against any damage quickly and efficiently.

"The design of this automation system was very different in comparison to our usual projects, in that it works very much like a robot would," said Liberty Mabaleka, project engineer at Cougar Automation. "The user can command the control system exactly what it needs to do and then it can report back findings through programmed intelligence."

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# UNDERWATER INTERVENTION

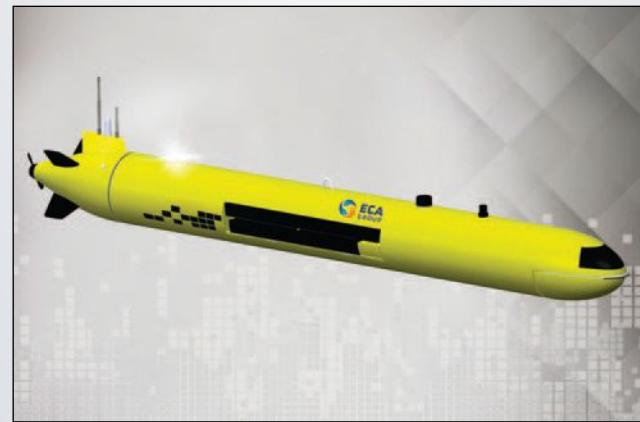
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## Horizon 2020 program to develop revolutionary underwater mining system

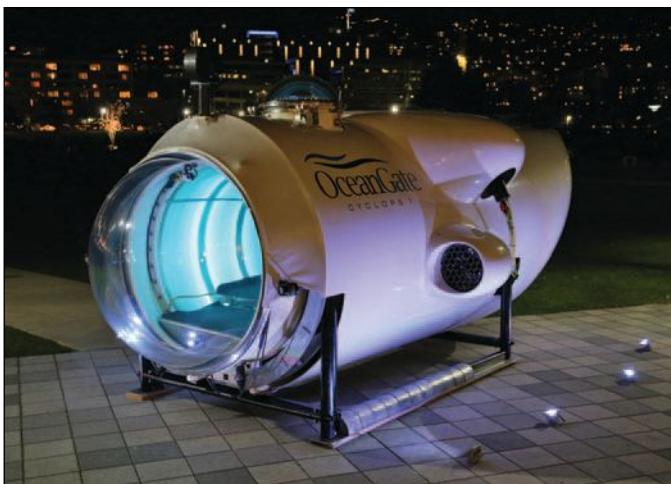
As part of the Horizon 2020 program, a new 42-month research and development project has been launched to help provide an opportunity to tap into the wealth of unexploited European mineral resources. The estimated cost of the project is approximately 12.6 million Euros. The aim of the iVAMOS! (Viable Alternative Mine Operating System) project is to design and build a robotic, underwater mining prototype with associated launch and recovery equipment, which will be used to perform field tests at four EU mine sites. Three of these are inland, inactive submerged mineral deposits and the other is offshore. Building on successful deep-sea excavation techniques, this prototype will provide a safer and cleaner option for extracting currently unreachable and/or uneconomic mineral deposits. iVAMOS! will also look to enhance currently available underwater sensing, spatial awareness, and navigational and positioning technology, as well as providing an integrated solution for efficient real-time monitoring of the parameters associated with potential environmental impacts. Under the coordination of BMT Group Ltd and the technical management of Soil Machine Dynamics Ltd, a consortium of 17 project partners from nine EU countries will collaborate, including Soil Machine Dynamics Ltd; Damen Shipyards Group; Instituto de Engenharia Sistemas e Computadores; Fugro EMU Limited; Zentrum für Telematik e.V.; Montanuniversität Leoben; Minerália, Lda; Marine Minerals Ltd; Empresa de Desenvolvimento Mineiro SA; Sandvik Mining and Construction G.m.b.H; Geological survey of Slovenia; La Palma Research Centre for Future Studies; European Federation of Geologists; Trelleborg Ede Bv; Federalni zavod za Geologijo and Fondacija za obnovu I razvoj regije Vareš.

## First commercial success for the A18 underwater robot

The ECA Group announces the sale of the first next-generation A18 autonomous underwater robot for several million euros. The robot will be delivered to the customer in 2016. After several successful A91 orders in 2013 and 2014, this export sale is a first for the ECA Group's latest autonomous underwater vehicle (AUV). The sale was made shortly after the vehicle was marketed in October 2014, even before the end of the development stage. It confirms customers' growing interest in long-range AUVs that are more compact due to the miniaturization of sensors and embedded equipment. The A18D robot(photo) is able to travel underwater for more than 24 hrs and up to 3,000 m in depth. Equipped with next-generation sensors and with the latest software technology in terms of missions, the robot has the best operational capacity for hydrographic surveys, oceanographic research, exploitation of the natural resources of the seabed, and even search and rescue operations. The new A18 range comprises robots of 350 to 650 kg that can operate at depths of up to 3,000 m. They represent ECA Group's new mid-range AUVs. The A18 is sufficiently effective for our key customers' requirements. They can be deployed from a light naval platform from 12 m, using different launching and retrieval systems also offered by ECA. The catalogue price of A18 AUVs ranges from €4.5 million to €5 million.



## OceanGate unveils Cyclops 1



OceanGate Inc. officially launched the revolutionary five-person submersible prototype, Cyclops 1, in a public open house hosted at the Museum of History and Industry (MOHAI) in Seattle.

The launch included an educational initiative in which the OceanGate Foundation provided 200+ Seattle students, grades kindergarten through high school, the opportunity to visit MOHAI and experience science in action by experimenting with buoyancy, touring the submersible and learning firsthand the impact of Inspiration Through Exploration.

"The technologies employed and adapted for Cyclops 1 have resulted in a revolutionary innovation that will open the oceans for monitoring, inspection, assessment and documentation," states Stockton Rush, CEO of OceanGate.

Cyclops 1 is the first step in a development program designed to meet demand from government and commercial clients for more advanced technologies and capabilities at deeper depths. Cyclops 1 showcases a number of systems critical for the 3,000 and 6,000-m capable Cyclops 2 & Cyclops 3 submersibles scheduled for launch in 2016. Cyclops 1, limited by its steel pressure vessel to a maximum 500 m (1,600 ft) dive depth, will spend 2015 on OceanGate's Eye on the Sanctuaries Tour, a cross-country campaign developed in collaboration with the NOAA's Office of National Marine Sanctuaries and dedicated to raising ocean awareness through executing missions at historic locations and sanctuaries in the Pacific, Gulf of Mexico, and Atlantic. Dive sites include the Farallon Islands, the Flower Gardens, and the Battle of the Atlantic.

Cyclops' features include an enhanced automated control system to monitor life support, power management, navigation and other critical system diagnostics as well as the latest sonar from Teledyne BlueView and a new advanced visual imaging system from Battelle. Using a combination of Commercial Off the Shelf (COTS) technology and innovative system architecture designed by APL and OceanGate's internal engineering group, the automated control system aims to revolutionize how manned submersibles operate by reducing time spent on vehicle control and increasing time on mission objectives. This control system will also improve mission safety by reducing opportunity for user error. Other advances include new hydrodynamic components designed to maximize the submersible's in-water speed and maneuverability and a redesigned interior that will enhance the client experience and increase productivity.

For more information, visit [www.oceangate.com](http://www.oceangate.com).

## UNDERWATER INTERVENTION

### Fugro expands AUV fleet with delivery of Echo Surveyor VII

Fugro took delivery of the Hugin 1000 AUV, the Echo Surveyor VII, in December 2014. Depth rated to 4,500 m, the new AUV now holds the record for the deepest Hugin AUV dive, surveying in water depths surpassing 4,200 m.

As the latest addition to Fugro's AUV fleet, the Echo Surveyor VII is specifically designed for high resolution and efficient survey operations in water depths reaching 4,500 m. The extended depth rating of the Kongsberg Hugin 1000 AUV places it in the most advanced ranking of deep sea survey instrument platforms, and it can be mobilized for rapid deployment to suitable vessels of opportunity in a range of worldwide project locations.

Representing state-of-the-art development, the Echo Surveyor VII houses an instrumentation payload ideal for geochemical hydrocarbon seep exploration and produces data with enhanced resolution and increased quality. The AUV provides improved multibeam swath coverage and supports the acquisition of side-scan sonar, subbottom profiler and CTD profiler data. In addition, it offers rigorous internal navigation for accurate and efficient data collection.

Fugro operates one of the largest fleets of commercial AUVs in the world and has applied this technology in some of the most complex and challenging deepwater surveys. The Echo Surveyor VII recently joined three of Fugro's specialist survey vessels in the search for the missing Malaysia Airlines flight MH370 in the Southern Indian Ocean. The new design features of this AUV are particularly suitable to support this exceptional mission, including the high-resolution camera capability to provide positive verification as required.

The addition of the Echo Surveyor VII further advances Fugro's fleet of high quality geophysical and remote sensing survey instrumentation. As the ultimate choice of instrument platform for deep sea and remote surveys, this newest AUV highlights Fugro's commitment to remain at the forefront of industry advances with recognized, world-class technology and expertise.

For more information, visit [www.fugro.com](http://www.fugro.com).



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## Sabertooth goes 4D in Lake Vättern

For offshore operators, a 4D geo-spatial data acquisition system with data visualization in real-time is now available for the Seaeye Sabertooth AUV.

Its full capabilities were demonstrated to representatives of 12 companies from seven countries, together with the Danish Navy, in Saab's exclusive underwater test centre at Lake Vättern, Sweden.

This advanced system has been configured for the Sabertooth by Saab QPS, a Saab Seaeye partner and leading developer of hydrographic survey and mapping software.

Operators get a complete hydrographic data acquisition, navigation, and processing software package that is fully integrated into the Sabertooth.

The development unifies the QINSy and Fledermaus systems developed by Saab QPS into a single enhanced option for the Sabertooth.

QINSy is a data interface and acquisition software package that consolidates data acquired from different sensors in real-time. All acquired data can be viewed in various dedicated displays, which is ideal for real-time QA/QC of the data.

Fledermaus analyzes and provides 4D visualization of the acquired data, such as synchronized video, water column analysis, multi-beam sonars and pipe detection sensors.

For the demonstration the Sabertooth was equipped with a high-end sensor suite including side-scan sonar, subbottom profilers, high frequency imaging sonar, multibeam echo sounder and cameras, along with GPS, DVL and inertial measurement unit (IMU) supporting the navigation. Processing of the trajectory data was achieved with an algorithm developed by Saab Dynamics and renown for its navigational accuracy.

One demonstration included an extended autonomous survey mission performed to show the extent of the navigation accuracy and trajectory performance as well as the quality of the high-resolution sonar images captured.

Another involved a range of autonomous missions in the lake, including seabed survey, structure inspection, obstacle avoidance and a docking maneuver into an underwater docking station. A fiber link was used to allow live viewing of the data being gathered.

Visitors had an opportunity to examine the Sabertooth, a breakthrough hybrid concept that combines the autonomy and range of an AUV with the



maneuverability and hovering capability of a light-work ROV—making it an ideal vehicle for long-range missions where there is a need to stop and conduct a detailed task.

Three operational modes are possible: autonomous roaming, attached fiber-optic cable, and umbilical for power and communications.

Fitted with the advanced Saab Seaeye iCON intelligent control system, its behavior-based architecture offers a decision-making capability that can, in survey mode, react to unexpected data by deviating from a programmed mission to gather data or perform a task before resuming its mission plan.

It is intended that the Sabertooth can be left at deep and distant locations where it can operate from a remote subsea docking station ready to be launched on routine inspection, repair, and maintenance work and deal with emergencies.

At such a remote location, where it might remain for a year, tooling packages can be stored at its docking station where batteries can be re-charged, data and video downloaded, and fresh instructions uploaded over the Internet.

As offshore operators go deeper and into more difficult to access areas, the Sabertooth Hybrid AUV/ROV concept is attracting interest from those looking for a reliable and versatile underwater vehicle that can accommodate a wide range of data acquisition systems and tooling onto a single platform.

The strategic alliance between Saab Seaeye and Saab QPS bridges the gap between hardware and software development that is bringing innovative technology opportunities to the industry and setting new standards.

For more information, visit [www.seaeye.com](http://www.seaeye.com).

## Leading Tasmania subsea training center addresses Asia-Pacific skills shortage

A world-renowned diver training facility in Tasmania is helping address the skills shortage in the Asia-Pacific subsea sector as it teams up with a Malaysian recruitment and training provider. The Underwater Centre, Tasmania is working with a team of 21 candidates who have been put forward

for training by Kuala Lumpur-based Samsian Solution & Services.

Samsian Solution & Services provides training and recruitment opportunities for personnel in the oil and gas, mining, water, power and maritime sectors in Southeast Asia.

The students are currently completing The Underwater Centre's Standard Commercial Diving Training Package, which qualifies them to work onshore and offshore as commercial divers. The 3-month training course includes the required Australian Diving Accreditation Scheme (ADAS) Parts 1, 2 and 3 certifications, providing them with the necessary accreditation to work legally as a diver.

Part 1 of the training involves occupational SCUBA diving to 30 m and includes training predominantly in the use of subsea hand-tools, surveys and inspection diving, and rescue diving. Part 2 is Occupational SSBA (Surface Supply) to 30 m and includes pneumatic and hydraulic powered tools training, such as jack-hammering, needle-gunning and air-lift dredging. Students are also taught about salvage, construction, welding and burning.

Meanwhile, ADAS Part 3 is the entry-level qualification required for gaining work in the offshore industry and involves diving up to 50 m, the deepest occupational ticket achievable on air. Part 3 sees the use of wet-bells, chamber use and operation, decompression diving, more rescues, offshore awareness, and advanced underwater work.

Samsian Solution & Services spokesperson Jamie Tham said that they chose The Underwater Centre's ADAS training for their candidates because of its recognition in the region's oil and gas sector.

"Before being chosen to take up the training, each of the candidates must carry out a range of assessments and physical tests. They must also demonstrate their passion for being an ADAS-accredited diver and the work that will entail," she said.

"The Underwater Centre has an excellent reputation in the industry and we have found the team of staff and instructors there to be very helpful. Commercial diving is a skill that is currently in high demand within our local industry, and most of the candidates will be able to secure a job with oil and gas contractors once they have completed the training. We will help them secure job placements within the industry."

The Centre's operations manager Herb Mitton said the team was working

very well and that they were learning skills vital for the "real world."

"The men are performing very well with a good level of theoretical knowledge and in-water prowess being displayed by them all. This has also been the case with regards to their attitude shown toward their training and tasks, and they are working very well as a team, learning the skills they will need in the real world," said Herb.

"The ADAS guidelines and competencies we train and assess under are realistic, achievable with effort and hard work, and are exactly tailored to industry requirements. We very much expect our students to earn their qualifications."

The Underwater Centre, Tasmania, is based at Beauty Point. The Centre has been delivering diver education since 1996 and was originally created to address the demand for commercial diver training in the Southeast Asia-Pacific region. It is the only school in the world to offer all levels of the internationally-accepted ADAS commercial diver certification, from ADAS Part 1, right up to ADAS Part 4 Closed Bell. It has a sister base in Fort William, Scotland.

For more information, visit [www.theunderwatercentre.com](http://www.theunderwatercentre.com).

#### **DeepOcean to provide services to Petrobras**

DeepOcean Brasil Servicos Ltda., a subsidiary of DeepOcean Group Holding BV, announced that it has been awarded a 1 year extension of contract for the provision of flexible repair and IMR services from Petróleo Brasileiro S.A. using the Deep Endeavour.

Deep Endeavour is a multi-purpose subsea support construction and cable-lay vessel, with work-class ROV, riser recovery and deployment system and more than 1,600 sq. m of deck space. Vessels track record includes ROV-based subsea maintenance operations, saturation diving support, and topsides construction support. Vessel has already proven her performance in the Brazilian Inspection, Maintenance and Repair (IMR) market and will maintain her special capability for repairing flexible pipelines and electro hydraulic control umbilicals.

Additionally, Axa Engenharia Submarina Ltda. (AXA), a subsidiary of DeepOcean Group Holding BV, announced that it has been awarded a contract for the provision of geo-hazard surveys on the Libra Field from the Petróleo Brasileiro S.A. led consortia, consisting of Shell Brasil Petróleo Ltda., Total E&P do Brasil Ltda.,

CNOC Brasil Petróleo e Gás Ltda. and CNOOC Petroleum Brasil Ltda.

The contract is for the provision of geo-hazard survey on a seafloor area of 1,640 sq. km in the Libra field. Libra field is located in a water depth of approximately 2,000 m in the Santos Basin, about 230 km off the coast of Rio de Janeiro, Brazil. Surveys will be performed with a 3,000 m rated AUV. The

AUV is capable of delivering high resolution high-quality HISAS bathymetry and side-scan sonar data for subbottom profiling at high speeds. The AUV operations are launched and supported by the survey support vessel MV Tau on charter with DeepOcean. The contract will commence as soon as current AUV commitments have been completed.

"The combination of DeepOcean's

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impressive track record of more than 60,000 km of high-specification pipeline inspections and route surveys and AXA employees' long-term experience in AUV-based seabed mapping services is compelling. Winning this contract on Libra is a great recognition of our services on this strategically important project to our valued clients in Brazil," says the experienced Donizeti Carneiro, commercial manager of AXA.

"This is the second AUV-based survey contract DeepOcean and AXA have been awarded recently in Brazil and supports our strategic investments in AUVs to add to our extensive range of global ROV-based subsea survey and pipeline inspection services. This contract will be executed from our office in Brazil," says Mads Bårdesen, DeepOcean's EVP International.

For more information, visit [www.depoeceangroup.com](http://www.depoeceangroup.com).

## Schmidt Ocean Institute selects Greensea to help build full ocean depth robotic research vehicle

Greensea Systems, Inc., a world leader in automation and navigation for unmanned underwater vehicles, announces its selection by Schmidt Ocean Institute (SOI), a non-profit foundation advancing the frontiers of ocean research and exploration, to join the team developing SOI's new robotic undersea research vehicle. Schmidt Ocean Institute will produce a series of three vehicles with advancing depth and research capabilities to comprise the Hybrid Remotely Operated Vehicle (HROV). Greensea was selected to support SOI's HROV program.

David Wotherspoon, the HROV program project manager for SOI is thrilled about the new addition to its development team. "Greensea has professional software engineers that have a track record of delivery and is emerging as a go-to company for AUV, HROV and ROV control system software. After internal and external reviews, Schmidt Ocean Institute decided to use Greensea Systems as they approach their task from an operator's perspective, which makes integration and functionality the

project driver. We are very excited to be working with them."

Schmidt Ocean Institute has already begun work designing the full ocean depth undersea robotic research vehicle and will operate at depths of 11,000 m. It will be one of the world's only robotic vehicle capable of providing scientists real-time access to the deepest parts of the ocean. In 2014, SOI deployed its 82.9-m ship RV Falkor twice to the Mariana Trench's, which is the deepest part of the world's oceans. The HROV will be the next-generation vehicle to help researchers gather data from those unexplored depths.

With a background that includes diver, ROV operator, and physicist, Greensea President and CEO Ben Kinnaman understands what it takes to create an ROV that will deliver the precise, accurate, repeatable data the scientific community needs. "Greensea's technology is specifically designed to improve the relationship between man and machine. We make powerful, integrated technology that is intuitive to operators, so they can work smarter not harder." Greensea's turnkey solution for Schmidt will provide integrated data, sonar and video in a fully automated environment.

Greensea's technology has been tested and proven on numerous vehicles including large scientific vehicles such as NOAA's Deep Discoverer. Their product designs offer incredible stability because they all use openSEA, the company's patent-pending software system anchored by a core library. The library provides native support for thousands of vehicle devices, which gives stability to even the industry's most disruptive technology. Greensea's unique experience providing advanced control systems for work class ROVs complements SOI's commitment to using advanced science and technology in the pursuit of oceanographic knowledge, research and discovery.

For more information, visit [www.greenseainc.com](http://www.greenseainc.com).

## NOAA tests unmanned systems for research and management

NOAA's Office of National Marine Sanctuaries has successfully tested the integration of two different types of unmanned systems for potential use in research and management of national marine sanctuaries. The tests earlier this month in Hawaiian Islands Humpback Whale National Marine Sanctuary involved NOAA's Puma unmanned aircraft system and Liquid Robotics, Inc., Wave Gliders®.

During the tests, two Wave Gliders equipped with acoustic sensors and positioned a few miles apart were able to identify and relay the location of a target vessel that entered their vicinity to the operations center. This information was programmed into the Puma, which was then able to locate and photograph the target. The test simulated real-life management situations that could include vessels and marine life in distress, marine surveys, and access within marine protected areas.

"Unmanned aircraft systems represent the next development in marine resource monitoring and are potentially cheaper, greener and safer than manned flights," said Matt Pickett, aviation operations director for NOAA's Office of National Marine Sanctuaries. "This successful test and collaboration with Liquid Robotics demonstrates the potential for these two technologies to work together for management and research operations."

The Puma is a 13-lb, battery-pow-



Liquid Robotics Wave Glider takes a photo of the deployment of the Puma Unmanned Aircraft System during NOAA's testing in the Hawaiian Islands Humpback Whale Sanctuary. Photo: Liquid Robotics, Inc.

ered aircraft with a 9 ft. wingspan, equipped with real-time video and photo capability. The aircraft can be hand-launched and recovered from any location on land or at sea from a boat. Durable and rugged for deployment to remote marine areas and repeat usage, the aircraft can fly for up to 2 hours on a single charge and cover a range of about 50 sq. mi.

The Liquid Robotics Wave Glider has a propulsion system that uses both wave-powered and stored solar energy to navigate challenging ocean environments. Its innovative design allows it to cost-effectively collect and transmit data gathered during missions of lasting up to 1 year, over thousands of miles, or while remaining in place. Individual or small group glider deployments carry suites of sensors and operate individually or in fleets.

For more information, visit [www.sanctuaries.noaa.gov](http://www.sanctuaries.noaa.gov).

## Fugro provides third vessel to join search for missing MH370

Fugro Supporter, a multi-purpose offshore survey vessel, is currently on its way to the Southern Indian Ocean search area having conducted trials in Bali. The vessel is equipped with a Kongsberg HUGIN 4500 AUV that will be used to scan those portions of the search area that cannot be searched effectively by the equipment on other vessels.

The addition of the Fugro Supporter, which is expected to commence search activities in late January, is jointly funded by the governments of Australia and Malaysia.

In December 2014, 65-m survey vessel Fugro Equator completed a bathymetric survey of around 208,000 sq. km of the seafloor, collecting seabed data and transmitting them to the ATSB for processing by Geoscience Australia. The resulting bathymetric maps of the seabed assisted in planning subsequent stages of the MH370 search and ensured safe and effective operation of the underwater

search equipment.

The 6-month bathymetric survey of the relatively uncharted search area off Western Australia has revealed previously unknown features including rugged terrain and deep trenches.

Fugro Discovery has been conducting deepwater search operations since October 2014. The 70-m vessel is equipped with specialist deep tow survey systems including side-scan sonar and underwater video as well as hydrocarbon detection sensors. Fugro Equator was reconfigured to accommodate similar specialist equipment and has been mobilized to the search area to join the underwater search operations.

In addition to locating the missing Boeing 777 aircraft, the underwater search aims to map the MH370 debris field in order to identify and prioritize the recovery of specific aircraft components, including flight data recorders, which will assist with the Malaysian investigation.

For more information, visit [www.fugro.com](http://www.fugro.com).

## M Subs Ltd launches prototype submersible

On 11 February 2015, M Subs Ltd (a subsidiary of Submergence Group LLC) launched the prototype manned submersible, S351-UOES2 in Plymouth, UK. The submersible, christened Margaret, is the culmination of 3 years of research and development and is one of two prototypes being evaluated by USSOCOM. Margaret will undergo several months of sea trials, be certified by Det Norske Veritas -Germanischer Lloyds, and then be delivered to USSOCOM for extensive trials and evaluation.

For more information, visit [www.msubs.com](http://www.msubs.com).



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## Speedcast acquires Geolink Satellite Services

SpeedCast International Limited announced the acquisition of Geolink Satellite Services, a leading provider of satellite communications solutions in the African region and part of the CETel Group. The closing of the transaction is subject to regulatory approval. The acquisition will strengthen SpeedCast's fast growing services for the energy and maritime sectors, enhance its portfolio of mobile satellite solutions, and bolster its capabilities in the African region. Geolink Satellite Services is a leading provider of satellite solutions in the African market and has strong positions in the maritime industry. The company services customer requirements in over 20 African countries, with key customers in the oil & gas, mining, media, NGO and maritime sectors. Geolink specializes in mobile satellite solutions, as well as fixed VSAT solutions, in the increasingly important African market. The company also has experience providing services to the media industry in Europe. Geolink is based in Paris, France and works with a network of technical partners throughout Africa, in addition to the company's own field engineering team, for the support of its solutions. With this acquisition, SpeedCast significantly enhances its capabilities to serve and support its customers in the African market, a key area of operations for the energy sector. The acquisition will benefit SpeedCast's existing customer base, as SpeedCast is experiencing a growing number of requests for services in Africa from its Asia-Pacific customers. Further, the African continent continues to be a growth spot for VSAT services and therefore represents a new potential source of growth for SpeedCast. Last but not least the Geolink acquisition adds to SpeedCast's growing leadership in providing services to the maritime sector. The acquisition follows SpeedCast's successful acquisitions of two established satellite industry players, SatComms Australia and Oceanic Broadband, in the Australasia region in the past 12 months.

## THOR 7 arrives in French Guiana

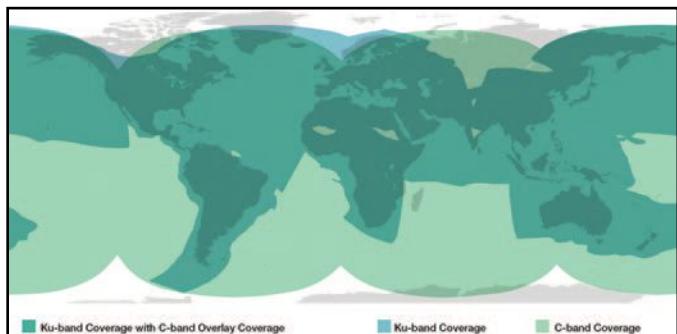
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Ocean News & Technology

Telenor Satellite Broadcasting (TSBc) announced that its THOR 7 satellite has arrived safely at the Guiana Spaceport in Kourou. THOR 7 is now set to start its final preparations before its launch by Arianespace, scheduled for mid-April 2015. THOR 7 is TSBc's first growth satellite, providing expansion and restoration capacity for the distribution of broadcast and data communication services throughout Europe. The spacecraft is to be launched from the Guiana Spaceport on board an Ariane 5 ECA launcher. "With the launch of THOR 7, TSBc looks forward to further extending our position in the market and expanding our regional coverage," said Morten Tengs, CEO, Telenor Satellite Broadcasting. "The HTS Ka-band payload on THOR 7, designed specifically for the mobility VSAT market, is a first for TSBc and will allow us to further increase our market share in the maritime and offshore sector, delivering cost-effective solutions and high-powered coverage over the North Sea, the Norwegian Sea, the Red Sea, the Baltic Sea and the Mediterranean." This marks the start of the THOR 7 launch campaign – TSBc's mission team will now be stationed at Kourou during the campaign period to supervise final preparations before the launch.



## KVH introduces enhanced VoIP service for mini-VSAT Broadband network



KVH Industries, Inc. has rolled out a new dedicated voice configuration for its mini-VSAT Broadband<sup>(sm)</sup> global maritime satellite network to ensure customers always experience high-quality phone calls. The network's Voice over Internet Protocol (VoIP) service is now delivered on a prioritized and protected data stream, separate from the network's overall broadband data traffic. VoIP service is also prioritized onboard the vessel for quality VoIP service even during times of heaviest broadband data use.

By prioritizing phone service, this enhancement is designed to maintain the crystal-clear sound quality of mini-VSAT Broadband's VoIP service while also addressing the challenge that ship owners face in meeting increased onboard data usage. Maritime operators rely on broadband connectivity for everything from accessing email to utilizing web-based applications for better voyage planning, fuel optimization, and remote systems monitoring. At the same time, vessels experience demand for VoIP services around the clock by crew and officers, given the 24/7/365 nature of commercial vessel operations.

"With this enhancement, mini-VSAT Broadband users enjoy extremely high-quality VoIP service even during heavy data network use," said Marc Edwards, KVH's network operations director. "We rolled out this updated configuration to all service beams on the network, and the feedback indicates the quality of our voice service to be exceptionally good."

VoIP, which utilizes an Internet connection to transmit voice signals, is the primary method for vessels to conduct phone calls from sea. The mini-VSAT Broadband network utilizes spread spectrum technology, which enables low latency and contention, both factors contributing to the high voice quality of KVH's VoIP service. A telephony measurement known as mean opinion score (MOS) quantifies the voice quality of phone transmissions on a 1-to-5 scale, with 5 as best. A score of 3.4 is considered good for a satellite phone call, yet mini-VSAT Broadband VoIP calls measure up to 3.75, which is the same as a land-based VoIP call. In addition, KVH's mini-VSAT Broadband network uses 32 kbps for the dedicated voice channel, which is much higher than typical satellite phones.

The mini-VSAT Broadband network provides broadband connectivity to commercial vessels and recreational yachts around the world and is the market share leader in maritime VSAT, according to a 2014 report by industry analyst Euroconsult. KVH also designs and manufactures the TracPhone® V-IP series of satellite communications antenna systems for use with the mini-VSAT Broadband network.

For more information, visit [www.kvh.com](http://www.kvh.com).

### MTN named communications provider for premier cruise brands

MTN Communications announces the expansion of its cruise client base with three additional operators leveraging enhanced services for passenger, crew and corporate communications. MTN provides products, solutions and content to address each line's unique passenger segment with Internet and calling communications, entertainment and content.

The following operators have contracted with MTN:

- Noble Caledonia specializes in "small ships delivering big experiences." With the goal of generating lasting memories for like-minded travelers, the operator revolves its itineraries around world events and focuses on reaching new and unusual destinations in the world's far-flung corners. With the goal of creating the ultimate onboard ambience, passenger camaraderie, and a warm and friendly atmosphere, Noble Caledonia strives for a personal and caring service touch. This UK-based operator offers itineraries to every continent around the world.

- Grand Circle Cruise Line, based in Boston, has been creating cultural connections for 50+ years, operating small ship and river cruising worldwide for American travelers. Immersing passengers into other cultures, Grand Circle's focus is making customers feel comfortable and well cared for every step of the way. Grand Circle itineraries cover every continent in the world.

- Celestyal Cruises, a new brand of Louis Cruises, renewed its contract with MTN, extending a relationship that has spanned more than 12 years. The cruise operator is part of a leading tourism organization hosting travelers from around the world who want to experience the Eastern Mediterranean. Based in Greece, it is the preeminent cruise line for the Greek Isles and Turkey, and operates six ships.

"One size does not fit all in cruising, and each brand needs to deliver a customized and unique communications experience for passengers, as well as reliability and affordability for crew," said Brent Horwitz, senior vice president and general manager, cruise and ferry services, MTN. "No matter where they sail and no matter what they offer onboard, we concentrate on providing each the most robust and specialized communications solution. These operators are addressing the explosion of Bring Your Own Device (BYOD) passengers and crew onboard vessels. Our approach enables them to deliver impressive Internet speeds; the ability to download and upload bandwidth-intensive images, videos and files; access live global TV; and stay in touch with family and friends. These are initiatives to exceed the high expectations of quality service at sea as we welcome these organizations to the MTN family."

MTN has been enhancing its network to further transform the customer experience, offering passengers and crew more options on how to pay for and consume data. The company evolved its infrastructure into a robust hybrid network, combining satellite and terrestrial broadband connectivity. MTN also supports the industry's latest modem technology for improved efficiencies and throughput available on vessels. Its regular roll-out of new communications solutions for customers supports Internet, TV, voice services and mobile apps for the maritime industry's most demanding customers.

MTN, the pioneer in delivering the first broadband VSAT (very small aperture terminal) satellite communications to a U.S. Navy vessel at sea, brings more than 30 years' of experience in innovating remote communications solutions. The MTN team brings a history of employees previously employed, or currently working, on vessels at sea. With 24x7x365 proactive network operations center (NOC) support and technicians

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## Harris CapRock® launches industry's most advanced managed communications solution

Harris CapRock Communications has launched the industry's first unified, fully managed satellite, wireless and terrestrial connectivity service designed to reduce customers' voice, data and equipment management costs.

Harris CapRock One is an intelligent, highly-integrated, end-to-end service that transparently switches between the various transport mediums to optimize communications for customers around the globe.

Customers in the energy and cruise industry, for example, often struggle to obtain reliable, always-on communications when their vessels, drilling sites and ships change their global positions and communications needs. With Harris CapRock One, they can replace current single or dual-band communications support options with a multiple-medium solution that exceeds their needs by providing optimal connectivity at any given time.

“Harris CapRock is going to drastically change the way our clients experience managed communications services,” said Tracey Haslam, president, Harris CapRock. “Harris CapRock One is the first commercial service of its kind to unify satellite, wireless and terrestrial connectivity into one platform. Customers want a solution that is flexible and optimizes their operations no matter where they are located, or how mobile their assets are. Harris CapRock One delivers that and more.”

Harris CapRock's unique service offering combines a multi-band antenna with an Intelligent Communications Director (ICD). The multi-band antenna allows for C-, Ku- and Ka-band connectivity with no additional moving parts, meaning that any satellite orbiting the Earth can be accessed with no technician intervention required. The ICD is a geographically aware smartbox that recognizes where the multi-band antenna is around the world and carries a database of the network footprints available. The device is aware of the operator's traffic and can route traffic intelligently over the most appropriate network path based on speed, latency, location and

cost. By optimizing the network traffic, the ICD enhances the end-to-end experience, completing an intelligent routing solution with end-to-end application performance management.

Energy and cruise industry businesses can invest in fewer radomes that support any signal and will self-configure for the scenario depending on where the vessel or site is in the world. Ships and oil and gas sites now have multiple communications choices in one technology solution, achieving the highest uptime in the industry at 99.999%. Customers can receive this high availability solution for one simple price.

Other telecommunication services supported by Harris CapRock One include fiber, point-to-point and point-to-multi-point radio, WiMax, terrestrial Multi-Protocol Label Switching (MPLS), and private and carrier-based Long Term Evolution (LTE). Additionally, Harris CapRock can deploy hybrid networks that leverage multiple transport technologies, providing true “no touch roaming” services across an entire fleet.

For more information, visit [www.harriscaprock.com](http://www.harriscaprock.com).

## KVH ships 5,000th TracPhone System for mini-VSAT Broadband

KVH Industries, Inc. recently shipped its 5,000th TracPhone® satellite communications antenna system for the mini-VSAT Broadband(sm) network, adding more than 1,000 units in the past year and extending the company's market share lead in maritime VSAT service. Together, the advanced TracPhone antenna systems and global mini-VSAT Broadband network constitute an end-to-end solution for maritime satellite communications, providing essential connectivity to tankers, containerships, fishing fleets, offshore supply vessels, government patrol cutters, and luxury yachts around the world.

In 2012, just 5 years after being introduced, the mini-VSAT Broadband service became the maritime VSAT market share leader according to leading market research reports, a position that has been repeatedly re-confirmed in report updates.

KVH's advanced TracPhone antenna systems include the TracPhone V11-IP, a 1.1-m diameter, dual-mode C/Ku-band antenna for global VSAT connectivity; the TracPhone V7-IP, a 60-cm diameter enterprise-grade antenna for Ku-band service worldwide; and the TracPhone V3-IP, a 37-cm diameter

Ku-band antenna that is the world's most compact maritime VSAT antenna. All three TracPhone V-IP systems feature the Integrated CommBox™ Modem (ICM), a streamlined belowdecks unit that replaces the need for a rack full of components and integrates all antenna control, onboard network management, and modem functions in one small box. The compact antenna hardware makes installation faster and less expensive, and gives worldwide fleets the ability to efficiently install the KVH system with minimal idle time for their vessels.

Prior to launching the IP-MobileCast content delivery service last year, KVH developed not only the multicasting technology to make it feasible, but also acquired a company to produce, procure, and license content for the maritime market. KVH Media Group produces daily digital newspapers under the NEWSlink™ brand; licenses award-winning new-release Hollywood movies and TV programs under the MOVIElink™ and TVlink™ brands; provides sports highlights and video clips from around the world under the SPORTSlink™ brand; and develops digital music channels under the MUSIClink™ brand. This content is available via IP-MobileCast subscription packages.

For more information, visit [www.kvh.com](http://www.kvh.com).

## SES launches new investment program

SES S.A. is executing on its pronounced growth strategy with the procurement of three new satellites, SES-14, SES-15 and SES-16/GovSat, all to be launched in 2017. SES has ordered three next-generation satellites, SES-14, SES-15 and SES-16/GovSat, the latter together with the Luxembourg Government in a new joint venture, LuxGovSat.

The satellites are using the newest spacecraft technologies, leading to optimal performance and highest efficiency and allowing SES to address the accelerating needs of fast growing markets where SES is already well positioned. The satellites will be manufactured by Airbus Space and Defence, Boeing and Orbital ATK, respectively. The new orders bring the total number of SES satellites currently under procurement to seven, six of which are delivering incremental growth capacity.

SES-14 and SES-15 are both powerful hybrid satellites, using Ku-, Ka- and –in the case of SES-14–also C-band in

wide-beam and high-throughput (HTS) technology and a purely electric propulsion system that significantly enhances the satellites' economic efficiency thanks to the enhanced payload that can be carried as a result of the reduction in fuel mass.

SES-16/GovSat is a state-of-the-art multi-mission satellite with high-powered and fully steerable beams for government missions. It will be owned and operated by LuxGovSat, a new joint venture between SES and the Luxembourg government.

For more information, visit [www.ses.com](http://www.ses.com).

### **Lockheed Martin demonstrates maritime test bed**

Lockheed Martin recently demonstrated how its leading-edge maritime test bed can help the U.S. Navy accelerate the fielding of various sensor intelligence capabilities in the maritime and joint warfighting environments.

The goal of the demonstration was to show how the test bed can bring significant improvements in advanced sensing, data integration, decision support, elec-

tromagnetic support operations, enhanced targeting and fire control and non-kinetic fires. All of these gaps were defined as capability gaps in the Acquisition Gaps for Science & Technology memorandum, which was released by the Navy's Program Executive Office for Command, Control, Communications, Computers, and Intelligence (PEO C4I).

Using data fusion, workflow automation, and electromagnetic visualization tools, the test bed ingested various types of simulated radar, communications and signals intelligence, then depicted the emerging tactical situation. Mimicking sea and ashore naval environments, the test bed successfully expedited the entire intelligence cycle from the initial intercept of the signals through the sharing of a fused tactical picture across multiple naval platforms to combat identification which can be used directly by combat systems to determine an appropriate kinetic or non-kinetic response.

"The amount of sensor intelligence our customers have to analyze is continually escalating," said Dr. Rob Smith, vice president of C4ISR for Lockheed

Martin's information systems and global solutions business. "Using our test bed, we showed how quickly a variety of intelligence, surveillance and reconnaissance capabilities can be validated to expedite the Navy's ability to process and control that intelligence."

Developed with internal research and development funding, the test bed leverages Lockheed Martin's intelligence, command and control, and cybersecurity expertise to provide an empowering capability to share and exploit sensitive information. In the future, the team will refine additional capabilities into the test bed to match the maritime environment and integrate relevant competencies into Navy programs of record. The test bed will also allow classified information to be securely integrated and shared at the highest classification levels, then stripped of sensitive source data and shared with unclassified handlers using a Lockheed Martin cross-domain solution already deployed across the Department of Defense.

For more information, visit [www.lockheedmartin.com](http://www.lockheedmartin.com).



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## Balfour Beatty sells 80% interest in Thanet OFTO

Balfour Beatty announced the disposal of an 80% interest in the Thanet offshore transmission project (Thanet OFTO) for £40 million. Thanet OFTO is the high-voltage electricity transmission system connecting the 300-MW Thanet Wind Farm, off the coast of Kent, to the onshore transmission grid. Assets include one offshore and one onshore substation and over 50 km of subsea cables that are operated and maintained by Balfour Beatty's Services division under a 20 year license granted by the energy regulator Ofgem. The wind farm generates enough electricity for approximately 200,000 homes each year. The 80% interest in Thanet OFTO is being acquired by funds managed by Equitix, a market leading investor and fund manager of core infrastructure assets. Balfour Beatty has co-invested with Equitix on a number of infrastructure projects, including the Greater Gabbard OFTO project, which achieved financial close in November 2013 and the Gwynt y Môr OFTO project, which is expected to achieve financial close in February 2015. Leo Quinn, Balfour Beatty Group chief executive, said, "This disposal validates the Directors' Valuation of the Investments Portfolio, which was updated last month, and clearly demonstrates the investment business's ongoing ability to deliver significant value for the Group. The OFTO sector remains a key market, which is why we have retained 20% ownership in Thanet, and we look forward to working with our partner, Equitix, to ensure the long term success of this project."

## MMT completes cable crossings survey

As part of the preparations for the cable laying campaign, MMT has completed a cable crossings survey for Kraftnät Åland. The planned submarine cable is 152 km long and will be laid from Naantali, Finland to Juvik, Åland. The survey was planned based on a desktop survey done by MMT during the summer and autumn of 2014. All available information for the area was combined in a database and compared with information from Kraftnät Åland. A selection of priority blocks was made based on that information and served as the basis for the survey campaign. The aim for the survey campaign was to gather detailed information on where the existing cables crosses the planned cable route. The cable crossings survey was recently performed and included the use of MMT's surface-towed Geometrics G-882 TVG, ROV-mounted Innovatum gradiometers and ROV video. For the assignment MMT used the chartered vessel Geomari owned by GTK, Finland and the MMT survey & ROV vessel Icebeam. Icebeam was well suited in the challenging Åland archipelago, and the ability to quickly adapt survey performance according to local conditions proved crucial for the project to execute it in a timely and safe manner.

## Huawei Marine wins contract to build Ceiba-2

Huawei Marine Networks Co. Ltd. has been awarded a contract by the government of the Republic of Equatorial Guinea to build the Ceiba-2 Submarine Cable System expected to be ready for service in the fourth quarter of 2015. Utilizing Huawei Marine's leading-edge Wavelength Division Multiplex (WDM) and Optical Transport Network (OTN) technologies, the 290-km system will feature a design capacity of 8 Tbps and link the capital of Malabo to Bata, the country's economic hub with a branching unit towards Kribi, Cameroon. Once completed, the system will enable Equatorial Guinea to connect to larger submarine cable systems including WACS, SAT-3, and Main One via Kribi, eventually providing access to a vast European network. It will also provide restoration or redundancy routes for existing traffic on Ceiba-1, the direct link between Malabo and Bata, and the Africa Coast to Europe (ACE) submarine cable branch to Bata. Mr. Olo Bahamonde, Minister of Equatorial Guinea's Ministry of Transport, Post and Telecommunications, said, "The development of a robust telecommunications infrastructure is vital to the future of Equatorial Guinea. We are pleased to work with Huawei Marine to implement the Ceiba-2 Submarine Cable System which will substantially boost the economic and commercial development of the country."

## Prysmian secures contract for German offshore wind farm



Prysmian Group has been awarded a contract by Iberdrola Renovables Offshore Deutschland GmbH worth a total of around Euro 60 million to supply and install wind turbine inter array cables for the Wikinger offshore wind farm, located within the West of Adlergrund cluster in the German Baltic Sea.

In May 2014 Prysmian Group already announced award of a contract with 50-Hz Offshore GmbH to design, produce and install multiple 220-kV HVAC 3-core extruded submarine cable systems between planned offshore wind parks within the West of Adlergrund cluster.

Under the Wikinger contract, Prysmian is responsible for the design, manufacture, installation, burial, termination and testing of total 81 km of 33-kV submarine cables in different cross-sections to connect the 70 wind turbines and an offshore substation that form the 350-MW wind farm. Cables will be produced in Prysmian's facility in Drammen, Norway, one of the Group's excellence centers for submarine cables. Installation works are scheduled to be complete by the end of 2016.

This new project is a full inter-array turnkey supply and installation contract, which re-affirms the Group's full expertise in offshore wind farm connections and an extended ability to execute complex installation solutions in this field in order to support the demands of this growing industry.

Over the years Prysmian has moved ahead with major investments in new and upgraded assets, broadening the range of offered products, services and capabilities in order to be fully equipped to face the many challenges coming from the offshore wind power market in a timely manner.

The Group's investment programs have been aimed at expanding production capabilities, multiplying the use of innovative technologies, and strengthening execution capabilities with conversion of a dumb barge to self-propelled DP2 vessel able to operate in very shallow waters.

Prysmian now can rely on three production facilities dedicated to submarine cables, situated in Arco Felice (near Naples, Italy), Pikkala (Finland) and Drammen (Oslo, Norway); two installation vessels, Giulio Verne and Cable Enterprise, as well as well-proven in-house cable protection equipment, and specialized operations teams.

For more information, visit [www.prysmian.com](http://www.prysmian.com).

## NordLink HVDC interconnector will use Nexans' subsea power cables

The Norwegian and German power grids will be able to share green energy directly for the first time thanks to Nexans submarine HVDC (high voltage direct current) cables to be installed as part of the NordLink project. Nexans will design,

manufacture and install two 525-kV cable subsystems, with a total length of more than 700 km, off the coast of Norway and Denmark. The project, Nexans' largest of this type to date, is due for completion in 2019. The contract value is approximately 0.5 billion Euros.

The 1,400-MW NordLink VSC (Voltage Source Converter) HVDC project, a collaboration between Statnett, TenneT and the German promotional bank KfW, will connect the Norwegian and German electricity markets to exchange green energy. Surplus wind and solar power produced in Germany can be exported to Norway. Conversely, hydroelectric power from Norway can be exported to Germany. This will be an important contribution to the future development of climate-friendly energy.

Nexans will design, manufacture and install mass impregnated non-draining (MIND) HVDC cables at depths down to 450 m off the coast of Norway and Denmark. The cables will be laid by Nexans' own cable-laying vessel, C/S Nexans Skagerrak, and protected on the seabed by trenching with Nexans' Capjet system.

The Nexans power cables will feature the same reliable and well proven design implemented for the successfully completed installations of the Skagerrak 1, 2, 3 projects and more recently the Skagerrak 4 project for the 140-km subsea HVDC interconnector between Denmark and Norway.

Dirk Steinbrink, Nexans senior executive vice president high voltage & underwater cables, said, "The NordLink project will be Nexans' largest subsea power cable contract to date in terms of length and value, and we look forward to continuing our close working relationship with TenneT, KfW and Statnett on this important project. The key to this success is our state-of-the-art subsea cable technology combined with the proven capability to handle complete turnkey projects from design through to installation. We are excited to be involved in the NordLink, which is a further step towards a complete integration of the European power grid."

For more information, visit [www.nexans.com](http://www.nexans.com).

#### **ABB wins order for Denmark's largest offshore wind farm**

ABB has won an order worth over \$100 million from Energinet.dk, the Danish transmission system operator, to build an alternating current (AC) cable system that will enable the integration and transmission of power from the

Kriegers Flak offshore wind farm to the mainland grid.

As Denmark's largest offshore wind farm, it will help to increase the country's wind power capacity to over 40%, capable of providing electricity to meet the demand of over 600,000 homes.

Wind energy is a cornerstone of Denmark's Green Energy plan to become fossil fuel free by 2050. The planned 600-MW wind farm will help

strengthen regional energy markets and increase the security of supply by boosting transmission capacity.

ABB's cable system will connect the offshore wind farm platforms Kriegers Flak A and B to Rødvig in Denmark. ABB will design, supply and install three high-voltage alternating current 220-kV three-core submarine cables with a total length of about 100 to 44 km from each of the platforms to shore

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and 11 km between the two platforms. The project is scheduled to be commissioned in 2018.

Cable systems are essential components of sustainable energy networks, transmitting vast amounts of electricity over long distances, often across or between countries. ABB is a global leader in high-voltage cable systems with a worldwide installed base across applications including city center infeeds, oil and gas platform power supplies, subsea interconnections and the integration of renewables. ABB has commissioned more than 25 high-voltage DC cable connections and numerous of high-voltage AC cable links around the world.

For more information, visit [www.abb.com](http://www.abb.com).

## OMM completes multi-tiered support package for Butendiek

Offshore Marine Management (OMM) has completed a comprehensive project support package for the Butendiek offshore wind farm.

The wind farm, situated 32 km west of the island of Sylt on the German/Danish border, comprises 80 wind turbines with a total capacity of 288 MW—enough to power 360,000 households.

The work involved connecting the Butendiek offshore wind farm to the Sylwin Alpha Convertor platform and saw OMM working for multiple key players within the industry to ensure separate phases of the project were completed efficiently.

The phases, which formed part of OMM's project support package, included multiple pre-lay grapple Runs and route clearances throughout 2014,

which were completed within the planned timescales.

Other phases saw comprehensive pull-in operations, crew transfers by CTV as well as accommodation provision for both OMM staff and client personnel. Five guard vessels were also supplied by OMM during cable installation work.

Paul Hampton, operations manager at OMM, said, "Our flexibility enables us to deliver multiple services to multiple clients simultaneously, while maintaining the highest standards of quality and health and safety. Our philosophy for the completion of the separate phases of the Butendiek project was the continuity of the experienced onshore and offshore personnel, as well as a commonality in the equipment provided and the utilization of project specific procedures and processes. This philosophy is built around a core methodology developed and proven over years of successful operation in this sector and has ensured a high quality and, most importantly, safe service is offered to all our offshore partners."

OMM played an integral part in ensuring that Sylwin Alpha was brought closer to capacity. The final Butendiek project was completed successfully on 30 January 2015.

For more information, visit [www.offshoreomm.com](http://www.offshoreomm.com).

## Angola Cables DGM attracts large audience, positive response

Angola Cables successfully completed its latest Data Gathering Meeting (DGM) at Pacific Telecommunications Council's signature annual event, PTC '15 on Tuesday, 20 January 2015.

Moderated by Eric Handa, founder and CEO of APTelecom, the official international sales manager and pre-sales agency of record for Angola Cables, the DGM focused on updating and educating the audience on Angola Cables' South Atlantic Cable System (SACS) and Monet submarine cable networks. Guest presenters included Artur Mendes, CCO of Angola Cables, as well as Angola cables program directors Jol Paling and Dave Willoughby.

The event was highlighted by exclusive content and presentations, special breakout sessions, and a live Q&A from the audience.

A video archive of the event is available for viewing at [www.youtube.com/watch?v=0nnVJd7JLTM](http://www.youtube.com/watch?v=0nnVJd7JLTM).

The event was well attended by dozens of guests, many of whom were representing leading carrier and cable

operators, content providers, capacity buyers, and other submarine cable and telecom industry executives.

"We were pleased and encouraged by the turnout and response from the audience at our Data Gathering Meeting at PTC '15, as well as the feedback we've received for both our SACS and Monet networks," said Antonio Nunes, CEO of Angola Cables. "We encourage everyone who wasn't able to attend in person to view the video of the event and download the presentation so they can get an inside look at the latest market trends, pricing insights, and demand analysis surrounding the SACS and Monet networks."

For more information, visit [www.angolacables.co.ao](http://www.angolacables.co.ao).

## Telecom Namibia hosts first WACS upgrade meeting

The West Africa Cable System (WACS) Consortium is meeting in Windhoek, Namibia to discuss the upgrade of the system's capacity in view of the enormous bandwidth demand witnessed since its commissioning in May 2013.

The system upgrade process will be undertaken in two phases, with phase 1 expected to be completed by end of June 2015 while phase 2 will be ready by end of October 2015.

The current upgrade will increase the capacity of the upgrading parties from 11% to 45% of their total capacity entitlement of the WACS system design capacity. Subsequent upgrade phases will be implemented in the future depending on the future bandwidth demand until parties reach their 100% WACS design capacity entitlement.

WACS is a submarine fiber optic cable that links countries in Southern Africa, Western Africa and Europe. WACS is based on a consortium model and is a joint effort of a number of African and global telecoms operators.

The system was officially commissioned in May 2012 and since then the bandwidth uptake has been quite enormous. This has forced the WACS consortium to go out on tender to upgrade the system.

The tendering process was finalized and the supplier appointed in December 2014 in the form of Huawei Marine Networks (HMN). Global telecoms operators from South Africa, Botswana, Angola, DRC, Congo Brazzaville, Cameroon, Togo, Nigeria, Ghana, Ivory Coast, Cape Verde Islands, Spain, Portugal, UK, India and Canada are represented at this meeting.

The Swakopmund Landing Station serves as a broadband gateway to the world for Namibia's ICT industry. The station is also currently transiting for land-locked countries like Botswana, Zambia, Zimbabwe and Malawi. This, therefore, reflects the importance of WACS as an asset not only to Namibia but to the SADC region, Africa and the world at large.

For more information, visit [www.telecom.na](http://www.telecom.na).

### Seaborn secures backhaul in Brazil

Seaborn Networks, Netell Telecom, and Citatel Dutos e Fibras Opticas announced that Seaborn has acquired backhaul and metro fiber network capacity in the State of Sao Paulo from Netell and Citatel for Seaborn's Brazil-U.S. subsea cable. This contracted capacity provides a diverse, dark fiber back-haul solution from Seaborn's cable landing station in Santos as well as a dark fiber, mesh network solution to Seaborn's points of presence in metro Sao Paulo.

Seaborn is the developer of Seabras-1, a new Brazil-U.S. submarine cable that will provide the first direct route between Sao Paulo and New York. The system is being constructed by Alcatel-Lucent Submarine Networks. Partners Group, the global private markets investment manager, is providing full project equity and is a co-sponsor of the project. Natixis, the corporate, investment, insurance and financial services arm of Groupe BCPE (second largest banking group in France) is providing full project debt with backing from COFACE, the French export credit agency.

The contracting party on behalf of Seaborn for the Netell and Citatel transactions is Seabras 1 Brasil Ltda., which is Seaborn's Brazilian operator of Seabras-1.

Netell has also purchased a substantial amount of capacity on Seabras-1, which it will use to serve its local, regional and international carrier and enterprise customer base. This follows other recent customer announcements, including that Microsoft is the foundational customer on Seabras-1 and that Tata Communications has also confirmed it is an anchor customer on the system.

Larry Schwartz, chief executive officer, Seaborn Networks, said, "With construction of Seabras-1 underway, we are extremely pleased to have contracted with Netell and Citatel. This important milestone is the culmination of the strong relationship among the three companies that has developed over the past few years. Equally as important, Netell's investment for significant capacity purchase on Seabras-1 validates the demand in Brazil for an independent, express submarine cable route between Sao Paulo and New York with seamless extensions to other geographies around the world."

Wagner Rapchan, chief executive officer, Netell said, "Brazil and the entire South American continent require increasingly more capacity and diversity in international connectivity. This is why we are proud to be supporting Seaborn with metro fiber networks in Sao Paulo and in turn purchasing capacity on the Seabras-1 cable system. When there is greater choice for connecting Brazil to the rest of world, there will be greater opportunity for local innovation in IT and communications services. This is a great step forward for the market."

Irineu Berardi, a shareholder of Citatel Dutos e Fibras Opticas, said, "With our extensive network of fiber cables in both Sao Paulo and Santos, we are delighted that Seaborn has purchased long-term and high quality, diverse fiber paths between Santos and Sao Paulo from Citatel."

Seabras-1 is scheduled to be ready for service at the end of 2016.

For more information, visit [www.seabornnetworks.com](http://www.seabornnetworks.com).

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## Malaysian carriers sign MoU for domestic cable system

Telekom Malaysia (TM) has signed a Memorandum of Understanding (MoU) with TT dotCom Sdn Bhd (TTdC), a wholly owned subsidiary of Time dotCom Berhad, for the development and construction of a new submarine fiber optic cable system called the Sistem Kabel Rakyat 1 Malaysia (SKR1M).

On 30 December 2014, TM announced that it was awarded by the Malaysian Communications and Multimedia Commission (MCMC) a contract via an open tender process to develop and construct SKR1M cable system. The project will be established through a Public-Private Partnership (PPP) arrangement between MCMC and TM.

In the spirit of supporting the Government's aspiration in fostering partnerships among industry players, TM is partnering up with TIME to jointly deploy the SKR1M cable system with the establishment of the SKR1M Consortium.

Upon the signing of the MOU and the formation of the SKR1M

Consortium, the Parties shall proceed with the tender exercise to determine the preferred technology partner to supply and deliver and implement the SKR1M network.

During the MOU period, the Parties will also develop the principles for the Construction and Maintenance Agreement (C&MA). This C&MA is to establish the rules that shall govern the implementation and management of SKR1M.

The term of duration of the MOU is 3 months or it will expire upon execution of the C&MA, whichever is earlier. Further details and relevant information would be disclosed upon the execution of the C&MA between TM and TTdC.

For more information, visit [www.tm.com.my](http://www.tm.com.my).

## Vocus buys additional capacity on Southern Cross

Vocus Communications Limited has entered into a purchase program for additional capacity on the Southern Cross Cable, which connects Australia and New Zealand to the United States.

The program will increase existing capacity by close to 10 times (when

fully allocated), ensuring Vocus will continue to meet the rapid growth in Internet data demand.

Notably, in contrast to previous upfront capacity purchases, capacity will be allocated and paid in annual installments over a 6-year period commencing December 2015. As a result, the asset and liability relating to these purchases will be recognized incrementally as capacity is allocated instead of upfront.

The total cost of the purchase program is US\$58.5 million. In line with previous purchases, the capacity is for the life of the cable, currently to November 2030.

Vocus CEO, James Spenceley, said, "The favorable structure of the new agreement aligns the asset, liability and amortization to expected use. This significant increase in capacity enables Vocus to continue to leverage the high growth in data demand from the wholesale and enterprise sectors. Given its redundant and protected nature, Southern Cross capacity is a valuable asset and a key differentiator for Vocus."

For more information, visit [www.vocus.com.au](http://www.vocus.com.au).

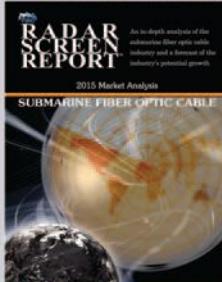
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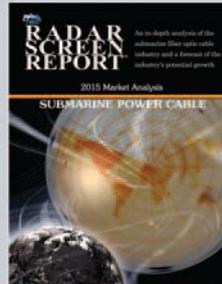
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## SUBSEA CABLES

### Tenerife deploys high-capacity network to cable station

Transmode announced that Tenerife Island Council (Cabildo Insular de Tenerife) in the Canary Islands (Spain) has built a high-capacity network based on Transmode's TM-Series and TG-Series platforms. The Council has built the new optical metro network to connect all its facilities and decentralized offices and to provide high-capacity access to the datacenter and international submarine cable landing station, D-Alix.

The new packet-optical network is the first of three phases to be deployed in the island and it connects Tenerife Island Council 38 sites in a metro network covering the island of Tenerife over multiple rings. The network allows each of the council departments to connect to a high-speed LAN and run managed, differentiated services over a 40-wavelength flexible optical network controlled by Transmode's Enlighten™ multi-layer management suite. Importantly, the network interconnects with the D-Alix strategic hub in the south of the island, which provides international connectivity via submarine cables to Africa and the rest of the world.

Transmode joined forces in the project with Enlighten™ eco-system partner and Transmode sales partner APFUTURA, based in Barcelona, Spain. APFUTURA provided local sales support and the company's APEX outside plant management tool that together with Enlighten™ has helped to map and reference the network, both the fiber layout and the location of all network elements including remote passive WDM filters and splice chambers. APEX is integrated into Transmode's Enlighten Ecosystem.

At the heart of the network deployed by Tenerife Island Council is Transmode's family of EMXP packet optical transport switches, which provide Carrier Ethernet 2.0 (CE2.0) services over a robust Ethernet layer with carrier-class resilience and performance. The optical layer of the network is also significant as the unusual band-pass architecture allows the network to be deployed without remote amplification outside the central offices. This greatly simplifies the network operation and reduces cost through the use of simple common configurations in all remote customer premises nodes that don't require complex installation procedures.

For more information, visit [www.transmode.com](http://www.transmode.com).

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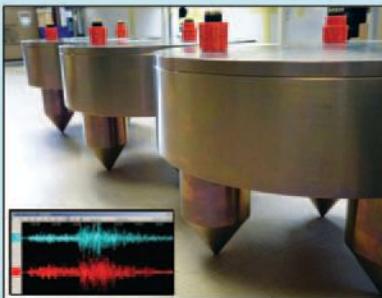
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# Seafloor Communications Specialists



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[info@csnetinternational.com](mailto:info@csnetinternational.com)  
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## Experts in Seafloor Communications Network

CSnet offers end-to-end solutions providing global users a pre-engineered, expandable, portable system that can be deployed and redeployed anywhere – in water depths up to 3,000 meters. Meeting the needs for a wide range of spatial, power or bandwidth requirements, the Offshore Communications Backbone (OCB) serves research, industrial and government applications, providing the infrastructure needed to deliver power in support of continuous 24/7 monitoring; delivering data and providing command and control on-shore via satellite or shore-ended cable.

## Offshore Communications Backbone

The OCB is a modular seafloor communications network that is directly connected to the Internet. Clients can provide and control their own sensors and data outputs, or CSnet can provide a suite of sensors from the surface to the seafloor with data directly forwarded to the client's onshore facilities. CSnet's OCB allows for individual component and end to end networked testing of power and communications functionality during the buildup and pre-deployment phases, ensuring a cost effective and successful installation. The OCB represents a proven network module that has been designed, constructed and tested, eliminating upstart time and cost. Each OCB module is expandable and so can be configured to accommodate large or small applications at a predictable cost.

# OFFSHORE STATS & DATA


**TELEDYNE  
OIL & GAS**

CORMON
DGO
IMPULSE
ODI
STORM CABLE
VARISYSTEMS

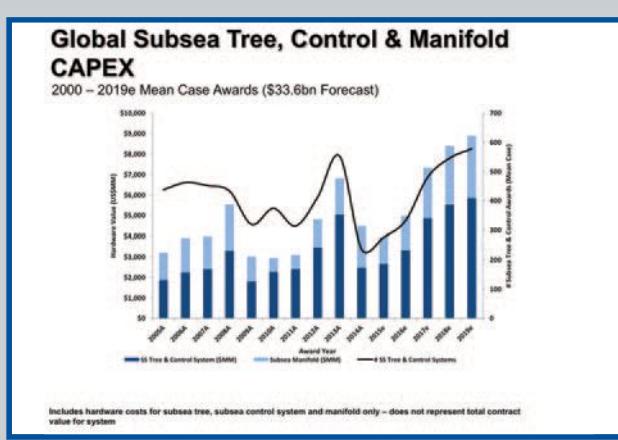
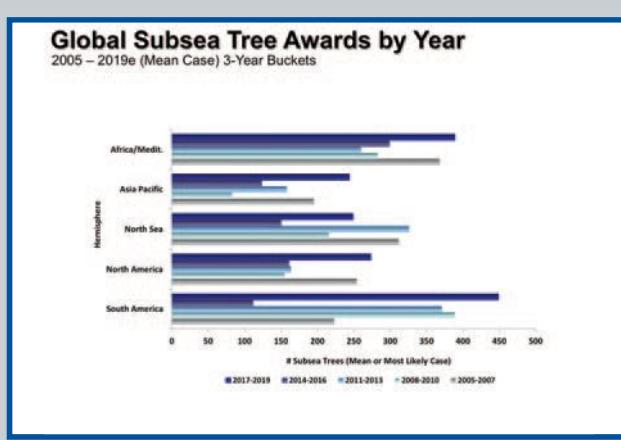
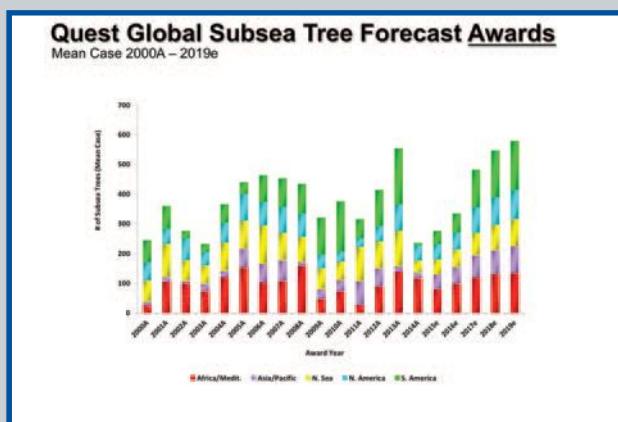
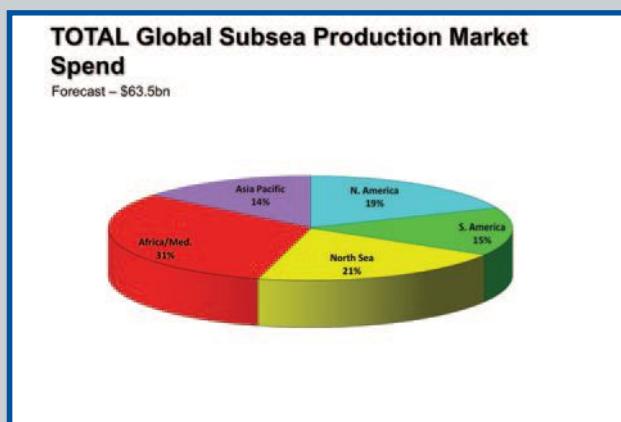
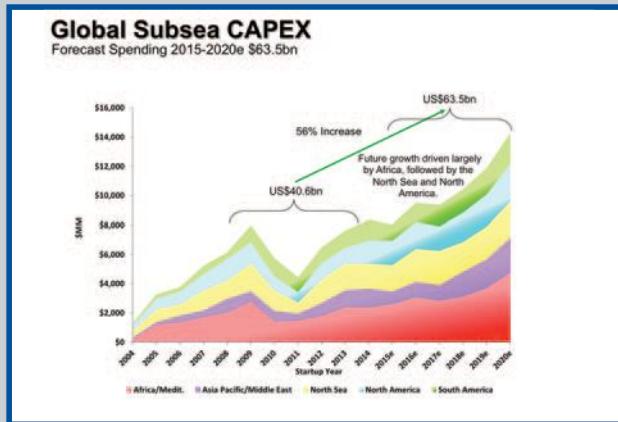
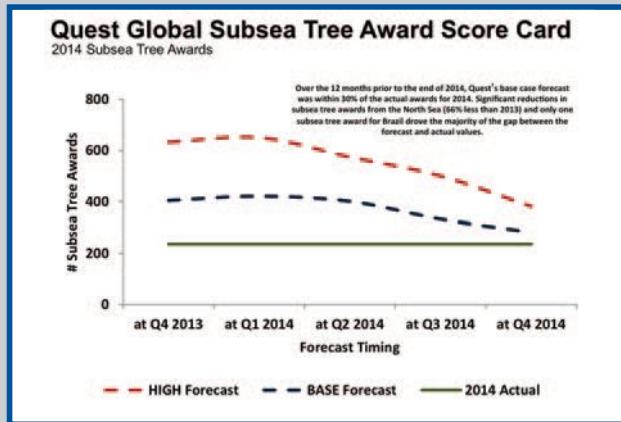







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## Quest Offshore Activity Report



April 2015

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Ocean News & Technology

# Monthly Stock Figures & Composite Index

| Industry<br>Company Name   | Symbol        | Close(Mid)<br>March | Close(Mid)<br>February | Change        | Change<br>%   | High<br>52 week | Low   |
|--|---------------|---------------------|------------------------|---------------|---------------|-----------------|-------|
| <b>Diversified, Production Support and Equipment Companies</b>       |               |                     |                        |               |               |                 |       |
| Baker Hughes, Inc.   | BHI           | 59.17               | 64.59                  | -5.42         | -8.4%         | 75.64           | 47.51 |
| Cameron Intl. Corp.  | CAM           | 43.38               | 47.59                  | -4.21         | -8.8%         | 74.89           | 39.52 |
| Drill-Quip, Inc.   | DRQ           | 66.38               | 73.02                  | -6.64         | -9.1%         | 116.53          | 65.28 |
| Halliburton Company  | HAL           | 40.04               | 44.42                  | -4.38         | -9.9%         | 74.33           | 37.21 |
| Tenaris SA   | TS            | 26.68               | 30.23                  | -3.55         | -11.7%        | 48.45           | 26.28 |
| Newpark Resources, Inc.  | NR            | 9.08                | 9.58                   | -0.50         | -5.2%         | 13.60           | 8.07  |
| Schlumberger Ltd.  | SLB           | 80.60               | 88.10                  | -7.50         | -8.5%         | 118.76          | 75.60 |
| Superior Energy Services, Inc.                                       | SPN           | 20.11               | 21.77                  | -1.66         | -7.6%         | 37.05           | 16.70 |
| Weatherford International, Inc.                                      | WFT           | 11.56               | 12.38                  | -0.82         | -6.6%         | 24.88           | 9.40  |
| Deep Down, Inc.  | DPDW          | 0.85                | 0.88                   | -0.03         | -3.4%         | 2.10            | 0.61  |
| FMC Technologies   | FTI           | 36.53               | 42.03                  | -5.50         | -13.1%        | 63.92           | 34.85 |
| <b>Total Diversified, Production,<br/>Support and Equipment.....</b> | <b>394.38</b> | <b>434.59</b>       | <b>-40.21</b>          | <b>-9.3%</b>  | <b>650.15</b> | <b>361.03</b>   |       |
| <b>Geophysical / Reservoir Management</b>                            |               |                     |                        |               |               |                 |       |
| Dawson Geophysical Company   | DWSN          | 4.65                | 6.41                   | -1.76         | -27.5%        | 22.14           | 4.57  |
| Mitcham Industries, Inc.   | MIND          | 5.35                | 6.89                   | -1.54         | -22.4%        | 15.80           | 5.14  |
| Compagnie Gnrale de Gophysique-Veritas                               | CGV           | 5.81                | 7.14                   | -1.33         | 4.50%         | 17.55           | 5.31  |
| <b>Total Geophysical /<br/>Reservoir Management.....</b>             | <b>15.81</b>  | <b>20.44</b>        | <b>-4.63</b>           | <b>-22.7%</b> | <b>55.49</b>  | <b>15.02</b>    |       |
| <b>Offshore Drilling Companies</b>                                   |               |                     |                        |               |               |                 |       |
| Atwood Oceanics, Inc.  | ATW           | 27.49               | 34.15                  | -6.66         | -19.5%        | 53.90           | 26.12 |
| Diamond Offshore Drilling, Inc.                                      | DO            | 26.62               | 35.86                  | -9.24         | -25.8%        | 55.37           | 26.02 |
| ENSCO International, Inc.  | ESV           | 20.36               | 30.55                  | -10.19        | -33.4%        | 55.89           | 19.78 |
| Nabors Industries, Inc.  | NBR           | 11.60               | 13.10                  | -1.50         | -11.5%        | 30.24           | 9.91  |
| Noble Drilling Corp.   | NE            | 13.63               | 19.18                  | -5.55         | -28.9%        | 30.29           | 13.15 |
| Parker Drilling Company  | PKD           | 2.88                | 3.53                   | -0.65         | -18.4%        | 7.39            | 2.51  |
| Rowan Companies, Inc.  | RDC           | 17.89               | 24.22                  | -6.33         | -26.1%        | 33.78           | 17.48 |
| Transocean Offshore, Inc.  | RIG           | 13.66               | 18.93                  | -5.27         | -27.8%        | 46.12           | 13.28 |
| <b>Total Offshore Drilling.....</b>                                  | <b>134.13</b> | <b>179.52</b>       | <b>-45.39</b>          | <b>-25.3%</b> | <b>312.98</b> | <b>128.25</b>   |       |
| <b>Offshore Contractors, Services, and Support Companies</b>         |               |                     |                        |               |               |                 |       |
| Helix Energy Solutions Group, Inc.                                   | HLX           | 13.65               | 16.13                  | -2.48         | -15.4%        | 28.00           | 13.06 |
| Gulf Island Fabrication  | GIFI          | 13.65               | 17.11                  | -3.46         | -20.2%        | 24.01           | 12.32 |
| McDermott International, Inc.  | MDR           | 3.26                | 2.73                   | 0.53          | 19.4%         | 8.45            | 2.10  |
| Oceaneering International  | OII           | 48.88               | 51.26                  | -2.38         | -4.6%         | 79.05           | 48.45 |
| Subsea 7 SA  | SUBCY.PK      | 8.25                | 10.21                  | -1.96         | -19.2%        | 21.10           | 8.17  |
| Technip ADS  | TKPPY.PK      | 15.18               | 16.6                   | -1.42         | -8.6%         | 28.75           | 13.39 |
| Tetra Technologies, Inc.   | TTI           | 5.25                | 5.01                   | 0.24          | 4.8%          | 13.43           | 4.72  |
| <b>Total Offshore Contractors,<br/>Service, and Support.....</b>     | <b>108.12</b> | <b>119.05</b>       | <b>-10.93</b>          | <b>-9.2%</b>  | <b>202.79</b> | <b>102.21</b>   |       |
| <b>Offshore Transportation and Boat Companies</b>                    |               |                     |                        |               |               |                 |       |
| Seacor Holdings, Inc.  | CKH           | 69.15               | 73.40                  | -4.25         | -5.8%         | 88.29           | 67.50 |
| Gulfmark Offshore, Inc.  | GLF           | 13.98               | 17.23                  | -3.25         | -18.9%        | 46.82           | 13.67 |
| Bristow Group  | BRS           | 58.92               | 61.02                  | -2.10         | -3.4%         | 81.60           | 54.72 |
| PHI, Inc.  | PHII          | 31.00               | 36.20                  | -5.20         | -14.4%        | 52.98           | 29.35 |
| Tidewater, Inc.  | TDW           | 22.70               | 29.19                  | -6.49         | -22.2%        | 56.98           | 22.31 |
| Trico Marine Services, Inc.  | TRMAQ.PK      | 13.22               | 13.61                  | -0.39         | -2.9%         | 11.01           | 13.68 |
| Hornbeck Offshore  | HOS           | 19.06               | 20.43                  | -1.37         | -6.7%         | 47.45           | 18.32 |
| <b>Total Offshore Transportation<br/>and Boat .....</b>              | <b>228.03</b> | <b>251.08</b>       | <b>-23.05</b>          | <b>-9.2%</b>  | <b>385.13</b> | <b>219.55</b>   |       |

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Ocean News &amp; Technology

# Monthly Stock Figures & Composite Index

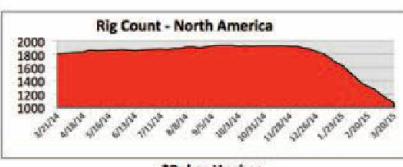
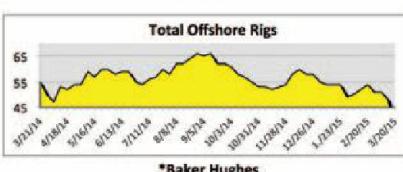
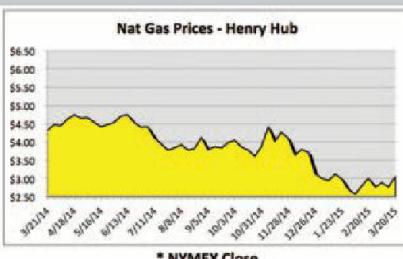
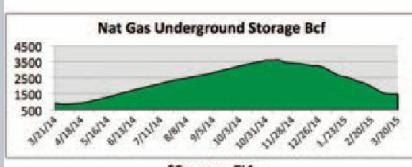
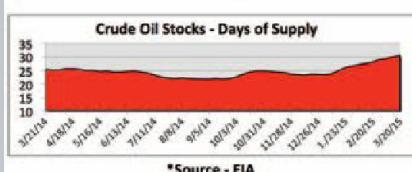
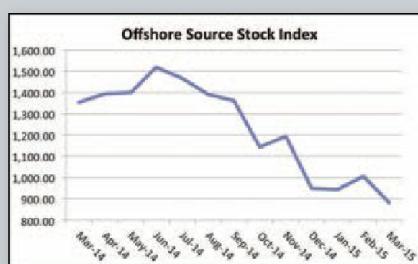
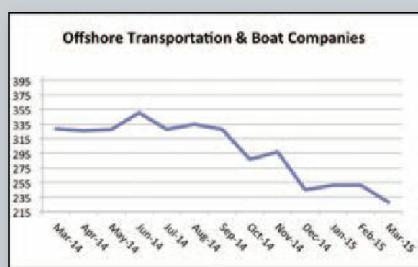
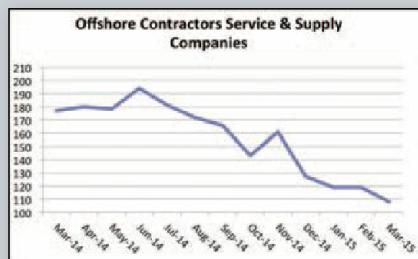
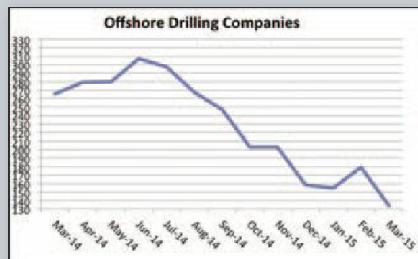
| Industry  | Close(Mid)<br>March | Close(Mid)<br>February | Change<br>March | Change<br>%<br>February | High<br>52 week | Low<br>52 week |
|---|---------------------|------------------------|-----------------|-------------------------|-----------------|----------------|
| Diversified, Production Support & Equipment Companies |                     |                        |                 |                         |                 |                |
| Total Diversified, Production, Support and Equipment  | 394.38              | 434.59                 | -40.21          | -9.3%                   | 650.15          | 361.03         |
| Total Geophysical / Reservoir Management              | 15.81               | 20.44                  | -4.63           | -22.7%                  | 55.49           | 15.02          |
| Total Offshore Drilling                               | 134.13              | 179.52                 | -45.39          | -25.3%                  | 312.98          | 128.25         |
| Total Offshore Contractors, Service and Support       | 108.12              | 119.05                 | -10.93          | -9.2%                   | 202.79          | 102.21         |
| Total Offshore Transportation and Boat                | 228.03              | 251.08                 | -23.05          | -9.2%                   | 385.13          | 219.55         |
| Total Offshore Source Index                           | 880.47              | 1,004.68               | -124.21         | -12.4%                  | 1,606.54        | 826.06         |

## 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

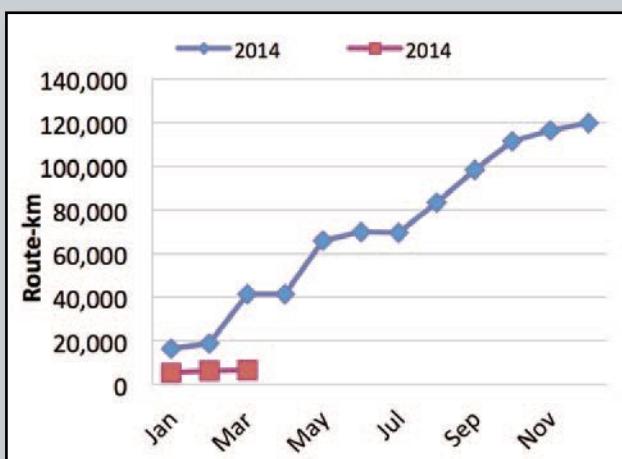
Monitoring the Pulse of the U.S. Offshore Oil & Gas Industry



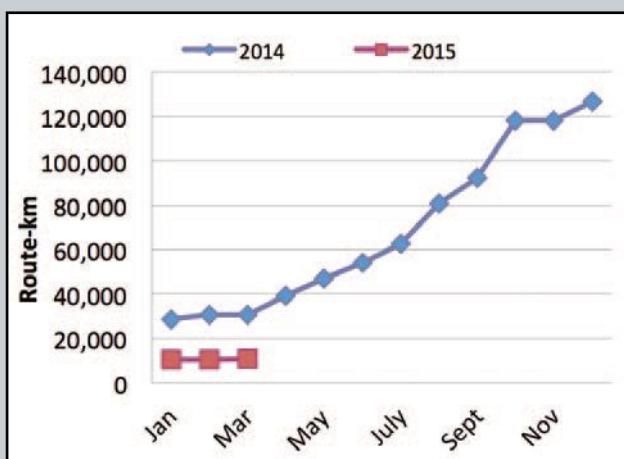
Positive trend, at least 3 weeks  
Changing trend, less than 3 weeks  
Negative trend, at least 3 weeks

# Subsea Telecom & Power Cable Data

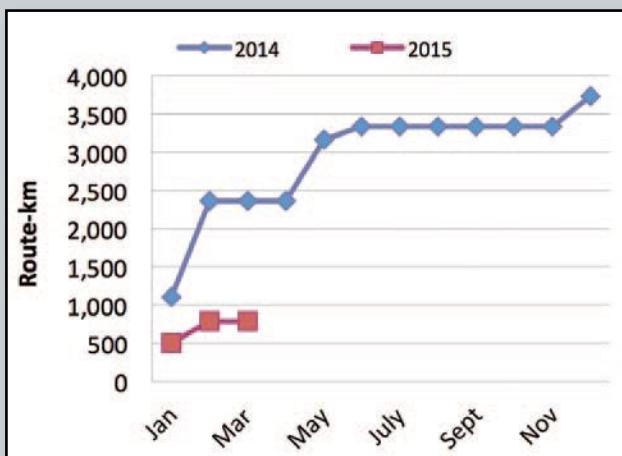
## FO Cable Awards by Month



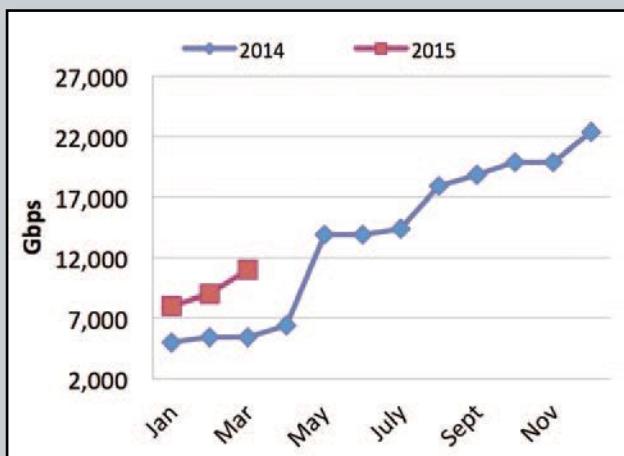
## FO Cable Announcements



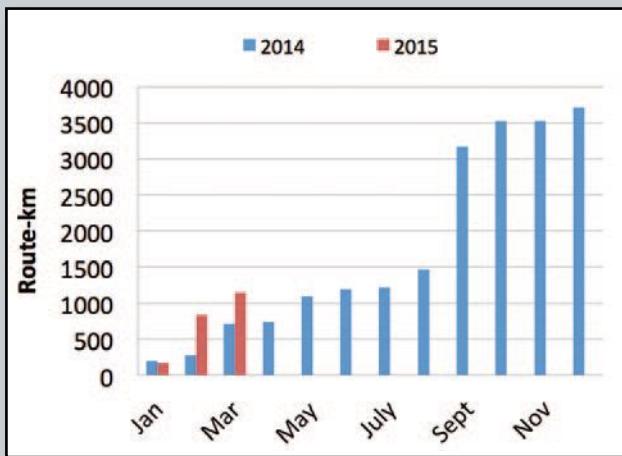
## Submarine FO Cables Entering Service in Route-km



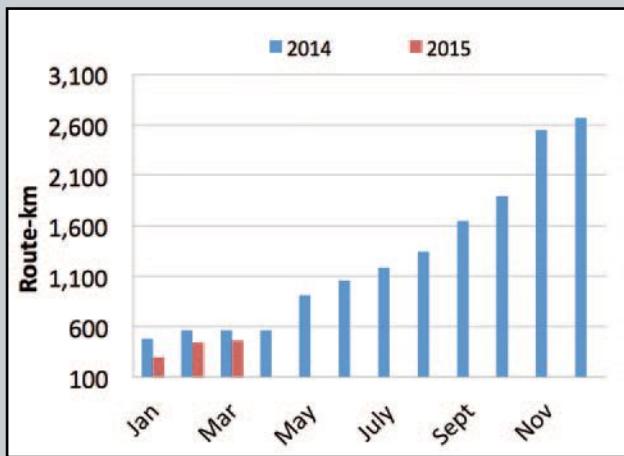
## Upgrades of Existing Cable Systems in Gbps



## 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    | NOBLE JIM DAY                | Stones               | 9,560            |
| Petrobras America Inc.              | WR   | 469   | G16997    | VANTAGE TITANIUM EXPLORER    | Chinook              | 8,835            |
| Murphy Exploration & Production Co. | MC   | 697   | G34019    | ENSCO DS-5                   | Blind Faith          | 7,164            |
| ExxonMobil Corp.                    | WR   | 584   | G20351    | MAERSK VIKING                | Julia                | 7,120            |
| Chevron USA Inc.                    | WR   | 758   | G17015    | T.O. DISCOVERER CLEAR LEADER | Jack                 | 6,965            |
| Anadarko Petroleum Corp.            | KC   | 919   | G21447    | WIRELINE UNIT (LAF #5)       | Lucius               | 6,941            |
| Anadarko Petroleum Corp.            | KC   | 919   | G21447    | ENSCO 8500                   | Lucius               | 6,941            |
| BP Exploration & Production, Inc.   | MC   | 522   | G08823    | ENSCO DS-3                   | Fourier              | 6,932            |
| BP Exploration & Production, Inc.   | GC   | 743   | G15607    | SEADRILL WEST AURIGA         | Atlantis             | 6,816            |
| Union Oil Co. of California         | WR   | 634   | G18745    | PACIFIC SHARAV               | Saint Malo           | 6,803            |
| Union Oil Co. of California         | KC   | 814   | G25810    | PACIFIC SANTA ANA            |                      | 6,758            |
| LLOG Exploration Offshore, LLC      | MC   | 300   | G22868    | SEADRILL SEVEN LOUISIANA     | Delta House          | 6,131            |
| Deep Gulf Energy II                 | MC   | 215   | G24060    | ENSCO 8505                   | Odd Job              | 5,996            |
| Statoil Gulf of Mexico              | WR   | 160   | G34634    | MAERSK DEVELOPER             |                      | 5,895            |
| LLOG Exploration & Production Co.   | MC   | 300   | G24064    | SEADRILL WEST NEPTUNE        | Delta House          | 5,746            |
| Eni U.S. Operating Co. Inc.         | MC   | 773   | G19996    | NABORS POOL 140              | Devil's Tower        | 5,610            |
| Chevron USA Inc.                    | KC   | 414   | G26748    | T.O. DISCOVERER INDIA        |                      | 5,515            |
| BP Exploration & Production Inc.    | GC   | 743   | G15607    | T.O. DEVELOPMENT DRILLER III | Atlantis             | 5,413            |
| Anadarko Petroleum Corp.            | GC   | 859   | G24194    | ROWAN RESOLUTE               | Heidelberg           | 5,346            |
| Shell Offshore, Inc.                | MC   | 687   | G05862    | ATWOOD CONDOR                | Mensa                | 5,292            |
| Anadarko Petroleum Corp.            | GC   | 903   | G24197    | ENSCO 8506                   | Heidelberg           | 5,274            |
| Anadarko Petroleum Corp.            | GC   | 903   | G24194    | WIRELINE UNIT (HOUAMA #5)    | Heidelberg           | 5,254            |
| Freeport-McMoRan Oil & Gas LLC      | MC   | 85    | G08484    | NOBLE TOM MADDEN             | King                 | 5,190            |
| Anadarko Petroleum Corp.            | GC   | 680   | G22987    | BLAKE 1007                   | Constitution         | 4,972            |
| LLOG Exploration Offshore, LLC      | MC   | 253   | G24062    | ENSCO 8503                   | Delta House          | 4,927            |
| BP Exploration & Production, Inc.   | KC   | 93    | G25780    | ENSCO DS-4                   | Gila                 | 4,860            |
| Cobalt International Energy, LP     | GB   | 958   | G30876    | ROWAN RELIANCE               |                      | 4,846            |
| Deep Gulf Energy II, LLC            | MC   | 727   | G24107    | NOBLE DANNY ADKINS           | Kodiak               | 4,829            |
| ExxonMobil Corp.                    | AC   | 25    | G10380    | WIRELINE UNIT (L.J. #3)      | Hoover               | 4,809            |
| Hess Corp.                          | MC   | 726   | G22898    | STENA FORTH                  | Tubular Bells        | 4,570            |
| Anadarko Petroleum Corp.            | GC   | 683   | G18421    | WIRELINE UNIT (N.O. #2)      | Caesar               | 4,487            |
| Shell Offshore, Inc.                | MC   | 812   | G34460    | NOBLE GLOBETROTTER           |                      | 4,475            |
| BP Exploration & Production Inc.    | GC   | 782   | G15610    | MAD DOG SPAR RIG             | Mad Dog Phase 2      | 4,428            |
| BP Exploration & Production Inc.    | GC   | 627   | G25174    | SEADRILL WEST SIRIUS         |                      | 4,416            |
| BHP Billiton Petroleum (GOM) Inc.   | GC   | 610   | G20084    | T.O. DISCOVERER INVICTUS     | Shenzi development   | 4,275            |
| BP Exploration & Production Inc.    | KC   | 147   | G30926    | SEADRILL WEST VELA           |                      | 4,248            |
| Shell Offshore, Inc.                | MC   | 943   | G34467    | STENA ICEMAX                 | Oasis                | 4,213            |
| Anadarko Petroleum Corp.            | GC   | 562   | G11075    | DIAMOND OCEAN BLACKHAWK      | K-2                  | 4,017            |
| Freeport-McMoRan Oil & Gas LLC      | GC   | 643   | G35001    | NOBLE SAM CROFT              |                      | 3,885            |
| Shell Offshore, Inc.                | GB   | 602   | G11553    | CAL-DIVE Q-4000              | Macaroni             | 3,708            |
| Anadarko Petroleum Corp.            | EB   | 602   | G14205    | NOBLE BOB DOUGLAS            | Nansen               | 3,645            |
| Shell Offshore, Inc.                | MC   | 809   | G12166    | NOBLE DON TAYLOR             | Princess             | 3,641            |
| Shell Offshore, Inc.                | GC   | 248   | G15565    | T.O. DEEPWATER NAUTILUS      | Glider               | 3,225            |
| Shell Offshore, Inc.                | VK   | 956   | G06896    | NABORS 202                   | Ram-Powell           | 3,214            |
| ConocoPhillips Co.                  | MC   | 118   | G27994    | MAERSK VALIANT               |                      | 3,091            |
| Shell Offshore, Inc.                | GC   | 158   | G07998    | WIRELINE UNIT (HOUAMA DIST)  | Brutus               | 2,985            |
| Shell Offshore, Inc.                | GC   | 158   | G07995    | H&P 202                      | Brutus               | 2,985            |
| Shell Offshore Inc.                 | MC   | 807   | G07963    | H&P 201                      | Mars (Ursa/Princess) | 2,945            |
| LLOG Exploration Offshore, LLC      | MC   | 546   | G25098    | NOBLE AMOS RUNNER            | Longhorn             | 2,570            |
| Murphy Exploration & Production Co. | MC   | 582   | G16623    | T.O. DISCOVERER DEEP SEAS    | Medusa               | 2,463            |
| Chevron USA Inc.                    | VK   | 786   | G12119    | NABORS 87                    | Petronius            | 1,751            |
| EnVen Energy Ventures, LLC          | EW   | 1003  | G13091    | NABORS S.D. XIV              | Prince               | 1,490            |
| Stone Energy Corp.                  | VK   | 989   | G06898    | NONE RIG PA OPERATION        | Pompano              | 1,293            |
| Stone Energy Corp.                  | MC   | 109   | G05825    | COIL TUBING UNIT (N.O. #2)   | Amberjack            | 1,030            |
| Fieldwood SD Offshore LLC           | EB   | 165   | G06280    | WIRELINE UNIT (L.J. DIST)    | East Breaks 164      | 863              |
| Marathon Oil Co.                    | EW   | 873   | G12139    | NABORS SUPER SUNDOWNER XXI   | Lobster              | 773              |
| Marathon Oil Co.                    | EW   | 873   | G12136    | WIRELINE UNIT (HOUAMA #2)    | Lobster              | 773              |
| Whistler Energy 11, LLC             | GC   | 18    | G04940    | NABORS MODS 201              | Boxer                | 750              |
| Ankor Energy LLC                    | MC   | 21    | G22850    | NABORS MODS 200              |                      | 668              |
| W&T Offshore, Inc.                  | EW   | 910   | G13079    | H&P 203                      |                      | 560              |

Deepwater prospects with drilling and workover activity: 60

Current Deepwater Activity as of Monday, 9 March 2015

### Activity by Water Depth

| Water Depth (m) | Active Leases | Approved Applications | Active |
|-----------------|---------------|-----------------------|--------|
| 0 to 200        | 1,414         | 36,021                | 2,337  |
| 201 to 400      | 98            | 1,125                 | 20     |
| 401 to 800      | 210           | 889                   | 10     |
| 801 to 1,000    | 348           | 585                   | 9      |
| 1,000 & above   | 3,207         | 2,008                 | 26     |

### Rig Activity Report 13 March 2015

| Location       | Week of 03/13 | +/- Ago | Week | +/- Ago |
|----------------|---------------|---------|------|---------|
| Land           | 1069          | -64     | 1133 | -668    |
| Inland Waters  | 8             | 0       | 8    | -10     |
| Offshore       | 48            | -3      | 51   | -6      |
| U.S. Total     | 1125          | -67     | 1192 | -684    |
| Gulf of Mexico | 46            | -3      | 49   | -6      |
| Canada         | 220           | -80     | 300  | -302    |
| N. America     | 1345          | -147    | 1492 | -986    |
|                |               |         |      | 2331    |

Activity by Water Depth Information current as of Monday, 9 March 2015

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

## New iDive housing for iPads

A new underwater housing called the iDive is available that allows iPads to be used at depths up to 100 m. The housing is easy to load and allows for full functionality underwater with the exception of Bluetooth (as of now anyway). A novel pressure management system (PMS) keeps a thin layer of air between the screen and a flexible, protective membrane. Air can be added from either a regulator's first stage supply or an attached CO<sub>2</sub> cartridge, allowing for both tethered or untethered use. Threaded accessory mounts around the housing perimeter allow for custom configurations with external lights, specialized camera lenses, sensors or other external devices.



The applications for the iDive in this new underwater environment are vast. The original need arose when inventor, marine biologist Dr. Michael Breumen decided a better method was needed to record fish and coral survey data while SCUBA diving. Prior to this, Dr. Breumen and his research team each carried a long checklist of items (in small print) on an underwater slate to manually tally the counts. Upon completion of the dives, typically sometime after they returned to the University, their counts would have to be transcribed and collated into a database. Equipped with the iDive, they can carry a survey form that contains not only the name of the item but also a photo for easy identification allowing them to simply tap on the screen to add to the count. They can also adjust the screen contrast and brightness and enlarge the text and photos for better visibility; take photos and notes of unusual sightings; record or playback sounds; and more importantly automatically upload their data to a database immediately upon return to the surface to share with other researchers anywhere in the world.

Other users might include commercial divers, scuba instructors, recreational divers, citizen scientists and even military forces (e.g., Navy seals). New tools and APPs will likely become available to provide more functionality as the need grows. At some point, it would be nice to have an APP that can track a diver in a map of the environment while monitoring depth, air consumption and other variables. Even better, if multiple divers can be tracked and their information shared wirelessly through optical, acoustic or RF links!

For more information, visit [www.idivehousing.com](http://www.idivehousing.com).

## EdgeTech to deliver over \$1M in acoustic releases for the Ocean Observatories Initiative

EdgeTech, the leader in high-resolution sonar imaging systems and underwater technology, recently received an order from the Woods Hole Oceanographic Institution (WHOI) for 50 additional 8242XS Deep Water Acoustic Transponding Releases. The follow-on order brings the total dollar value of the acoustic transponding releases ordered for OOI to over \$1M.

The EdgeTech 8242XS Acoustic Release Transponder is a field-proven, reliable, 6,000 m rated versatile mooring instrument. The release is made entirely of nickel aluminum bronze alloy with titanium closure hardware for very long deployments with no corrosion. Acoustic status reply includes tilt and release state and utilizes a command structure proven in the toughest acoustic environments anywhere.

The acoustic releases will be used to support the National Science Foundation-funded Ocean Observatories Initiative (OOI). As noted by WHOI, "The OOI will construct a networked infrastructure of

oceanic sensor systems to measure physical, chemical, geological, and biological variables in the ocean and seafloor. The acoustic releases are vital to our understanding of many of the crucial scientific questions to which the OOI can provide answers."

The latest batch of EdgeTech 8242XS acoustic transponding releases will ship from the West Wareham, MA manufacturing facility by May 2015.

For more information, visit [www.edgetech.com](http://www.edgetech.com).



## Seanic announces delivery of unique subsea chain tensioner

Seanic Ocean Systems Inc. is pleased to announce the successful testing and delivery of a custom-designed chain tensioner to a client that specializes in deep water well containment equipment and technology. The tool was custom-designed by Seanic's engineers over the course of the last year and recently completed a rigorous pre-delivery testing program intended to verify its dependability in an emergency situation.



When a marine riser is disconnected from a wellhead, offshore operators must take great care to prevent bending or damaging the wellhead. Seanic's chain tensioner is used in the situation where a wellhead has been knocked out of level. The tool is used to generate up to 400,000 lbs of pull to enable the well to be returned to its original position.

The chain tensioner is operated with a single directional control valve by a ROV and is the only one of its kind that is subsea deployable with a chain that is both removable and installable subsea.

For more information, visit [www.seanicusa.com](http://www.seanicusa.com).

## RTsys' new compact system for acoustic propagation measurements

RTsys offers a devices range composed of versatile underwater hydrophone recorders, real-time remote monitoring buoys and portable devices. These systems are adapted to several applications, such as offshore and environment noise control, mammal monitoring or scientific instrumentation.

RTsys' last innovative system for acoustic propagation measurements is the PR-SDA14. This device is an ultra-compact acoustic recorder, only 1.7 kg for 210 x 150 x 100 mm. These light weight and dimensions make the PR-SDA14 really easy to carry and to use.

The PR-SDA14 can be used from a vessel or from shore to realize three simultaneous actions: calibrated acoustic emissions sequences, conductivity measurement and continuous passive acoustic signals recording. Thus at any time, user can select in the pre-established acoustic library of the sys-

tem a noise emission short sequence to emit. Moreover, conductivity, temperature and GPS data are stored synchronously while operating.

The PR-SDA14 case is a user-friendly system, equipped with a headphone jack for live stream listening and a screen and push buttons for direct control. The battery life of the PR-SDA14 has 34-hr rechargeable autonomy.

For more information, visit [www.rtsys.eu](http://www.rtsys.eu).

## Teledyne BlueView releases QuickStitch-powered by EIVA

Teledyne BlueView is a leading provider of underwater 3D acoustic imaging equipment used to inspect, monitor, measure and quantify areas of interest below the surface. The 3D Scanning Sonars scan from a fixed location and produce a highly detailed point cloud centered on the scan location. To obtain data over larger areas, multiple, overlapping point clouds are collected from various scan locations. Editing and combining the various adjacent point clouds was time consuming and difficult to do using standard off-the-shelf 3D registration software.

QuickStitch was designed specifically for data collected with a Teledyne BlueView 3D Scanning Sonar to streamline the review, cleaning and alignment process. Developed by EIVA from the NaviModel solution, which is part of the NaviSuite software suite, QuickStitch is based on industry proven hydrographic software.

QuickStitch has a simple GUI with powerful features:

- point-to-point measurement;
- data editing;
- point cloud alignment (manual and automatic);
- enhanced visualization options; and
- data export.

The specially designed software provides current and future 3D Scanning Sonar customers with a fast and effective solution for reviewing, cleaning and aligning multiple point clouds.

For more information, visit [www.blueview.com](http://www.blueview.com).

## Perko commercial LED side lights are rugged and adaptable

Owners of medium to large commercial vessels need reliable equipment that requires little maintenance and is easily adaptable in mounting and replacing. Perko's Flex Mount LED navigation lights are ideal for boats 65.6 to 164 ft in length. They are available in either single or double stack combinations that include sidelights, masthead, stern, towing and all-round versions.



Proudly built in the USA of rugged black or white polymer with sealed LED housings, these lights adapt to wide range of installations, are easy to mount and have no user serviceable parts. They fit the same bolt pattern as the Perko Figs. 1364–1374 series. Operating on 12/24 VDC or 120/240 VAC systems, they come pre-wired with 3 ft of heavy-duty 16/3-SO cable. Offered with LED bulbs that provide a longer serviceable life, they draw less power and are more durable than traditional incandescent units. With a lens height of 3.5 in., they feature a color-specific translucent insert on the top to help identify the color of the lens. They are ABYC-certified and USCG-third party certified for 2 to 5 nm.

Perko's new Flex Mount Navigation Light System allows the same lamp to be used for both single and double mount applications. The 1077–1080 series uses a heavy-duty powder-coated aluminum support mounting bracket that allows individual fixtures that are damaged in service to be easily and quickly replaced. This interchangeability results in a significant cost savings in equipment and less installation and repair time.

The single light series retail starting around \$700. The double light unit series begin around \$1,600.

For more information, visit [www.perko.com](http://www.perko.com).

## Kongsberg Maritime delivers welding cameras for remote pipeline repair system

Kongsberg Maritime Camera Group has designed, manufactured and delivered a new underwater video camera for use on an advanced subsea Remote Pipeline Repair System (RPRS). The cameras are specifically designed to monitor the welding arc and welding pass in an unmanned hyperbaric welding habitat when operating to depths of 1,500 msw.

The camera has been extensively tested and qualified for use in an argon gas environment during welding operations. An extremely wide dynamic range (WDR) image sensor is used,



which provides the RPRS operating team real-time close-up viewing of the welding process while at the same time allowing detail of the adjacent welding pass to be seen with minimal image/visual degradation from the intensity of the welding arc.

The camera's pressure housing is constructed from titanium alloy, and a sapphire front port protects the lens from damage. As space is limited in the vicinity of the weld, the camera was designed to be as compact as possible, measuring just 105 mm in length and 56 mm in diameter.

Martin Tanner, systems & projects sales engineer, Kongsberg Maritime Camera Group comments: "We are very proud to work on this unique project and are satisfied that the final product we delivered is of the highest quality. This project was the perfect platform for our design team to showcase their capability and they did not disappoint."

For more information, visit [www.kongsberg.com](http://www.kongsberg.com).

## New winch/lift and throttle controls rated for heavy seas and high pressure wash-downs

In keeping with our 20+ year tradition of providing ultra survivable rugged controls to critical application, Bokam Engineering, Inc. is presenting a new line of snap action and place and hold single-axis winch and throttle controls. Based on Bokam's award winning, heritage proven, solid state, sensor technology, this new line of products provides lateral single-axis controls for a wide range of applications including top side winch, lift and throttle control functions in marine environment-exposed applications.

Bokam products have been counted on to provide reliability and survivability in a wide range of water-based and ground-based applications for a global array of customers. "Our customers have come to expect that our products are bullet-proof and environment-

proof," comments Michael Shvartsman, Bokam's product development manager.

The new product line combines the reliability and survivability of the solid state sensor products, have life cycle expectancy of 10 billion life cycles with Bokam's patented rotational motion mechanism, and have programmable modular microprocessor based electronics. With programmable sensitivity and output characteristics, the modular controls come in a wide range of outputs to meet the requirements of practically any control system. With various modular interface handles, the building block configuration can be constructed to meet the interface and mechanical needs of various installations and human factors requirements. Various mounting interface and enclosure packages are available with configurations ranging from IP56 to IP66 (survivability in heavy seas) and IP69K (survivability during/after high pressure, high temperature wash-down).

For more information, visit [www.bokam.com](http://www.bokam.com).

## AXYS deploys two dual-LiDAR WindSentinel buoys at ORE Catapult's offshore met mast

AXYS Technologies Inc. is pleased to announce the unprecedented deployment of two dual-LiDAR WindSentinel floating LiDAR systems, utilizing the Offshore Renewable Energy (ORE) Catapult's offshore anemometry mast. This will be the world's first deployment of a floating LiDAR system to feature two LiDARs, as each system has an additional Zephir 300, AXYS' first deployment of this sensor.

The WindSentinel systems will be deployed in the North Sea, 3 nmi off the coast of Blyth, Northumberland for a 1 month validation and research study at the ORE Catapult's National Renewable Energy Centre. They will then be moved to France for a 12-month campaign as part of a bankable energy assessment for two commercial wind farms.



"AXYS is very pleased with the world's first deployment of two WindSentinel systems, each equipped with two LiDARs, for validation against the mast at Blyth," says Graham Howe, director of sales at AXYS Technologies. "We look forward to working more with ORE Catapult on innovative technologies designed to reduce the cost of offshore wind."

For more information, visit [www.axystechnologies.com](http://www.axystechnologies.com).

## FarSounder launches major software update for navigation sonars: SonaSoft 3.0

The release of SonaSoft 3.0 represents a major upgrade to the state of the art in real-time, forward-looking sonar capabilities. New in SonaSoft 3.0, FarSounder has dramatically improved its 3D sonar display. These improvements include:

- Target persistence via new image stabilization techniques;
- Updated color mapping fusing depth and signal level information;
- Significantly improved Auto Squelch mode;
- Expanded chart overlay including full 3D image; and
- One-to-one scaling of 3D images.

The software update is compatible with FarSounder's existing products and is available to all current and new navigation sonar customers.

For more information, visit [www.farsounder.com](http://www.farsounder.com).

## Ocean Signal introduces new rescueME MOB1

Ocean Signal introduces its new rescueME MOB1 for the first time at Seawork International this year as the latest product in its range of devices integral to the safety of crew in the commercial environment. The communication and safety at sea specialist will present the world's smallest AIS MOB device with integrated DSC, in addition to SafeSea products the S100 SART, V100 VHF and E100G EPIRB.

The award-winning rescueME MOB1 forms part of the Ocean Signal product portfolio developed to meet the needs of all commercial shipping, offshore industries and fishing sectors and designed to operate in the harshest marine conditions.

Integrating easily into even the most compact life jackets, the rescueME MOB1 will provide commercial workers and crew with the reassurance that they can be located quickly and recovered in the event of a man overboard situation.

Once the rescueME MOB1 is activat-

ed, Automatic Identification System transmissions will provide accurate position information on the vessel's chart plotter. The plotter will show a red circle plus longitude, latitude, and distance and bearing to the person in distress. In addition, the DSC VHF alarm will also be triggered. The integrated strobe light with moulded lens ensures the survivor can be seen easily in poor light conditions.

At 30% smaller than other similar products, the lightweight and easy-to-use rescueME MOB1 measures just 134 mm (height) by 38 mm (width) by 27 mm (depth) and weighs 90 g. Operating within a temperature range of -20°C and +55°C, the Ocean Signal device has a comprehensive self-test facility and features a 7-year battery life.

For more information, visit [www.oceansignal.com](http://www.oceansignal.com).



### MacArtney and Sea-Bird Scientific supplies winch and CTD packages to Turkish research vessels

MacArtney Underwater Technology and Sea-Bird Scientific have joined forces to deliver no less than four state-of-the-art complete oceanographic instrumentation solutions to research vessel operators in Turkey.

A key common denominator for the type of oceanographic package procured by these Turkish research clients is the powerful combination of highly versatile MacArtney CORMAC Q winches and cutting-edge Sea-Bird Scientific CTDs and water sampling systems. In addition to this, clients have opted to mix-and-match a multitude of different instrumentation options, including the broad range of optical and water quality sensors from WET Labs and Satlantic offered by Sea-Bird, to form complete



turnkey CTD packages corresponding with their specific scientific measurement needs. In extension of this, all installation, commissioning and training, performed by MacArtney specialists, was also included in the packages.

The first of four Turkish research vessels to take delivery of the MacArtney and Sea-Bird CTD solution was the R/V Tubitak Marmara built by CEKSAN shipyard for the Scientific and Technological Research Council of Turkey. The second and third Turkish research vessels to benefit from a turnkey MacArtney and Sea-Bird package was the R/V Seydi Ali Reis—a brand new scientific vessel operated by the Sinop University—and the ARAMA 1—a newly built vessel operated by the Mediterranean Sea and Fishery Institute based in Antalya. Finally, a fourth system procured by an undisclosed Turkish client, for installation on a new research vessel, has been delivered, with commissioning planned to take place during 2015.

For more information, visit [www.macartney.com](http://www.macartney.com).

### Deepwater Drilling & Rig Report: Reassessing Deepwater Strategies in a Dynamic Market

The deepwater oil and gas market is currently in a transition phase, with lower oil price colliding with market dynamics leading to increased uncertainty. The deepwater drilling and rig market, which has seen an oversupply of rigs due to an unprecedented build out coinciding with lower oil prices faces greater uncertainty than any almost any other market segment.

The deepwater rig market is currently highly volatile—drilling contractors are struggling to place newbuild rigs despite rapidly declining day rates while new rigs previously delivered continue to saturate the market.

The changes taking place now in the deepwater drilling sector have long-term implications across the deepwater supply chain; understanding these implications will allow companies to best position themselves for the future of this market. Quest's new "Deepwater Drilling and Rig Report, Reassessing Deepwater Strategies in a Dynamic Market" highlights the key trends in this market, analyzes their implications and provides companies with the insight needed to navigate the changing deepwater market.

This report combines Quest's industry leading deepwater exploration and

development data with rig supply to answer questions like, What will rig supply look like in the long term? How many rigs will leave the market? When will day rates stop falling? How low will they fall? How many deepwater wells will be drilled in the coming years? What are the long term implications of this on the deepwater market?

For more information, visit [www.questoffshore.com](http://www.questoffshore.com).

### New submersible logger for Turner Designs C-sense pCO<sub>2</sub> sensor

Turner Designs is excited to announce the introduction of a submersible logger designed to work with our C-sense pCO<sub>2</sub> sensor. Designed by Precision Measurement Engineering, Inc. (PME), an internationally known water quality instrument design corporation, the C-sense Logger package records time, date, internal temperature, and the partial pressure of gas in liquids.

C-sense enables in situ pCO<sub>2</sub> monitoring over an extended period of time in water, oil or water and oil mixtures in depths up to 600 m. Applications include water quality monitoring, aquaculture, wastewater monitoring, reef monitoring, carbon capture storage monitoring and biofuel production.

Integration with the C-sense Logger enables collection and internal storage of data at a variety of sampling rates set by the customer. Data are offloaded to a computer via a USB cable for easy viewing and analysis. The logger and sensor are powered by the Turner Designs re-chargeable battery pack, potentially powering the C-sense Logger to collect 3,000 samples before re-charging is required.

For more information, visit [www.turnerdesigns.com](http://www.turnerdesigns.com).



## The new DAQ device from SAIL to revolutionize acoustic monitoring

St Andrews Instrumentation (SAIL), pioneers in passive acoustic monitoring instrumentation, is pleased to announce the launch of its new data acquisition device (DAQ) at Ocean Business 2015, stand V38.

Encased in compact and robust IP51 housing, the new SAIL DAQ device is a compact and easy-to-use solution for real-time data retrieval. Simply connect a hydrophone or microphone or other inputs and you're ready to connect to a laptop or PC. Conventional techniques use up premium footprint and on-site updates. The new DAQ card not only increases the number of channels that can be used, but saves time and money.

Other features include up to 4, 8, 12 analogue channels; multiple stacking; USB 2.0 connection; works with PAMGuard (other software packages following soon [i.e. DASYLab® MATLAB® and LabVIEW]); Windows 7 drivers supplied; and 12V DC supply.

For system integrators, SAIL supplies the DAQ card as a standalone product without the housing. This gives users the freedom and flexibility to



design in as many or as few DAQ cards according to their requirements.

According to Jamie MacAulay from the Sea Mammal Research Unit, "The SAIL DAQ card reduced our acoustic setup from a complex meter square box to a simple, compact system which sat next to our laptop. Not many things that size or price that can synchronously amplify, filter and digitise 12 channels of data at 1 MS/s."

For more information, visit [www.sa-instrumentation.com](http://www.sa-instrumentation.com).

## Okeanus announces acquisition of modular flotation equipment

Okeanus Science and Technology, LLC (Okeanus) announces the addition of two sizes of Trelleborg modular flotation buoys to its inventory of oceanographic and marine scientific rental equipment.

Built from syntactic foam, two models of modular buoys are available for rental from Okeanus. The Trelleborg micro buoy, suitable for larger flotation jobs, provides 204 lbs of uplift on the end unit, and 233 lbs of uplift on the mid-section units. The smaller Trelleborg nano buoy features 72 lbs of uplift on the end units, and 76 lbs of uplift on the mid-section units. Both mid-section units and end units of both buoys are available for rental.

Syntactic foam buoys, designed to be utilized mid-water column subsea, are used for offshore projects necessitating that an ROV hold a tool in a certain direction or otherwise be suspended at a certain depth. Okeanus' team can build custom flotation packages with two end units and varying numbers of mid-section units to suit jobs with uplift requirements ranging from 70 to 700 lbs.

For more information, visit [www.okeanus.com](http://www.okeanus.com).

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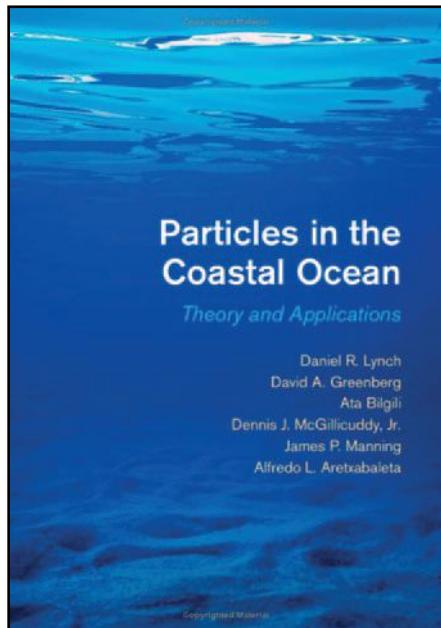
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## Particles in the Coastal Ocean: Theory and Applications

by Daniel R. Lynch, David A. Greenberg, Ata Bilgili, Dennis J. McGillicuddy Jr., James P. Manning, and Alfredo L. Arretxabaleta

The coastal ocean comprises the semi-enclosed seas on the continental shelf, including estuaries and extending to the shelf break. This region is the focus of many serious concerns, including coastal inundation by tides, storm surges, or sea level change; fisheries and aquaculture management; water quality; harmful algal blooms; planning of facilities (e.g., power stations); port development and maintenance; and oil spills. This book addresses modeling and simulation of the transport, evolution, and fate of particles (physical and biological) in the coastal ocean. It is the first to summarize the state of the art in this field and direct it toward diverse applications, for example measuring and monitoring sediment motion, oil spills, and larval ecology. This is an invaluable textbook and reference work for advanced students and researchers in oceanography, geophysical fluid dynamics, marine and civil engineering, computational science, and environmental science.

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Acteon company 2H Offshore appointed **Phil Ward** director in its Aberdeen, Scotland office. This new role reflects Ward's experience, knowledge and commitment to 2H and is a promotion from his current role as principal engineer, the company said. Ward will work alongside the existing management team to jointly lead the company's growing Aberdeen business. Ward holds a master's degree in engineering from the University of Cambridge. He is also a chartered engineer and a member of the Institute of Mechanical Engineers. Having worked for 2H Offshore in its Aberdeen office for more than 4 years, he is said to offer extensive understanding of drilling, completion and intervention riser systems, both for subsea well and fixed platform operations, and in-depth knowledge of wellhead fatigue assessment, mitigation and structural monitoring.

Transocean Ltd. said that **Steven Newman** and the board of directors mutually agreed that he would step down as president and chief executive officer. Newman also elected to resign as a director of Transocean. Until a permanent replacement is named, **Ian Strachan**, chairman of the board will also serve as interim CEO. Since June, Transocean's

market cap has fallen from about \$16.8 billion to about \$7.1 billion amid deteriorating oil prices and demand for offshore rigs. Transocean is the largest global provider of offshore contract drilling services. Newman assumed the reins of Transocean in March 2010 from long-time CEO Robert Long. Shortly thereafter, he sat before the U.S. Congress answering probes concerning Transocean's drilling rig, Deepwater Horizon, which ignited, sank and spilled large amounts of oil into the Gulf of Mexico. Four years after the Macondo event, in September 2014, Transocean was cleared from liability for the spill.

Wood Group appointed **Michele McNichol** chief executive officer for Wood Group Mustang (WG Mustang). McNichol succeeds **Steve Knowles**, who was to retire 1 April 2015. McNichol has more than 25 years of experience in the oil and gas industry and has been with WG Mustang since 2001. She was previously executive vice president, with direct responsibility for offshore,



Newman

onshore, oil sands and pipeline operations worldwide. She has served as president of the upstream business unit and regional director for upstream operations across the Americas. Her tenure at WG Mustang includes high-profile industry projects, including serving as WG Mustang's project manager for BP Thunder Horse, the world's largest semi-submersible production facility. Knowles has led WG Mustang since 2006, focusing on growth and international expansion. As a result, WG Mustang now has operations in 15 countries across five continents.

**Blaine Thibodeaux** was named president of offshore survey company Fugro Chance Inc. His responsibilities include Fugro's Gulf of Mexico and Arctic offshore operations, including marine positioning, offshore construction and subsea projects, and international services. Having begun his career with Fugro's IT group in 1996, he joined John Chance Land Surveys (a Fugro company) in 1997. As a division manager, he oversaw FLI-MAP®, the airborne corridor mapping system, collecting many thousands of miles of LiDAR data for federal and state agencies and the private sector. Thibodeaux succeeds **Glynn Rhinehart**.

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Unique Maritime Group (UMG) announced the appointment of **Rodney McKechnie** as the managing director for Unique Hydra, its office based in South Africa. McKechnie is a seasoned executive with experience gained in international Fortune 100 companies across various industrial sectors including motor manufacturing, food and alcoholic beverages, electronics, white and brown goods and also the Public Sector.

PMI Industries, Inc. announces that **Sean Berry** has joined the company as account manager, technical sales. Berry is primarily responsible for account management for the company's subsea cable hardware, testing laboratory and seismic exploration customers. He serves as the primary contact and liaison between PMI and various domestic and international accounts as well as other marine companies. He brings over a decade of customer relationship management experience in various manufacturing and aerospace industries. His skills include global sales, marketing, sales channel development, territory management, and strategy creation and implementation.

Okeanus Science and Technology, LLC is pleased to announce the appointment of **Jordan Westmoreland** to operations manager. Westmoreland, an employee of Okeanus since its inception in 2013, will oversee day-to-day operations as well as maintenance and mobilization efforts of the company's fleet of marine scientific rental equipment. Leveraging his wealth of hydrographic survey and oceanographic research experience, Westmoreland will be responsible for assessing customer and project specifications to develop specialized equipment packages and solutions that best suit each customer's needs.

Leading IRM and light construction company Harkand has bolstered its inspection services with the appointment of a new inspection manager based in their Aberdeen office. **Andrew Inglis** has more than 15 years of experience in delivering subsea inspection services in the North Sea region. He previously held inspection management roles at Subsea 7 and Bibby Offshore Ltd.

Oceaneering International, Inc. announced that its board of directors appointed **Roderick A. Larson** as presi-

dent and chief operating officer. Larson has been with Oceaneering since May 2012, serving as senior vice president and chief operating officer with worldwide responsibility for all of Oceaneering's oilfield business operations.

**HBW Resources, LLC** (HBW), an integrated strategic consulting and advocacy firm focused on energy and transportation issues, and **CSA Ocean Sciences Inc.** (CSA), a firm specializing in services related to environmental impacts of activities throughout the world, have announced a global strategic partnership to perform a variety of services in support of offshore commercial projects worldwide. This new offering will combine HBW's unique skills in consulting and advocacy for energy and transportation projects with CSA's offshore environmental expertise to present a combined level of global capabilities that is unmatched. Through this strategic partnership, HBW and CSA will jointly pursue a number of commercial opportunities, including non-technical risk assessments utilizing HBW's PRIME+ platform for offshore projects.



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**2 Describe your job function (circle 1):**

- |                    |                          |
|--------------------|--------------------------|
| 1. OWNER           | 5. BUYER                 |
| 2. MANAGER/PROF    | 6. SALES                 |
| 3. ENG'R/SCIENTIST | 7. OTHER (Specify) _____ |
| 4. TECH'N/OPERATOR |                          |

**3**

**Describe your organization (circle 1):**

- |                                  |                                  |
|----------------------------------|----------------------------------|
| A. SHIPS, CONSTRUCTION, SALVAGE  | O. DIVING EQUIPMENT/SERVICES     |
| B. U/W VEHICLES/COMPONENTS       | P. CONSULTING, DATA SERVICES     |
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*Birns Aquamate design and manufacture underwater electrical connectors, cable assemblies, and cable terminations. The company produces a wide range of standard industry connectors such as the 5500 Series, SC, MC, LP, FAWL/FAWM, Rubber Molded, etc. BIRNS Aquamate is the only underwater connector producer that guarantees compatibility with other manufacturers. Birns also specializes in fast turn-around for custom design of special connector solutions. Stocking dealers in the UK (Scorpion Oceanics), South Africa (Marine Solutions) and Holland (Seascape) as well as dealers in Canada, Norway, Russia, China, Belgium and Brazil.*

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1700 Gillespie Way  
El Cajon, CA 92020 USA  
Tel: +1 619 562 7071  
Fax: +1 619 562 9706  
E-mail: [seacon@seaconworldwide.com](mailto:seacon@seaconworldwide.com)  
Website: [www.seaconworldwide.com](http://www.seaconworldwide.com)



*The SEA CON® Group are world leaders in underwater connector technology and provide an extensive and diverse range of electrical, optical and hybrid connector assemblies, submersible switches and cable system solutions for many applications within the Oceanographic, Defense, Oil and Gas and Environmental markets. With locations in California and Texas, USA, Mexico, Brazil, the United Kingdom and Norway and a worldwide network of agencies and representatives, SEA CON® is able to supply very quick solutions to any requirements across the globe.*

### [MacArtney A/S \(Headquarters\)](#)

Esbjerg, Denmark  
Tel: +45 7613 2000  
[info@macartney.com](mailto:info@macartney.com)  
[www.macartney.com](http://www.macartney.com)



### [North America](#)

[MacArtney Inc.](#)  
Houston, TX, USA  
Tel: +1 713 266 7575  
[mac-us@macartney.com](mailto:mac-us@macartney.com)  
[www.macartney.com](http://www.macartney.com)

*For more than 35 years, SubConn® wet mateable connectors have been the number one connector supplier for the underwater industry. The range features standard circular, micro, low profile, metal shell, power and ethernet connectors, penetrators and custom connectors for special applications. Worldwide SubConn® sales and support is provided exclusively by the MacArtney Group.*

### [Teledyne ODI - A Teledyne Technologies Company](#)

1026 North Williamson Blvd.  
Daytona Beach, FL 32114  
Tel: +1 386 236 0780  
Fax: +1 386 236 0906  
Toll Free: (888) 506 2326  
E-mail: [ODI\\_marketing@teledyne.com](mailto:ODI_marketing@teledyne.com)  
Website: [www.odi.com](http://www.odi.com)



*A leader in subsea electrical & fiber optic interconnect systems. Wet-mateable connectors include signal & high-power electrical, optical, and hybrid products. All based on patented PBOF technology. These rugged components are designed for use at any ocean depth, in the harshest environments. ODI also provides top quality custom engineered solutions for any subsea networking challenge.*

### [Teledyne Oil & Gas](#)

1026 North Williamson Blvd.  
Daytona Beach, FL 32114  
Tel: +1 386 236 0780  
Fax: +1 386 236 0906  
Toll Free: +1 888 506 2326  
E-mail: [oilandgas@teledyne.com](mailto:oilandgas@teledyne.com)  
Website: [www.teledyneoilandgas.com](http://www.teledyneoilandgas.com)



*Delivering engineered solutions for subsea & topside monitoring, sensing and interconnection applications. Technology-focused capabilities include corrosion & erosion monitoring networks, data acquisition/evaluation/reporting systems and turnkey systems integration, power & data interconnection systems and subsea engineering. Teledyne Oil & Gas is Teledyne ODI, Teledyne Impulse, Teledyne Cormorant & Teledyne DG O'Brien.*

### DESALINATION SYSTEMS

#### [Lifestream Watersystems Inc](#)

16611 Gemini Lane  
Huntington Beach, CA 92647  
Tel: 714-375-6583  
Fax: 714-375-6586  
E-mail: [lifestream22@aol.com](mailto:lifestream22@aol.com)  
Website: [www.lifestreamwater.com](http://www.lifestreamwater.com)  
Contact: Julie Kimmel



*Since 1991, reverse osmosis desalination systems supplying potable and high purity water for: marine use; Navy, Coast Guard and other military; offshore platforms; onshore oil and gas. Customized systems available for hazardous area locations, wastewater treatment and to customer provided specifications. Skid mounted and containerized. Output 500-500,000 gallons/day.*

## DESIGN AND ENGINEERING

### Hydro Leduc NA, Inc.

19416 Park Row, Ste. 170  
Houston, TX 77084  
Tel: 281-679-9654  
E-mail: bogden@hydroleduc.com  
Website: www.hydroleduc.com



*Hydro Leduc is a specialist in the design and manufacture of hydraulic piston pumps, hydraulic motors, hydro pneumatic accumulators, and customized hydraulic components satisfying customer needs with reliable products from a reliable source. As the leader in micro hydraulics, it is feasible to obtain several tons of force from a minimal power source within a restricted space envelope. The techniques of micro hydraulics allow simple solutions to problems that are often beyond the limits of traditional mechanical options. Hydro Leduc's expertise is at your service in varied applications such as oil service tools, oceanographic instrumentation, aeronautics, and any extreme working condition of temperature, pressure, medium, and environment.*

## DIVING & MEDICAL TRAINING COURSES

**Interdive Services Ltd & InterMedic Services UK**  
3 Stoke Damerel Business Centre  
5 Church Street, Stoke Plymouth  
Devon, PL3 4DT, Great Britain  
Tel: +44 1752 55 80 80  
Fax: +44 1752 56 90 90  
E-mail: vanessa@interdive.co.uk or diving@interdive.co.uk  
Website: www.interdive.co.uk  
Contact: Ms. Vanessa Yardley



*High quality marine related training courses approved by HSE, IMCA, IDSA, NPD, MCA and RYA. Training from basic to advanced levels (including hospital based) by friendly & experienced instructors. Training providers to UK Ministry of defense. Training on your site, at our facilities, inhouse or overseas. Also, experienced diver assessments and Offshore Medic course.*

## FIBER OPTIC PRODUCT/SERVICES

**BGB Technology Inc.**  
1060 Port Walthall Drive  
Colonial Heights, VA 23834  
Tel: +1 804 451 5211  
E-mail: sales@bgbtechnology.com  
Website: www.bgbtechnology.com  
and www.bgbengineering.com



*BGB is a manufacturer of fiber optic rotary joints (FORJ), media converters and wave division multiplexers used in the transmission of high speed data and video signals. The Optilinc FORJ is available with either ST or Deutsch RSC TM connectors. BGB can also supply integrated slip ring/FORJ assemblies if required.*

### Focal Technologies Corporation, Moog Inc.

77 Frazee Avenue  
Dartmouth, Nova Scotia  
Canada B3B 1Z4  
Tel: +1 902 468 2263  
Fax: +1 902 468 2249  
Email: focal@moog.com  
Website: www.moog.com/marine  
Contact: Shawn Taylor



*Focal, A Moog Inc. Company, specializes in providing electrical slip rings, fiber optic rotary joints, hydraulic utility swivels and fiber optic multiplexer solutions for the worldwide marine industry including ROV, seismic, FPSO turret and oceanographic applications. Product features include hybrid packages that combine fiber, electrical and fluid rotary joints for harsh environments.*

### Ocean Specialists Inc.

8502 SW Kansas Ave  
Stuart, FL 34997  
Tel: +1 772 219 3033  
Fax: +1 772 219 3010  
Email: jbyous@oceanspecialists.com  
Website: www.oceanspecialists.com  
Contact: Jim Byous



*Ocean Specialists, Inc (OSI) is a submarine fiber optic network development company with global project capabilities. OSI works with clients during all project phases of subsea network development, from planning and design to procurement and implementation. Our customers, primarily representing Oil and Gas, Telecommunications and Ocean Observing, recognize the value of fiber optic networks to their field and services solutions, and look to OSI to deliver the skills and experience that developing these network require.*

## SeaView Systems

7275 Joy Road., Suite A  
Dexter, MI 48130, USA  
Tel/Fax: +1 734 426 8978  
E-mail: info@seaviewsystems.com  
Website: www.seaviewsystems.com  
Contact: Matthew Cook



*SeaView Systems produces optical fiber data transmission devices designed for subsea equipment. Products include the SVS-109 Video/Data mux, SVS-209 Gbit Ethernet Converter, SVS-309 2 channel HD-SDI converter and the SVS-509 OmniData stack. SeaView also offers a wide selection of supporting OEM components and custom ROV design, integration and refurbishment services.*

## GYRO COMPASSES

### iXBlue

Tel: +33 (0) 1 30 08 88 88  
Fax: +33 (0) 1 30 08 88 00  
Website: www.ixblue.com



- QUADRANS compact surface gyrocompass
- OCTANS surface gyrocompass and motion sensor
- OCTANS NANO compact subsea gyrocompass and motion sensor
- OCTANS 3000 subsea gyrocompass and motion sensor

*iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.*

## Teledyne TSS Ltd.

1 Blackmoor Lane  
Croxley Business Park  
Watford, Hertfordshire WD18 8GA  
Tel: +44 (0) 1923 216020  
Fax: +44 (0) 1923 216061  
E-mail: tsssales@teledyne.com  
Website: www.teledyne-tss.com  
Contact: Carolyn Jones



**USA Office:** 7701 West Little York, Suite 300  
Houston, TX 77040, Contact: Keith Pope  
Tel: +1 713 461 3030, Fax: +1 713 461 3099

*Supplier of the Meridian range of IMO, Wheelmark and High Speed Craft approved surface and subsea gyro compasses. Options include heave, roll and pitch and battery backup versions as well as a range of repeaters and ancillary products. TSS also continues to support the world-renowned range of SG Brown gyro compasses and marine equipment.*

## INSURANCE

### John W. Fisk Company

4833 Conti Street, Suite 200  
New Orleans, LA 70119  
Toll Free: +1 888 486 5411  
E-mail: insure@jwfisk.com  
Website: www.jwfisk.com



*Fisk Marine Insurance provides all types of insurance to any limit required for commercial diving, marine contractors, offshore oilfield and platforms, plug and abandonment (P&A) contractors, land based energy, ocean marine cargo and oceanographic research worldwide. Our coverages include Workers Compensation (USL&H & Jones Act, General Liability, Professional Liability, Hull P&I, Equipment, Bonds and International Packages for clients working outside of the USA. Contact us for more information: 1-888-486-5411 or insure@jwfisk.com. Visit our website: www.jwfisk.com*

## LIQUID STORAGE

### Aero Tec Laboratories, Inc. (ATL)

45 Spear Road Industrial Park,  
Ramsey, NJ 07446 USA  
Tel: +1 201 825 1400  
Fax: +1 201 825 1962  
E-mail: atl@atlinc.com  
Website: www.atlinc.com  
Contact: David Dack



*ATL specializes in the design/manufacture of custom bladder-type fluid containment systems, including tanks, inflatables, pillows and bellows for surface and subsea. ATL's flexible fluid containers boast unparalleled chemical tolerance, abrasion resistance, and remarkable durability - used with methanol, diesel fuel, gases, ethylene glycol, hydraulic fluids and chemical cleaning cocktails. Expedited deliveries are also available.*

# OCEAN INDUSTRY DIRECTORY

ON&T's Product & Service Directory

## MAGNETOMETERS

### Geometrics, Inc.

2190 Fortune Drive  
San Jose, CA 95131  
Tel: +1 408 954 0522  
Fax: +1 408 954 0902  
E-mail: sales@geometrics.com  
Website: www.geometrics.com  
Contact: Ross Johnson



Geometrics, a member of OYO Corporation, manufactures, sells, and services portable geophysical instruments for land, marine, and air investigations of the subsurface. Geometrics' product line includes proton precession and cesium magnetometers, high-resolution seismographs, and electrical conductivity imaging and resistivity systems. Geometrics' instruments are used around the world for natural resource exploration, geotechnical and environmental assessments, ordnance detection, locating archeological and treasure sites, teaching and research.

## MANUFACTURERS' REPRESENTATIVE

### ROMOR Ocean Solutions

51 Raddall Ave, Unit 10  
Dartmouth, Nova Scotia  
Canada B3B 1T6  
Tel. +1 (902) 466-7000  
Fax. +1 (902) 466-4880  
Email: Sales@romor.ca  
Website: www.romoroceansolutions.com  
Contact: Darrin Verge, President & CEO



ROMOR Ocean Solutions provides instrumentation solutions for the geophysical, oceanographic, defense, security, oil & gas, and renewable energy industries. By partnering with world renowned manufacturers, ROMOR is able to offer technical knowledge, value added services, logistics expertise, and the most reliable instrumentation on the market.

## MARINE ENVIRONMENTAL CONSULTING SERVICES

### CSA Ocean Sciences Inc.

8502 SW Kansas Avenue  
Stuart, FL 34997  
Tel: +1 772-219 3000  
Fax: +1 772-219 3010  
E-mail: gstevens@conshelf.com  
Website: www.csaocean.com  
Contact: Gordon Stevens



CSA Ocean Sciences Inc. (CSA) is a marine environmental consulting firm specializing in multidisciplinary projects concerning potential environmental impacts of activities throughout the world. With extensive experience in environmental sciences and technical field operations, CSA is staffed and equipped to offer a complete range of services for projects in offshore, nearshore, estuarine, wetland, and freshwater environments.

## MOTION SENSING EQUIPMENT

### iXBlue

Tel: +33 (0) 1 30 08 88 88  
Fax: +33 (0) 1 30 08 88 00  
Website: www.ixblue.com



- PHINS surface and AUV INS
- PHINS 6000 deep water subsea INS
- HYDRINS hydrographic survey INS
- MARINS M-Series first rank and submersible ships INS
- ROVINS subsea INS

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

### Kongsberg Seatex AS

Pirsentertet  
N-7462 Trondheim, Norway  
Tel: +47 73 54 55 00  
Fax: +47 73 51 50 20  
E-mail: km.seatex@kongsberg.com  
Website: www.km.kongsberg.com/seatex  
Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com



Kongsberg Seatex is a leading international marine electronics manufacturer specializing in the development and production of precision positioning and motion sensing systems. Our commitment is to provide quality products and solutions for safe navigation and operations at sea in the commercial offshore, maritime, hydrographics and defence industries

### Teledyne TSS Ltd.

UK Office: 1 Blackmoor Lane  
Croxley Business Park  
Watford, Hertfordshire WD18 8GA  
Tel: +44 (0) 1923 216020  
Fax: +44 (0) 1923 216061  
E-mail: tsssales@teledyne.com  
Website: www.teledyne-tss.com  
Contact: Carolyn Jones



USA Office: 7701 West Little York, Suite 300  
Houston, TX 77040, Contact: Keith Pope  
Tel: +1 713 461 3030, Fax: +1 713 461 3099

Comprehensive family of motion sensors available; ranging from a heave sensor through to heave, pitch and roll, and at the top end of the range highly accurate position and heading systems.

## OCEANOGRAPHIC INSTRUMENTS/SERVICES

### ASL Environmental Sciences, Inc.

#1-6703 Rajpur Place, Victoria  
BC, Canada V8M 1Z5  
Phone: +1 250 656 0177  
Fax: +1 250 656 2162  
E-mail: asl@aslenv.com  
Web: www.aslenv.com



ASL provides physical oceanographic consulting services and instruments. Services: flow measurement, ice studies, wave measurement and analysis, numerical modeling and remote sensing. Products: Ice Profiler- measures ice-keel depths; Acoustic Zooplankton Fish Profiler- monitors the presence and location of zooplankton, fish or sediments; and the WERA NorthernRadar - measures surface currents and waves from shore up to 200km. ASL has a large lease pool of oceanographic instruments.

### CONTROS Systems & Solutions GmbH

Wischhofstraße 1-3, Bld. 2  
24148 Kiel, Germany  
Tel: +49 (0) 431 260 959 00  
Fax: +49 (0) 431 260 95 901  
E-mail: contact@contros.eu  
Website: contros.eu



CONTROS  
Systems & Solutions GmbH

CONTROS Systems & Solutions GmbH develops, produces and markets in-situ underwater sensor systems to detect hydrocarbons, pCO<sub>2</sub>, dissolved oxygen, Total Alkalinity, and fully integrated systems down to full ocean depth to gather the most efficient and reliable data in any condition and in combination with data logging and software solutions.

### Falmouth Scientific, Inc.

1400 Route 28A, PO Box 315  
Cataumet, MA 02534-0315 USA  
Tel: +1 508 564 7640  
E-mail: fsi@falmouth.com  
Website: www.falmouth.com



### Sensors – Systems – Service

Falmouth Scientific, Inc. designs and manufactures precision oceanographic instrumentation and systems. Product areas include:

- Ultra-Portable Seismic Systems • Current, Wave, and Tide meters • Structural Stress Monitoring Systems • SideScan Sonar Imaging Systems • Acoustic Transducers, Systems, and Support • Acoustic Positioning and Relocation Beacons

### nke Instrumentation

rue Gutenberg  
56700 Hennebont, France  
Tel: +33 2 97 36 41 31  
Fax: +33 2 97 36 10 12  
E-mail: info.instrumentation@nke.fr  
Website: www.nke-instrumentation.com



• Fresh and marine waters multiparameter probes: CTD, dissolved oxygen, turbidity, fluorescence, pH • Monitoring data loggers for atmospheric and marine corrosion, and cathodic protection • Dedicated and customized measurement and monitoring equipment for: sediment transport, underwater systems behaviour, fishing efforts and environmental parameters, intelligent networks...

Contact : Valérie Le Pen - vlepen@nke.fr or Goulyen Prud'homme - gprudhomme@nke.fr  
• Provor and Arvor profiling subsurface floats (ARGO project), CTD, dissolved oxygen and optical sensors; Argos and Iridium transmission. • Drifting surface buoys with temperature and GPS receiver for Surface velocity project. • Carioca drifting buoy: sea water dissolved pCO<sub>2</sub>, chlorophyll, wind speed and salinity.  
Contact: Patrice Brault - pbrault@nke.fr

### Nortek AS

Vangkroken 2  
1351 Rud, Norway  
Tel: +47 6717 4500  
E-mail: inquiry@nortek.no

### Nortek USA

27 Drydock Avenue  
Boston, MA 02210  
Tel: +1 617 206 5750  
Email: inquiry@nortekusa.com  
Website: www.nortek-as.com



Nortek's products span from single point turbulence sensors to long range current profilers. Our customers are scientists, consulting engineers and professionals working in the offshore oil and gas industry. Nortek provides solutions measuring surface waves to currents 6,000 m deep. Nortek is global, positioned to help you wherever your solution is needed.

### RBR

95 Hines Road, Ottawa  
Ontario Canada K2K 2M5  
Tel: +1 613 599 8900  
Fax: +1 613 599 8929  
E-mail: info@rbr-global.com  
Website: www.rbr-global.com



RBR designs and manufactures rugged submersible data loggers, recorders, sondes, controllers, and sensors for water quality measurement. Our standard data logging instruments range from one to 24 channels, configured as a CTD, or multi-parameter (sensor) recorders. Specialty loggers are available with specific sensors for harsh environments or unique applications like measuring tides and waves.

### [Sea and Land Technologies Pte Ltd](#)

65 Tuas Avenue 1  
Singapore 639508  
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E-mail: enquiry@sea-landtech.com  
website: www.sea-landtech.com



A leading solutions provider in South East Asia and Australia for Oceanography, Meteorology, Hydrography, Hi Resolution Geophysical studies, Coastal Monitoring, Hydrology and Environmental surveys. Our proficiency is in providing the latest sensing technology and software solutions to meet the specific needs of the industry. Representing top manufacturers for over 20 years, SALT seamlessly blends value added services like calibration, system integration, training, repairs, cable moulding services with the technology products to offer a diverse range of innovative solutions for the user community in the region. Headquartered in Singapore, SALT has offices in Malaysia, Indonesia, Thailand, Philippines and Australia. Rental systems are available.

### [Sea-Bird Scientific](#)

13431 NE 20th St.  
Bellevue, WA 98005  
Tel: +1 425 643 9866  
Fax: +1 425 643 9954  
E-mail: info@sea-birdscientific.com  
Website: www.sea-birdscientific.com  
Contact: Calvin Lwin, Sales



SEA·BIRD  
SCIENTIFIC

Sea-Bird Scientific, comprised of Sea-Bird Electronics, WET Labs, and Satlantic, provides integrated solutions to customers' measurement needs. Sea-Bird Scientific is the leader in accurate, stable ocean instruments for measuring conductivity (salinity), temperature, pressure, oxygen, pH, chlorophyll, CDOM, turbidity, beam attenuation, irradiance, radiance, PAR, nitrate, and phosphate. Our CTD profilers, water samplers, moored CT recorders, wave/tide recorders, DO sensors, and optical sensors are used by research institutes, ocean observing programs, government agencies, and navies globally.

### [Star-Oddi](#)

Skeidaras 12, 210  
Gardabba, Iceland  
Tel: +354 533 6060  
Fax: +354 533 6069  
E-mail: baldur@star-oddi.com  
Website: www.star-oddi.com  
Contact: Baldur Sigurgeirsson

**STAR : ODDI**

A manufacturer of miniature data loggers with sensors as temperature, depth/pressure, salinity, tilt/acceleration, compass direction/magnetometer, light levels, acoustic receiving/transmitting. The loggers are used for various researches, including oceanography, fishing gear studies, equipment behavioral monitoring and fish tagging. Data is presented in the application software with a time-stamp for each measurement.

### [SubTech GmbH](#)

Wellseedamm 3,  
24145, Kiel, Germany  
Tel: +49 (0) 431/22039880  
Fax: +49 (0) 431/22039881  
E-Mail: sales@subctech.com  
Website: www.subctech.com  
Contact: Stefan Marx



SubTech GmbH develops, produces and sells professional environmental and conditional monitoring equipment as well as Li-Ion based power solutions. Core products are pCO<sub>2</sub> analyzer, Li-Ion rechargeable batteries, subsea data logger and control equipment for different platforms. We provide reliable customized solutions for ships, buoys and ROVs/AUVs for full ocean depth.

### [Turner Designs](#)

845 W Maude Avenue  
Sunnyvale, CA 94085  
Phone: +1 408 749 0994 x146  
Toll Free: +1 877 316 8049 x149  
Fax: +1 408 749 0998  
Contact: Tom Brumett, Sales Engineer  
E-mail: sales@turnerdesigns.com  
Website: www.turnerdesigns.com

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**iXBlue**  
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iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

### [L-3 Klein Associates, Inc.](#)

11 Klein Drive  
Salem, NH 03079  
Tel: +1 603 893 6131  
Fax: +1 603 893 8807  
Email: Klein.Mail@L-3com.com  
Contact: Deborah Durgin, Supervisor, Marketing & Sales



Klein Associates, Inc.

L-3 Klein is the world's leading sensor technology provider that manufactures and designs high-resolution side scan and multi-beam sonar equipment, and radar-based security and surveillance systems. L-3 Klein has developed a worldwide reputation of excellence in the industry by providing quality products and excellent customer service. Please feel free to check out our product offerings at [www.L-3Klein.com](http://www.L-3Klein.com).

### [Marine Sonic Technology](#)

120 Newsome Dr. Suite H, PO Box 1309  
Yorktown VA 23692-1309  
Toll Free: +1 800 447 4804  
E-mail: jdemille@marinesonic.com  
Website: www.marinesonic.us



Marine Sonic Technology, Ltd. builds high quality, high resolution side scan sonar systems. Located in Gloucester, Virginia, Marine Sonic has been in business for more than 20 years. Our towed systems are rugged, easy to deploy and easy to operate. We also offer highly efficient embedded side scan systems for use in AUVs which occupy minimal space in the vessel and operate with minimal power consumption.

### [SOUND VELOCITY PROBES/CTDS](#)

#### [SAIV A/S](#)

Nygardsviken 1, 5164  
Laksevag, Norway  
Tel: +47 56 11 30 66, Fax: +47 56 11 30 69  
E-mail: info@saivas.no  
Website: www.saivas.no  
Contact: Gunnar Sagstad

- **STD/CTD, Sound Velocity probes/recorder with optional multi-parameter facilities;** Turbidity, Fluorescence, Oxygen etc.

• **Precision pressure /depth (0.01% accuracy) and temperature sensors/recorders.** Applications: hydrographic profiling, installation on ROV's and towed systems, etc. Robust and compact designs are combined with accuracy and "plug and play" compatibility. Output format for sonar equipment, e.g. EM1002, EM3000, SSP, HiPAP and Reson 8125.

### [SUB-BOTTOM PROFILES](#)

#### [iXBlue](#)

Tel: +33 (0) 1 30 08 88 88  
Fax: +33 (0) 1 30 08 88 00  
Website: www.ixblue.com



- **ECHOES 3500 T3 and T7** high penetration sub-bottom profilers
- **ECHOES 5000** full ocean depth sub-bottom profiler
- **ECHOES 10000** shallow water sub-bottom profiler

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

### [SUBSEA FABRICATION](#)

#### [New Industries](#)

6032 Railroad Avenue  
Morgan City, LA 70380  
Tel: +1 985 385 6789  
E-mail: bill.new@newindustries.com  
Website: www.newindustries.com  
Contact: Bill New



New Industries provides quality fabrication services to the offshore oil & gas and marine industries focusing on large diameter pressure vessels, suction piles, DNV buildings and deepwater subsea production equipment such as jumpers, PLETs, PLEMs and manifolds.

### [SUBSEA TOOLING](#)

#### [Seanic Ocean Systems](#)

8860 Fallbrook Drive  
Houston, TX 77064  
Tel: +1 713 934 3100  
E-mail: info@seanicusa.com  
Website: www.seanicusa.com  
Contact: Karen North



Seanic was formed to address the growing demand for simple, rugged and reliable subsea tooling for remote intervention. Along with engineered solutions, Seanic also offers experience in the design, manufacturing, storage, repair & maintenance of subsea products. Seanic provides a worldwide standard product line of ROV tooling such as torque tools, FLOT's, hot stabs, manifolds, buckets and ROV interface panels.

# OCEAN INDUSTRY DIRECTORY

ON&T's Product & Service Directory

## Subsea Americas

3447 Hwy 182  
P.O. Box 185  
Berwick, LA 70342  
Tel: +1 985 714 1767 or 985 518-0055  
E-mail: charles@subseaamerica.com  
Website: www.subseaamericas.com  
Contact: Charles Mayea



*Subsea Americas (SSA) is a leading provider of rental ROV tooling equipment on a worldwide basis. SSA is a 24 hr. / 7 days a week service provider of a comprehensive range of standard subsea tooling equipment. From torque tools and flying lead orientation tools to 15k isolated hydraulic intensifiers and wire rope cable cutters - SSA can fully support the client's needs with quality service, and reliable equipment at a most competitive cost.*

## **SWITCHES**

### SEACON Advanced Products, LLC.

1321 Nefius Road  
P.O. Box 767  
Bellville, TX 77418 USA.  
Tel: +1 979 865 8846  
Fax: +1 979 865 8859  
E-mail: sales@seacon-ap.com  
Website: www.seacon-ap.com



*SEACON Advanced Products, LLC., manufactures a wide variety of versatile and robust switches to suit a number of applications. These include Limit, Positive Action and Proximity switches in a range of materials including Titanium, Plastic and Stainless Steel which can be supplied in varying load capacities up to 7 amps and pressure rated to 10,000 psi. To further aid simplicity, our proven range of Modular Proximity Switches have been integrated with the Micro WET-CON electrical wet-mate connector making this switch a very modular component that is easily installed and replaced in the field, but without compromising reliability.*

## **UNDERWATER VEHICLES/AUVS**

### Hydroid, Inc.

a subsidiary of Kongsberg Maritime  
6 Benjamin Nye Circle  
Pocasset, MA 02559-4900 USA  
Tel: +1 508 563 6565  
Fax: +1 508 563 3445  
E-mail: glester@hydroid.com  
Website: www.hydroid.com  
Contact: Graham Lester



*Hydroid, a subsidiary of Kongsberg Maritime, is the world leader in manufacturing advanced Autonomous Underwater Vehicles (AUVs). REMUS AUVs provide innovative and reliable systems for the marine research, defense, hydrographic and offshore/energy markets. Hydroid vehicles represent the most advanced, diversified and field-proven family of AUVs and support systems in the world.*

### OceanServer Technology, Inc.

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