

# OCEAN NEWS

& TECHNOLOGY

July 2015

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**Galvanic Corrosion in  
the Ocean Environment**

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Construction of first turbine at  
Gwynt y Môr wind farm in the Irish Sea.

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# EDITORIAL

By John Manock



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## Submarine Fiber Optic Cables From Pariah to Lifeline

Every year, about midway through the year, I try to take the opportunity to discuss the submarine fiber optic cable market. This is the industry that I came from and I will always have a soft spot for it, even though it can be love/hate relationship.

The submarine fiber optic cable market has seen more than its share of highs and lows. In one 5-year period at the end of the last century and the beginning of this one, it swung from being a darling in the business trade press and a market that everyone was trying to grab a share of to a global pariah for investors and a market that the same press claimed was becoming extinct.

Quietly and subtly, out of the limelight and the thoughts of the media, the submarine cable market persevered. It made its way out of the collapse and started building cables again. In the decade that followed, it was a tough market to be in—strong enough to survive but not to thrive.

Gradually, as nothing in this industry happens quickly except collapses, something amazing happened. People, again some of the same ones from earlier in the century, realized that the pariah that was the submarine fiber optic cable market had been, like a phoenix, reborn. Not only were there real business opportunities, but these cables had become a critical asset to nearly everyone on the planet.

What had happened was that the Internet industry realized that submarine cables were the best way to deliver their services—services that today have become the lifeline for business, government, leisure and recreation and just about every other aspect of the economy and society. The world relies on the Internet, and the Internet relies on submarine fiber optic cables.

Now as we reach the mid-point of 2015, more than a decade after the collapse, the submarine fiber optic cable market, although still challenging, is attracting investors, seeing new companies enter the market and getting the credit it deserves as a critical asset in today's world.

This is causing a boom in the market. Instead of the lukewarm growth of the previous 5 years, 2014 and the first half of 2015 have benefited from a surge in investment coming from financial institutions, governments and non-government organizations, telecom and Internet companies and even charitable organizations and pension funds. It has been quite a whirlwind.

Now, getting down to the numbers. The 5 years from 2009 through 2013 saw a steady, but unspectacular pace of growth for the submarine cable industry that was, if lucky, only about two-thirds the annual manufacturing capacity of the industry. This was good compared to 2002-2004, when demand was almost zero, but not good enough for the suppliers of submarine systems to thrive.

2014 was different. Thanks to increased investment and a more positive outlook in the financial community towards the submarine fiber optic cable market, the market broke out—reaching levels more than double the average of the previous 5-year period.

In our January 2015 Radar Screen Report, which forecasts the submarine cable market, we expected 2015 to start out slowly (being unable to keep up the pace set in 2014), but picking up to reach levels beyond those of the 2009-2013 period, but lower than the 2014 spike. So how have we done?

Not too badly, as it turned out. The first quarter of 2015 was very slow—which we anticipated as the logical consequence of so many supply contract awards being made in 2014. But the second quarter came on with a vengeance. From April through June, at least as much cable (in terms of kilometers) was contracted for than the average annual totals during the 2009-2013 period.

In addition, 2015 is running at a pace that would, if it continues throughout the year, bring the total amount of submarine fiber optic cable contracted for to about 75% of the total for 2014. That is a little higher than we predicted (which was about 60%) and would make 2015 the third strongest year so far this century, after 2014 and 2007, the latter being the year that Africa began to be opened up to the Internet through a huge investment in international submarine fiber optic cables.

Will this market strength continue? Probably not at this level. But submarine fiber optic cables will remain the primary means of transporting Internet service globally and there will be continued demand for new cables to replace or supplement existing ones. It is ironic that the pariah with no future is now keeping the world connected.

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# Ocean Engineering 101: **GALVANIC CORROSION IN THE OCEAN ENVIRONMENT**

One of the most common, yet easily preventable, sources of corrosion in the marine environment comes from fastening two different (dissimilar) materials into direct contact with each other then immersing them in seawater. There are ways around this problem, however.

Materials are tested for their galvanic potential against a standard reference electrode, typically Ag/AgCl or Hg/HgSO<sub>4</sub>. The result is a list of relative electro potentials, the galvanic series, ranking materials by their positive or negative voltages. The more positive voltages are the more noble materials, such as titanium and gold, and are less likely to corrode. The more negative voltages indicate the more active materials, the ones most likely to corrode, such as zinc, aluminum, and magnesium. The more noble materials are considered cathodic, hence the term “Cathodic Protection.” The more reactive materials are considered anodic, leading to the term “Sacrificial Anode.”

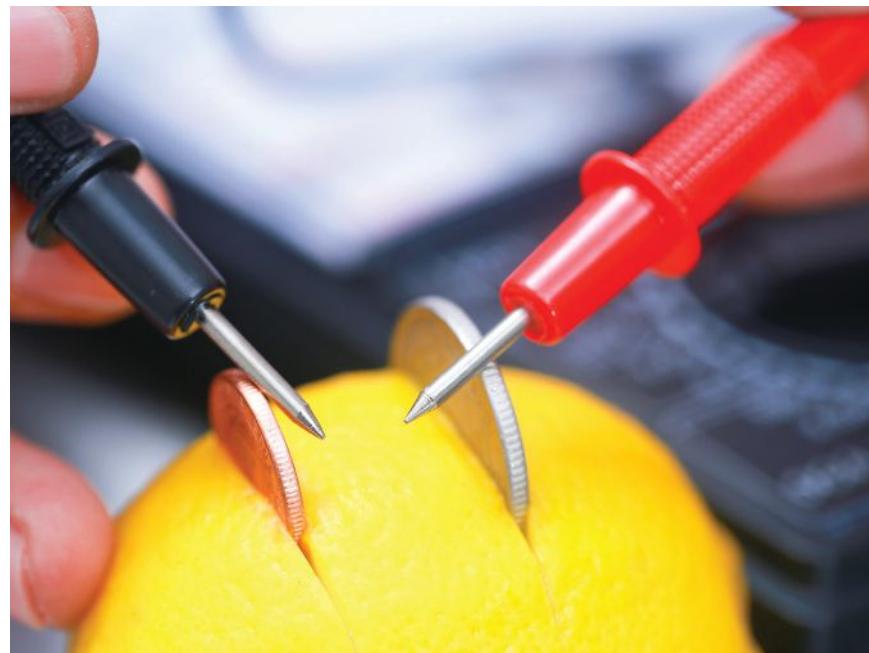
As always, there are caveats. Some materials, such as stainless steels, appear twice on the galvanic series. This is a result of a surface conversion process called “passivation,” where the reactivity of the surface is reduced and the part moves towards the noble end of the scale.

It takes four things to make a simple galvanic or voltaic cell:

- 1) A noble metal (Cathode);
- 2) A sacrificial metal (Anode);
- 3) An ion path; and
- 4) An electron path.

It's a powerful insight that whatever serves as the ion path (#3), say saltwater, cannot also act as the electron path (#4). Those functions must be done by different means. So designers can prevent galvanic corrosion by either electrically isolating the two metals with a dielectric, such as delrin, or removing the object from contact with seawater.

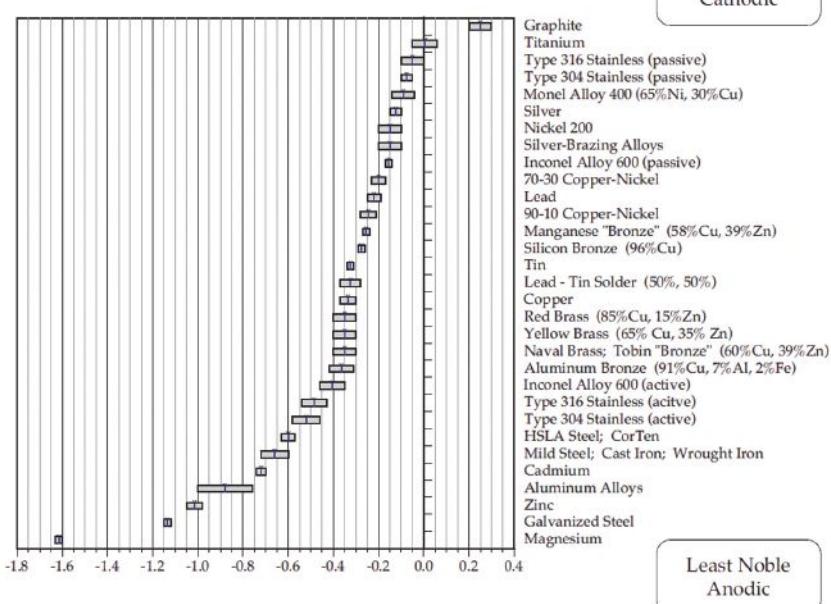
The first option results in an assembly that is mechanically connected, but electrically isolated. This is the preferred method.



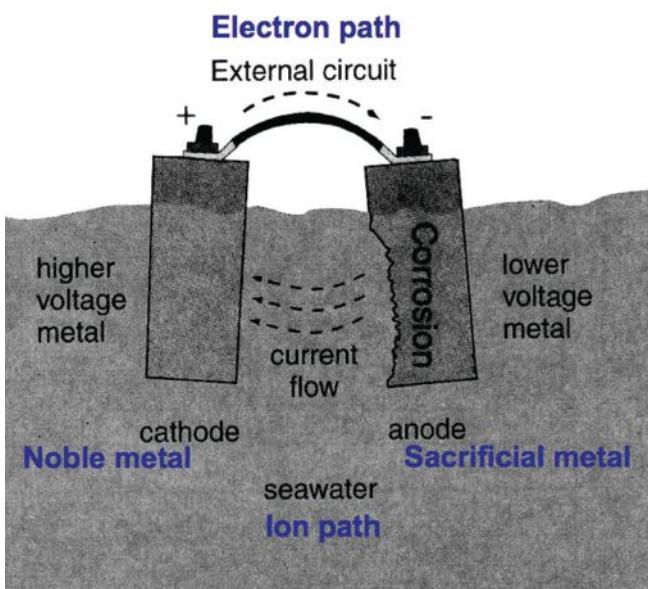
*A galvanic or voltaic cell starts with two dissimilar materials in an electrolyte. Connect the two metals with a wire to make a circuit, and corrosion of the anode begins (Photo courtesy of WikiHow).*

## The Galvanic Series

Average Voltage in Seawater



*The galvanic series in flowing seawater. Stagnant seawater becomes anaerobic, and the reduction of oxygen changes the potentials (Graphic courtesy of Kasten Marine).*



*A simple galvanic cell in seawater (Graphic adapted from Professional Boatbuilder).*

Removing the object from contact with seawater sounds counterintuitive at first: we design machines to go into seawater. This approach argues for an inert surface coating, such as a good marine paint system, anodize, or even oil immersion, such as a structure inside a PBOF case.



*A plastic shoulder washer may be used to isolate a stainless steel fastener assembly from an aluminum frame.*

Some designers have argued that anodize is a good insulator, and they'd be right if the anodizing were a continuous and perfect surface. That's often not the case, however. Anodizing is a surface conversion process of a few thousandths of an inch thickness, and the build up of anodize occurs at right angles to the plane of the surface. Thus, an anodized part design that includes sharp angled

features, such as threads or right angle corners, will be compromised from the start. (See "OE 101: Anodizing Aluminum for Underwater Applications," ONT, April/May 2009, pp 54-56). Anodizing aluminum creates a thin shell of aluminum oxide, a brittle ceramic, over the original softer base material. It's like a knight's armor. This thin shell can also crack when the softer substrate yields and the surface cannot, such as from an impact or flexure in the field. A small chip results in a cathode-anode ratio that concentrates corrosion at the small exposed spot, accelerating corrosion at the exposed point. Not always unwelcome, designers can creatively employ this for release mechanisms or scuttling plugs.

With the increasing use of carbon fiber composites, designers will do well to note the placement of graphite on the chart at the high end of the noble scale. Dissimilar material isolation will be a critical element of a successful design.

Another special case is the use of lead ballast. Lead has a place on the galvanic series that must be considered when attaching it to a frame.

Welding two or more pieces of metal together can create material differences in the assembly. Welding is essentially a casting process that joins two or more wrought parent materials. The welded zone may have chemical dissimilarities to the parent materials, creating a galvanic cell.

Selection of an underwater bulkhead connector may be limited, and force a dissimilar material combination. This can also force a related problem known as Cathodic Delamination of an elastomer from the base material, as may be found with an overmolded boot.

If there is no way around joining two dissimilar metals together, such as the weldment described above, three options may be considered. First, make the exposed area of the more reactive metal significantly larger than the noble metal, skewing the anode-cathode ratio to where the corrosion will be dispersed over a larger area and slow the rate of corrosion at any one point. Thus, counterintuitively, if you feel you have to paint something, paint the noble metal. Secondly, the use of a third, more reactive metal will strategically force corrosion to occur where it does not matter. Zinc anodes are a good example of this approach. (Designers should note that anode grade zinc is a different alloy than the pure zinc used in cast spelter sockets.) Third, an imposed electrical current may be used to reverse the electropotential of two materials.

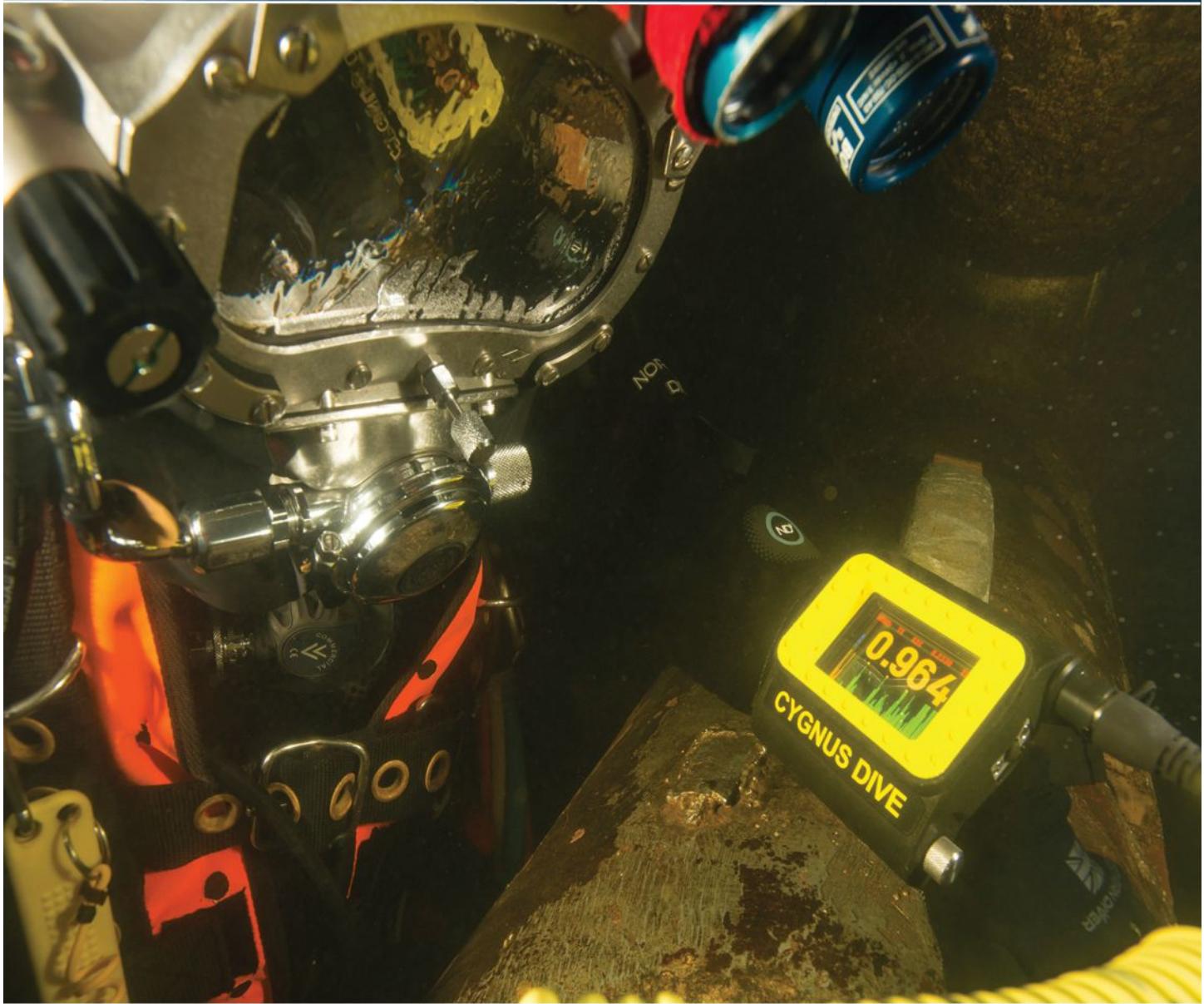
Underwater housings may also be made of inert materials, including glass, plastic, ceramics, even concrete. This eliminates one side of the galvanic cell.

References: "Handbook of Oceanographic Engineering Materials," Stephen Dexter; "Handbook of Ocean and Underwater Engineering," John J. Myers; Corrosionist, <http://www.corrosionist.com>; Corrosion Source, <http://www.corrosionsource.com>.



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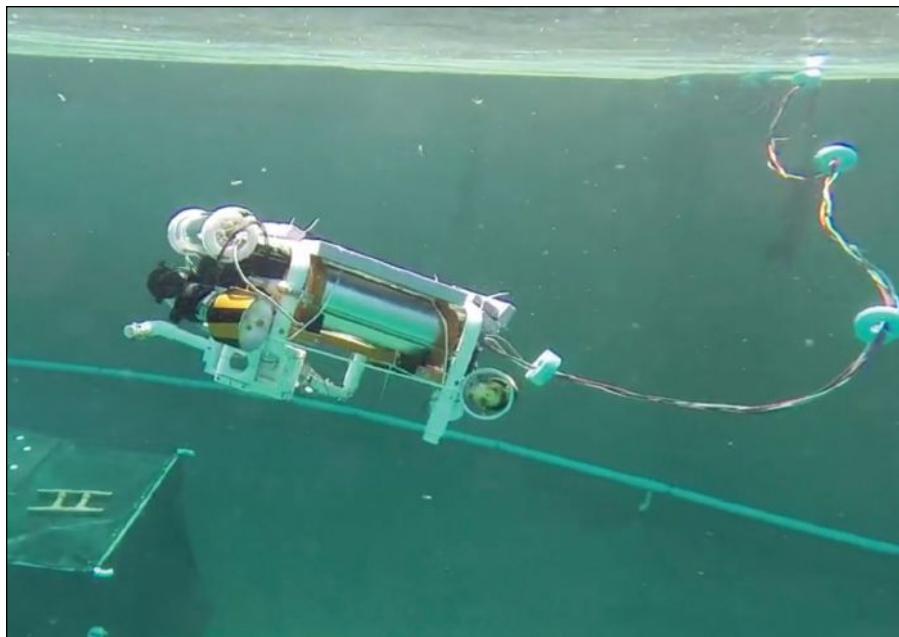
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# OCEAN INDUSTRY

## 2015 MATE International ROV competition held in Newfoundland



The Marine Advanced Technology Education (MATE) Center, the National Science Foundation (NSF), NSF's Office of Polar Programs, and the Marine Technology Society ROV Committee held the 14th Annual MATE International Student ROV Competition.

Sixty-three teams representing middle schools, high schools, home schools, after-school groups, community colleges, and universities from 16 different countries competed in this year's event, which was held 25-27 June 2015 at the Marine Institute (MI) of Memorial University and the National Research Council's Ocean, Coastal, and River Engineering (OCRE) facility in St. John's, NL, Canada.

This year's competition focused on the role that ROVs play in scientific research and the offshore oil industry in the extreme environment of the Arctic. The underwater mission tasks included piloting under an ice sheet to sample organisms and deploying instrumentation and battling current, waves, and wind to inspect pipelines and test oilfield equipment. This year's complex missions were made possible by the unique features of MI's flume tank and the OCRE's ice tank and offshore engineering basin.

Each year the competition challenges students to think of themselves as "entrepreneurs." Students are asked to transform their teams into companies that design, build, and market their "product" as a way to gain a better understanding of the breadth of real-world business operations. Along the way, they learn how to manage a project, work as a team, think creatively, and problem-solve, which are all important 21st century workplace skills.

During the event, a panel of judges—professionals representing industry, science, government, education, and exploration—evaluated the student-run companies on their ability to effectively communicate their vehicles' design and construction via technical documentation, marketing displays, and sales presentations.

The competition also featured the Ocean Career Expo, organized by the MATE Center and its partners in the Centers for Ocean Sciences Education Excellence.

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

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### BOEM and Association of American State Geologists to collaborate on offshore marine minerals and oil and gas information sharing

The Bureau of Ocean Energy Management (BOEM) and the Association of American State Geologists (AASG) have signed an agreement to foster interaction, cooperation and coordination on marine minerals and oil and gas resources on the outer continental shelf (OCS). Since the 1990s, BOEM and its predecessor agencies have worked with numerous state geological surveys on cooperative agreements to evaluate OCS sand resources for coastal resilience, restoration projects and planning. A national-level agreement will improve information exchange and the ability for BOEM, AASG and its members to communicate on national plans and issues with each other. "As BOEM worked through extensive coordination with 13 Atlantic states following Hurricane Sandy, we realized that we could streamline operations even more through closer coordination with state geologists," said Renee Orr, BOEM's chief of strategic resources. "They are important partners in helping us strengthen coastal resilience using OCS sand, as well as managing offshore oil and gas activities in all four OCS regions—the Atlantic, Pacific, Gulf of Mexico and offshore Alaska." Officials from BOEM and AASG finalized the agreement on 17 June during the AASG annual meeting in Flagstaff, Arizona. Richard Desselles, division chief for resource evaluation, represented BOEM's Office of Strategic Resources, and Dr. Jonathan Arthur, AASG president, signed for the association. "On behalf of the Association of American State Geologists, we welcome the enactment of this MOU with the Bureau of Ocean Energy Management's Office of Strategic Resources to ensure the continuation of information sharing between our Nation's state geological surveys and our federal colleagues," said AASG president Jonathan Arthur. "This MOU will serve us well as we work on items of mutual interest that affect the development and protection of our Nation's diverse coastal resources." Under the agreement, BOEM's Office of Strategic Resources may provide information to the association on appropriate BOEM permitting, research and planning activities for informal review and comment by the affected states. The AASG, through individual state geological surveys, may provide information to BOEM on appropriate state projects for informal review and comment. The purpose of these reviews is to facilitate information sharing that will foster mutually beneficial interaction, increase opportunities for cooperative BOEM-state geological survey activities and minimize conflicts and misunderstanding.

## USS Constitution enters dry dock for 3 years of repairs

The U.S. Navy's oldest commissioned warship is now in dry dock for 3-year renovation.

USS Constitution — commissioned in 1798 — recently entered Dry Dock 1 at the Charlestown Navy Yard where the ship will be renovated for a scheduled maintenance availability originally scheduled in March but delayed due to the severe winter weather on the Northeast in the earlier part of the year.

"We couldn't have asked for better weather or better support from the dedicated team of professionals who helped with the docking," said Cmdr. Sean Kearns, USS Constitution's 73rd commanding officer in a statement.

"We're now positioned to carry out the restoration work which will return Constitution to the water preserving her for the next generation of Americans to enjoy and learn about our nation's great naval heritage."

The \$12 to \$15 million restoration will preserve and repair the 2,286 ton ship from the upper masts to the waterline and is scheduled to be completed by 2018.

"The ship was made famous in the War of 1812 following several engagements with the Royal Navy earning Constitution the nickname 'Old Ironsides,'" USNI News wrote last year following the ship's last underway before the repairs.

"Since then the ship has remained in commission undergoing several renovations and crewed by about 50 active duty U.S. Navy sailors."

The work to be conducted on the ship, according to the Navy includes:



- Replacing lower hull planking and caulking;

- Removing the 1995 copper sheathing and replacing it with 3,400 sheets of new copper that will protect the ship's hull below the waterline;

- Replacement of select deck beams; and

- On-going preservation and repair of the ship's rigging, upper masts, and yards.

Visitors are able to visit the ship while in dry dock as of June.

For more information, visit <http://news.usni.org>.

university clients including NOAA and the University of Victoria.

The team has already successfully completed several complicated deep-ocean tasks on this cruise and the ship is now transiting to Alaska for the next leg of this paid expedition.

A new mineral deposit project is also being developed by Odyssey. In anticipation of acquiring the mineral rights to this prospective deep-sea mineral deposit, Odyssey has developed an expedition plan designed to assess the potential viability and value of the resource.

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

## Seawork 2015 was a sell-out and a record-breaking event

Europe's largest commercial marine exhibition and conference, Seawork, has concluded and been hailed a resounding success.

With over 600 exhibitors and over 10,000 products and services on offer, international, national and local exhibitors experienced unparalleled levels of interest from all areas from the commercial maritime sector.

From shipbuilding to diving to wind farm operations to maritime security and careers, the exhibition delivered the perfect platform for a host of offerings unmatched by any other European event.

International delegations were in attendance, from Brazil, the U.S. and China. In association with the UKTI, Seawork hosted a series of meetings throughout the week, which were arranged with many UK South Coast exhibitors. Previous years have seen numerous deals and collaborations formed following these meetings and this year is no exception.

The Seawork Conference vessel, the Ocean Scene witnessed jam-packed seminar sessions, with particular interest in the Solent Offshore Renewable Energy Consortium 'Meet the Buyer' event, which attracted over 200 people.

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



After completing the "Olympus" project search and inspection operations and conducting equipment testing, the Odyssey Explorer returned to port in Cork, Ireland to await the results of the data analysis and be positioned to commence the next stage of work on this project, the "Victory" project, or a potential multi-month paid contract, depending on which opportunity is next available to pursue.

In addition to work on the Odyssey Explorer, Odyssey technicians and equipment have been conducting scientific experiments aboard the Dorado Discovery under contract. Pelagic Research Services contracted the Dorado Discovery and Odyssey's equipment and technicians separately to conduct several projects in the Pacific Northwest region for government and

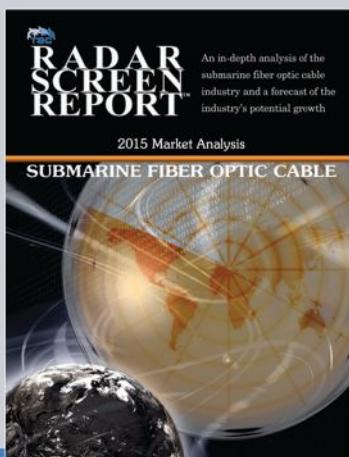
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## The World of Submarine FIBER OPTIC CABLE

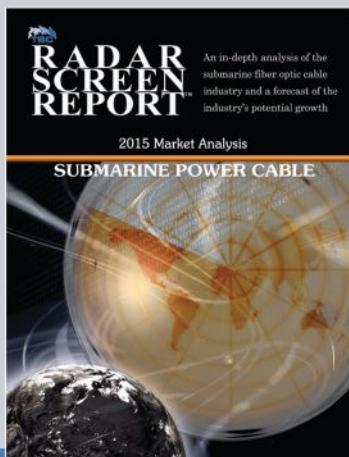
Increasing dependency on global connectivity correlates to a strengthening market for submarine fiber optics. The 2015 Radar Screen Fiber Optic Cable Report provides an in-depth overview of the state of the industry and insight to future opportunities over the next five years.



- Review of 2014 Contracts
- Forecast Demand 2015-2020
- Major Factors Impacting the Market
- List of 2014 Projects Under Contract
- List of Future Planned Projects

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## Gas and low-flashpoint fuels code adopted by IMO

The new mandatory code for ships fuelled by gases or other low-flashpoint fuels was adopted by IMO's Maritime Safety Committee (MSC) when it met at the Organization's London headquarters for its 95th session from 3 to 12 June 2015. The MSC adopted the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code), along with amendments to make the Code mandatory under the International Convention for the Safety of Life at Sea (SOLAS). The use of gas as fuel, particularly liquefied natural gas (LNG), has increased in recent years due to lower sulphur and particulate emissions than fuel oil or marine diesel oil. But gas and other low-flashpoint fuels pose their own set of safety challenges, which need to be properly managed. The IGF Code aims to minimize the risk to the ship, its crew and the environment, having regard to the nature of the fuels involved. The amendments to SOLAS chapter II-1 (Construction – Structure, subdivision and stability, machinery and electrical installations) include amendments to Part F Alternative design and arrangements to provide a methodology for alternative design and arrangements for machinery, electrical installations and low-flashpoint fuel storage and distribution systems; and a new Part G Ships using low-flashpoint fuels to add new regulations to require ships constructed after the expected date of entry into force of 1 January 2017 to comply with the requirements of the IGF Code, together with related amendments to chapter II-2 and Appendix (Certificates). The IGF Code contains mandatory provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using low-flashpoint fuels, focusing initially on LNG.

## exactEarth and Harris Corporation form strategic alliance to provide real-time global maritime tracking

exactEarth Ltd., the leading provider of Satellite Automatic Identification System (AIS) data services, and Harris Corporation, a world leader in space, geospatial and remote sensing solutions, have formed an alliance to provide a new level of AIS data service that will deliver real-time global coverage for maritime vessel tracking. The new service will leverage the persistent global coverage and real-time connectivity of the Iridium NEXT constellation through the implementation of 58 hosted payloads covering the Maritime VHF frequency band. Compatibility testing of the hosted payload with the Iridium satellites has been completed and the first launch is scheduled for early 2016 with the completed constellation expected in 2017. The new service will provide customers with the fastest, most accurate vessel information available. With revisit times and latency under one minute, the service expansion represents a monumental leap forward in the ability for both Harris and exactEarth to offer truly unsurpassed global ship tracking and maritime information solutions. The alliance leverages exactEarth's proven and patented signal de-collision detection technology and Harris' expertise in satellite hosted payloads, advanced radio frequency technology and antenna solutions. Harris becomes the exclusive provider to the U.S. government of AIS products and services produced under the alliance, including exactEarth's exactAIS product portfolio, while exactEarth continues to serve all other global markets.

## Illegal discharges under joint surveillance in the Baltic and North Seas

Aircraft from six countries from Baltic Sea (HELCOM) and North Sea (Bonn) areas carried out a joint international aerial surveillance operation, confidential until finish, with the purpose of detecting illegal discharges at sea. The operation hosted by the Danish Defence Command resulted in only one observation of a minor discharge of vegetable oil and another spot of an unknown substance detected in the 62,000 sq. km operation area over Skagerrak and Kattegat, in total 42 total flight hours in good visibility. The 2015 Super CEPCO-Coordinated Extended Pollution Control Operation—was participated by Denmark, Finland, Germany, Ireland, Norway and Sweden. Such coordinated assignment is a regular biannual effort of the HELCOM member states, this time conducted jointly with the Bonn Agreement and with the Danish Defence Command Air Station Aalborg (EKYT) as a base.

## New Kongsberg Maritime and DNV-GL DP operator training



Kongsberg Maritime has become the first global maritime training provider to offer a new DNV-GL approved Dynamic Positioning Operator (DPO) training scheme at its training centers worldwide. The brand new KONGSBERG Training Scheme for DP Operators is based on a combination of new and established DNV training standards, with the learning process designed by Kongsberg Maritime.

The scheme is a step-change in the critical area of DPO training, with teaching and assessor competence, and the use of advanced simulators forming the platform for training high quality DPOs in a significantly reduced timeframe. The KONGSBERG Training Scheme for DP Operators focuses on competence training and competence assessment developed using the latest methods developed in the science of education. Instructors will work more closely with individual students throughout the duration of the scheme.

After completing the training program students leave with a DP certificate only by passing the mandatory theoretical and practical independent assessment. Implemented to ensure the competence of DPOs leaving the course, the exam is a significant change in approach to DPO training, which until now has not featured mandatory examinations and certification. Kongsberg Maritime is approved by DNV-GL as the global certification body for the new scheme, which is designed to produce highly qualified and competent DPOs.

The first KONGSBERG Training Scheme course for DP Operators starts in August at Kongsberg Maritime's training facility in Kongsberg, Norway. KONGSBERG training centers in Aberdeen, Houston, Rio de Janeiro and Singapore will also operate the new scheme.

The scheme is based on a three-step program. Step one is an intensive 10-day course, covering theory and practical elements with significant time spent on Kongsberg Maritime's cutting-edge DP and offshore training simulators. After logging the required sea-time with their employer (step two), course participants will return to the training centre to complete their training (step three) and take the exam. During the whole process, simulator and theoretical exercises will be used to monitor student learning levels.

The scheme also features an option to extend to a fourth step, to gain training and certification for specific DP operations. Course participants can select from Offshore Loading, Drilling and Offshore Operations extensions, all of which require the DPO to take an application-specific exam. Step-four participants will benefit from highly specialized training in theory and on application specific simulators.

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

## New and improved PSV design launched by Wärtsilä

With new rules and regulations affecting the Platform Supply Vessel (PSV) market, Wärtsilä is launching a new PSV ship design. The new design builds upon Wärtsilä's extensive and successful track record within the PSV segment, and puts the emphasis on increased cost efficiency, innovation and reducing environmental risk.

The design enables significantly lower fuel consumption when compared to existing PSVs on the market. The key improvement areas featured in this design include an efficient energy system with batteries, and optimised hull lines with high propeller efficiency. Other important features include an optimized superstructure and engine room, and an accommodation arrangement that promotes cost efficient construction. The design is in line with the future regulations for up to 1,200 cu. m of type II chemicals, and has significantly improved visibility from the bridge, reduced noise and vibration, and a main deck design that optimizes the deck cargo area.



"Wärtsilä ship designs consistently raise the bar for shipping in terms of efficiency and sustainability, and this state-of-the-art PSV design is yet another example of this. We are the leading ship designers of North Sea PSVs and our designs reflect the company's extensive experience and capabilities," says Riku-Pekka Hägg, vice president, Wärtsilä ship design.

More than 4000 vessels have been built using Wärtsilä ship designs. The company's designs are always based upon meeting the operational requirements of the vessel, and upon reducing the capital (CAPEX) and operational (OPEX) costs while minimizing environmental impact.

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

## Carnival Corporation orders first LNG-powered cruise ships from Meyer Werft

Carnival Corporation & plc announced it has signed a multi-billion dollar contract to build four next-generation cruise ships with the largest guest capacity in the world. The contract with Meyer Werft is part of a larger previously announced strategic memo of understanding with leading shipbuilders Meyer Werft and Fincantieri S.p.A for nine new ship orders.

The four new ships will also feature a revolutionary "green cruising" design. The ships will be the first in the cruise industry to be powered at sea by LNG.

The company said two of the ships will be manufactured for AIDA Cruises at Meyer Werft's shipyard in Papenburg, Germany. Additional information about the ships, including which new ships will be added to each brand, will be made available at a later date.

Based on Carnival Corporation's innovative new ship design, each of the four next-generation ships will have a total capacity of 6,600 guests, feature more than 5,000 lower berths, exceed

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180,000 gross tons and incorporate an extensive number of guest-friendly features. A major part of the innovative design involves making much more efficient use of the ship's spaces, creating an enhanced onboard experience for guests.

Pioneering a new era in the use of sustainable fuels, the four new ships will be the first in the cruise industry to use LNG in dual-powered hybrid engines to power the ship both in port and on the open sea. LNG will be stored onboard and used to generate 100% power at sea—producing another industry-first innovation for Carnival Corporation and its brands.

In addition to the two ships being built in Germany, Meyer Werft—which had the capacity to accommodate these four ship-building orders in its production schedule—will also build the two additional ships detailed in the announcement at its shipyard in Turku, Finland. Each new ship will be specifically designed and developed for the brand and the guests it will serve, underscoring the company's goal to consistently exceed guest expectations and provide first-time and repeat guests with the vacation experience of a lifetime on each and every cruise.

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

## Topaz selects ABS to provide fleet management software for offshore support vessels

Topaz Energy and Marine, a leading offshore support vessel company, has selected ABS as its fleet management software provider. Topaz will use the ABS Nautical Systems Fleet Management Software to achieve operational excellence by introducing a more streamlined approach to fleet management. This new relationship marks the continued expansion into the Middle East and offshore support vessel markets for ABS Nautical Systems.

René Kofod-Olsen, chief executive officer of Topaz Energy and Marine, said, "We took a substantial amount of time to select the correct fleet management system. It was imperative to select a company that not only has a proven solution in the maritime industry but offers user-friendly products and a fully integrated solution that aligns with our company objectives. The trust we have built with ABS over the years also played a major part in the decision-making process."

Topaz will install the ABS nautical systems fleet management software suite

on 58 of its core vessels to more efficiently plan for maintenance work, minimize downtime and reduce costs associated with drydocking. The relationship will also nurture the company's safety culture by providing further safeguards for the health and safety of their employees.

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

## Maersk Line orders 11 ultra-large container vessels

Maersk Line signed a new building contract with Daewoo Shipbuilding & Marine Engineering (DSME). The order is for 11 plus 6 optional second generation Triple-E container vessels with a capacity of 19,630 TEU (20 ft equivalent) each. The vessels will have a length of approximately 400 m, width of 58.6 m, and a 16.5 m draft.

The contract has a value of USD 1.8 billion. It was signed by Mr. Sung-Leep Jung, president and CEO of DSME, and Mr. Søren Skou, CEO of Maersk Line, at a ceremony at Maersk Line's headquarters in Copenhagen.

This is the second new-building order in Maersk Line's investment program, following the seven 3,600 TEU feeder vessels announced earlier this year. Over the coming 5 years, Maersk Line is planning to invest USD 15 billion in new-buildings, retrofitting, containers and other equipment. Maersk Line will thus be able to maintain the necessary capacity to grow with global demand as well as replace less efficient tonnage.

The new vessels will be the largest in Maersk Line's fleet and are intended for the Asia–Europe service. The vessels will replace smaller, less efficient vessels. The 11 new vessels will join Maersk Line's fleet between April 2017 and May 2018. They will sail under Danish flag.

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

## Van Oord's Stornes upgraded at Damen Shiprepair & Conversion

Van Oord's flexible fallpipe vessel, Stornes, has recently been in Damen Shiprepair & Conversion Rotterdam for a scope of work that allows the vessel to operate at greater water depths in future.

Stornes is a 175 m long, 26.24 m wide, DP2 vessel used for subsea rock installation to protect piping. Since her delivery to Van Oord in 2011, Stornes has mostly been installing rocks to water depths up to 800 m. However, a contract awarded to the company in 2013 required the vessel to operate at



1,300 m. After some minor modifications in 2014, the first phase of the contract was executed. Now, the vessel has received an upgrade to her rock-dumping tower, which enables an even better performance at these water depths. For this, Van Oord chose Damen, as Damen shiprepair & conversion sales manager Paul Ippel explains, "We have been welcoming vessels from Van Oord for some years now and we received an invitation to tender for the Stornes project in 2014."

Mr. Ippel says the long-standing relationship between the two companies is based on close cooperation. "From the outset of the project, cooperation between ourselves and the tender desk, superintendents and project managers of Van Oord has been excellent. This has meant that both partners maintained a continual understanding of what was happening and ensured the success of the project."

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

## TU Varna opens new maritime simulator wing

The simulation center of the Technical University of Varna has officially opened its new simulation wing. Following the opening of its simulation center in 2012, the TU Varna has known a steady growth and further expansion into a new simulator wing was required. All the simulators in the TU Varna training center are delivered and installed by VSTEP. The new wing features a NAUTIS Class B DP Simulator as well as a NAUTIS class A Full Mission Bridge Simulator and a new ECDIS Simulator classroom.

The opening ceremony was attended by representatives of the Technical University and officials of the municipal government of Varna. The rector of the Technical University, Mr. Ovid Farhi, and the mayor of Varna, Mr. Ivan Nikolaev Portnih, were present during the opening.

Simulator developer VSTEP was again the developer of choice to deliver and install its DNV certified NAUTIS simulators at the facility, including a NAUTIS DP Class B simulator and a NAUTIS Class A Full Mission Bridge Simulator. Using state-of-art simulation technology, the DP Class B simulator can be directly combined with the Class A FMB to form a fully multi-functional 360° Bridge setup. The bridge can also be transformed into a full mission tug simulator.

In addition to the DP and FMB simulators, the existing NAUTIS ECDIS Classroom has been extended with five new ECDIS stations. The NAUTIS ECDIS Classroom is now fully operational to provide type approved training for all current ECDIS systems, including Maris, Kelvin Hughes, NavMaster and SevenCS' E-Globe which are all integrated into the NAUTIS ECDIS Systems, making the simulation center of the TU Varna one of the most advanced training and education hubs in the region.

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

### Oshima receives approval in principle for new LNG-fuelled bulk carrier design

DNV GL has presented Oshima Shipbuilding Company with an Approval in Principle (AiP) certificate for a LNG-fuelled Kamsarmax bulk carrier. The new, innovative design has been found to comply with DNV GL class rules and all current and upcoming regulations, including the new emission control regulations and the draft IGF Code for fuel with a low flashpoint.

As regulations on harmful ship emissions such as sulphur become stricter, reducing SOx, NOx, CO<sub>2</sub> and particulate matter is at the top of the agenda for many players in the maritime industry. As a result, shipowners and operators are increasingly looking into the use of alternative fuels to ensure compliance for their fleet, now and in the future.

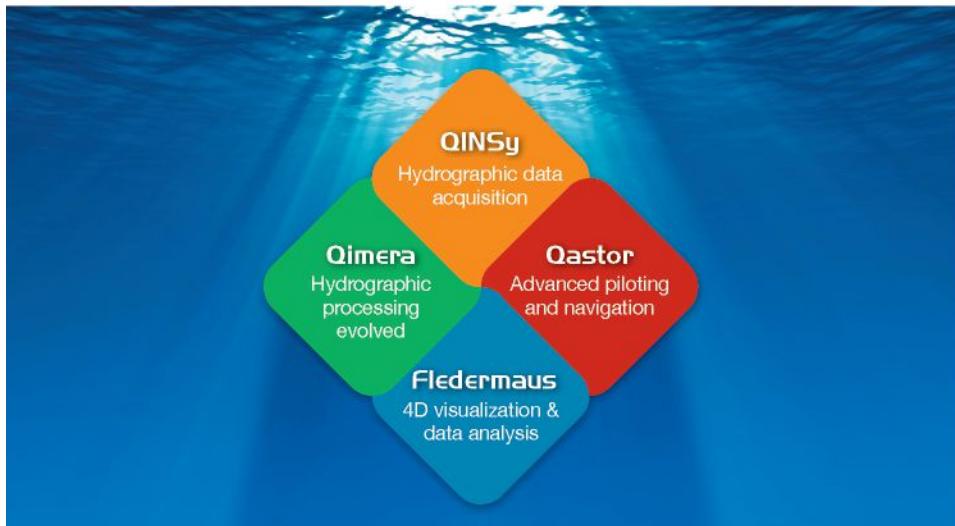
As space on deck is limited on a bulk carrier, the design features an innovative solution—changing the ship's superstructure to a U-shape that can accommodate the LNG tank in its center. This approach allows the accommo-

dation deck house to be completely separated from the LNG storage tank and scalability in terms of the amount of LNG storage onboard. Meanwhile, a tank cover adds an additional safety barrier and ensures compliance with the draft IGF Code. The bunkering stations for LNG, heavy fuel oil (HFO) and marine diesel oil are located at the side of the accommodation deck house.

Tatsuro Iwashita, director and general manager of the Design Department at Oshima, points out: "One of the main factors for shipowners and operators considering the use of LNG as ship fuel is the space required to store LNG on board. But as a result of our changes to the superstructure, our design does not reduce the vessel's cargo capacity. Combined with its dual fuel capabilities, this should make the design very attractive for charterers, especially for trade routes where the LNG fuel price is competitive to HFO and substantially cheaper than marine gas oil (MGO)."

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

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### More than two dozen undersea Atlantic coral canyons now protected

The Mid-Atlantic Fishery Management Council voted to protect 27 named deep sea canyons divided into 15 protection zones, as well as a vast swath of surrounding deep sea habitat, off the region's coast. These areas are home to rare, ecologically important and highly vulnerable coldwater coral communities as well as a range of other remarkable sea life. At approximately 38,000 sq. mi and extending from the edge of the continental shelf to the boundary of the U.S. Exclusive Economic Zone, this will be the largest ocean area in the U.S. Atlantic and Gulf of Mexico protected from destructive bottom fishing. The Council, together with NOAA, manages U.S. fisheries resources in the region and initiated development of the protection plan 3 years ago to safeguard deep sea corals—which grow very slowly and can be hundreds or thousands of years old—against bottom trawling and other destructive bottom fishing. The protection plan is the first to rely on special legal authority to protect deep sea corals that was added to the federal fisheries management law in 2006. The plan now goes to NOAA, where approval is expected. Since 2011, NOAA has led a series of dives into the Atlantic canyons to research, map and characterize the undersea canyons. The result has been a steady stream of discovery and revelation: new and rare species, new understandings about ecological relationships and the diversity of ecological settings in the canyons and seamounts, and new appreciation of how special these deep-sea ecosystems are. According to NRDC's issue brief, "The Atlantic's Deep Sea Treasures: Discoveries From A New Frontier of Ocean Exploration," dozens of coral species have been identified, at least three of which are believed to be brand new to science. Some are so abundant that scientists described them as coral "forests." Species of red, black, bubblegum, stony, and soft corals have all been found, a number of which were never before known to exist in this region.

### Global marine data to become unified and accessible

An international project aims to enable the next great scientific advances in global marine research by making marine data sets more easily accessible to researchers worldwide. Currently different data formats between research centers pose a challenge to oceanographic researchers, who need unified data sets to get the most complete picture possible of the ocean. This project, called ODIP II, aims to solve this problem using NERC's world-class vocabulary server to "translate" between these different data semantics. The vocabulary server, which is effectively now an international standard for a service of this kind, was developed by the British Oceanographic Data Centre (BODC); a national facility operated as part of the National Oceanography Centre (NOC). The Head of BODC, Dr. Graham Allen, which is leading the vocabularies aspect of ODIP II, said "This project will open up the possibilities of global marine research. For example, if scientists could access all the data on ocean temperature from, say, the North Sea, they would get a much more comprehensive insight into changes in ocean circulation there. Data management innovations like this enable the next big global scientific advances to happen." ODIP II is a collaboration between the U.S., Australia and the EU, which are led by British Geological Survey and MARIS (Netherlands). The EU's Horizon2020 program has provided £2M for this project. By the time ODIP II is complete, in May 2018, it aims to have developed a means of seamlessly sharing and managing marine data between the EU, the USA and Australia, by co-ordinating the existing regional marine e-infrastructures. Helen Glaves of British Geological Survey, who is leading ODIP II, welcomed the extension: "ODIP has already succeeded in demonstrating a coordinated approach to the sharing of marine data on a global scale through the development of prototypes. This new funding will not only allow these prototype solutions to become fully operational, but will also enable the scope of the current project to be widened."

## NOAA deploys survey ships for Arctic charting



*NOAA ships spent the last several days preparing for their Arctic missions. Here, Chief Bosun Jim Kruger (front) works with Jason Kinyon and Lindsey Houska on NOAA Ship Rainier as they get ready to depart for the summer's first Arctic survey project, in Kotzebue Sound. (Credit: NOAA).*

NOAA officially launched its 2015 Arctic hydrographic survey season, in Kodiak, Alaska in a World Ocean Day ceremony that showcased the deployment of the NOAA ships Rainier and Fairweather.

In remarks directed to the crews of NOAA ships, Vice Admiral Michael S. Devany, NOAA deputy under secretary for operations, said, "Most Arctic waters that are charted were surveyed with obsolete technology, with some of the information dating back to Captain Cook's voyages, long before the region was part of the United States. Your work this summer is a crucial mission in our determination to make the Arctic seas safer for shipping, sustenance, and marine life."

In anticipation of growing vessel traffic in the Arctic, NOAA is increasing its charting activities in the region to help ensure navigation safety. This week, Rainier and Fairweather will depart Kodiak to begin a summer of hydrographic surveying projects in the Arctic. NOAA will use the surveys, which will measure ocean depths and search for dangers to navigation, to update nautical charts for Alaska's waters.

This summer's projects were the focus of the deployment ceremony, which was attended by federal, tribal, state and local dignitaries and featured a performance by the Kodiak Alutiiq Dancers.

For this year's Arctic survey projects, the NOAA ships will collect new charting data for Port Clarence, Kotzebue Sound, and Point Hope. The ships will also survey the seafloor as they transit to and from the project areas, collecting data along a potential Arctic shipping route from Unimak Island to the Chukchi Sea, as proposed in the U.S. Coast Guard's Port Access Route Study for the region.

NOAA's Office of Coast Survey, which manages NOAA's surveys and creates the nation's nautical charts, will also manage a survey project conducted by TerraSond under a federal contract. The private company will check the extent of the Prince of Wales shoals to help vessels transiting to and from points in the Chukchi and Bering Seas.

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

## Interruption of the Gulf Stream may lead to large cooling in Europe

A new record of past climate change shows that a warm climate in northern Europe can be hit by a sudden cooling associated with an interruption of the North Atlantic Ocean circulation and the Gulf Stream. This is shown in a new study published in Quaternary Science Reviews, investigating the development of northern European climate about 120 thousand years ago.

The investigated time interval, called the Eemian, occurred before the last Ice Age and was characterized by warmer-than-present temperatures in large parts of the globe. The Eemian climate evolution can therefore serve as an analogue for a future warmer climate.

The study of fossil remains, such as plants and insects, preserved in geological deposits in northern Finland revealed an abrupt climatic cooling event that happened in an otherwise warmer climate. During this event the temperatures dropped 2°C to 4°C and remained low for a period of 500 to 1,000 years. Comparison with seafloor sediment records from the Norwegian

Sea and the North Atlantic indicates that the rapid cooling was associated with a sudden slowdown in North Atlantic deep water formation and a reduction in the northward extension of the Gulf Stream that transports heat to northern Europe.

The new evidence shows that the last time when temperatures were significantly warmer than today, climate instability occurred.

"This may have been caused by melt water coming from the Greenland Ice Sheet, disrupting the North Atlantic Ocean circulation. While the exact mechanism behind the sudden cooling still remains uncertain, the study illustrates the potential for major climatic instability in and around the North Atlantic region under future global warming", says Karin Helmens at the Department of Physical Geography, Stockholm University.

The study was performed by an international research group led by Dr. Karin Helmens from Stockholm University and Bolin Centre for Climate Research (Sweden). The group also includes scientists from the University

of Helsinki (Finland), University of Bergen and Bjerknes Centre for Climate Research (Norway), and VU University Amsterdam and University of Amsterdam (The Netherlands).

For more information, visit [www.su.se](http://www.su.se).

## New study could pave way for an ocean acidification early warning system for coral reefs

A new study on Australia's Great Barrier Reef showed that corals are continuously exposed to two key climate change-related stressors throughout the year, but not necessarily at the same time. The results can help scientists better monitor the exposure of coral reef ecosystems to global climate change.

For 6 months, an international team led by scientists at Scripps Institution of Oceanography at UC San Diego collected high-resolution measurements of temperature, pH, carbonate chemistry, and other key environmental parameters on the Heron Island coral reef flat, located in the southern Great Barrier Reef. The results revealed that exposure to low pH and high water temperature



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occur in a non-synchronized way, which suggests that coral reefs could be subject to stressful conditions more often than scientists previously thought.

"Corals are being exposed to environmental stressors at different times, which could allow a reef some recovery time between stress events, such as a warm-water bleaching event," said David Kline, project scientist at Scripps Oceanography and lead author of the new study. "On the other hand, there is also a greater chance that stress events occur during times of high energy demands, such as reproduction."

The study, published in the 3 June issue of the journal PLOS ONE, is the first to provide a high-resolution, long-term dataset of seawater carbonate chemistry on a coral reef flat, or the shallow back reef close to shore. During the 2010 experiment, night-time pH levels on the reef flat were often lower than pH values predicted by the Intergovernmental Panel on Climate Change for the open ocean in 2100.

"We can use this new information to develop a warning system for both temperature and pH stress events on coral reefs," said Kline. "In a world with growing CO<sub>2</sub> levels, that will become more important."

Climate change and ocean acidification are widely considered to be the largest threats to coral reefs globally. To monitor ocean acidification, scientists measure the pH of seawater, which decreases as the oceans absorb carbon dioxide from the burning of fossil fuels. In the oceans, chemical reactions convert a portion of the CO<sub>2</sub> into carbonic acid, thereby lowering the pH.

The research team hopes that these results illustrate the importance of including both temperature and pH in computer models that predict when coral reefs are most likely to be impacted by these types of stress events.

The study included researchers from the University of Queensland in Australia, Stanford University, Conservation International, Carnegie Institution, University of Hawaii, University of Alaska, Institut

Océanographique Paul Ricard, and the Hebrew University of Jerusalem.

The research was funded by Australian Research Council (ARC) Linkage Infrastructure, Equipment and Facilities grants, an ARC Centre of Excellence grant, a Queensland Government Smart State Premier's Fellowship, National Science Foundation grants, and the Pacific Blue Foundation.

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

### Diverse corals persist, but bioerosion escalates in Palau's low-pH waters

A new study led by scientists at Woods Hole Oceanographic Institution (WHOI) found that the coral reefs in Palau seem to be defying the odds, showing none of the predicted responses to low pH except for an increase in bioerosion—the physical breakdown of coral skeletons by boring organisms such as mollusks and worms. The paper was published 5 June 2015 in the journal *Science Advances*.

"Based on lab experiments and studies of other naturally low-pH reef systems, this is the opposite of what we expected," says lead author Hannah Barkley, a graduate student in the WHOI-MIT Joint Program in Oceanography.

Experiments measuring corals' responses to a variety of low pH conditions have shown a range of negative impacts, such as fewer varieties of corals, more algae growth, lower rates of calcium carbonate production (growth), and juvenile corals that have difficulty constructing skeletons.

"Surprisingly, in Palau where the pH is lowest, we see a coral community that hosts more species and has greater coral cover than in the sites where pH is normal," says Anne Cohen, a coauthor on the study and Barkley's advisor at WHOI. "That's not to say the coral community is thriving because of the low pH, rather it is thriving despite the low pH, and we need to understand how."

When the research team compared the communities found on Palau's reefs with those in other reefs where pH is naturally low, they found increased bioerosion was the only shared common feature.

So how do Palau's low-pH reefs thrive despite significantly elevated levels of bioerosion? The researchers aren't certain yet, but hope to be able to answer that question in future studies. They also don't completely understand why conditions created by ocean acidification seem to favor bioeroding organisms.

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

### CSA utilizes unique GIS software for underwater survey

Utilizing full motion video (FMV) technology, CSA Ocean Sciences Inc. (CSA) marine biologists have successfully conducted an underwater biodiversity survey. FMV is defined as digital video with integrated geospatial information (real-time latitude and longitude) and relates the video to other geospatially defined attributes, such as multi-beam bathymetry, in space and time. Unlike older technologies where static time and latitude and longitude were "burned" into the digital image, the spatial and temporal information associated with FMV can be accessed by geographic information systems (GIS). The result is a powerful tool for capturing geospatially articulated information from within the video image and rendering that information into a GIS for further analysis.

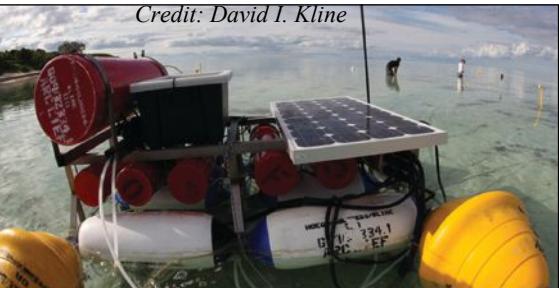
During this survey, CSA assessed fish and macro-invertebrate assemblage composition and abundance over reefs and other hard bottom features. Digital video and navigation data were collected from an underwater vehicle that was used to survey transects over a target area. As data were collected, they were fused into a FMV stream and then recorded as FMV-compliant video. The FMV was then played back in association with a seafloor map in ArcGIS for Desktop.

The process of synchronization (in live stream or post-processing mode) can be conducted using any combination of vehicles, vessels, or even divers carrying a camera using CSA's underwater telemetry systems. As the FMV is played back, pre-determined bookmarks representing transects, quadrats, or other sample units are integrated with the video to provide a more complete, geographically accurate time track of the camera over the seascapes as a cross-check to ensure that proper sample boundaries were maintained. In addition, ArcGIS for Desktop allows the analyst to easily classify and record the position of objects in the video (fish and macroinvertebrate species) from pre-prepared drop-down menus.

Once the biological data were extracted for this project, advanced GIS techniques were employed to determine spatial associations of the biota with seafloor features, helping to identify potential "hotspots" of biodiversity and essential fish habitat.

FMV technology provides a new level of information available to future marine spatial planning efforts.

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



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## Blackbird signs agreement for wave energy plant in Guinea-Bissau

Blackbird International Corporation has signed an agreement with the government of Guinea-Bissau for the development by Wave Electricity Renewal Power Ocean Ltd (WERPO) of a 500 MW sea wave power plant along the coastline of Guinea-Bissau at a value of \$500 million. Blackbird is the sole shareholder of WERPO. The project will be a joint venture with the government of Guinea-Bissau whereas the government will have a 30% partnership and earn 40% of the profits for a period of 25 years. BBRD is forecasting the costs of the project at an estimated \$325 million for the entire project. The government of Guinea-Bissau is obliged by the contract to pay 10 cents per KWH and our projections are for \$50 million yearly revenue from this contract. Current estimates are that the actual planning and building will take 3 years until completion. This project will help Guinea-Bissau become more independent with a stable power supply that can solve all the energy problems in the country. Mr. Shmuel Ovadia, director and inventor of BBRD's technology, stated, "Guinea-Bissau is a perfect location to introduce sea wave energy as a viable and profitable solution for rising energy needs by implementing our patented technology and is further testament to our unique and patented sea wave power generation technology and its worldwide demand."

## Swansea Bay Tidal Lagoon enters advanced work phase

The British construction industry is set to play a leading role in the delivery of the £1 billion Swansea Bay Tidal Lagoon following the conclusion of one of the project's main civil engineering and construction package tenders. Laing O'Rourke has been named as preferred bidder for the ~£200 million contract to deliver the lagoon's 410-m turbine house and sluice structure block. This element of the build will require up to 500 workers at peak construction, a substantial number of whom will be local to South Wales. Concrete, reinforcing and other materials will also be sourced locally. Laing O'Rourke has named Arup as its lead design and engineering partner for the contract. Andrew McNaughton, who earlier this month joined Tidal Lagoon Power as director of engineering & construction, will lead the delivery of the Swansea Bay Tidal Lagoon. He said, "Announcing that Laing O'Rourke is joining the team is a major step forward for the project. As preferred bidder, their contribution over the next few months alongside General Electric and Andritz Hydro will be invaluable in preparing for delivery on site in 2016." Following advanced works and value engineering, a fixed price contract will be signed later this year for the main build. Tidal Lagoon Swansea Bay Plc has also run tenders for the project's marine works package and for a package to provide public realm ancillary works. The results of these tenders will be announced shortly. Further tenders for the construction of a turbine assembly plant in Wales, and for the lagoon's public realm and buildings work will proceed through the summer.

## ORIX participates in the development of Kashima Port wind farm

ORIX Corporation, a leading integrated financial services group; Wind Power Group K.K., a member of the Komatsu Group; and SB Energy Corporation announced that ORIX has agreed to participate in the joint development and construction of Kashima Port Large-Scale Offshore Wind Farm that is to be built offshore Kashima Port in Kamisu City, Ibaraki Prefecture. The equity investment by ORIX into the project company also has been completed. The project involves the installation of 20 wind turbines offshore Kashima port, with each turbine possessing output capacity of 5,000 kW. The project aims to create the largest commercial offshore wind farm business in both Asia and Japan with the maximum output of approximately 100 MW and a projected annual power generation of approximately 245 million kWh. The wind farm planning and construction will be carried out by Wind Power Energy K.K., a special purpose company jointly invested by ORIX, Wind Power Group, and SB Energy. This is the first time ORIX has taken part in an offshore wind farm project.

## Aquamarine Power to share know-how with Wave Energy Scotland



Wave energy company Aquamarine Power has secured a 3-month contract with Wave Energy Scotland (WES) to share knowledge gained through the development of Oyster technology.

The work package, known as "Project Know-How," will enable Aquamarine Power's team to share the experience gained through building, installing and operating two full scale Oyster wave energy machines at the European Marine Energy Centre in Orkney.

WES aims to support and accelerate the development of wave energy technology in Scotland and was established as part of development agency Highlands and Islands Enterprise. It is funded by the Scottish Government.

Commenting on the contract award, Aquamarine Power chief executive officer, Paddy O'Kane said:

"Aquamarine Power has accumulated a wealth of knowledge in verifying the Oyster concept. It is important that this learning is shared with others. Public funding is a scarce resource and we must ensure that the lessons we have learned, and the problems we have solved, can be put to good use by others in the industry."

"This work package will help us all to collaborate and 'work smarter' in solving current and future wave industry challenges." Within the 'know-how' package, Aquamarine Power will hold a workshop for WES industry invitees and will disseminate knowledge in areas as diverse as offshore operations, corrosion and protection, supply chain components, resource modeling and assessments and maintainability improvements.

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

## Crown Estate publishes major offshore data collection

The Crown Estate, which manages the United Kingdom's offshore lands, has published a vast collection of new offshore data and information on its online Marine Data Exchange (MDE). This data—totaling over 11.5 terabytes (TB) have been gathered from a wide range of surveys and technical studies from the former Celtic Array offshore wind project off the coast of Anglesey in Wales, and from the First Flight Wind offshore wind project off the coast of County Down, Northern Ireland.

The Irish Sea data encompass a wealth of information, comprising environmental material, such as bird and mam-

mal surveys; human activity evaluations, such as shipping, navigation and archaeological data; and physical environmental detail, such as geotechnical and geophysical data and sediment sampling. This follows the publication last year of a major collection of data from the former Atlantic Array offshore wind project in the Bristol Channel.

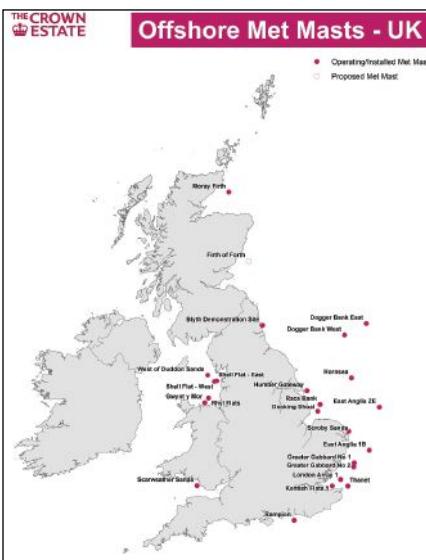
These studies can take a long time and be expensive to carry out—for example, marine bird surveys, which are an essential part of planning to ensure that natural habitats are not affected by offshore developments, can take around 3 years to complete.

Huub den Rooijen, head of offshore wind for the Crown Estate, said, “We are harnessing the power of open data to help build a picture of this natural resource for different marine users. By making information easily available through the Marine Data Exchange we can help stimulate research, support academia and contribute towards the sustainable development of the seabed to unlock value over the long term.”

The Marine Data Exchange also provides access to wider environmental survey data and reports collated during the planning, building and operation of offshore renewable energy projects. Recent improvements to its functionality and user experience include a new facility to generate tailored alerts to new content.

The Crown Estate takes an active approach to managing the seabed to unlock value from this natural asset, including through supporting offshore wind. It invests in activities such as technical surveys and commissioning of reports, through to bringing industry together to share knowledge and best practice. This is part of its positive approach to active asset management and long-term investment.

For more information, visit [www.thecrownestate.co.uk](http://www.thecrownestate.co.uk).



## German offshore wind parks perform relatively well

With an average cost overrun of 20%, offshore wind parks perform well in comparison to other large-infrastructure projects. The average large-infrastructure project in Germany is 73% more expensive than planned. This was one of the key findings of a study by the Hertie School of Governance, under the leadership of Genia Kostka, professor of governance of energy and infrastructure.

Although the coordinators of offshore wind parks face a range of risks related to pioneering new technology, a case study focusing on eight of these projects identified a clear ability to learn and adapt the planning of construction and installation. However, planned expansion was delayed an average of 13 months per park by problems with the regulated grid connection. For consumers this meant a price hike of over 1 billion Euros by the end of 2014. A central weak point has been the lack of coordination between transmission providers and wind park developers, a problem compounded by unclear political frameworks.

Niklas Anzinger, author of the case study, said, “Better coordination, also with the neighboring North Sea states, would ensure additional learning effects and allow offshore wind energy to make the desired contributions to the energy transition.”

Within the energy sector, the data reviewed by the researchers has allowed a comparison of nuclear power plant construction from the 1960s to the 1980s: the six reviewed nuclear power plants were on average 187% more expensive, in other words three times more expensive than planned. Learning effects over time were not identified.

“With by now comparatively standardized technology as well as shorter construction and installation periods, windparks can definitely be planned better,” said Anzinger.

This study, under the leadership of professor of governance of energy and infrastructure, analyses the scale, patterns and causes of cost overruns in 170 large public infrastructure projects in Germany. Of those, 119 were finished between 1960 and 2014 and 51 are currently still under construction. Projects from the building, transportation, defense, energy and ICT sectors are analyzed based on systematically planned versus real budgets. Three detailed case studies on the Berlin Airport BER, the

Elb Philharmonic and Offshore Wind Parks round out the investigation.

The study was made possible by the friendly support of the Karl Schlecht Foundation.

The detailed working paper and case studies are available for download at [www.hertie-school.org/infrastructure](http://www.hertie-school.org/infrastructure).

## Aecon Group secures fabrication contract for OpenHydro

Aecon Group Inc. and Lengkeek Vessel Engineering have been selected for contracts worth \$25 million as part of the first round of procurement awards on the Cape Sharp Tidal project after a competitive tender process. Cape Sharp Tidal is a joint venture between Emera Inc. and OpenHydro.

Later this year, the project aims to deliver one of the world’s first tidal arrays, with the deployment and grid connection of two 16-m turbines in the Bay of Fundy, each capable of generating 2 MW of electricity.

Aecon Group Inc. secured the contract for fabrication of turbine components. It will also develop a 1,150 ton capacity barge for OpenHydro, which will be used to deploy turbines onto the seabed for the Cape Sharp Tidal project, as well as other future tidal array developments. Lengkeek Vessel Engineering was awarded the contract for design of the barge.

In April, the government of Nova Scotia introduced legislation that provides both clarity and strategic direction for the development of marine renewable energy in the province. Once in place this fall, the Act will ensure projects continue to develop in a way that respects the environment and considers the interests of local communities.

The Bay of Fundy’s tidal resource is one of the most powerful in the world. Cape Sharp Tidal is seeking to use the initial demonstration array in 2015 as the first phase of a commercial-scale project in the Bay of Fundy, which is subject to regulatory approvals, will see the development grow to an output of 300 MW.

In April 2015, OpenHydro was awarded \$6.3 million for the Cape Sharp Tidal project by Sustainable Development Technology Canada (SDTC), a not-for-profit foundation that finances and supports the development of clean technologies. SDTC funding will support OpenHydro in further refining its technology into a product ready for industrial roll-out.

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

## GE delivers electrical conversion system for tidal arrays

One of the world's first tidal arrays near Paimpol-Bréhat, France, will soon be deployed. Delivering a new generation of renewable energy, the project will harness the predictable power of ocean tides to generate electricity.

Development of the tidal demonstrator farm kicked off under the leadership of Electricité de France S.A. (EDF). GE Power Conversion has been in partnership with EDF since the very beginning and is now on track for finalization of the electrical conversion system, due for summer 2015. GE's Belfort team is working diligently to perform relevant tests before installing the system both subsea and onshore.

Two OpenHydro 16-m turbines will be connected to a common subsea converter that will transform the current to high voltage direct current (HVDC) to provide 1 MW of electricity. The power will be transmitted to the onshore station and eventually feed into the electrical grid. GE Power Conversion is undertaking development of the subsea converter as well as the onshore station.

The enclosure for the subsea converter is 9 m in length, 5 m in width and 4 m in height.

The converter will be delivered to Brest and be installed by DCNS on the specific foundation designed by OpenHydro, which supports both the convertor and the 16-m turbine.

Among the advanced technology employed to put the complex electrical design into action is GE's MV3000 low voltage drive. Together with other electrical components, it enables the low voltage alternating current, generated by the Open-Centre Turbines to be transformed into HVDC. The electrical current will then be transported through the 16 km subsea cable to the onshore station. HVDC significantly reduces energy loss and therefore offers remarkable energy savings over long distance power transmission.

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



## TenneT issues Green Bond for offshore wind farms

TenneT Holding B.V. successfully launched and priced its inaugural Green Bond issue, a EUR 1 billion dual tranche (6 and 12 year) bond issue, each sized at EUR 500 million, with the support of five banks: HSBC Bank plc., ING Bank N.V., Royal Bank of Scotland, Lloyds TSB Bank plc. and Rabobank.

This announcement relates to the issuance of Green Bonds for investments in the transmission of renewable electricity from offshore wind farms to the onshore electricity grid. The following offshore projects are financed with the proceeds:

- DolWin1 (commissioning 2015): a 165 km HVDC link with 800 MW capacity;
- DolWin2 (commissioning 2015): a 135 km HVDC link with 916 MW capacity; and
- DolWin3 (commissioning 2017): a 162 km HVDC link with 900 MW capacity.

TenneT's investments in offshore wind energy projects across the Netherlands and Germany are expected to total EUR 7 to 9 billion over the next 10 years. In the period up to 2019, TenneT is realizing over 7,000 MW of connection capacity for offshore wind farms in the German sector of the North Sea, transmitting electricity equivalent to the annual power consumption of approximately 9 million households. By 2023, the TSO expects to have realized 3,500 MW of connection capacity in the Dutch sector of the North Sea, corresponding to the annual power consumption of over 4 million households.

In April 2015, TenneT published a Green Bonds Framework that serves as a structure for verifying the sustainability quality (i.e., the social and environmental added value) of the projects to be financed through the issuance of Green Bonds.

For more information, visit [www.tennet.eu](http://www.tennet.eu).

## Full power at Westermost Rough offshore wind farm

The Westermost Rough offshore wind farm has achieved full power output capable of generating up to 210 MW of electricity—enough to meet the annual electricity demands of well over 150,000 U.K. homes. It is the first offshore wind farm to make commercial use of the Siemens 6 MW wind turbine.

Westermost Rough is a joint ven-



ture between DONG Energy (50%) and its partners Marubeni Corporation (25%) and the UK Green Investment Bank plc (25%).

Construction of the wind farm is being managed from DONG Energy's office in the Fish Dock, Grimsby, on Britain's east coast, by a team of about 50 people. A permanent home for the wind farm's operations and maintenance team has also been built at the Royal Dock in Grimsby.

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

## All turbines are installed at Borkum Riffgrund 1

Only few days after having reached the 3,000 MW milestone, DONG Energy has installed the last of a total of 78 turbines at Borkum Riffgrund 1 Offshore Wind Farm in the German North Sea. The next step will be the final commissioning of all remaining wind turbines. More than half have been already commissioned. All closing activities will run during summer.

When fully operational the German offshore wind farm will be capable of generating 312 MW electricity. This will be enough to meet the annual electricity demands of 320,000 German households.

The offshore wind farm is owned by DONG Energy (50%), Kirkbi (32%) and William Demant Invest (18%). DONG Energy is also building the Gode Wind 1+2 in Germany. They are expected to be completed in 2016. With a total capacity of 582 MW they will be the biggest offshore wind farm in Germany and will be able to produce CO<sub>2</sub> electricity corresponding to the annual demand of more than 600,000 German households.

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

## Contract signed on Taiwan's first offshore wind farm

Formosa Wind Power Company Ltd, which K2 Management is supporting as a general consultant, has signed a firm and unconditional turbine supply agreement for the test project of Formosa 1 Offshore Wind Farm, which is Taiwan's first utility-size offshore wind farm.

Siemens Wind Power has been awarded with the contract and will deliver two 4 MW turbines to be installed in 2016 for the Formosa 1 Phase 1.

Formosa Wind Power Co. Ltd. is a winner of the Taiwan Government Grant Scheme promoting wind energy development in Taiwan. The Formosa 1 Offshore Wind Farm is located near the coast of Miaoli County.

Co-founder and partner at K2 Management, Per Melgaard is heading up the company's Asian activities with offices in Thailand, Korea and Taiwan and has been directly involved in Taiwan offshore project.

For more information, visit [www.k2management.com](http://www.k2management.com).

## SRP's Rocksteady™ performs successfully on Perth wave energy project

Subsea Riser Products Ltd (SRP), an Acteon company, and part of its marine risers and moorings business, has completed the third and final installation using the SRP Rocksteady™ mooring connector for the Perth Wave Energy demonstration project, offshore Western Australia.

Summarizing the original sourcing decision, David Kessel, Carnegie supply chain and IMS manager, said, "As part of the ground-breaking Perth Wave Energy Project, a competitive tender process was undertaken for the rapid connection system that joins the CETO pump to the seabed pile foundation. Carnegie Wave Energy selected SRP and its Rocksteady connector technology based on cost, quality, reliability and delivery."

Carnegie's demonstration project is the first wave energy project to use a variant of the SRP Rocksteady subsea mooring connector. Kessel added, "The Rocksteady connector ensured a

safe, quick connection and subsequent release of the CETO unit, which significantly reduced the installation time and the amount of diver intervention needed.

"During the first unit installation, the Rocksteady connector automatically latched when fully inserted in the receptacle. It was then preloaded to survive the cyclic wave loading. Carnegie required a 1-day (port-to-port) installation and met this target with the installation of the second and third CETO units, in which the Rocksteady played a vital role."

With all three CETO systems now installed, the Rocksteady subsea mooring connectors, with a maximum breaking load (MBL) of 2,000 tonnes, have been operating successfully for more than 6 months in sea states of up to 3.5 m wave height. Carnegie will soon be undertaking the first subsea disconnection to conduct an onshore inspection of the full CETO 5 system.

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

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**HII awarded \$3.3M for CVN 79 work**

Huntington Ingalls Inc. (HII), Newport News, Virginia, is being awarded a \$3,352,611,760 fixed-price-incentive-firm target contract for all remaining detail design and construction (DD&C) efforts for aircraft carrier USS John F. Kennedy (CVN 79). This new contract award, along with simultaneously awarded modification N00024-09-C-2116, will provide all design and construction services and material for the construction of CVN 79, including necessary research studies; engineering; design; related development efforts; detail design and procurement of material; construction; life cycle support; logistics data; and other data to support the DD&C of CVN 79. Work will be performed in Newport News, Virginia, and is expected to be complete by June 2022. Fiscal 2011, 2013, 2014, and 2015 shipbuilding and conversion (Navy) and fiscal 2015 research, development, test and evaluation funding in the amount of \$188,031,383 will be obligated at time of award and funds will not expire at the end of the current fiscal year. The contract was not competitively procured in accordance with FAR 6.302-1—only one responsible source and no other supplies or services will satisfy agency requirements. The Naval Sea Systems Command, Washington Navy Yard, Washington, District of Columbia, is the contracting activity (N00024-15-C-2114).

**BAE awarded \$26.8M for submarine propulsor and tailcone**

BAE Systems Land & Armaments LP, Minneapolis, Minnesota, is being awarded a \$26,775,439 firm-fixed-price modification to previously awarded contract (N00024-09-C-4137) for the manufacture and delivery of propulsor and tailcone for Virginia-class submarines SSN 792 (USS Vermont) and SSN 793 (USS Oregon). This modification is for the manufacture and assembly of the fixed portion and partial rotating portion of the Virginia-class submarine propulsor required to support construction of SSN 792 and SSN 793. Work will be performed in Louisville, Kentucky (88%) and Minneapolis, Minnesota (12%), and is expected to be completed by May 2017. Fiscal 2015 shipbuilding and conversion (Navy) funding in the amount of \$26,775,439 will be obligated at the time of award and will not expire at the end of the current fiscal year. The Naval Sea Systems Command, Washington, District of Columbia, is the contracting activity.

**Southeast Asia security update**

As a result of more and increasingly intensive attacks in Southeast Asia, it has been confirmed that International Marine Transportation Limited (IMT), Exxon Mobil's UK-based shipping affiliate, is going to start conducting Best Management Practices 4 (BMP4) audits for vessels transiting through the area. BMP4 has been effective in hardening vessels transiting through the Indian Ocean so that even an unarmed merchant ship, while by no means impregnable to an attack by pirates, is now much harder to capture. Gerry Northwood OBE, COO of MAST, said, "BMP4 been designed for the Indian Ocean and long distance ocean passages, therefore it needs to be tailored to the conditions of Southeast Asia, which involve voyages with short sea legs between ports. Vessels should be working closely with highly experienced security advisors to develop, with the ship's Master and crew, additional security measures and drills. This will guarantee that consideration of the ship's operational schedule, the threat in various regions and the crew's capacity for additional duties are all taken into account." Northwood added, "With minimum manning and busy schedules, ships' crews work very hard and often lack the time to properly focus on security and conduct effective 24-hour watches, especially while at anchor. "Due to the complex nature of the region, involving different countries, territorial waters and jurisdictions, the use of armed guards is not advisable. The choice of an unarmed security team would be the best solution. It can not only advise the Master and crew on security hardening, but can additionally maintain a proper and effective lookout, providing the much needed assistance to ensure security measures remain effective while at anchor, in port and during cargo operations."

**ONR testing high-speed planing hulls**

In May, scientists sponsored by the Office of Naval Research (ONR) performed experiments to better understand the motions, forces and pressures generated by waves on boats with high-speed planing hulls.

Planing hulls are like those used on a speedboat—they're designed to produce lift and allow the watercraft to glide on top of the water, skimming more quickly over its surface. At higher speeds, waves become a problem. The higher the crests of the waves, the more the boat will rise to the top of the wave and then fall back down to the wave's trough with great force. This is known as "wave slam."

"When a hull is going at speed and it hits a wave, it's like hitting a wall—it's a violent collision, and the forces are very large," said Dr. Bob Brizzolara, a program officer with ONR's Sea Warfare and Weapons Department. "This causes injuries to sailors—commonly back and leg injuries—and also can degrade the structure of the vessel."

This research was motivated by a series of workshops ONR program officers held with personnel from the Navy small combatant craft commands about high-priority challenges that ONR could help with. One identified challenge was the need to carry greater loads while maintaining their speed capabilities. To do this, some structural weight would need to be shed. Since the hull is the heaviest part of a vessel, Brizzolara and his team began there, investigating ways to save weight.

Working with Naval Surface Warfare Center (NSWC) Carderock Division, USNA and the University of Iowa, ONR is considering ways to reduce hull weight while maintaining structural adequacy. For unmanned craft, it might be possible to reduce weight even further, allowing additional payload to be carried.

The team is executing the research in two parts: experimentally with scale models and using computer simulations. The scale models are tested in the large tow tank at NSWC Carderock. Computer simulations for planing hulls are being developed by the University of Iowa, a challenging problem due to the complexity of planing hull physics. The model results will be used to develop computer simulations that are more realistic and accurate. This will vastly increase the numbers of tests that can be run since the computer simulations are much less expensive than experimental testing.

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

## HMS Prince of Wales takes her bow

The forward section of Britain's biggest future warship is now outwardly complete after engineers successfully attached the final part of HMS Prince of Wales' bow.

After some exact calculations to get the center of gravity spot on, the 620-ton block was raised by the enormous Goliath crane that dominates the north bank of the Forth and then put down on its final position on the front of the ship in the dry dock.

The upper bow has been constructed in four huge sections, all built at the Appledore yard in Devon, then shipped to Rosyth, where Prince of Wales is taking shape in the same enlarged dry dock where her older sister Queen Elizabeth was pieced together.

Lifting the second ship's upper bow segment into place comes just days after the forward island – home, among some 100 compartments, to the carrier's bridge – was also fixed into position on the flight deck.

The teams across the Alliance should be proud of their involvement in constructing and assembling blocks on

to HMS Prince of Wales.

"Seeing the forward island in position on the flight deck marks a highly-visible achievement in the assembly program. And with her bow now attached she is taking on the appearance of the immensely powerful aircraft carrier she will be when she enters service," said Angus Holt in charge of building Prince of Wales for the Aircraft Carrier Alliance, the consortium of industry and defense formed to create the two ships.

For more information, visit [www.royalnavy.mod.uk](http://www.royalnavy.mod.uk)

## Harry S. Truman completes sea trials

Sailors assigned to the aircraft carrier USS Harry S. Truman (CVN 75) returned to Norfolk Naval Station after completing 5 days of sea trials, making the final milestone after a 6-month condensed incremental availability (CIA) period, 27 May.

Sea trials, which take place following a maintenance availability period, allow Truman and representatives from Norfolk Naval Shipyard to assess the

ship's state of readiness and ensure maintenance was properly completed.

Truman and its crew, at sea for the first time since November 2014, tested equipment that supports surface operations, flight deck evolutions, deck seamanship and damage control readiness through various drills and system checks—ensuring both ship and sailors are ready for future at-sea operations.

"During this underway, the crew completed in-depth general quarters training that was about as close to real-life scenarios as we can simulate," said Chief Mass Communication Specialist D. B. Withrow, chief of Truman's repair locker 1-Bravo. "Completing our training evolutions in an actual at-sea environment allowed us to identify and address areas we may have missed back in the yards."

Truman also used this critical juncture at sea to test newly implemented systems and complete qualifications.

Command Master Chief Antonio D. Perryman said the crew trains to win and he believes, based off the crew's previous successes, they will come through when it matters.

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Perryman explained a condensed incremental availability period is not an easy time, but a necessary one. He said the crew worked hard to get the ship to its current level of readiness, however there is still a lot of work ahead.

"We came out on sea trials, we were successful and now we get to go home, button up a few things and get back underway," said Perryman. "We will continue to train; we will strive to be better. We have an ammo on load coming, and flight deck certs. We have a lot of moving parts so we have to continue to practice safety. We have to keep our operational risk management up and always continue to put things in front of the sailors to keep them happy and keep them successful."

Truman will have a short break in homeport before heading back to sea for flight deck certification and Tailored Ship's Training Availability, more milestones in preparation for an upcoming deployment scheduled for later this year.

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

### Latest Virginia-Class Submarine named USS New Jersey

Secretary of the Navy Ray Mabus hosted a ship-naming ceremony 24 May in Jersey City, New Jersey, to announce that SSN 796, a Virginia-class attack submarine, will bear the name USS New Jersey.

Mabus told the audience the submarine will be named to honor the long-standing history its namesake state has had with the Navy. New Jersey was where USS Holland, the Navy's first submarine, was designed and constructed in October 1900.

"New Jersey's relationship with our Navy has been defined by innovation, leadership, and courage—in conquest and in combat," said Mabus. "The name of our newest nuclear-powered fast-attack submarine will carry on that strong tradition."

Since the creation of that first submarine, two naval ships have been

named New Jersey, a battleship commissioned in 1906 that was part of the famed Great White Fleet and another battleship commissioned in 1943, making SSN 796 the third naval ship to bear the name New Jersey.

"As we sail deeper into the 21st century it is time for another USS New Jersey, time to keep that storied name alive in our Navy and Marine Corps," said Mabus. "She will sail the world like those who have gone before her, defending the American people and representing our American values through presence."

The next-generation attack submarines will provide the Navy with the capabilities required to maintain the nation's undersea supremacy well into the 21st century. They will have enhanced stealth, sophisticated surveillance capabilities and special warfare enhancements that will enable them to meet the Navy's multi-mission requirements.

These submarines will have the capability to attack targets ashore with highly accurate Tomahawk cruise missiles and conduct covert, long-term surveillance of land areas, littoral waters or other sea-based forces. Other missions include anti-submarine and anti-ship warfare, mine delivery, and minefield mapping. They are also designed for special forces delivery and support.

Each Virginia-class submarine is 7,800-tons and 377 ft in length, has a beam of 34 ft, and can operate at more than 25 kts submerged. It is designed with a reactor plant that will not require refueling during the planned life of the ship, reducing lifecycle costs while increasing underway time.

The submarine will be built under a unique teaming agreement between General Dynamics Electric Boat (GDEB) and Huntington Ingalls Industries-Newport News Shipbuilding (HII-NNS) wherein both companies build certain portions of each submarine and then alternate deliveries. New Jersey will be delivered by HII-NNS.

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

### HMS Quorn clears historic minefields

Royal Navy minehunter HMS Quorn has spent 2 weeks in May taking part in a NATO operation to clear historic minefields off the coast of Estonia.

Called "Open Spirit," the operation is an annual event carried out by NATO with ships from member states locating, and neutralizing some of the 85,000 mines laid in the Baltic Sea during the

First and Second World Wars.

Quorn, alongside Minehunters and Mine Clearance Diving Teams from nine nations, has been methodically scouring the coastal waters of Estonia, which were heavily mined by Russian and German forces during both World Wars, looking for historic ordnance that now poses a danger to merchant shipping, fishermen and the local ecology.

In total, the NATO Group of 11 ships and three drones identified almost 200 mines during the 10 day period, successfully destroying 38, three of which were claimed by Quorn, the remainder posing no danger to shipping.

This operation was vitally important to maintain the safety of shipping in this region.

Once located and positively identified either by the remote-controlled Seafox Mine Disposal System, or by the ship's divers, it is then up to the Clearance Diving team to 'countermine' (destroy) the ordnance using explosives.

For more information, visit [www.royalnavy.mod.uk](http://www.royalnavy.mod.uk).

### HMS Ocean to assume Royal Navy's Fleet Flagship role

HMS Ocean, the Royal Navy's very high readiness helicopter carrier, will shortly assume the duties of Fleet Flagship. The Plymouth-based ship took over from HMS Bulwark on the morning of Monday, 1 June having recently proved her operational capability in an intense multinational amphibious exercise off Scotland.

The ship will sail next month for the first of a series of exercises that will demonstrate the flexibility of the warship for tasks ranging from the delivery of humanitarian aid to the full range of amphibious operations.

Ocean is also paving the way for HMS Queen Elizabeth, which will assume the role of the Royal Navy's Flagship when she enters service.

Separately HMS Ocean recently completed fitting new communications



and IT systems that now allow the ship to host a staff, headed by a Rear Admiral, commanding UK and NATO Task Groups.

As well as the ship's role as the Royal Navy's Flagship, the headquarters staff in Ocean will be the Maritime Component Commander of the NATO Response Force (NRF) in 2016.

Hosting this key NATO role in the Fleet Flagship demonstrates the UK's commitment to NATO and the Alliance's regional partners.

In preparation for the NATO role, Ocean and the staff will take command of a series of major multinational exercises being run throughout the summer and autumn, which will validate the ability to command Task Groups comprising over 50 warships.

For more information, visit [www.royalnavy.mod.uk](http://www.royalnavy.mod.uk).

#### **USS Chancellorsville brings newest Aegis technology to U.S. 7th Fleet**

The Ticonderoga-class guided-missile cruiser USS Chancellorsville (CG 62) and its crew of 350 sailors entered



the U.S. 7th Fleet area of responsibility (AOR) on 11 June. Chancellorsville, the first Aegis cruiser to be outfitted with Aegis Baseline 9, will enhance presence in the U.S. 7th Fleet AOR by conducting theater security cooperation engagements and maritime security operations while maintaining stability in the Indo-Asia-Pacific region.

Chancellorsville will join U.S. 7th Fleet's Forward Deployed Naval Forces and will bring a host of new technological advancements and warfighting capabilities to the region.

Chancellorsville, having recently completed a detailed modernization and testing program, has the Navy's most

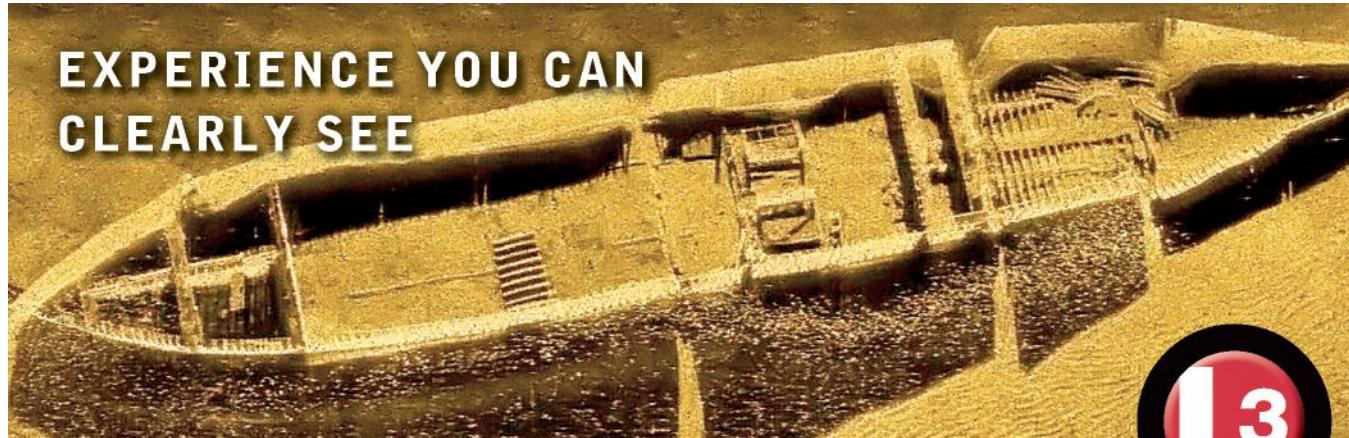
advanced air and missile defense system. It will be the first forward-deployed ship to have the latest version (called Baseline 9) of the Aegis Weapon System, a computer-based system for defending a carrier strike group against air and missile attacks.

The Baseline 9 upgrades installed on board include an overall Aegis Weapon System upgrade coupled with an improved cooperative engagement capability, a more robust surface to air missile capability, the AN/SPQ-9B integrated for anti-missile defense, AN/SQQ-89A(V)15 sonar system upgrades, and a gun weapon system upgrade that includes installation of two 5 in./62 caliber gun mounts, the Electro-Optical Sighting System and the MK 160 Fire Control System.

Chancellorsville is a multi-mission air warfare, undersea warfare, naval surface fire support and surface warfare combatant ship capable of supporting carrier strike groups, amphibious forces, or of operating independently and as flagships of surface action groups.

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

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# OFFSHORE INDUSTRY

## EIA reduces 2015, 2016 U.S. crude oil production growth forecasts

The U.S. government has lowered its 2015 and 2016 crude oil production growth forecasts amid lower prices and fewer active drilling rigs.

In its short-term energy outlook, released in mid-May, the U.S. Energy Information Administration (EIA) lowered its 2015 crude oil production growth forecast to 530,000 bbl per day from 550,000 bbl per day, while 2016 growth was seen at 20,000 bbl per day, down from 80,000 bbl per day previously.

Meanwhile, EIA raised its 2015 U.S. oil demand growth forecast to 340,000 bbl per day compared to 330,000 bbl per day seen in April and cut its 2016 demand growth forecast to 70,000 bbl per day from 90,000 bbl per day previously.

Since June 2014, U.S. producers have reacted quickly to a nearly 60% drop in prices by cutting spending, eliminating jobs and idling more than a half of the country's rigs. Active oil rigs in mid-May declined for the 22nd week in a row, Baker Hughes reported.

Still, "while there are fewer rigs drilling for crude, U.S. oil production this year is still on track to be the highest in more than four decades," EIA Administrator Adam Sieminski said in a statement. The EIA added that U.S. crude oil production averaged some 9.3 mmbbl per day in March, but is expected to decline from June through September before growth resumes.

## WEA survey finds strong support nationwide for energy development

U.S. voters strongly support developing resources on public lands, giving states more control over regulating such activities, and lifting the ban on exporting crude oil produced in the United States, concluded a survey commissioned by the Western Energy Alliance.

The national telephone survey of 1,000 likely voters 12-16 April by the Tarrance Group found 77% support giving states complete or shared authority with the federal government in managing and regulating activities on public lands within their borders.

When it came to overseeing energy development on public lands, 62% favored giving prime authority to state and local governments, while 34% preferred the federal government. For

wildlife conservation, 73% favored state agencies for management within their boundaries, and 79% supported updating the federal Endangered Species Act to give state agencies more control, the survey said.

It found 57% of the respondents felt Congress should overturn the 1975 crude oil export ban to allow trade with allied nations. Majority support exists for reversing the export ban across political parties, with 65% among Republicans and 51% among both Democrats and Independents, WEA said.

A combined 62% of the survey's respondents felt general U.S. policies were moving in the wrong direction, with 50% having a favorable impression of how oil and gas are produced in the United States and 35% having an unfavorable impression.

## Oil industry takes aim at Obama's proposed Arctic drilling mandates

Oil companies and industry trade groups have come out swinging against an Obama administration plan to require they have both the rigs and time to drill relief wells in case of emergencies at their operations in U.S. Arctic waters.

The proposed requirements would unnecessarily shorten an already brief window for exploratory drilling in the Chukchi and Beaufort seas while dramatically boosting the costs of those operations, dissuading companies from drilling in the region, industry representatives said in formal comments filed with the government.

And they warned, the proposal would lock in the "same-season relief well" requirement even though rapidly evolving technologies might be a better solution when companies lose control of an Arctic well.

Under the proposed mandate, companies would have to have a second drilling rig near their Arctic operations able to bore a relief well in case of an emergency. The identified relief rig could be actively drilling other wells and could be under contract to other companies. Federal regulators also would shorten the allowable season for exploratory drilling in the region to accommodate the extra time needed to complete a relief well before sea ice encroaches on the area.

Environmentalists insist that companies should spare no expense in safeguarding the activity in the Arctic.

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### Ultra-deepwater production set for steady growth, DW report claims

Analyst Douglas Westwood (DW) predicts oil and gas production from ultra-deepwater fields (>1,000 m/3,281 ft water depth) will grow 7.7% during 2015 to 2021, from 6.5 mmboe per day to 10.2 mmboe per day.

DW's latest World Drilling & Production Forecast says the growth will come from the drilling of 1,470 ultra-deepwater wells, an increase of 68% over the previous 7 years.

At these water depths, the analyst adds, only the most highly productive plays are being targeted. Additionally, deepwater projects typically have financing secured several years ahead of first production.



The major deepwater oil producers—Angola, Brazil, Nigeria, and the United States—look set to lead, with the strongest forecast growth (up from 1.2 mmbbl per day this year to 1.7 mmbbl per day in 2021). This is due to 11 floating production platforms entering service, including Anadarko's Lucius spar, and Chevron's Jack/St. Malo and BP's Mad Dog Phase 2 semi-submersibles.

Gas production could more than double from 1.1 mmboe per day in 2015 to 2.5 mmboe per day in 2021, DW claims. Although much of this growth will come from established producers, ultra-deepwater gas will start being exploited for the first time off Equatorial Guinea and Mozambique, where FLNG vessels are likely to begin operations on ultra-deepwater fields late this decade. Israel, too, could produce large volumes.

DW anticipates global capital spending of \$378 billion over the next 7 years on floating production platforms and subsea hardware, with 45% allocated to ultra-deepwater fields.

# OFFSHORE INDUSTRY HEADLINES

Research & Development • Environmental Assessment • Discovery

## BP, Halliburton, Transocean settle 2010 Deepwater Horizon claims

BP has settled the 2010 Deepwater Horizon financial claims with U.S.-based oilfield services provider Halliburton and Swiss contract drilling company Transocean. The claims were regarding the Gulf of Mexico offshore Macondo well disaster that killed 11 crew members and spilled millions of bbl of oil.

Transocean has resolved all outstanding claims against the company arising from the disaster by reaching two separate settlement agreements with the Plaintiffs' Steering Committee (PSC), and with BP Exploration & Production and BP America Production.

Subject to approval by the U.S. District Court for the Eastern District of Louisiana, the agreement with the PSC will see Transocean paying two classes of plaintiffs a total of \$212 million.

Under the agreement with BP, Transocean will assure BP for personal and injury claims of its employees, as well as those relating to any future cleanup or removal of diesel or other pollutants stored on the Deepwater Horizon. In addition, BP will pay Transocean compensatory damages and also drop its attempts to recover as an "additional insured" under Transocean's liability policies.

BP will pay Transocean \$125 million in compensation for legal fees incurred.

"These settlements provide substantial closure to 5 years of litigation and we are confident that this agreement can be a significant step forward in our efforts to renew our partnership with BP," said Jeremy Thigpen, Transocean's president and chief executive officer.

Separately, oilfield services provider Halliburton has also reached an agreement with BP Exploration & Production to resolve remaining issues relating to the oil spill incident.

"We are pleased to have reached an amicable resolution with BP, our valued customer, that allows us to close another chapter in the Deepwater Horizon case for Halliburton," said Dave Lesar, Halliburton's chairman and chief executive officer. "This agreement allows Halliburton to strengthen its relationship with BP by negotiating a global master services agreement between the companies."

## LLOG to restart drilling at Deepwater Horizon explosion site in U.S. Gulf

Deepwater drilling was set to resume near the site of the catastrophic BP plc well blowout in April 2010 that killed 11 workers and caused the nation's largest offshore oil spill off the coast of Louisiana. A Louisiana-based oil company, LLOG Exploration Offshore LLC,

planned to drill into the ill-fated Macondo reservoir, according to federal records reviewed by The Associated Press. Harper's Magazine is said to have been the first to report the news.

LLOG's permit to drill a new well near BP's site was approved last April by the Bureau of Safety and Environmental Enforcement, an agency overseeing offshore oil and gas drilling operations. The company's exploration plan was approved last October following an environmental review by a sister agency, the Bureau of Ocean Energy Management.



The exploration plan calls for drilling into Mississippi Canyon Block 252 from an adjacent block by June, federal records show. Drilling was to be conducted by the Sevan Louisiana, a semi-submersible drilling rig owned by Sevan Drilling ASA, an international drilling company based in Oslo, Norway.

LLOG's drilling plans estimate that an uncontrolled blowout from its well could cause 20,500 bbl of oil to be released each day for a total of 109 days, or the time it would take to drill a secondary well to cut off the flow.

In the event of a blowout, the company's plans call for the use of blowout preventers, containment systems and drilling a relief well to contain a spill.

## Capex, revenues, reserves up in 2014, but cuts loom: Ernst & Young

U.S. oil and gas companies reported increases across the board in capital expenditures, revenues, and reserves in 2014 as oil prices nearly halved during the second half, according to an annual oil and gas reserves study conducted by Ernst & Young unveiled in Houston.

The study analyzes U.S. upstream spending and performance data for the past 5 years for the largest 50 companies based on year-end 2014 oil and gas reserves estimates from disclosure information reported to the U.S. Securities and Exchange Commission.

Compared with 2013, revenues increased 10% in 2014 while year-end oil and gas reserves gained 8% and 7%, respectively. A 16% rise in capex in 2014 to \$200.2 billion, however, contrasted

with a decrease in overall spending during the previous year. Total capital expenditures for study companies have more than tripled from 2005 to 2014, even with a big cutback in spending during the 2009 financial crisis. However, due to volatile oil prices in the first quarter of 2015, U.S. producers significantly reduced capital expenditures at an average of 20% to 25% in recent months.

The report indicates that overall spending increased in 2014. A significant portion of the growth came from proved and unproved property acquisition costs, each of which increased more than 20% to \$27.3 billion and \$27.2 billion, respectively.

Development costs, meanwhile, increased 15% to \$121.3 billion as exploration costs increased 6% to \$23.8 billion, with independents leading the way in both categories. Development costs for independents were up 23% compared with 13% for large independents and 10% for integrated companies. Exploration costs for independents were up 50% while spending by integrated companies and large independents declined.

## UK and Norway could benefit from falling costs, analyst says

Wood Mackenzie expects capital and operating costs in the UK and Norway's upstream sectors to decrease steadily this year in response to lower oil prices. Drilling costs could account for the largest reductions, potentially dropping by one-third by the end of 2016, as rig-vessel rates come down due to over-supply.

In the near term, development costs for pre-final investment decision (FID) projects could fall by 10% to 20%, the analyst adds, while operating costs are set to decrease by up to 15% in UK waters and 10% offshore Norway.

However, the two countries are expected to deflate at different rates, based on distinct rig and labor markets and varying activity levels. Wood Mackenzie cautions that the outlook for upstream costs beyond 2016 remains less clear and will depend on movements in oil prices. High capital and operating costs are said to be the single biggest issue for companies in the UK and Norwegian sectors of the North Sea today.

Rig rates in the region have already fallen substantially, with reductions of up to 20% for new contracts agreed in 2015; 40% of mobile rigs in the UK and 23% in Norway are either currently without contract or due to come off by the end of 2015, giving scope for high reductions in future contract renewals. As upstream capital investment in both countries declines, competition within the supply chain is increasing.

## Carolinas, Florida split over seismic surveying offshore Atlantic coast

The Carolinas and Florida are going in opposite directions regarding federal permits for offshore seismic surveying.

Both North Carolina and South Carolina have signed off the initial federal permits. South Carolina certified a project by Spectrum GEO while North Carolina has approved permits for Spectrum and GX Technology.

On the other hand, U.S. Sen. Bill Nelson (D-Florida) has filed legislation to block any seismic permits on Florida's Atlantic coast. The administration of Governor Rick Scott also has asked for postponement of seismic work in federal waters of the Atlantic.

Florida already has a ban on drilling off its Gulf of Mexico coast until 2022 as part of legislation passed in 2006.

## Exxon, Chevron holders say 'no' to adding climate experts to boards

Shareholders of the top two U.S. oil companies on Wednesday rejected proposals to add directors with climate change expertise to their boards. Proposals to add an independent director with expertise in climate change received the support of about 20% of shareholders at each company, according to preliminary tallies provided at Chevron's annual meeting and that of Exxon Mobil Corp.

By contrast, an advisory proposal allowing Chevron shareholders with stakes of at least 3% to nominate independent directors passed. One at Exxon fell just short of approval. Chevron minority investors could now use their newly won proxy access to nominate people with environmental credentials to boards.

Both companies had recommended against the measures and said in filings with the U.S. Securities and Exchange Commission that directors already had wide experience needed for the job. Oil companies, while acknowledging the need to address climate change risks, have said it will take decades to develop technologies that economically capture carbon emissions.

In January, Europe's Royal Dutch Shell Plc backed a measure from activist investors asking it to be more proactive about planning for climate change, and its chief executive has warned of rising temperatures.

## Oil giants band together to add voice to climate change debate

Europe's largest oil companies are banding together to forge a joint strategy on climate-change policy, alarmed they'll be ignored as the world works toward a historic deal limiting greenhouse gases.

Royal Dutch Shell Plc, Total SA, BP

## Exploration near 'Great Blue Hole' draws criticism

The government of Belize's new draft proposal allowing companies to conduct offshore exploration for oil and gas near the Great Blue Hole has attracted criticism from various environmental groups. The Great Blue Hole is a large submarine sink-hole off the coast of Belize.

Under the latest proposal, companies can undertake offshore drilling in 99% of the country's territorial waters. The groups opposed the new proposal, saying that they will cause danger to the world's second largest coral reef, and fragile reef ecosystems will be disturbed due to the exploratory oil wells. Environmentalists claim that even a minor oil spill can impact the environment.

The 124 m Great Blue Hole was named a United Nations Educational, Scientific and Cultural Organization (Unesco) world heritage site in 1996.

In 2013, the judge of the Belize Supreme Court banned all licenses and contracts that were related to offshore drilling in Belizean waters over safety and environmental concerns.

According to the judge, the government awarded offshore drilling contracts to companies which lacked adequate experience in the field of drilling and exploration. This is expected to increase the risk of accident, the judge said.

Environmentalists are also concerned about the adverse impact of offshore oil spills as tourism accounts for half of the country's economy.

The Great Blue Hole, which was formed during several episodes of quaternary glaciation, is a part of the larger Belize Barrier Reef Reserve System.



*The Great Blue Hole near Belize City, Belize. Photo is courtesy of U.S. Geological Survey (USGS).*

Plc, Statoil ASA and Eni SpA are among oil companies that plan to start a new industry body, or think tank, to develop common positions on the issues. They are said to be working on an action plan to put forward proposals and arguments at the United Nations' (UN) climate talks, which are to be held in Paris this December.

"We're trying to put together a group of people to begin to speak the same language [on climate]," BP chief executive Bob Dudley said at a meeting hosted by IHS Inc.'s CERA consulting unit in Houston in April. "There's a bit of different language coming out of different companies and therefore our voice is lost in this."

His counterpart at Total, Patrick Pouyanne, said in Paris that the industry needs to work together. "If each of us is attacked separately, we will be stronger as a group."

Statoil chief executive Eldar Sætre has embraced the United Nations' goal to limit global warming to 2°C, a level beyond which some scientists claim disastrous climate change will bring more violent storms and rising sea levels.

He set up a renewable-energy unit and described steps the industry should follow, starting with a shift to cleaner fuels such as gas, reducing flaring and support for carbon pricing.

"If we don't, we risk becoming an industry that neither gets access nor acceptance—and that's not a good thing," Sætre said at the CERA gathering.

Efforts to reduce fossil-fuel investments and spur renewables such as solar and wind power have gathered pace in the past 2 years with oil companies sitting largely outside the debate. One aim of the European producers will be to push natural gas as more climate friendly in generating power than coal, according to reports. Of the most used fossil fuels, gas is the one that pollutes the least while coal tops emissions.

Meanwhile, U.S. majors ExxonMobil Corp. and Chevron Corp. have told shareholders their companies will not participate in the coalition. They want to maintain control over their own strategies and messages, regarding carbon limits negotiations at the UN's climate talks in Paris, according to one report.

**Atkins wins 5-year oil well decommissioning contract**

Project management and consulting services company Atkins has won a 5-year offshore contract to assist UK's Centrica Energy with oil and gas decommissioning activity. Under the multidisciplinary pre-FEED (Front End Engineering Design) decommissioning contract, Atkins will provide engineering and design services to the energy company. According to Atkins, the deal is applicable to any fields to be decommissioned in the UK or Netherlands during the contract period, as decided by Centrica. As part of its decommissioning work with Atkins, Centrica aims to focus on completing the job in a safe and environmentally responsible way. Separately, Centrica Energy has awarded a contract to Offshore Installation Services (OIS), a unit of Acteon to decommission multiple wells in the North Sea. As per the initial plan, OIC will decommission six subsea wells in the central North Sea and they will be decommissioned through a diverless, vessel-based approach. The work will be carried through an anchor-handling tug supply vessel (AHTS), the Island Valiant.

**Technip chosen for BP's Thunder Horse South project**

BP Exploration & Production has selected Technip for the Thunder Horse South drilling quarters unit expansion project in the Gulf of Mexico. Under the terms of the contract, Technip will be responsible for the design, engineering, fabrication, installation and pre-commissioning of the new production pipeline systems on the south side of the oil field. The existing field development, at a water depth of around 1,900 m, is located in Mississippi Canyon, Blocks 778 and 822, in the ultra-deepwater Gulf of Mexico environment. As part of the project works, Technip will provide project management and engineering services. The project will also see the coating, fabrication, installation and permanent anchoring of two 3.25 km rigid production flowlines with four



*Thunder Horse platform.*

pipeline end terminations. The overall project management will be carried out by Technip's operating center located in Houston, Texas, and the infield flowlines will be welded at its spoolbase in Mobile, Alabama. Technip's ultra-deepwater pipelay and subsea construction vessel Deep Blue will perform the offshore installation, which is expected take place in the second half of 2016.

**McDermott picked for work on Pemex' Ayatsil-C jacket**

Mexico's Pemex has awarded McDermott International Inc. a contract for the engineering, procurement, construction, installation, and pre-commissioning of the Ayatsil-C replacement jacket and associated deck installation. McDermott expects to use in-house engineering and procurement, the Altamira fabrication yard in Mexico, and the Intermac 600 transportation and launch barge and heavy-lift Derrick Barge 50 to complete the installation. The total weight of the facilities is about 14,800 tons. Completion is scheduled for the fourth quarter of 2016. In the Bay of Campeche, the Ayatsil field is the largest discovery for Pemex to date. Pemex has said it plans to develop Ayatsil with as many as four platforms and adjacent Tekel heavy-oil field with one platform, all tied to an FPSO. It plans to drill 43 wells in the project. Water depths in the area are approximately 375 to 405 ft. This is the fourth contract McDermott has received for the Ayatsil field.

# Chevron's massive Big Foot project facing long delay



*Chevron's Big Foot platform is being moved to sheltered waters.*

Chevron's huge deepwater Big Foot development in the Gulf of Mexico has suffered another delay after the platform's subsea installation tendons sustained damage, Chevron said, adding that production won't start later this year as planned because the company now has to move the platform to sheltered waters while it assesses the problem.

Six of the 16 tendons already installed to tether the platform to the ocean floor sank, forcing Chevron to deploy remotely operated vehicles to inspect the mile-long steel tubes and figure out what happened.

"We're assessing damage to the tendons and will be undertaking an investigation to determine the exact cause," Chevron said in a statement. The platform did not suffer damage because it was not connected to any of the tendons or subsea wells when the incident occurred, Chevron reported. There were no injuries or spills, the company said.

"The mishap... is clearly a negative from production, cash flow and operational excellence standpoints," Roger Read, senior analyst at Wells Fargo wrote in a note to investors.

The delay means Chevron will likely miss out on its chance to pull 8,000 bbl per day this year from Big Foot, and another 30,000 bbl per day next year, Read wrote. Chevron owns a 60% stake in the project, which

is designed to process 75,000 bbl of crude oil and 25 mmcf of natural gas per day. Statoil holds a 27.5% stake and Marubeni Oil & Gas has a 12.5% share.

The \$5.1 billion platform was sanctioned in 2010 and was originally scheduled to begin production in November 2014, but a strong loop current in the U.S. Gulf prevented the platform from sailing out. The field was discovered in 2006 by the Big Foot No 2 well and lies at a water depth of nearly 5,000 ft.

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NDC's new rig "Butinah" was headed to its drilling location in the Zakum Field.

### Lamprell delivers new jack-up to Abu Dhabi's National Drilling Co.

Engineering and contracting services provider Lamprell has completed construction on the jack-up drilling rig and delivered it to Abu Dhabi's National Drilling Co. (NDC). After departing from Lamprell's Hamriyah facility in early May, the new "Butinah" rig was sailing to its drilling location in the Zakum Field off Abu Dhabi.

Last week, NDC exercised its option with Lamprell to build its ninth rig, which joins its sister rigs, the Makasib, the Muhaiyimat, the Qarnin, the Marawwah, and recently the Shuweihat that was delivered in December 2014. All nine rigs designed by Lamprell are according to the Cameron LeTourneau Super 116E (enhanced) class design.

Delivery of the new rig will bring the total number of Lamprell new build jack-up units delivered to 27, and its 14th Super 116E jack-up drilling unit to different clients during the last 9 years. NDC also has further options for the engineering company to construct up to an additional two jack-ups, which have been extended to the 2015 third quarter.

"NDC has launched this strategic offshore rigs acquisition project to maintain the highest levels of reliability and availability in order to meet clients' present and future requirements," said Abdalla Saeed Al Suwaidi, NDC's chief executive officer.

### Conversion of shuttle tanker Navion Norvegia to FPSO starts in Singapore

Teekay Partners said conversion was underway of a 1995-built shuttle tanker, the Navion Norvegia, to an FPSO for the Libra field offshore Brazil, at a cost of around \$1 billion. Following delivery from Sembcorp Marine's Jurong Shipyard in Singapore, the vessel should

begin operations in early 2017 under a 12-year fixed-rate contract with Petrobras and its partners.

Teekay has taken delivery of the Arendal Spirit, its first modern floating unit for maintenance and safety, and expected this vessel to start its charter contract with Petrobras in June.

Among the contractor's other programs, the Randgrid shuttle tanker was in transit to a shipyard in Singapore to be converted to an FSO for Statoil's Gina Krog project in the Norwegian North Sea. Start-up is due in early 2017.

### Prysmian upgrades submarine cable laying vessel for offshore operations

Italian company Prysmian Group has upgraded its Cable Enterprise vessel from a moored cable laying barge into a DP2 cable laying barge. After conversion, the vessel will be equipped with 8 MW of power to maneuver with its own propulsion system.

Cable Enterprise is now capable of retaining its position in dynamic positioning (DP mode), even at the time of bad weather conditions.

With its powerful propulsion system, the vessel will be able to undertake lay and burial operations with different types of plough, including HD3 ploughs.

The submarine cable laying barge also maintains its ability to ground out and operate even in shallow waters.

Following the upgrade, the vessel can also operate on its own without the need of tugs during cable installation activities.

Equipped with seven independent positioning systems, the Cable Enterprise will be able to meet stringent operational requirements that are demanded by the oil & gas industry. Claimed to be environmentally friendly, the vessel can achieve an almost 80% nitrogen oxides (NOx) emission reduction.

As part of upgrades, new accommodation decks and operational areas have



*The Cable Enterprise.*

been added to the vessel, in addition to the installation of a new cable tank to increase its versatility for cable projects going forward. In April 2014, Prysmian Group awarded a contract to Viktor

Lenac shipyard for the vessel conversion works. A section of ExxonMobil's existing offshore operations in the United States will be supplied and installed with submarine cables by Cable Enterprise in DP mode, the initial project to be executed by the vessel.

### McDermott awarded project for 12 jackets offshore Saudi Arabia

McDermott International, Inc. was awarded a large brownfield contract by Saudi Aramco for the engineering, procurement, construction and installation (EPCI) of 12 jackets for offshore oil and gas fields in Saudi Arabian waters.

Work is scheduled for completion by the end of the first quarter of 2016 and will be included in McDermott's second



*McDermott's large brownfield contract covering 12 jackets is similar to these pictured for offshore oil and gas fields in Saudi Arabian waters.*

quarter 2015 backlog. This is the second award McDermott has received in 2015 from Saudi Aramco and represents work scope bid under an existing long-term agreement. In March 2015, the client awarded McDermott a brownfield contract for a power supply system replacement that utilizes McDermott's full EPCI expertise.

"The project called for an extremely responsive bid phase and for fast-track execution," said Tom Mackie, McDermott's vice president, Middle East. "Our ability to provide schedule certainty—through the provision of integrated EPCI services combined with the right technical solution to meet the challenging time constraints—was key to winning the project."

Engineering and procurement is expected to be performed by McDermott's teams in Dubai, U.A.E., and Al Khobar, Saudi Arabia. The jackets are scheduled for fabrication by McDermott's Dubai, U.A.E.-based fabrication facility. Vessels from the McDermott global fleet are scheduled to undertake the installation work.

## Wood Group completes MWCC vessel engineering

Wood Group Mustang has completed engineering services for the two Marine Well Containment Co. (MWCC) vessels that can be deployed in the event of a deepwater well control incident in the U.S. Gulf of Mexico.

Services provided included the follow-on design engineering, on-site engineering, integration and testing of systems and components from multiple vendors, field engineering support, and management of U.S. regulatory review. Other work, including spares procurement, is ongoing.

In the event of a deepwater incident, if required, the modular capture vessels (MCVs) will be outfitted with modularized processing equipment before being deployed to the incident site.

In addition to the engineering services, Wood Group is providing commissioning services for the MCVs and has reservist personnel who will be deployed to support commissioning activities and operate the production equipment on-board should the MCVs be called into action.

## Trelleborg to moor two FPSOs offshore Angola

Trelleborg has won a contract to supply tandem mooring systems for two FPSOs offshore Angola.

The tandem mooring-winches and integrated Quick Release Hawser Hook (QRHH) are installed onto the stern of the FPSO and used to moor a shuttle tanker in open sea conditions, with a separation of up to 492 ft. The mooring system includes integrated mooring tension monitoring, as well as a remote release system that can instigate an emergency release of the FPSO-shuttle tanker mooring from the FPSO stern deck or vessel's control room.

The capacity of the QRHH is generally 250 mt safe working load (SWL), and 30 mt for the hawser winch.

## Bordelon takes delivery of ultra-light intervention vessel

Bordelon Marine has taken delivery of the M/V Shelia Bordelon, a DP2 ultra-light intervention vessel (ULIV).

This specialized vessel features an NOV 50-ton active heave compensating crane with 3,000 m of wire, a mezzanine deck with internal office and control rooms capable of supporting two full work class ROV systems. The vessel offers 6,200 sq. ft of clear useable deck space, POB of 60, and two independent through-hull USBL systems.



M/V Shelia Bordelon

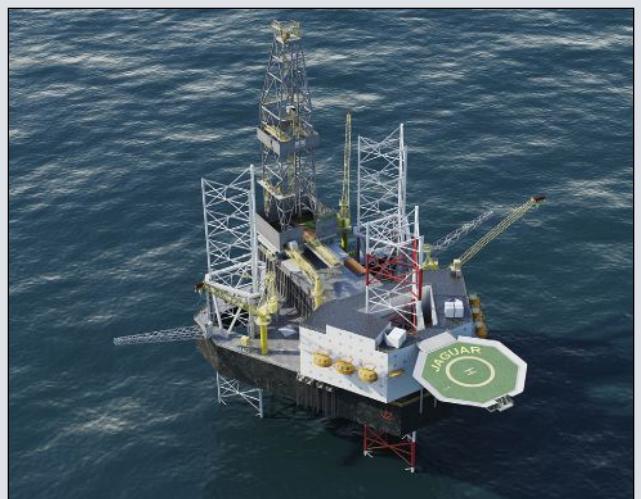
The vessel is also equipped with four additional below deck Tier 3 generators, providing fully redundant power to the crane and ROV systems.

"We think it hits a sweet spot and provides an affordable high-spec option that the industry is currently missing. As sub-sea infrastructure develops, the ULIV will play an increasingly important role in the vessel portfolio of these projects. Thus providing a much needed cost benefit option to the client," said Wes Bordelon, company president and chief executive officer.

## Rieber takes delivery of Polar Empress seismic vessel

GC Rieber Shipping has taken delivery of the newbuild seismic vessel, Polar Empress, from Myklebust Verft. The Polar Empress is a 3D seismic vessel with ice-class 1A. It is 371 ft long and 70.5 ft wide, and can accommodate 70 crew. The vessel can tow up to 22 streamers.

"The construction of the vessel makes it particularly suitable for operations in the Arctic, an area of strategic priority and



## Cameron unveils Letourneau Jaguar class drilling unit

Cameron has introduced a new drilling unit to the market, the Letourneau Jaguar class self-elevating mobile offshore drilling unit. Utilizing the Letourneau 1,000-Kip elevating unit and the Letourneau storm LOK leg fixation system, the Jaguar is capable of operating in water depths up to 400 ft in harsh conditions or 500 ft in moderate waters.

The rig also has the capacity to drill ultra-high-pressure/high-temperatures wells to 40,000 ft, with a hook load of 2.5 million pounds and setback capacity of 1,700 kips in quads, filling the market gap between the typical premium and ultra-large jack-ups, Cameron said.

Unique to Letourneau rig designs, the Jaguar only requires a leg fixation system in severe storm conditions. This design feature allows for about a half-day savings each time a rig is moved. Another unique feature of the Jaguar is the design of its spud can and leg well, which allows for pulling individual legs above the waterline, permitting classification society Special Periodic Survey inspection without dry docking, potentially saving weeks of downtime and hundreds of thousands of dollars.

Other design features include:

- Cantilever with 3,400 kip maximum combined drilling load capacity, longitudinal reach of 80 ft or greater, and transverse skidding movement of 25 ft of the rig centerline.
- Drilling variable deck load including cantilever loads of more than 15,000 kips in 70 knot winds. Severe storm variable deck load of more than 11,000 kips in 100 knot winds.
- Storage to well handling of two 25,000 psi BOP stacks.
- Includes 11 active-reserve mud pits and two slugging pits, with a 7,770-bbl combined capacity. Expanded pit capacity can be easily integrated during construction or may be retrofitted post-delivery.
- Mud systems large capacity and dedicated piping accommodates simultaneous use of oil, saltwater, and fresh water-based muds without cross contamination.
- Automated tubular handling from pipe rack to downhole, including independent stand making.

expertise for GC Rieber Shipping. With the Polar Empress we are strengthening our position within the high-end seismic segment," said Irene Waage Basili, GC Rieber's chief executive officer. The newbuild joins other GC Rieber seismic vessels on charter to Dolphin Geophysical. Dolphin Group ASA is the parent company of Dolphin Geophysical, a global full-range, asset light supplier of marine geophysical services.



*The Transocean Barents.*

### Shell gets OK to use Transocean Barents rig to drill Draugen well

Norwegian government supervisory authority, the Petroleum Safety Authority Norway (PSA), has approved Norske Shell's proposal to use the Transocean Barents facility to drill a well on the Draugen field.

Shell was set to drill a new production well, designated 6407/9-G-5 H, using the semi-submersible Transocean Barents mobile drilling facility of the Aker H-6e type. Drilling was expected to last for a period of 45 days, or until mid-June.

Located around 150 km north of Kristiansund, the Draugen is an oil field in the Norwegian Sea operated by Norske

Shell with water depth of 289 m.

In October 1993, production began on the field that has been developed using a fixed concrete facility with an integrated deck. Subsea wells that are tied back to the Draugen facility are producing deposits in the surrounding area.

The well, which will be connected to a subsea pipeline system leading to the Draugen facility, would be closed and monitored until the system is ready.

Built at Aker Kvaerner Stord in 2009, Transocean Barents is owned and operated by Transocean and was issued with an acknowledgement of compliance (AoC) by the PSA in October 2012. Registered in the Marshall Islands, the facility is classified by DNV GL.

### Kosmos finds second producing horizon in offshore Mauritania well

Kosmos Energy's Tortue-1 exploration well in Block C8 offshore Mauritania has encountered additional hydrocarbons while drilling to total depth to evaluate the deeper Albion stratigraphy. Based on the preliminary results, Tortue-1 has intersected about 32 ft of net natural gas pay in the lower Albion section. This is in addition to the previously announced 351 ft of net pay encountered

in the Cenomanian, which was the primary objective. The well was drilled beyond the primary objective to obtain deeper stratigraphic information and to enable seismic calibration of the Albion, which will be tested in subsequent wells.

Located 177 mi southwest of Nouakchott in 8,858 ft of water, and drilled with the Atwood Achiever drillship, the Tortue-1 well was drilled at a total cost of approximately \$125 million to a total depth of 16,732 ft.

### Total reaches production milestone on deepwater Block 17 off Angola

Total has produced its two-billionth bbl from its operated deepwater Block 17, about 93 mi offshore Angola. Following start-up last summer of the CLOV hub, the block has become the company's most prolific site worldwide, with current production of more than 700,000 boe per day. This is the highest of any operator in Angola, the company claims. Total has four major producing hubs with FPSOs in the block serving the Girassol, Dalia, Pazflor, and CLOV projects. Total operates Block 17 in partnership with Statoil, Esso Exploration Angola, and BP Exploration Angola. Sonangol is the concessionaire.

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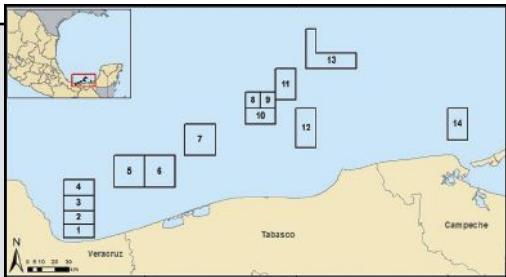
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## Nineteen companies cleared for Mexican shallow-water blocks

Mexico has approved 19 companies and seven groups to bid on 14 shallow-water exploration blocks as the country prepares to allow private producers to drill in its waters for the first time since 1938.

ExxonMobil Corp., Chevron Corp., and Pacific Rubiales Energy Corp., were among the companies that Mexico's oil regulator, known as CNH, cleared to develop an estimated 80,000 daily crude bbl in the Gulf of Mexico, Commissioner Juan Carlos Zepeda said in a live feed of the meeting.

Some 34 companies applied to pre-qualify for the July 15 auction. Mexico forecasts that the opening of the energy industry will bring in \$62.5 billion in private investment by 2018 and increase its annual oil output by 500,000 bbl a day in that time.



## Flurry of seismic activity precedes historic offshore Mexico auctions

Seismic activity has picked up substantially ahead of bidding for tracts offshore Mexico, the first such private offerings in nearly 80 years. In addition to 14 shallow-water blocks scheduled for auction this month, the Comisión Nacional de Hidrocarburos (CNH) will also auction nine other shallow-water blocks in the Gulf of Mexico in September and 26 onshore blocks in December.

TGS received a permit from Mexico's CNH to conduct a 112,779-mi regional 2D seismic survey in the Gulf of Mexico. TGS will commence acquisition of the "Gigante" survey in the second quarter.

Data processing will be performed by TGS with initial fast-track results in the third quarter. Gigante will also include gravity and magnetic data with a regional structural interpretation.

This survey will use four Seabird vessels to acquire a regional grid of 2D multi-client seismic with 39,370 ft offsets. Gigante will cover a large sector offshore Mexico, including the Perdido fold belt and Campeche Bay. Line ties will be made in to previously acquired U.S. GoM grids.

Petroleum Geo-Services ASA has started a multi-client 2D seismic program offshore Mexico. The two 2D vessels Atlantic Explorer and Sanco Spirit will acquire multiple projects recently approved by the Mexican government. The first program to be acquired is the Mexico Well Tie MC2D, which will provide clients with grounding for understanding the hydrocarbon prospectivity in the area.

Fast-track products were to become available in June. These surveys will be acquired using PGS proprietary GeoStreamer technology and are supported by industry prefunding.

Spectrum and Schlumberger entered into a cooperation agreement to jointly acquire and process Spectrum's offshore Mexico Campeche-Yucatan 2D regional multi-client program. The cooperation agreement includes more than 27,000 mi of regional 2D seismic data in the frontier Campeche-Yucatan area.

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The Deepwater Champion rig at Stabroek concession area.

### ExxonMobil makes significant discovery off Guyana

ExxonMobil Corp. said it made a significant oil discovery on the Stabroek Block, located about 120 mi offshore Guyana. The well was drilled by ExxonMobil affiliate, Esso Exploration and Production Guyana Ltd., and encountered more than 295 ft of high-quality oil-bearing sandstone reservoirs. It was safely drilled to 17,825 ft in 5,719 ft of water. Stabroek Block is 6.6 million acres, or 26,800 sq. km.

"I am encouraged by the results of the first well on the Stabroek Block," said Stephen M. Greenlee, president of ExxonMobil Exploration Co. "Over the coming months we will work to determine the commercial viability of the discovered resource, as well as evaluate other resource potential on the block."

The well was spud on 5 March 2015. The well data will be analyzed in the coming months to better determine the full resource potential, the company said.

Esso Exploration and Production Guyana Ltd. holds 45% interest. Hess Guyana Exploration Limited holds 30% interest and CNOOC Nexen Petroleum Guyana Ltd. holds 25%.

### Eni discovers gas and condensates offshore Libya

Italian oil company Eni has discovered gas and condensates offshore Libya in the Bouri North exploration prospect in Area D. According to the company, the area is located 140 km from the coast and 20 km north of the Bouri production field.

Drilled at a water depth of 125 m, the A1-1/1 well encountered gas and condensates in the Metlaoui Group of Eocene age.

The well represents the second discovery made by the company offshore Libya since the beginning of 2015, and is expected to deliver more than 3,000 boe per day.

The production test was constrained by surface facilities and during this process the well flowed 1,340 boe per day with a choke size of 64/64.

Through its subsidiary Eni North Africa, Eni operates contract Area D with 100% working interest in the exploration phase. At present, the company produces more than 300,000 boe per day in the country.

Located 120 km north of the Libyan coast in the Mediterranean Sea, the Bouri offshore field is part of Block NC-41, which was initially discovered in 1976 at 8,700 ft depth.

The field has an annual production potential of six billion cu. m and is expected to contain 4.5 Bbbl in proven recoverable crude oil reserves in addition to associated natural gas of 3.5 tcf.

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## W&T Offshore scores discovery at Ewing Banks in Gulf of Mexico

W&T Offshore made a new discovery at Ewing Banks 910 and first production from the SS #6 well at Mississippi Canyon 538 field (Medusa) in deepwater of the Gulf of Mexico. The company drilled and evaluated the Ewing Banks 910 A-5 ST well and logged 160 ft of gross hydrocarbon interval and is currently in the process of completing the well.

W&T Offshore has a 50% working interest in the well and expected it to be online and flowing by the end of the second quarter of this year. In addition, the company plans to drill the A-8 exploration well at Ewing Banks 910 based on seismic data.

Recently, W&T Offshore drilled Medusa SS #6 well and is said to have achieved first production flowing at a gross rate of about 8,000 bbl of oil as well as 6 mmcf of natural gas. The company was completing a second extension well, the SS #7 well at Medusa, which it has a working interest of 15%.

## Maersk Oil reports discovery at Xana prospect offshore Denmark

Maersk Oil has discovered hydrocarbons in the Xana prospect in the Danish North Sea. The jack-up Noble Sam Turner spudded the high-pressure/high-temperature Xana-1X well last December in 223 ft of water on license 9/95 in the northern part of the Danish sector. The well, which reached a total depth of 16,637 ft, was being plugged and abandoned, the company said.

"At present the partners are in the process of assessing the technical and commercial implications of the discovery and looking at potential follow-up," said Martin Rune Pedersen, managing director of Maersk Oil's Danish business Unit.

Partners are Dong E&P, Nordsøfonden, Noreco Oil Denmark, and Danoil Exploration.

## ONGC finds more oil, gas deposits offshore India's eastern coast

ONGC has notched two hydrocarbon discoveries offshore India's east coast.

In the deepwater Krishna Godavari basin, the company drilled well KG-DWN-98/2-M-4 approximately 25 km offshore to a depth of 10,650 ft.

Based on subsurface geological, MDT/Mini DST and electro-log data, the well established six hydrocarbon-bearing zones with net pay of 256 ft. The objective in the interval 9,514-9,541 ft tested conventionally flowed oil at 3,160 bbl per day and gas at more than 3 mmcm a day.

The discovery has opened a new up area for exploration and appraisal, ONGC

claimed. In block KG-OSN-2004/1, well KG-OSN-04/1-NASG-1, drilled in 227 ft of water, 12 mi south of Antarvedi in Andhra Pradesh, encountered significant gas volumes.

Subsurface geological, electro log data and MDT indicate net pay of 82 ft within Pliocene sands. Object-I in the interval 5,666 to 5,699 ft tested around 2.09 mmcm per day through a 24/64-in. choke, the company reported.

This was the sixth discovery in the block, according to the company.

## CNOOC finds oil on Liuhua 20-2 in eastern South China Sea

CNOOC Ltd. has made a mid-sized discovery on the Liuhua 20-2 structure in the eastern South China Sea. The discovery well, LH20-2-1, was drilled and completed at a depth of about 9,744 ft, encountering oil pay zones with a total thickness of 115 ft. The oil production of the well tested around 8,000 bbl a day and the crude oil density is about .75. The Liuhua 20-2 structure is located in average water depth of about 1,280 ft.

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## Ocean Victory ready to begin operations at \$2.1B Juniper project



*The Ocean Victory rig is owned and operated by Diamond Offshore Drilling. The photo is courtesy of BP.*

BP Trinidad and Tobago (bpTT), a subsidiary of UK-based oil company BP, said the Ocean Victory drilling rig had arrived and was expected to commence drilling operations in mid-May at its \$2.1 billion offshore Juniper gas project.

Owned and operated by Diamond Offshore Drilling, the semi-submersible drilling rig was to take personnel, equipment and supplies to the offshore location. Ocean Victory can drill to a total depth of up to 25,000 ft and in water depths of up to 6,000 ft.

bpTT has contracted the rig to drill five subsea wells at the Juniper platform, and the contract is for an initial term of 2 years. The Juniper field, which is located 50 mi off the southeast coast of Trinidad, is the company's first subsea field development.

The latest operation will be the one on bpTT's offshore facilities for Ocean Victory, which traveled 2,168 nmi in 23 days from Mississippi. The operation joins the SKD Jaya and the Rowan EXL II.

### Anadarko selects CCS joint venture for Mozambique

Anadarko Petroleum has selected a consortium for the initial development of an LNG complex onshore Mozambique to process production from the company's deepwater gas fields in Offshore Area 1 in the Rovuma basin.

The winners, following a front-end engineering and design competition, are CB&I, Chiyoda Corp., and Saipem (CCS JV).

Anadarko chairman Al Walker said the company and its co-venturers have to date secured more than 8.8 mm tons per year in non-binding long-term off-take agreements, which are now progressing toward binding sales and purchase agreements.

They have additionally obtained letters of intent from lenders for project financing and are working with Mozambique's new government to keep the project moving forward. They expect to submit a plan of development in the next few months.

The scope of work for the onshore LNG park includes two

LNG trains, each with a capacity of 6.6 mm tons per year, an increase over the original plan; two LNG storage tanks, each with a capacity of 6.35 mmcf; condensate storage; a multi-berth marine jetty; and associated utilities and infrastructure. The selection of CCS JV remains subject to negotiation and entry into a definitive agreement prior to the partners taking a final investment decision.

### Statoil adds features to latest Snøhvit umbilical design

Statoil's Snøhvit gas field in the Barents Sea offshore northern Norway will be equipped with a new static umbilical design, according to supplier Nexans. It will combine hydraulic, electrical, and fiber-optic services.

The latest phase of the Snøhvit development will establish an additional well at a new carbon dioxide (CO<sub>2</sub>) injection template as well as preparing for gas production from existing templates. Nexans' umbilical, to be installed in a water depth of 984 ft, will be routed between existing distribution unit to the new subsea template.

The contractor said Statoil's umbilical design is intended to provide a consistent and cost-efficient solution for simplified or fasttrack projects, such as tie-ins to existing infrastructure, or other kinds of subsea oil and gas projects.

The umbilical for Snøhvit, manufactured in Halden, Norway, features standard elements with minor adjustments. Snøhvit's wells and subsea facilities are controlled directly from the onshore operations center in Hammerfest.

In 2005, Nexans also supplied the main umbilical and infield umbilicals for the original development. At 475,720 ft, this remains the world's longest single-length umbilical, the contractor claims.

### Cobalt moves ahead with Cameia development project

Cobalt International Energy expects to achieve formal sanction by year-end for its Cameia development project in Block 21 offshore Angola.

Currently the Cameia #4 well was being drilled, and development drilling will likely continue until early 2016. Cobalt anticipates start-up in 2018.

The company said it continues to focus on optimizing the Cameia production facility and subsea infrastructure design and costs to take advantage of favorable prices in the current market downturn.

Its current FPSO design is a nominal 75,000-bbl per day facility, with a likely production capacity of more than 80,000 bbl per day early in the field's life. Cobalt re-affirmed that the project economics remain sound. In Angolan Block 20, the company's recent Orca #2 appraisal well and drillstem test results confirmed the presence of a large oil accumulation in the presalt Sag section.



### Rockhopper gets approval for Ombrina Mare field EIA

Italy's Minister of the Environment approved the environmental impact assessment for Rockhopper's planned Ombrina Mare field development in the Adriatic Sea. The decree must now be countersigned by the Ministry of Cultural Heritage and the Ministry of Economic Development for the Minister to award the field production concession. Meanwhile, an acid wash at Rockhopper's Adriatic Guendalina gas field significantly lifted production at in one of the wells.

## IOEC to commission four platforms for South Pars 17, 18 in Persian Gulf

Iranian Offshore Engineering and Construction Co. plans four satellite platforms for phases 17 and 18 of the South Pars gas field development in the Persian Gulf. IOEC head Gholam-Reza Manouchehri told news service Shana the platforms would have combined daily gas process capacity for 2 bcf. Iranian Marine Industrial Co. will likely build all four.

In a separate development, Iran said it has plans to put out to tender 17 oil and gas blocks as it prepares to unveil a new petroleum contract.

Hormuz Qalavand, director of exploration at National Iranian Oil Co. (NIOC), said his organization had been discussing proposals with various companies in Europe.

The new model would be a replacement for Iran's former "buyback" arrangement, under which the government agrees to pay the contractor an agreed price for all volumes of hydrocarbons the contractor produces.

With the new proposals, NIOC would be free to form joint ventures for crude oil and gas production with international companies that would be paid a share of the resultant output.

## Wintershall issues PDO, contracts for Maria field

Wintershall and its partners have submitted a plan for development and operation (PDO) for the 180-mmboe Maria field in the Norwegian Sea to the Norwegian Ministry of Petroleum and Energy. They plan to install two subsea templates tied back to several host platforms in the area.

The company estimates the total investments at around NOK 15.3 billion (\$2 billion), including development drilling. Startup is scheduled for end-2018, with the field likely to remain in production for 23 years.

Maria is 12.4 mi east of the Statoil-operated Kristin field and 28 mi south of Statoil's Heidrun field in the Halten Terrace region. Wintershall operates the surrounding license, in partnership with Petoro and Centrica Resources.

The reservoir will be linked via a sub-sea tieback to the Kristin, Heidrun, and Åsgard B production platforms. Maria's well stream will go to the Kristin platform for processing while supply of water for injection into the reservoir will come from the Heidrun platform and lift gas will be provided from Åsgard B via the Tyrihans D field subsea template.

Processed oil will be shipped to the Åsgard field for storage and offloading to shuttle tankers. Gas will be exported via a pipeline to the Åsgard Transport gas line to Kårstø.

Wintershall has awarded Subsea 7 a \$300-million pipeline and subsea construction (PSC) contract for the project. The contractor will design, procure, and install three pipelines linking Maria to surrounding fields.



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## Joint study: Options for protecting harsh environment subsea facilities

TWI has initiated a joint industry project examining the benefits of combining thermally sprayed aluminum (TSA) coatings and cathodic protection (CP) to thermally cycled risers and subsea pipelines. Current sponsors are BG, ExxonMobil, Petrobras, and Total.

Although TSA coatings are widely used to reduce the rate of corrosion on offshore facilities, there is scant published data concerning the simultaneous use with CP when applied to subsea hot risers and hydrocarbon transportation pipelines, according to TWI.

With only limited attention paid to the interaction of TSA with anodes or impressed current CP systems in international standards (such as ISO 15589-2 and DNV-RP-B401), guidance remains limited, the company added.

However, many fields are under development involving installation of remote, deepwater facilities and extraction of higher-temperature hydrocarbons, which could benefit from the findings of the new JIP, TWI said. The project scope includes measurement of the effects of environmental conditions on TSA coating and anode behavior when subject to constant elevated temperature and thermal cycling.

## Tracerco's scanner completes deepwater deployment in GoM

Discovery, the subsea CT scanner developed by Tracerco, has completed the first deepwater deployment on flowlines operated by Shell in the Gulf of Mexico. The scanner is used to assess the integrity of subsea pipeline assets, and it scans the flowlines in a non-invasive way.

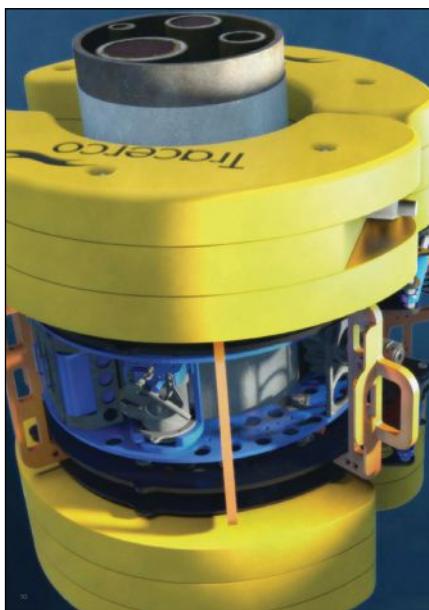
In the Gulf of Mexico, Discovery scanned 10 flowlines including jumpers, steel catenary risers, and pipe in pipe flowlines, all of different diameters.

Post scanning, it generated more than 250 CT scan images over a pipeline length of 50,000 ft. at depths of 4,200 ft.

Pipelines will be scanned from the outside to obtain a clear picture of the pipe and flow condition, without any need for the removal of the protective coating, reducing the risk of flowline damage or the build-up of hydrates.

Based on such data, available in real-time, Shell could build a complete profile of its pipeline and could confirm the asset condition.

Prior to selecting Tracerco's Discovery, Shell undertook a comprehensive technology review to choose an inspection solution to support safe operations. The inspection campaign can be conducted even while production contin-



*Tracerco's CT pipeline scanner.*

ues as the scanner attaches to the outside of the flowline, the company said.

"Using Discovery we were able to quickly deliver data, drip feeding the scans through to Shell engineers, then providing an in-depth analysis once we had all the information," said Jim Bramlett, Tracerco subsea technologies division business development manager.

"We understand that for each day a pipeline is out of action, or not performing at its peak, there are significant financial implications..."

## Ziebel claims largest oil industry data collection and transfer project

Ziebel has completed what it calls the largest-ever collection and transfer of data in the oil and gas industry. The company said it collected 1,708 terabytes of data about North Sea wells over 8 months at the request of an unnamed major operator.

The data was collected using Ziebel's Z-System, which uses fiber-optic composite rod technology to access and visualize wellbores in real-time. The Z-System can capture information applicable to well flow optimization, integrity risk control, reservoir modeling, and enhanced oil recovery, with minimum production.

The data gathered was compressed and transferred onto five of Ziebel's NAS servers, each of which comprises 36 hard drives. Each server measures 6.88 in. (17.5 cm) by 18.89 in. (48 cm) by 27.93 in. (71 cm) and has a capacity of 120 terabytes. Four of the servers were filled to capacity, with the fifth about half-full.

The data will be kept on these servers

until the customer has uploaded it for analysis, Ziebel said, whereupon it will be used to manage and develop wells in the future.

Meanwhile, advances in investigation and collection methods mean that the volume of oilfield data is expanding at a phenomenal rate. Industry experts believe that the sheer amount of data collected is growing by a factor of five every year. This results in new problems of data transfer, the company said, noting that the data can't simply be sent as an e-mail attachment or handed over on a USB stick.

## Subsea equipment monitoring technology to be trialed in NS

An unnamed sponsor of a joint industry project (JIP) to develop Viper Subsea's V-IR subsea integrity monitoring system has committed to deploy V-LIM line insulation monitor units in various North Sea fields.

According to V-IR developer Viper Subsea, the imminent deployment should improve umbilical condition monitoring and enable relatively simple integration of the V-IR subsea monitoring hardware.

The JIP, which started in October 2013, has attracted BP, Chevron, Shell, and Total as sponsors. The system is expected to be ready for field trials later in 2015.

"V-IR will be used to identify and locate faults in remote subsea electrical distribution systems," said Neil Douglas, managing director of Viper Subsea.

The V-LIM line insulation monitor can be integrated into topsides equipment either as part of a new development or as a retrofit to existing installations. It is said to accurately monitor the insulation resistance, polarization index, voltage, current, power, and capacitance of the umbilical and subsea equipment and will serve as the topsides modem for the V-IR system.

Viper Subsea is conducting development for the V-IR at its research and development facility near Bristol, while the JIP partners will ensure the products are optimized for field use.



*Developing Viper's V-IR subsea integrity monitoring system in North Sea fields.*

## INDUSTRY DEALS

### Egypt and Italy's Eni sign \$2B offshore oil exploration deal

Egypt has signed a \$2 billion offshore oil exploration deal with Italian company Eni. The new agreement signed by the company with the Egyptian General Petroleum Corporation (EGPC) is aimed at modifying previous oil agreements between both parties and activating the work programs. The activities include modifying the gas price in some agreements and extending work in others.

EGPC executive chairman Tareq Al-Mulla and Eni's exploration activities head Antonio Villa signed the agreement, which includes the implementation of exploration and development activities at Belayim concession areas.

The areas include Sinai, Abu Madi at Nile Delta, Ashrafi at Gulf of Suez, North Port Said in the Mediterranean, and Baltim at offshore Nile Delta. Both parties will also spend \$360 million on additional activities such as the drilling of five wells in north Port Said.

In the Baltim field, one well will be reconstructed and the other would be drilled with an investment of \$80 million. Another \$40 million will be spent in Gulf of Suez's Ashrafi field.

Signed by Eni and its partners, the deal stipulates providing unrecoverable signature bonuses totaling \$10 million, in addition to around \$505 million in recoverable signature bonuses for 5 years.

### BP planning to reduce stake in oil project off southern Australia

BP plans to divest some of its stake in the company's project in the Great Australian Bight. As part of the sale process, the company said it will reduce its stake by up to 50% from the existing 70%. The owners are planning to invest \$800 million in exploration activities on the project, scheduled to begin later this year, according to Bloomberg.

Addressing the Australian Petroleum Production & Exploration Association (APPEA) conference in Melbourne, BP Asia Pacific exploration vice-president Bryan Ritchie told reporters that a number of companies are in talks.

In a bid to save money, the company is also on look out for opportunities to work with other companies that are exploring in Great Australian Bight.

Ritchie said that the company aims to move forward in Australia and plans to a reduce stake in the venture to help reduce its risk of costly drilling.

In addition, the company plans to launch a "farm out" process in order to



*Great Australian Bight Marine Park.  
Photo: courtesy of Nachoman-au.*

bring in another partner, the Sydney Morning Herald reported.

The venture is 30% owned by Statoil, which plans to drill four wells 200 km off the coast. The Great Australian Bight is estimated to hold billions of barrels of oil and gas.

### Crowley acquires crew management company for oil and gas vessels

Crowley Maritime Corp. has acquired Maritime Management Services Inc., a Seattle-based crew management company for offshore oil and gas vessels, primarily in Singapore and the Gulf of Mexico. Maritime Management Services will be added to Crowley's international ship management division, which provides all phases of commercial ship management along with full technical management and government contracting.

Maritime Management Services offers crewmembers services such as visas, flag-state, and immigration documentation; crewmember certifications, including Standards of Training, Certification, and Watchkeeping (STCW) and any client or operational area requirements; logistics, administrative and travel support; and much more. In addition to Maritime Management Services' Seattle headquarters, the organization also has a secondary location in Singapore.

"Together, Crowley Accord and Maritime Management Services can offer total crewing solutions, from single hires and full crew management through complete technical management to the oil and gas industry," said Crowley's Mike Golonka, vice president of ship management.

In April 2014, Crowley formed Crowley Accord Management Pvt. Ltd., an international ship management venture managed globally by the company's ship management group. The company said that the venture increased the size and scope of Crowley's technical ship management offerings and supported the company's expansion into the international ship management market with a foreign crewing presence.

### Williams Cos. to buy Williams Partners LP for \$13.8B in stock

Williams Cos. said it agreed to buy the 40% of Williams Partners LP it doesn't already own for \$13.8 billion, simplifying its corporate structure in a bid to reduce taxes, increase payouts and accumulate cash for expansion.

Holders of Williams Partners, the pipeline company that handles about 30% of U.S. natural gas supply, will receive 1.115 Williams shares for each unit. The all-stock offer, Tulsa, Oklahoma-based Williams' biggest acquisition, represents about an 18% premium and is expected to close in the third quarter.

Williams follows Kinder Morgan Inc., the largest pipeline operator, in consolidating a master-limited partnership to make more cash available to pay investors and expand operations. Kinder Morgan bought three partnerships it controls for \$32 billion in November. Master-limited partnerships pass through much of their earnings to investors without paying federal income tax.

Williams Partners owns or operates more than 33,000 mi of natural gas and natural gas liquids pipelines.

### Universal LNG, Jurong Shipyard launch West Africa partnership

Universal LNG and Jurong Shipyard, the wholly owned subsidiary of Sembcorp Marine, have joined forces to launch the new West Africa LNG Development in a bid to address the offshore associate gas needs of the African continent. The West Africa LNG Development is expected to supply Africa with required energy resources and will reduce pollution globally.

The partnership aims to deploy new technology to capture and recycle associate gas and helps supply energy to those limited Sub-Saharan Africans who have access to electricity. According to Universal LNG, the technology will capture the gas and turn into clean liquified natural gas (LNG). The United Nations launched the "Zero Routine Flaring by 2030" initiative in April, which is endorsed by nine countries, 10 oil companies and six development institutions.



# UNDERWATER INTERVENTION

ROVs • AUVs • Imaging • Mapping • Diving Systems • Support Equipment

## Multi-robot underwater surveys successfully conducted from the NATO research vessel Alliance

The Centre for Maritime Research and Experimentation (CMRE) scientists, along with colleagues from the Royal Netherlands Navy Defence Diving Group, Naval Mine Warfare Centre of Excellence (EGUERMIN) and UK Royal Navy Maritime Autonomous Systems Trials Team (MASTT), experimented using different underwater robots in a joint scientific mine countermeasures (MCM) sea trial. The North Sea MCM Experiment 2015 (NSMEX'15) sea trial took place over 20-29 May 2015 in the North Sea off the coast of Ostend, Belgium. For the first time, the NATO Research Vessel (NRV) Alliance, a 93-m, 3,180-ton open-ocean ship, operated in the Belgian waters for a successful sea trial developed by CMRE, along with the Royal Netherlands Navy Defence Diving Group, Naval Mine Warfare Centre of Excellence (EGUERMIN) and UK Royal Navy Maritime Autonomous Systems Trials Team (MASTT). The experiment aimed at exercising state-of-the-art high-resolution underwater acoustic imaging systems and adaptive vehicle behaviours using different AUVs in order to assess the performance of different sonar systems and enhance interoperability and collaboration in the field. During NSMEX'15 multiple simultaneous underwater robot surveys were successfully conducted in the very challenging North Sea environment characterized by strong currents and complex seafloors. Initial results from this scientific campaign, including data from the MUSCLE AUV (CMRE robot for MCM experimentation), were presented at EGUERMIN on 1 June 2015.

## France's DCNS Picks Tiger and Falcon for Asia

DCNS Group, the French leader in naval defence and an innovator in marine renewable energy, has enhanced its ROV capability with a Saab Seaeye Tiger and Saab Seaeye Falcon. Both ROVs will be deployed by DCNS Far East-DCNS Singapore-based subsidiary across Asia-as the company extends its operations in the region. DCNS Far East chose the two ROVs for their versatility and reliability and for their power to cope with currents. Nicolas Leluan, DCNS Far East's managing director, says they will be used extensively in a wide range of large and complex projects. These include inspection of platforms, pipelines and moorings-together with salvage work and for the support of work-class ROV and diving operations. In addition, the Falcon will be deployed on infrastructure assessment projects across Asia for life extension evaluation that will involve bridge piling, jetties and harbors. The ROV will also be used for seabed surveys. The compact size of both vehicles and their precise maneuverability makes them ideal for working inside and around structures, particularly as the thruster power on both ROVs is renown for its ability to master strong currents and hold steady while working or observing. Each vehicle has the systems architecture and chassis capacity to house a variety of observation and inspection devices, with additional tooling skids easily fitted as needed. Both vehicles have a proven record of reliability and operational performance working at a diverse range of tasks across the world under demanding conditions.



## Fastest ROV sprints with Sonardyne SPRINT



MMT, specialists in high-resolution marine surveys, has successfully completed offshore integration trials of their new high-speed remotely operated vehicle with Sonardyne International's SPRINT inertial navigation system.

The 2,000-m rated vehicle, named Surveyor Interceptor, has been developed by MMT to improve the speed and efficiency of seabed mapping and pipeline inspections surveys. Its revolutionary design features a hydrodynamic hull and powerful drivetrain enabling the vehicle to travel at up to 6 kts, around 50% faster than conventional work-class ROVs. The accuracy of SPRINT complements the vehicle's state-of-the-art imaging and mapping sensors, resulting in improved survey data quality and substantially reduced 'cost per kilometre' of surveys.

Travelling at high speed close to the seabed requires the vehicle's automatic manoeuvring and propulsion systems to be supplied with highly precise and uninterrupted position updates. To meet this requirement, MMT selected Sonardyne's acoustically aided inertial navigation system, SPRINT. Designed for subsea vehicles, SPRINT makes optimal use of acoustic aiding data including USBL, LBL and Doppler Velocity Log (DVL) and other sensors such as pressure sensors to improve accuracy, precision, reliability and integrity in any water depth.

Inertial navigation is inherently self-contained and robust with very good short term accuracy but can drift over time. SPRINT is therefore aided with complementary acoustic positioning data to provide long term accuracy and robustness and greater vehicle control. On the Survey Interceptor, a Sonardyne Inverted Ultra-Short BaseLine (iUSBL) transceiver has been interfaced directly to the SPRINT resulting in a highly optimized navigation solution that delivered position updates up to 100 times a second.

Besides its stand-out levels of precision and fast update rates, MMT also chose SPRINT as it is the most cost-effective and low risk technology on the market. The system architecture inside SPRINT has been developed with flexibility and expandability in mind. This means the same vehicle-mounted hardware can be used as a premium survey vehicle grade gyrocompass or an acoustically aided INS, depending on operational requirements. Users are able to upgrade and switch capability on demand using remotely activated in-field upgrades, meaning they only pay for the features they need.

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

## UNDERWATER INTERVENTION

### MacArtney tech for Bibby HydroMap d'ROP subsea survey platform

MacArtney Underwater Technology is delighted to have supplied a consignment of underwater technology products and systems to the new and innovative Bibby HydroMap dynamic Remotely Operated Platform (d'ROP). The MacArtney scope of supply included a Moog Focal type 176 slip ring (electrical and optical) for the appurtenant winch system and Moog-Focal fiber optic multiplexer boards, MacArtney OptoLink fiber optic connectors and several SubConn connectors and connectivity assemblies for interfacing various systems and sensors on board the d'ROP vehicle.

In recent years, with the expansion of offshore wind and cable interconnectors, there has been a significant increase in the requirements for cable depth of burial surveying in coastal areas, where compact ROVs struggle with the environmental conditions and where work-class ROVs add significant project expense. These challenges spawned the idea for the d'ROP, which aims to provide a compact, efficient and stable platform for remote survey in dynamic coastal environments.

The d'ROP is developed and operated by renowned subsea survey company Bibby HydroMap (UK) and built by Hydrobotics (UK). The d'ROP borrows and combines proven principles and technology from existing ROVs, ROTVs along with methods from the modern day dredging industry. According to Bibby Hydromap, "the system is effectively a compact high powered work class ROV—but with all the expensive and complicated bits that are not needed for survey tasks stripped off." In tune with this overall design philosophy, the d'ROP mostly depends on off-the-shelf components—such as the ones supplied by MacArtney—in order to ensure simplicity and reliability of operation along with easy maintenance.

While the system was designed primarily for precision-tracking of buried cables and pipelines, the telemetry and connectivity components supplied by MacArtney allows the d'ROP to accept multiple sensors simultaneously, including multibeam echo sounders, magnetometers and sidescan sonars, with resultant data transmitted through a high-performance fiber optic connection. This flexibility opens up the potential applications of the system and makes it relevant to stakeholders from a wide range of industries.

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The d'ROP is initially designed for operation from the new semi-SWATHE research vessel, Bibby Athena and will be deployed through the vessel moonpool. The d'ROP relies upon the support vessel for forward propulsion, a heave-compensated winch and combined LARS for its vertical control, while the on-board vehicle thrusters maintain heading and fine adjustments to the lateral position. This way, the d'ROP maintains a fixed heading and altitude in relation to a survey line, cable or pipeline with great control and stability when compared to traditional mid-size ROV systems.

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

## **MODUS orders first Seaeye Sabertooth Hybrid AUV/ROV from SAAB and enters into collaboration agreement**

UK company Modus Seabed Intervention Ltd and Saab Dynamics AB of Sweden have entered into a Collaboration Agreement to further develop the operational use and applications of the Saab Sabertooth hovering hybrid AUV/ROV for the oil and gas and offshore renewables markets.

Under the agreement, Modus and Saab will work in collaboration to develop this game changing innovation and its applications in life of field subsea survey and inspection.



Following a 2 year evaluation and development program, Modus have ordered the first in a planned fleet of Sabertooth vehicles from Saab, which will be launched in Q1 2016. The system will be equipped with additional batteries for extended autonomous endurance and with increased thrust for high speed survey, making it ideal for both high current and deepwater applications. A suite of advanced survey sensors including the latest Edgetech 2205 combined triple frequency sidescan sonar, co-located swath bathymetry and sub bottom profiler, HD video/stills cameras, IXBlue Phins3 INS, and RDI workhorse DVL will be fitted in the vehicle. To manage data acquisition, navigation and processing of sensor data the software package QINSy from Saab QPS will be fully integrated.

The vehicle has been configured to allow additional sensors, such as standard MBES, cathodic protection (CP) probes and laser scanning systems to be quickly integrated against project specific applications.

Sabertooth can be uniquely operated in both fully autonomous (AUV) and tethered (ROV) modes, enabling fully flexible dual operations from one platform. While the vehicles capability can be applied across the range of subsea operations from site investigation surveys through to decommissioning support, a major focus is on its application in long term subsea operations and maintenance and on delivering significant cost savings to high quality visual and survey data acquisition. The vehicle is also capable of providing light intervention support and with a depth rating of 3,000 m can be deployed on a wide range of subsea tasks.

For more information, visit [www.modus-ltd.com](http://www.modus-ltd.com).

## **Intelligent solution increases capability of dive bell system**

Red Marine, based in northeast England, has successfully developed and delivered two shock absorber systems to Subsea 7 that significantly increases the performance and extends the lifespan of an existing dive bell handling system.

Each system—to be installed on the Osprey dive support vessel later this year—is a custom unit with a shock absorber and winch line tensioning system to enhance the protection of the dive bell and handling system during launch and recovery operations.

The shock absorbers are designed to



significantly reduce any shock loading on the lift winch wire caused by the differential motions of the vessel and the diving bell. In operation, a maximum acceptable line tension is set and once this value is reached a shock absorbing cylinder extends releasing extra wire length—up to 3.2 m—into the system reducing line tension in a controlled manner down to an acceptable level.

Further to this, an advanced slack management capability ensures wire tension will stay above a minimum acceptable level if the vessel and bell move towards each other, reducing the risk of snatch loadings on the system.

Certified in accordance with stringent DNV codes for diving launch and recovery systems, each dive bell shock absorber system weighs 4.3 tonnes and has been manufactured using Red Marine's proven supply chain.

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

## **UTEC NCS Survey completes West African AUV operations**

UTEC NCS Survey, an Acteon company, has recently completed 3 months of AUV operations for a number of Saipem projects located in West Africa.

TEC NCS performed pre-lay and as-laid surveys using their Gavia AUV systems on the Mafumeira and Litchendjili fields, offshore Angola and Congo. Using one of seven GAVIA AUVs, an anchor pre-lay side scan sonar survey was carried out in the Mafumeira field to clear the way for barge operations alongside the Mafumeira Norte Platform. The versatility of working inside the 500-m zone of the platform without affecting the platform operations was of particular value for this project.

Pipeline route and barge anchor corridor pre-lay surveys were carried out in Litchendjili in water depths of 3 to 12 m utilizing the GAVIA's multibeam and side scan sonar. The GAVIA was re-





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deployed to carry out post lay operations along the pipeline corridor to inspect for free spans and other anomalies.

Chris Erni, product line manager at UTEC NCS, said, "UTEC NCS Survey is delighted to have been awarded these significant contracts by Saipem. Our AUV team showcased our capabilities in West Africa and we look forward to developing our relationship with Saipem on future projects."

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

## Second Cougar for tidal renewable energy installers

For its mastery of strong currents around tidal turbines, Keynvor MorLift Ltd has added a second Saab Seaeye Cougar XT to their ROV fleet.

This new addition comes fully containerized and can be easily transported across the globe.

Alongside their more conventional Cougar assignments, Keynvor MorLift (KML) specialize in deploying their Cougars for operational, installation and maintenance work at tidal energy project sites in the UK and Northern Europe where exceptionally strong tidal currents occur.

"Being able to work in a strong tidal flow extends our working window deep into the tidal ranges," says business manager Bobbie Stone, "and the Cougar has helped us achieve improved results, even when fitted with a tooling skid."

Increasing their work time is a significant advantage for specialist marine contractor KML and they actively undertake research and development in this area with their Saab Seaeye Cougar fleet playing a key role.

"We chose to acquire another Cougar," Bobbie Stone says, "because it's unrivalled in its class for the type of subsea work we frequently carry out, particularly in high energy sites. It has good intervention capability with spe-

cialist tooling and it provides great value for money for its capacity."

In addition to work at tidal generation installations, KML's Cougars are used for many subsea tasks, such as general survey, light work duties, subsea installation, recoveries and salvage, along with the deployment and monitoring of specialist subsea survey/research equipment, including acoustic doppler current profilers, known as ADCPs.

KML has its own fleet of vessels and whereas the first Cougar system was integrated into one of those, the new Cougar has its own customized container system. This means it can be deployed from any vessel, even a small workboat, either supplied from KML's own fleet or sourced locally—resulting in reduced costs and increased flexibility for KML clients, explains Bobbie Stone.

She emphasizes the Cougar's advantage as a compact vehicle that has power and maneuverability to handle bolt-on skids with different tooling options for a wide range of subsea tasks.

Its exceptional control and response come from its six thrusters: four vectored horizontally and two vertically. Each thruster has velocity feedback for precise control in all directions and is interfaced to a fast-acting control system and solid-state gyro for enhanced azimuth stability.

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

## WFS, NuStar and Precision Technologies complete commissioning of new subsea system for JAMSTEC

For scientific purposes, The Japanese Agency for Marine-Earth Science and Technology (JAMSTEC) is planning to study the genesis of submarine resources at the hydrothermal vents area in Japanese waters. Some of the challenges faced during this operation are the streamlining of subsea data logging operations, working at depths of up to 2,000 m, managing the signal conversion electronics at water temp of near boiling point and reducing power consumption for longer duration subsea application.

In February 2014, WFS, working with its partner in Singapore Precision Technologies, met with NuStar Technologies to discuss the application of subsea wireless data logging capabilities to support flow metering in NuStar equipment designed for JAMSTEC's submarine resources research.

WFS collaborated with NuStar and Precision Technologies to develop and



deliver a subsea light weight and power efficient solution that combined the data logger and controller. To achieve this innovative solution WFS utilized patented Seatooth® technology. The system was successfully commissioned in Japan in April/May 2015.

"We are pleased to have chosen to work with WFS Technologies Ltd, the team helped simplify JAMSTEC's requirement on mineral flow rate data harvesting process, through direct flowmeter magnetic frequency data logging, effectively eliminating the need of additional signal conversion electronics and substantially reducing overall logging system power consumption, weight and size," Teo Sim Guan, engineering director of NuStar Technologies.

The Seatooth® S100 is a compact, low-power, wireless modem, data logger, multiplexer and controller. The Seatooth® S100 supports a variety of underwater applications, providing a robust wireless communications link up to 15 ft in the most challenging environmental conditions. The Seatooth® S100 is equipped with a standard data communications interface making it well-suited to underwater sensor, diver and vehicle applications. It can be deployed swiftly on temporary or permanent installations to support a range of offshore survey applications.

WFS are proud to announce the successful collaboration in this challenging subsea project. In this project, Seatooth® S100 will help improve safety, increase operational flexibility, reduce costs and extend asset life. The Submarine Mineral Genesis Monitoring System will be deployed for sea trial in early 2016.

For more information, visit [www.wfs-tech.com](http://www.wfs-tech.com).

## InterMoor completes mooring replacement project offshore Equatorial Guinea on schedule

InterMoor Inc., an Acteon company and part of its foundations and moorings business, finished replacing critical components in an FPU mooring system offshore Equatorial Guinea on schedule,





enabling the prime contractor, Boskalis, to expand the InterMoor work scope.

The original contract covered replacing old mooring chains and wire ropes for eight of the 12 mooring lines along with two drag anchors on Mobil Equatorial Guinea Inc.'s (MEGI's) Zafiro Producer floating production unit. During the operation, Boskalis contracted InterMoor to replace an additional mooring line.

The engineering work began in October 2014 in Houston and the Netherlands, where the Norwegian Anchor Handling & Construction (AHC) vessel Olympic Zeus was mobilized. InterMoor completed the installation work on location 64 km west of Malabo, offshore Equatorial Guinea, from the Olympic Zeus.

During the installation, InterMoor thoroughly inspected all the mooring lines as they were being disconnected from the floating production unit to determine which portion of the line required replacement with new chain and connectors. The company also documented the installation to ensure the client had accurate, as-built information on the mooring system.

The offshore installation was completed in March 2015 to MEGI's satisfaction and the project will be finalized with all documentation delivered in April 2015. InterMoor had previously worked for MEGI in country, but this was the company's first time working in conjunction with Boskalis.

Jim Macklin, vice president of projects and engineering, InterMoor, said, "Our past experience working with MEGI on their mooring installation

leveraged our ability to deliver this work safely and on schedule. The current market conditions in the oil and gas industry mean that more of our clients are focusing on integrity management to maintain their production levels. InterMoor will work to ensure production is uninterrupted by complications from mooring failures."

Not only was the project a success offshore, it also helped the local com-

munity onshore. InterMoor, MEGI, Boskalis and Olympic donated \$30,000 to a local school, based on the onboard safety performance of the crews during the execution of the work. The local school, Escuela Unitaria de Bareso, will purchase new furniture, improve the playground, install washroom facilities and waterproof windows.

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

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# MARITIME COMMUNICATIONS

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## New MTN solutions attract additional cruise customers and renewals

MTN Communications attributes recent new cruise customer wins and renewals to its strategic roll-out of transformative communications and content services on board ships. New customers American Cruise Lines and Club Med Cruises have signed agreements with MTN for communications services. Four additional customers have renewed with MTN: Crystal Cruises, Moana Cruises, Paul Gauguin Cruises and Phoenix Reisen. "Our innovation is possible for specific reasons," said Brent Horwitz, senior vice president and general manager, cruise and ferry services, MTN. "We are technology-agnostic when designing vessel communications systems. Our focus is on customized integration based on individual needs. Our solutions are successful because they deliver significant value by maximizing revenues, minimizing costs, improving operations and ensuring an exceptional experience. Finally, many on our team are former crew or vessel operators with an unprecedented understanding of customer demands. This helps us exceed expectations by serving our customers at multiple levels." The global, service-centric MTN team delivers high-speed Internet, voice and media solutions to cruise ships around the world. MTN recently unveiled new transformations in how people stay connected, informed and entertained at sea. The company's hybrid satellite and terrestrial broadband network changed the game in terms of bandwidth capacity on ships. It is also leading the shift in how passengers and crew consume data on board. With network, access to content via the Internet, and newly-launched MTN-TV high-definition (MTN-TV HD) services, MTN continues to lead the way in "blurring the lines" between land and sea communications.

## Inmarsat appoints Globecomm as VAR for maritime Global Xpress

Inmarsat has signed an agreement with Globecomm, appointing the specialized managed satellite services provider as a Value Added Reseller (VAR) for Global Xpress (GX), serving the Maritime market globally. The agreement completes Globecomm's Global Xpress offering, having previously been appointed as a GX VAR for the enterprise and global government markets. Global Xpress will be the first global Ka-band broadband satellite network providing very high bandwidth services to a range of land, maritime and aero terminals, delivered through a resilient, secure waveform that is optimized for mobility. Integrated seamlessly with Inmarsat's current L-band network, Global Xpress will ensure reliable communications in support of mission critical operations in the most challenging environments. Ronald Spithout, president, Inmarsat Maritime, said, "Globecomm has been a valued partner of Inmarsat for many years, delivering consistently successful solutions to the Maritime sector. I'm delighted to welcome them as a maritime GX VAR and to continue to develop and deepen our relationship through this most recent appointment." Globecomm specializes in the design and integration of high quality satellite communication systems and has an extensive global network. With a strong engineering pedigree and expertise in cellular networks, satellite networks, mobile satellite communications and content delivery systems, Globecomm designs, installs and supports communications solutions that meet the requirements for seamless global coverage, high performance and reliability demanded by the maritime sector. "Globecomm is among the world's leading providers of Ka-band solutions. Having GX in our portfolio is a central part of serving our maritime customers with increased performance. We look forward to our continued relationship with Inmarsat and delivering the most reliable solutions available," said Keith Hall, Globecomm CEO.



## Harris CapRock awarded systems integration contract



Harris CapRock Communications has been selected by Hess Corporation to provide a turnkey, integrated telecommunications solution to support the Stampede offshore field development project, which is operated by Hess Corporation in the Green Canyon area of the U.S. Gulf of Mexico.

The agreement represents Harris CapRock's first large-scale integration project with Hess, a leading global independent energy company engaged in the exploration and production of crude oil and natural gas. Harris CapRock will procure equipment and conduct factory acceptance testing, project engineering and detailed design and project management for the 22-system telecommunications project. The integrated solution supports audio/video conferencing, satellite and wireless communication.

"Choosing Harris CapRock as a single-source telecom provider for comprehensive systems integration improves responsiveness as well as saves time and money for Hess," said Tracey Haslam, president, Harris CapRock Communications. "Reliable customer service throughout the integration process will lead to reliable network communications for operators in the field."

Integrators play a key role in delivering products and technologies to the energy market. Harris CapRock has provided service in more than 120 countries and employs field technicians, engineers and project management personnel across a variety of IT and telecom systems specialties. Harris CapRock recently was named the most impactful services provider in the oil and gas sector by Via Satellite's 2014 Excellence Awards Program.

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

## Impartial maritime VSAT knowledge resource launched

A new online resource providing in-depth, impartial information and advice on maritime VSAT (Very Small Aperture Terminal) technology has been officially launched at Nor-Shipping 2015. maritimeVSAT.com is based on an initiative led by maritime communication services provider Marlink and supported by major industry organizations. Its purpose is to educate the wider maritime industry on all aspects of maritime VSAT by providing a detailed knowledge base and clear understanding of the technology available, thus helping ship-

owners to make an informed choice when upgrading vessel and fleet communications. From a neutral standpoint, maritimeVSAT.com provides essential information related to VSAT technology, services and installation. Key features include definitions of the terms commonly associated with VSAT, detailed information on how VSAT works, the types of satellite and coverage available, strengths and constraints and key considerations such as comparing services and cost of ownership. The site also contains a resources section with detailed articles about VSAT, coverage maps and videos.

The easy-to-use website has been developed in collaboration with leading industry bodies. It will be updated by contributors drawn from a highly experienced pool of talent from the maritime and communications industries.

"Within the VSAT industry, we sometimes forget that for many of our customers and end users, satellite communication technology is still a relatively new and complex concept," said Tore Morten Olsen, head of maritime satcoms

at Airbus Defence and Space, which owns Marlink. "We are convinced that maritimeVSAT.com can educate the market, increase their knowledge and understanding, and therefore also increase trust in the technology."

Until now, much of the information on choosing maritime VSAT services has been fragmented across different sites and is commercially driven. MaritimeVSAT.com is the only such impartial online resource for this subject, so the goal is to make it the first port of call for anyone researching the subject, providing a collection of factual information from expert sources.

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

#### **Telespazio, ST Teleport to offer global Ku-band connectivity**

Telespazio and ST Teleport have formed a strategic partnership to jointly establish a global Ku-band communications network for maritime oil and gas (MOG) customers. Under the multi-year agreement, ST Teleport will be Telespazio's preferred partner in Asia

Pacific. ST Teleport is also the only teleport company in the domestic market to have partnered the world's biggest teleport operator to expand its international reach.

Telespazio's network of seven teleports including the largest commercial teleport facility in the world, the Fucino space center with more than 170 antennas linked to major fiber point of presence (PoPs) around Europe, will connect with ST Teleport's earth station complex strategically located at the center of major shipping routes in Singapore, creating synergistic business value to boost their service offerings to customers and the MOG industry.

The companies will leverage on each other's extensive complementary presence, industry expertise and technical resources to create cost-effective, secure and reliable global satellite communications solutions for their customers across different vertical markets.

ST Teleport's MOG customers can now enjoy previously unavailable global Ku-band coverage, fast and uninterrupted data transmission, and global techni-

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cal support regardless of where they or their assets are located in the world. A comprehensive service coverage area over seven continents spanning Asia Pacific, Africa, the Americas, Europe and the Middle East with line of sight to more than 200 satellites will bring ultimate connectivity for mission-critical operations anywhere in the world. This multi-regional coverage is made possible by converging the companies' Ku-band beams around the world with automatic switching technology.

Telespazio, being a major global provider of geospatial application solutions and services in all areas relating to Earth observation, will bring new opportunities for ST Teleport to enter the geo-information industry to offer customers services such as environmental monitoring, rush mapping in support to natural disaster management, specialised products for defence and intelligence, maritime surveillance, interferometric products for landslide and ground subsidence analysis, thematic mapping for agriculture and forestry.

The two companies are also in the initial stages of jointly developing other value-added satellite communication services to enhance their portfolio and capabilities, which will be shared in the near future.

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

## Buzz Marine provides Fred Olsen with ferry communications

Buzz Marine has won the contract to supply nine of its HubbaX4 Go marine broadband devices for the high speed catamarans of the Fred Olsen ferry fleet which operates between the Canary Islands. The HubbaX4 Go is designed and built specifically for the rigors of the marine environment and will provide a cost effective alternative to maritime satellite communications for the passengers and crew of the ferries, allowing both voice and broadband data connection at sea.

The Fred Olsen fleet provides an important high speed link between the islands of the Atlantic archipelago. The new HubbaX4 Go system has a powerful, multi-directional MIMO antenna to provide uninterrupted connection to mobile broadband services for passengers and crew during the passage. Already in operation aboard the Bonanza Express, Bocayna Express, Bentago Express and Bencomo



Express, the HubbaX4 Go equipment will also be installed shortly on the impressive 126 m, 38 kt multihull, Benchijigua Express.

The HubbaX4 Go is a highly flexible system operating on 4G, 3G or 2G networks providing download speeds of up to 80 mbps and will allow up to 32 Wi-Fi devices to use the system simultaneously. The HubbaX4 antenna is housed in a small easy-to-install, IP67 certified casing that protects it from the extreme maritime elements. The antenna is connected to a HubbaX4 router located below deck to create a Wi-Fi hotspot.

Steve Smith, managing director of Buzz Marine, commented, "This is a significant installation for us as these vessels operate an important high speed link between the islands, some of which are up to 100 minutes passage time traveling at up to 38 kts. Initial results have shown the HubbaX Go to be highly effective in this environment so we are delighted that the flag ship of the fleet the Benchijigua Express will also now carry our HubbaX4 Go. We have had considerable interest in the HubbaX4 Go from other coastal operators around the world."

Buzz Marine has also developed the HubbaX4 Duo, a more complex system configured for vessels traveling across international borders and those that carry a VSAT terminal. The HubbaX4 Duo has a VSAT failover facility that enables the lower cost, faster download of the HubbaX4 Duo to seamlessly take precedence when in range of a mobile connection. This substantially reduces the operator's communication costs, which can be considerably less than using VSAT exclusively when within 20 mi of a mobile serviced coastline. The HubbaX4 Duo also provides a dual SIM facility for vessels that operate across international borders and multiple mobile providers.

For more information, visit [www.buzzconnect.co.uk](http://www.buzzconnect.co.uk).

## ORBIT receives additional order for Ka-band system

ORBIT Communication Systems has received an order to supply multiple OceanTRx™ 7-500 Ka-Band SatCom systems to one of the emerging Ka-band global satellite service providers. ORBIT's SatCom systems will be installed on board cruise ships. This order follows previous orders for ORBIT equipment already installed on several large cruise ships.

ORBIT's OceanTRx 7-500 stabilized antenna systems (2.2 m) provide continuous broadband data communications at very high rates. ORBIT's OceanTRx 4-500 (1.15 m) and 7-500 systems support Ka-band communications, which is considered the fastest growing segment in the satellite industry. Over the past 2 years, ORBIT has invested substantial resources in the development of these Ka-band systems, which have demonstrated their technological superiority in multiple deployments for commercial and defense users.

Ofer Greenberger, CEO ORBIT, said, "The satellite service provider's commercial service launched recently is an important milestone for us. We are delighted to be a key partner in turning their vision into a business reality. Its customers will now be able to enjoy a significant improvement in broadband transmission speeds made possible by its satellites and ORBIT's OceanTRx maritime SatCom systems. At their request, we will expand our cooperation to other markets beyond the maritime segment."

For more information, visit [www.orbit-cs-usa.com](http://www.orbit-cs-usa.com).

## Polsteam selects KVH mini-VSAT Broadband service

Polsteam, one of Europe's largest operators of bulk carriers, has selected the mini-VSAT Broadband service from KVH Industries, Inc. as its satellite communications solution. Polsteam, which is officially known as Polska Zegluga Morska, intends to install the TracPhone V7-IP satellite communications systems on 60 vessels.

"Onboard data applications that rely on broadband connectivity are offering exciting solutions for enhancing operational efficiency, managing operating expenses, meeting international regulations, and creating a better onboard life for officers and crew," said Leszek Trachimowicz, technical director of

Polsteam. "We are dedicated to ensuring that our vessels are realizing all the benefits of connectivity at sea, and we value the speed, reliability, and coverage that come with the KVH maritime connectivity solution."

Technical support and installation of the KVH maritime VSAT systems for Polsteam's vessels will be executed by EPA Marine, which is based in Szczecin, Poland. EPA Marine's team of highly qualified engineers specializes in installation and commissioning of maritime communications and navigational equipment.

KVH and its technology partner, ViaSat, Inc., use ArcLight spread spectrum technology to deliver fast broadband service, with Internet download speeds up to 4 Mbps. With its enterprise-grade infrastructure, the mini-VSAT Broadband network carried 500 Tb of data and 25 million voice minutes in 2014.

"We have created a truly next-generation maritime broadband system that delivers fast, high quality VSAT service on a global basis, which is vital for companies operating in today's competitive maritime industry," said Brent Bruun, KVH executive vice president of mobile broadband. "Access to broadband connectivity and real-time data is a differentiator for maritime operators, and we are extremely pleased to be working with Polsteam to bring advanced broadband service to their vessels."

Designed exclusively for the mini-VSAT Broadband network, KVH's unique TracPhone V-IP satellite communications antenna systems are built 85% smaller than typical VSAT antennas to install more easily on all vessels. The TracPhone line offers multiple antenna sizes ranging from the 37 cm diameter TracPhone V3-IP, to the 60 cm diameter TracPhone V7-IP, and the 1.1 m diameter TracPhone V11-IP. KVH recently shipped its 5,000th TracPhone system for the mini-VSAT Broadband service.

To further help maritime operators meet the challenge of the increasing reliance on broadband by both crew and operations, KVH recently introduced the IP-MobileCast™ content delivery service. This multicasting service uses the mini-VSAT Broadband network to deliver a separate data stream of news, sports, entertainment, and training content to improve the quality of life for crew members onboard commercial vessels. The IP-MobileCast™ service also delivers operational data such as electronic chart updates and weather information to help optimize fleet performance.

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



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## InfiNet's solutions to aid vessel communications in Gulf of Finland

InfiNet Wireless has announced the deployment of its wireless solutions within the Gulf of Finland. InfiNet Wireless' solutions will be used to create a modern technological wireless network within the Gulf, with the project being carried out by communications experts Geyzer-Telecom.

Operating within the Gulf is a fleet of 16 icebreakers, each with a length of 119 m and an unlimited sailing range. The suggested network coverage area is in excess of 10,000 sq. km as the ice-breaking fleet not only have to travel to break ice measuring 1.5 m thick, but provide vital assistance to other vessels working in and around the eastern part of the Gulf of Finland.

With the market constantly demanding increased connectivity, InfiNet's assistance was sought to improve connectivity across the fleet. The main objectives of the project are to improve the technological characteristics of the existing network based on the WipLL technologies.

The deputy head of Geyzer-Telecom's system integration and development department, Igor Malygin explained, "This is a very interesting project based on the immense capabilities of InfiNet Wireless' equipment. Before the project could even start, we had to carry out a range of complex tests to prove the operability of the proposed technical solution. We are confident of more, similar scale projects both in Russia and abroad, as InfiNet's products can solve the toughest of technical challenges."

Thirty-three areas of base stations and 200 stationary subscriber stations have already been installed at various seaport locations, which will carry out the connection to the broadband network of local wire networks at over 20 km with 50 Mbps bandwidth. Mobile subscriber devices have been installed on ice breakers' masts at heights up to 20



m. The bandwidth of such devices is no less than 4 Mbps at a vessel speed of 12 kts with the shipboard equipment set to provide a stable connection at 30 km distance from the coast. The system provides services of data, video and VoIP transmission. It conforms to main quality of service (QoS) requirements and provides the majority of the network traffic. The system is also equipped with subsystems of monitoring, diagnostics and automatic maintenance.

InfiNet Wireless' business development director, Roman Smirnov, explained further, "For the first time in these waters, these vessels will be able to transmit video at a greater distance from the coast, thanks to InfiNet Wireless' equipment. High network capacity allows us to meet the most complex objectives set by the seaport administration and find solutions which have been impossible until now. This technologically difficult project would be impossible without the joint efforts of InfiNet Wireless' engineers and our integrators such as Geyzer-Telecom and Integra Telecom Northwest. We are certain we will deploy this solution to other seaports."

Once fully completed, the upgraded network will provide rendering of commercial communication services for all companies operating in this territory. InfiNet Wireless' latest technical solutions will provide wireless communications for both fixed and mobile objects and expect to add at least another 100 vessels to the network in the near future.

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

## Intellian FleetBroadband Xtra solution approved by Inmarsat

Inmarsat has announced that the Global Xpress (GX) and FleetBroadband terminals manufactured by Intellian are now approved for use with FleetBroadband Xtra.

Designed to enable maritime customers to benefit from high-speed broadband connectivity, Fleet Xpress is an integrated Ka-band and L-band solution that utilizes capacity from the first GX satellite in commercial service, 1-5 F1, and Inmarsat's existing Inmarsat-4 fleet.

A key Inmarsat terminal manufacturing partner, Intellian continues to support Inmarsat's GX network services. The recently unveiled Intellian 65 cm GX60 and 1m GX100 are both approved for use, along with Intellian's FB250 and FB500 for FleetBroadband Xtra.



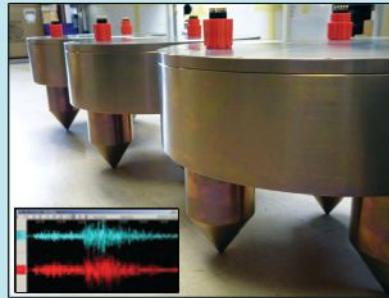
Intellian has been working closely with Inmarsat to test its latest VSAT terminals combined with the FleetBroadband systems live on the Global Xpress network. The GX60 and GX100 terminals were extensively tested live at sea last year, and now with the FB250 and FB500 Intellian are able to fully support the new services from Inmarsat. Eric Sung, president and CEO of Intellian Technology commented: "Working together with Inmarsat we are pleased to be able to deliver a complete solution of our proven technology designed to operate well into the future, fully supporting the latest Global Xpress services."

The company is currently offering both 65-cm and 1-m Inmarsat GX type approved terminals, designed to ensure the best service quality available for the FleetBroadband Xtra service and the forthcoming Fleet Xpress service that will become available when GX begins global commercial services early in the second half of 2015.

Inmarsat has completed the integration, evaluation and testing of the Intellian FleetBroadband Xtra solution incorporating Intellian's GX100 and GX60 GX terminals along with their FB250 and FB500 FleetBroadband systems. "We are very pleased that these Intellian terminals have been approved for use with our FleetBroadband Xtra service. I am proud that the newest service within our portfolio is gaining such momentum in the market that trusted manufacturing partners like Intellian are underwriting this with their terminals," said Ronald Spithout president of Inmarsat Maritime.

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

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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

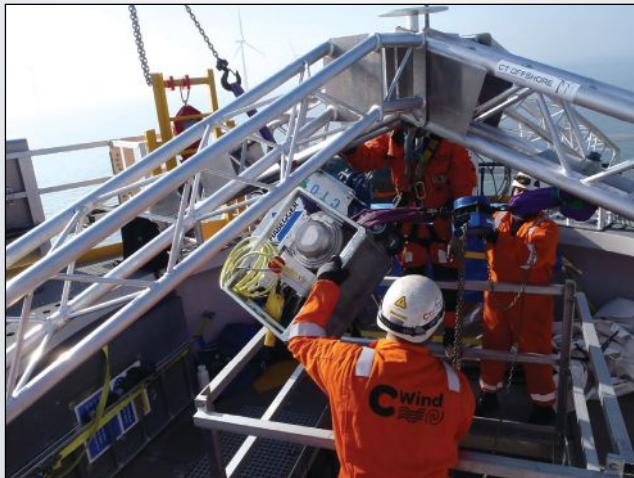
The OCB is a modular seafloor communications network that is directly connected to the Internet. Clients can provide and control their own sensors and data outputs, or CSnet can provide a suite of sensors from the surface to the seafloor with data directly forwarded to the client's onshore facilities. 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.

## KJCN turns to Ciena for upgrade

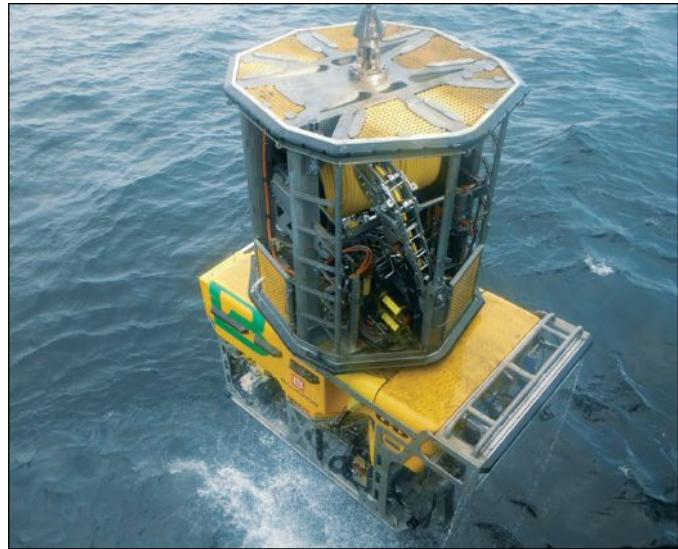
To enable future growth and support the demand for greater connectivity between Japan and South Korea, the Korea Japan Cable Network (KJCN) has selected Ciena® for a 100G network upgrade. This upgrade will allow KJCN to meet the needs of on-demand networking services and traffic growth driven by mobile broadband, cloud computing and HD video. Ciena's GeoMesh submarine solution will enable KJCN to increase the ultimate capacity of the cable system to 15 times of the original design capacity. The KJCN network is owned by the global consortium of communications companies, including KT (Korea Telecom), SoftBank Mobile, QTNet (Kyushu Telecommunication Network) and others. KJCN is comprised of two 250-km repeater-less submarine cables with diverse routes connecting Korea and Japan. The KJCN network is used by traditional carrier customers, as well as web-scale operators and content delivery providers to transfer a plethora of on-demand service and applications between Japan and South Korea. To help meet growing network demands, KJCN has deployed Ciena's 6500 Packet-Optical Platform, powered by WaveLogic coherent optics. Along with Ciena's plug-and-play programmable network elements and 100G coherent technology, KJCN will utilize high-powered Raman amplification to enable very high capacity transmission over these long unrepeated cable spans to increase the ultimate capacity of the system. Additionally, Ciena's OneControl Unified Management System together with the integrated test set capabilities of WaveLogic will provide end-to-end network management and visibility, helping KJCN to resolve issues proactively and maintain network availability.

## CWind wins CT Offshore cable pull-in services contract

CWind has won a contract to supply rigging and cable pull-in services to CT Offshore to support their cable laying project at DONG Energy's Gode Wind 1 & 2 offshore wind farms. Under the contract, CWind will support the pull-in of the cables at all 97 turbines as well as those connecting the array to the substation. Following extensive cable pull-in experience at offshore wind farms such as West of Duddon Sands, Gwynt y Môr and Greater Gabbard in the UK, this is CWind's first contract to provide this service in German waters. Brian Barkholt, project manager at CT Offshore, commented on the contract award to CWind: "We have worked with CWind on a number of contracts now and are very pleased with the quality of work they deliver. They understand our requirements exactly, which is essential if, like us, you want to deliver a successful cable laying operation on time and on budget." Peter Jorgensen, managing director CWind, commented, "This is a significant contract win for CWind, we are delighted to be asked to work with CT Offshore again, underscoring the high quality of our service and execution. We look forward to making the most of this excellent opportunity for our teams to build on our extensive experience in the UK to support our clients in a new market."



## Bourbon completes installation of cable for tidal project



Bourbon is participating in a tidal turbine connection project off the island of Ushant (Brittany, France), a first in France. A pioneer in the towing and installation of the first floating wind turbine off the coast of Portugal, Bourbon is committed in the field of renewable energies and is now supporting SABELLA. The company's mission was to lay the electrical cable for connecting the first tidal turbine to the national grid. The challenges: a narrow corridor, strong currents, 30 tons of cable.

The resources made available by Bourbon for this operation:

- The Argonaute, a vessel measuring 69 m long by 15 m wide, equipped with a dynamic positioning system;
- A Falcon series ROV, lightweight and highly mobile, specializing in diving support work and conducting visual inspections in shallow water;
- All necessary equipment for cable laying, landing and burying (winch, floats, fittings, underwater positioning systems, building vehicles, etc.); and
- A team of over 30 experienced professionals, including engineers, seafarers, divers and ROV pilots.

After 2 weeks of preparation, in close collaboration with all project stakeholders (client, cable manufacturer, divers, construction company, etc.), the laying of the electrical cable, a complex operation, was successfully conducted from 23 to 26 May 2015 in a window of favorable weather. The low tidal coefficient at this time made it possible to avoid strong currents. Rather, the wind and wave conditions were conducive to the work of the divers and the precise positioning of the vessel in order to lay the cable within a narrow corridor.

Teams from Bourbon and Sabella thus landed, placed, and buried 30 tons of 68-mm diameter cable over 2 km at depths from 0 to 60 m in the Fromveur Passage to Ushant. "This cable laying is an essential step of the Sabella D10 project; it makes it possible to connect the tidal turbine to shore. This is a delicate operation, given the very strong currents in the area. We were able to rely with confidence on the expertise and know-how of the Bourbon teams," said Fanch Le Bris, Sabella CEO.

For this project, Bourbon provided a turnkey service both upstream and downstream:

- Project management and engineering;
- Installation of the submarine cable and connector;
- Landing of cable to the collector; and
- Managing the various providers needed to complete the entire operation.

A team from Bourbon's research department will also support monitoring the project at the time of final immersion of the tidal turbine expected to occur by late June. Through these experiences in offshore wind and tidal farms, Bourbon positions itself as an integrator, installer of submarine cables for renewable energy.

The first tidal turbine mass developed in France, Sabella D10 is a demonstrator that will supply 15% of the island's energy needs for 1 year. This project follows the installation of an experimental prototype tidal turbine called Sabella D3 in 2008. The data returned will be analyzed and make it possible, ultimately, if it proves successful, to mass produce new, more powerful turbines, to be installed by 2017. An "experimental tidal farm" of three Sabella D15 type turbines linked to an energy storage system would then cover 70% of Ushant's electricity needs.

For more information, visit [www.bourbon-online.com](http://www.bourbon-online.com).

#### NEMO LINK announces contracts

NEMO LINK announced the two winning contractors who will build the first electricity interconnector between Great Britain and Belgium. They are Siemens and J-Power Systems, a subsidiary of Sumitomo Electric Industries, Ltd.

The contracts are together valued at about €500 million. Siemens will build the converter stations in both Kent and Zeebrugge using their HVDC Plus technology and they will have a 5-year service and maintenance agreement. J-Power systems will design, manufacture and install the state-of-the-art HVDC XLPE cable system—the first time it will be used operationally as a High Voltage Direct Current link at 400 kV.

NEMO LINK is the joint venture between National Grid and Elia, the Belgium Transmission System Operator, to deliver the 1,000 MW subsea link between the two countries. It will run 140 km and will provide enough electricity to power half a million homes.

The link will increase energy security for both countries and support integration of renewable energy. It has been designated as one of the European Commission's Projects of Common

Interest as it will help create an integrated European energy market.

Alan Foster, NEMO LINK board member, said, "We are delighted that Siemens and J-Power Systems have won these contracts. The use of this state-of-the-art cable technology allied to the very efficient converter stations will make NEMO LINK the most innovative interconnector in Europe, bringing new supplies of competitively-

priced electricity to the market."

Siemens will be responsible for the turnkey installation of both converter stations delivering 1,000 MW with a transmission voltage of 400 kV DC.

Siemens HVDC Plus technology allows efficient transportation of electrical power over large distances and in particular for subsea applications. These state-of-the-art converter stations will convert AC to DC and DC back to AC

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on the other side of the link. This system is highly controllable and allows power to flow in both directions. The power converters contribute to a high level of stability in the transmission system.

"We are very pleased to be working with NEMO LINK on another HVDC landmark project that will support the integration of the European energy market," said Tim Dawidowsky, CEO of the transmission solutions business unit at Siemens. "Siemens is a world leader in high-voltage direct current transmission and has installed projects in its HVDC Plus technology with a total capacity of 4.6 GW worldwide."

The engineering design work and site preparation should begin later this year and it's anticipated that the interconnector will go into commercial operation in 2019.

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

## Cable project Ostwind 1 heads towards last hurdle for approval

German grid operator 50Hertz has reached another important milestone in the approval procedure for the Ostwind 1 offshore cable project. The public hearing for the submarine cable route in the Exclusive Economic Zone (EEZ) for the grid connection of the Westlich Adlergrund cluster (project Ostwind 1) was held recently.

The competent authority for the approval of this route section is the Federal Maritime and Hydrographic Agency (BSH) in Hamburg. In the scope of the legally prescribed public participation procedure, the participants listened to the positions taken by more than 60 public agencies and discussed them under the guidance of the BSH. Following this hearing, the authority will work out the planning approval decision under the terms of the Offshore Installations Ordinance. 50Hertz expects the final decision in the summer of 2015 and hopes to commence preparations for the construction of the submarine cable route in the EEZ soon after.

Just as during the procedure with the Ministry of Energy of Mecklenburg-Western Pomerania, which is competent for the land route and the sea route in territorial waters, the majority of the positions concerned the environmental impact of the construction and operation of the power cables. Before the application documents were drawn up, 50Hertz performed a comprehensive scientific environmental study and drew up a matching route planning in order to

minimize the effects of the project on the environment.

On 9 March 2015, 50Hertz received the planning approval decision for the onshore route from the Ministry of Energy of Mecklenburg-Western Pomerania. As a result, the construction of the project section right off the coast and on land can start as planned during the summer of this year. The Ministry of Energy announced that according to its current time schedule, the planning approval decision for the offshore route should be reached this summer.

The Ostwind 1 project is part of the grid connection of the Westlich Adlergrund cluster and includes the connection of the Wikinger and Arkona-Becken Südost wind farms to the grid, based on development scenarios that were coordinated with a wide variety of parties (Offshore Network Development Plan - O-NEP/O-NDP). Both wind farm projects have obtained the necessary permits and are in a very advanced state of planning. The Ostwind 1 project cable routes cover 90 km at sea and 3 km on land each, terminating at the 50Hertz substation of Lubmin. The start of the construction works is planned for the summer of 2015 and the grid connections should be operational by the end of 2018.

The licensing authorities for the construction and operation of the grid connections are the Ministry of Energy of Mecklenburg-Western Pomerania, competent for the land route and the sea route within territorial waters, and the Federal Maritime and Hydrographic Agency (BSH), competent for the sea route in the EEZ.

For more information, visit [www.50hertz.com](http://www.50hertz.com).

## ABB wins order for one of the world's biggest wind farms

ABB has won an order worth around \$130 million from DONG Energy to supply a high-voltage cable system that will bring power from the Walney Extension wind park off the northwest coast of England to more than a million people in the UK.

The Walney Extension will provide additional generation potential of 660 MW on top of the existing offshore wind farm's 367 MW. When completed, both offshore wind farms will be capable of providing clean electricity to over 800,000 households, making a significant contribution to the UK's target of achieving 15% of its total energy production from renewable sources by 2020



and reducing carbon dioxide emissions.

"The Walney Extension cable link will help deliver clean renewable power to more than a million people," said Claudio Facchin, president of ABB's power systems division. "This project reaffirms ABB's commitment to delivering power and productivity for a better world and reinforces our position as a leading provider of innovative high-voltage cable technology."

Europe now has around 8 GW of offshore wind power connected to the grid. UK is the leading contributor, accounting for nearly half the installed capacity and a further 11.9 GW of offshore capacity under construction or having planning approval.

The existing Walney offshore wind farm is located 15 km west of Walney Island off the coast of Cumbria in the Irish Sea, with its turbines covering an area of approximately 73 sq. km. The Walney Extension Wind Farm site where ABB is supplying the high-voltage cable system is northwest of the existing installation and will cover an area twice as large at 149 sq. km.

Walney will be one of Europe's biggest wind farms when the new extension is ready. ABB will design, manufacture, supply and commission the 220 kV AC extruded cable system. The link includes more than 157 km of submarine cable to connect the two wind farm platforms to each other and to shore, as well as 24 km of underground cable for the grid connection.

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

## AquaComms engages APTelecom global sales channel

APTelecom has been appointed by Aqua Comms Limited (AquaComms) to assist with international sales and the commercialization of a new submarine cable system known as AEConnect, which links the U.S. to Ireland, and CeltixConnect, an existing Irish subsea cable providing connectivity between Dublin and London and greater Europe.

AEConnect, scheduled to be ready for service in December 2015, is the latest transatlantic subsea fiber optic cable system connecting North America to Europe with unprecedented capacity and reliability. AEConnect will land in Shirley, NY and Killala on the west coast of Ireland spanning more than 5,400 km, with stubbed branching units for future landings, and will use CeltixConnect an Irish Sea subsea cable for further reach. CeltixConnect extends from East Point Business Park, Dublin, Ireland to Holyhead, Wales, UK.

AEConnect's low latency and high reliability supports the bandwidth requirements of data centers, cloud-based networks and global content providers. As part of the remit, APTelecom will assist AEConnect with the commercialization aspects of their network.

"We are excited to be working with an industry leader like AEConnect on developing such innovative and much needed telecom infrastructure between the world's most demanding markets," said Ian Horley, vice president of sales and marketing of EMEA for APTelecom. "Our overall vision and strategy are aligned and working together will allow us to expedite AEConnect's goals."

"AquaComms' appointment of APTelecom is a fundamental step towards realizing our long-term strategy to build and operate a diversified, solution based network, to provide term and peak capacity product offerings, to support the global expanding data requirements of today and for tomorrow; ultimately offering 'infrastructure as a service,'" said Greg Varisco, COO of AquaComms. "AEConnect is currently being constructed using state-of-the-art technology, with 100G-coherent design for low latency, reliable delivery for even the most bandwidth-hungry applications and direct data center-to-data center connectivity across the Atlantic."

This news comes on the heels of several milestones that APTelecom has achieved in 2015. The company's client

base has increased by 30% over the past year, with expansion into new markets within Africa, Asia, Australia and South America. APTelecom's clients reach now covers 12 countries in every continent on the globe. Additionally, APTelecom has secured more than \$190 million in sales for submarine cable projects on behalf of its clients around the globe.

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

## Jan De Nul to install cables

Jan De Nul Group has secured two contracts with Dong Energy to execute cable installation works for the Burbo Bank Extension Offshore Wind Farm in Liverpool Bay. A first one for the installation of the export cables, and a second one for the installation of the infield cables.

Jan De Nul Group will install and bury the 25 km export cable between the offshore transformer platform and the beach as well as the 32 infield cables between the wind turbines and the offshore transformer platform, including crossing and protection of existing cables and pipelines.

For both installation works, which will take place during spring and summer 2016, Jan De Nul Group will use its cable laying vessel Willem de Vlamingh. The burial of the export cable will be executed by Jan De Nul Group's trailing suction hopper dredger modified with side installation pipe and for the trenching of the infield cables Jan De Nul Group will use its subsea trencher UTV1200.

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

## Global Marine announces new fiber links to offshore platforms

Global Marine Systems Limited has landed a pair of high-profile contracts from Tampnet. Both contracts are designed to further enhance high-capacity communications networks in the North Sea and entail highly skilled route survey, cable installation and protection services.

The first project, which is the fourth contract from Tampnet in a series of critical North Sea installations, is for a platform-to-platform cable system that includes four branching units. It will


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incorporate approximately 74 km of fiber optic cable, with the cable for the second platform being laid to allow for platform connection at a later date. One of the company's installation vessels, Innovator, has been contracted to complete the work following the successful installation of a prior Tampnet project in 2014.

Initially, mattress deployment work was undertaken across various oil and gas pipelines, as well as umbilicals. This was prior to Innovator laying fiber optic cable in the centerline of a channeled mattress on the seabed nearly 120 m below the surface. The mattress design has been developed specifically for this project utilizing concrete mattresses and combining this with recycled rubber providing greater support to the cable over the pipeline crossings and ensuring the cable is retrievable for future maintenance operations, should this be required. This inventive solution requires the extensive capability of Innovator and the Mohawk ROV.

The second contract from Tampnet is for 36 km of fiber optic cable installation in the southern North Sea. At one end of the system, the cable end spur has been previously installed ready for connection. Global Marine, using its installation vessel C.S. Sovereign, will recover the spur for the first platform, install a cable joint and lay cable to the branching unit 1 km from the Cable End Module (CEM) location near the second platform. The CEM is also being installed by C.S. Sovereign and will be used to tie into another subsea control system, these two subsea structures will be connected at a later date.

"Both projects are currently in progress and going well," said Andy Lloyd, director, installation at Global Marine. "Some of the work is more challenging than usual, to say the least, notably the installation of the CEM. Positioning this subsea structure accu-

rately was a crucial part in the overall delivery of this important project and relied heavily on sound project engineering both in the planning phase and subsequently during marine operations. I am pleased to say that we have already deployed the CEM successfully, which demonstrates our skill in this field, and is testament to the proven capabilities of our marine installation vessel, crew and equipment."

Anders Tysdal, technical director of Tampnet, added, "Our partnership with Global Marine has strengthened and this is as a result of their continued project delivery, meeting the oil & gas sectors' notoriously precise and high standards. It is clear they have exceptional capability in subsea cable operations. Their innovative engineering solutions and the ability to install subsea structures accurately and safely is an example of that."

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

## UNINETT selects Coriant 100G for Arctic optical network

Coriant has been selected by UNINETT, a non-profit provider of telecom and data network connections to Norwegian universities and research institutions, to build a new 100G-capable subsea optical transport infrastructure connecting Ny-Ålesund and Longyearbyen on the Svalbard archipelago.

The Coriant solution, which includes the industry-leading Coriant® hiT 7300 Multi-Haul Transport Platform and the Coriant® Transport Network Management System (TNMS), will enable UNINETT to cost-efficiently scale optical transmission capacity and meet the low latency connectivity requirements of demanding, high-bandwidth scientific research and education traffic and applications.

The northernmost civilian year-round settlement in the world, Ny-Ålesund is an important international research community that hosts a broad range of life, earth, and environmental scientists. Eleven institutions from 10 countries have established permanent research stations in Ny-Ålesund, and an increase in research activities, including plans for a new astronomical research observatory, is one of the primary drivers behind the need for higher network capacities. Real-time and near real-time astronomy data transmission is one example of the types of research and education applications requiring reliable, high-speed connectivity.

"High-speed global collaboration and real-time exchange of media-rich data and applications are critical to research and educational institutions, and serve as the life blood of research communities like Ny-Ålesund," said Vidar Faltinsen, chief technology officer, UNINETT. "In order help us achieve our goal of bringing our customers state-of-the art broadband communications, we needed a proven technology partner that could deliver a highly reliable and flexible DWDM solution, with the service expertise to support network deployment and service commissioning in Svalbard's particularly harsh environment. Coriant proved the ideal partner on all fronts."

Serving as Submarine Line Terminal Equipment (SLTE), the Coriant hiT 7300 LH/ULH platform will provide UNINETT with coherent 100G connectivity between Ny-Ålesund and Longyearbyen in a DWDM subsea application spanning approximately 260 km. The new network is designed to maximize utilization of deployed fiber resources and deliver reliable wavelength and sub-wavelength services to a large end-user community, including more than 200 Norwegian research and educational institutions and more than 300,000 users. With the industry's most advanced optical link control and GMPLS-based restoration capabilities, the hiT 7300 delivers the optimal optical performance, stability, and availability, especially in operating environments of dynamic change, such as unpeaked and unamplified subsea applications. Service management for the UNINETT network will be provided by the proven service and network management capabilities of TNMS, which create a rich set of tools that enable UNINETT to simplify capacity provisioning and lower operating costs.



"Coriant has a wealth of experience in providing robust and reliable optical transport solutions for hybrid subsea and terrestrial networks," said Uwe Fischer, chief technology officer, Coriant. "We continue to build our industry leadership on superior photonic layer performance, stability, and scalability, with proven features such as active power transient management and integrated high-density LH/ULH ROADMs that ensure the high-availability required by UNINETT's customers."

For more information, visit [www.uninett.no](http://www.uninett.no) or [www.coriant.com](http://www.coriant.com).

#### **EGS christens Geo Resolution**

The EGS management gathered recently in Singapore to conduct the christening and blessing ceremony of the RV Geo Resolution, the latest addition to EGS' fleet of deep water capable hydrographic and geophysical survey vessels. The ceremony took place at the Sembawang Shipyard, where the vessel was equipped and readied for her forthcoming survey duties.

EGS purchased the 68-m long RV

Geo Resolution (formerly HMNZS Resolution) from the Royal New Zealand Navy (RNZN) in October 2014. During her service in New Zealand, the vessel was the RNZN's principal hydrographic survey ship conducting surveying and charting on behalf of the New Zealand Navy. Originally designed and constructed in Mississippi for the U.S. Navy and named the USNS Tenacious, she was the 17th of a Class of 18 Stalwart-Class surveillance ships.

The vessel was handed over to EGS on 10 October 2014 and left Devonport Naval Base the same day for her voyage to Singapore. She arrived at the Sembawang shipyard on 7 November. EGS subsequent conversion to a commercial hydrographic and geophysical survey vessel included the installation and commissioning of a full ocean depth multibeam system, state-of-the-art USBL system and geophysical sensors to carry out surveys down to 2,000 m water depth. For *in-situ* geotechnical and burial assessment survey work, the geophysical equipment suite is complemented with gravity coring facilities and an

MCPT system as part of her permanent shipfit. Furthermore, communication systems have been upgraded to include a V-Sat system to enable broadband Internet connections and high speed ship-to-shore data transfers.

EGS' CEO Chris Welsh commented that, "This was an unique opportunity for EGS to acquire a vessel which was purpose built as an acoustically very quiet survey platform, ideally suited in every way for the survey work we perform. In addition it was clear from when we first inspected the vessel that she had been extremely well maintained by the previous Navy owners. In particular we would like to thank the New Zealand Navy's assistance during the purchase and transition to a commercial survey vessel. The RV Geo Resolution is a timely and perfect addition to EGS' fleet. Now, remarkably, her first commercial contract is back in New Zealand where she will be sailing to commence survey work on a new submarine cable system linking New Zealand and Australia."

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

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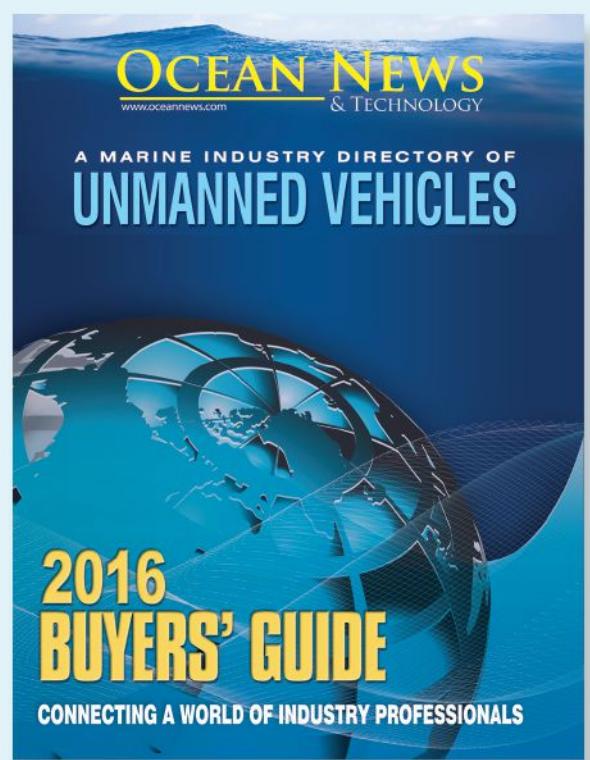
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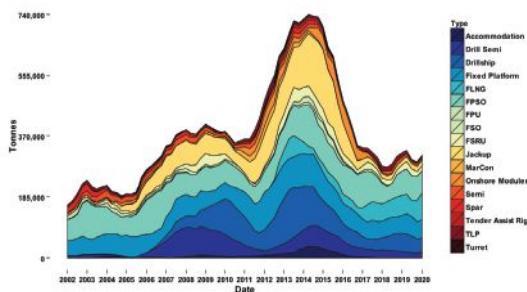
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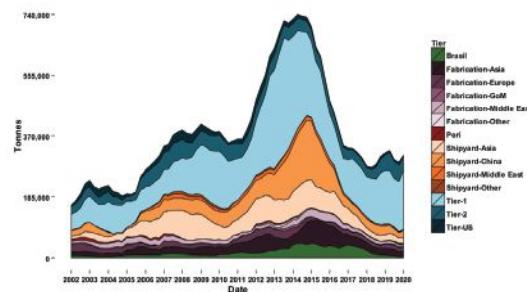
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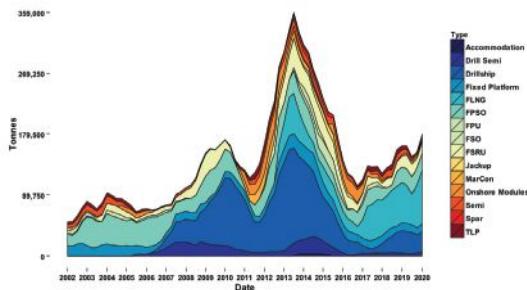
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2002 – 2020e



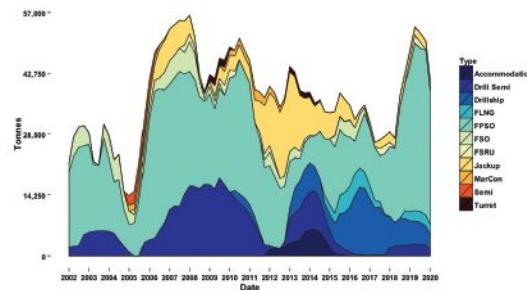
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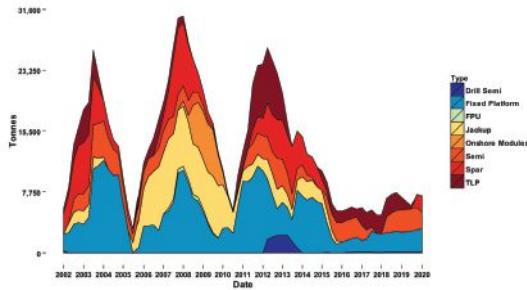
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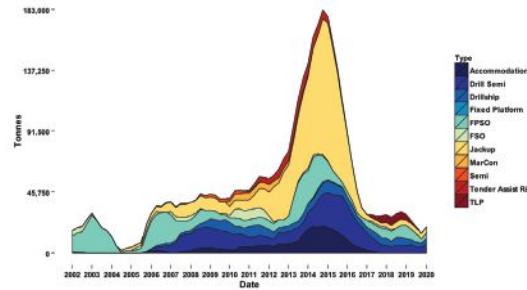
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# Monthly Stock Figures & Composite Index

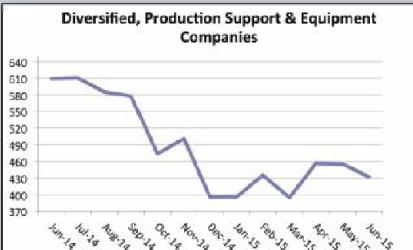
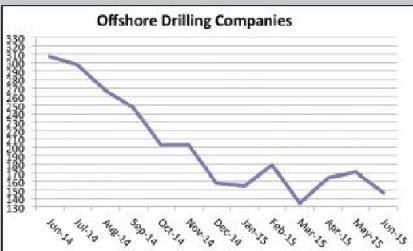
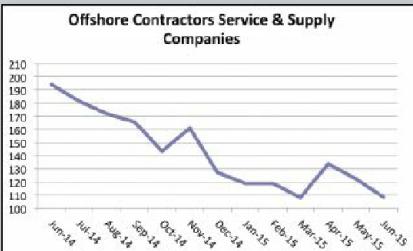
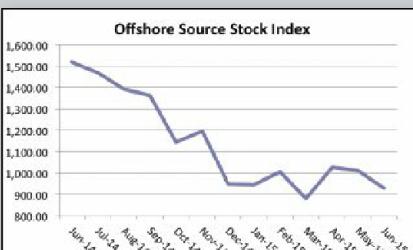
Industry Company Name	Symbol	Close(Mid) June	Close(Mid) May	Change	Change %	High	Low
						52 week	
<b>Diversified, Production Support and Equipment Companies</b>							
Baker Hughes, Inc.	BHI	61.96	65.83	-3.87	-5.9%	75.64	47.51
Cameron Intl. Corp.	CAM	53.55	52.24	1.31	2.5%	74.89	39.52
Drill-Quip, Inc.	DRQ	73.36	76.84	-3.48	-4.5%	110.23	65.28
Halliburton Company	HAL	44.05	46.21	-2.16	-4.7%	74.33	37.21
Tenaris SA	TS	27.94	31.04	-3.10	-10.0%	48.45	26.28
Newpark Resources, Inc.	NR	7.67	9.23	-1.56	-16.9%	13.60	7.59
Schlumberger Ltd.	SLB	87.04	92.04	-5.00	-5.4%	118.76	75.60
Superior Energy Services, Inc.	SPN	20.99	23.72	-2.73	-11.5%	37.05	16.70
Weatherford International, Inc.	WFT	13.20	14.38	-1.18	-8.2%	24.88	9.40
Deep Down, Inc.	DPDW	0.55	1.02	-0.47	-46.1%	1.95	0.49
FMC Technologies	FTI	42.12	41.80	0.32	0.8%	63.92	34.85
<b>Total Diversified, Production, Support and Equipment.....</b>	<b>432.43</b>	<b>454.35</b>	<b>-21.92</b>	<b>-4.8%</b>	<b>643.70</b>	<b>360.43</b>	
<b>Geophysical / Reservoir Management</b>							
Dawson Geophysical Company	DWSN	5.25	5.56	-0.31	-5.6%	17.28	4.22
Mitcham Industries, Inc.	MIND	4.58	4.57	0.01	0.2%	14.48	4.04
Compagnie Gnrale de Gophysique-Veritas	CGV	6.38	7.71	-1.33	-17.3%	15.14	5.31
<b>Total Geophysical / Reservoir Management.....</b>	<b>16.21</b>	<b>17.84</b>	<b>-1.63</b>	<b>-9.1%</b>	<b>46.90</b>	<b>13.57</b>	
<b>Offshore Drilling Companies</b>							
Atwood Oceanics, Inc.	ATW	27.97	33.13	-5.16	-15.6%	53.90	26.12
Diamond Offshore Drilling, Inc.	DO	26.91	32.72	-5.81	-17.8%	51.00	26.02
ENSCO International, Inc.	ESV	21.85	25.50	-3.65	-14.3%	55.89	19.78
Nabors Industries, Inc.	NBR	14.02	15.36	-1.34	-8.7%	30.24	9.91
Noble Drilling Corp.	NE	15.10	16.98	-1.88	-11.1%	30.29	13.15
Parker Drilling Company	PKD	3.38	3.62	-0.24	-6.6%	7.10	2.51
Rowan Companies, Inc.	RDC	20.51	22.95	-2.44	-10.6%	32.85	17.33
Transocean Offshore, Inc.	RIG	16.66	20.55	-3.89	-18.9%	46.12	13.28
<b>Total Offshore Drilling.....</b>	<b>146.40</b>	<b>170.81</b>	<b>-24.41</b>	<b>-14.3%</b>	<b>307.39</b>	<b>128.10</b>	
<b>Offshore Contractors, Services, and Support Companies</b>							
Helix Energy Solutions Group, Inc.	HLX	13.89	16.91	-3.02	-17.9%	28.00	13.06
Gulf Island Fabrication	GIFI	10.07	12.62	-2.55	-20.2%	23.57	10.05
McDermott International, Inc.	MDR	5.67	4.53	1.14	25.2%	8.29	2.10
Oceaneering International	OII	46.05	52.87	-6.82	-12.9%	79.05	46.97
Subsea 7 SA	SUBCY.PK	10.1	11.72	-1.62	-13.8%	20.30	8.17
Technip ADS	TKPPY.PK	16.3	17.32	-1.02	-5.9%	27.97	13.39
Tetra Technologies, Inc.	TTI	6.24	6.68	-0.44	-6.6%	12.11	4.72
<b>Total Offshore Contractors, Service, and Support.....</b>	<b>108.32</b>	<b>122.65</b>	<b>-14.33</b>	<b>-11.7%</b>	<b>199.29</b>	<b>98.46</b>	
<b>Offshore Transportation and Boat Companies</b>							
Seacor Holdings, Inc.	CKH	71.00	72.94	-1.94	-2.7%	83.88	67.36
Gulfmark Offshore, Inc.	GLF	12.01	14.57	-2.56	-17.6%	46.09	11.83
Bristow Group	BRS	52.72	60.11	-7.39	-12.3%	81.60	50.80
PHI, Inc.	PHII	33.75	31.87	1.88	5.9%	52.98	29.10
Tidewater, Inc.	TDW	23.12	27.66	-4.54	-16.4%	56.98	18.84
Trico Marine Services, Inc.	TRMAQ.PK	12.94	13.71	-0.77	-5.6%	14.53	12.06
Hornbeck Offshore	HOS	20.76	22.42	-1.66	-7.4%	47.45	17.91
<b>Total Offshore Transportation and Boat .....</b>	<b>226.30</b>	<b>243.28</b>	<b>-16.98</b>	<b>-7.0%</b>	<b>383.51</b>	<b>207.90</b>	

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# Monthly Stock Figures & Composite Index

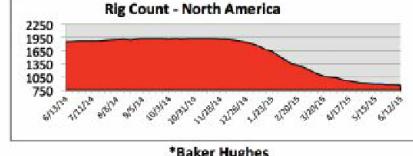
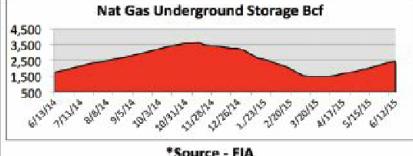
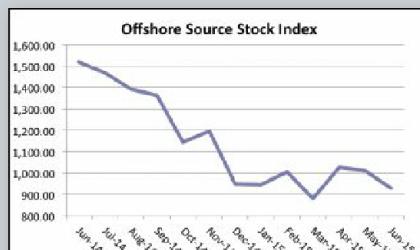
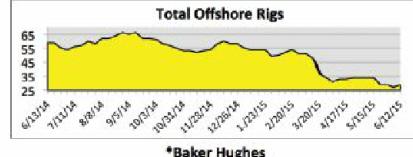
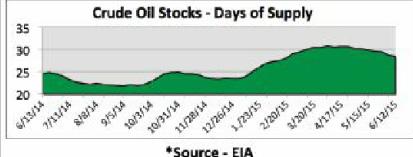
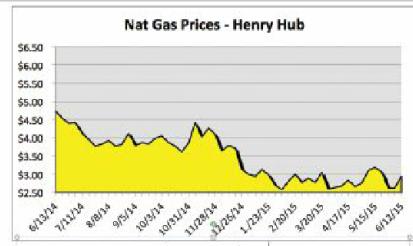
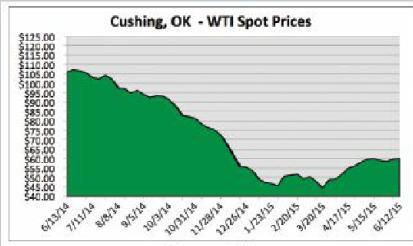
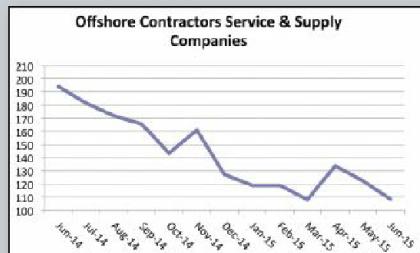
Industry	Close(Mid) June	Close(Mid) May	Change	Change %	High 52 week	Low	
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	Total Diversified, Production, Support and Equipment	432.43	454.35	-21.92	-4.8%	643.70	360.43
Geophysical & Reservoir Management Companies							
	Total Geophysical / Reservoir Management	16.21	17.84	-1.63	-9.1%	46.90	13.57
Offshore Drilling Companies							
	Total Offshore Drilling	146.40	170.81	-24.41	-14.3%	307.39	128.10
Offshore Contractors Service & Supply Companies							
	Total Offshore Contractors, Service and Support	108.32	122.65	-14.33	-11.7%	199.29	98.46
Offshore Transportation & Boat Companies							
	Total Offshore Transportation and Boat	226.30	243.28	-16.98	-7.0%	383.51	207.90
Offshore Source Stock Index							
	Total Offshore Source Index	929.66	1,008.93	-79.27	-7.9%	1,580.79	808.46

## 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

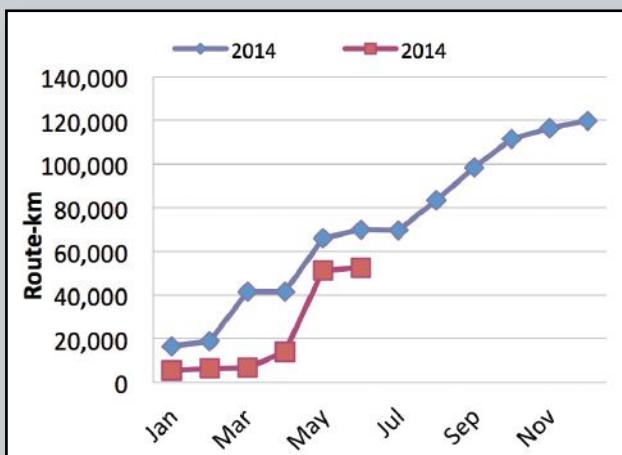
*Monitoring the Pulse of the U.S. Offshore Oil & Gas Industry*



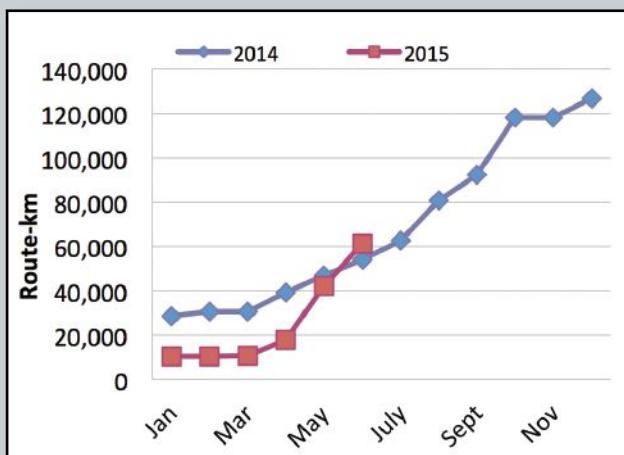
**Positive trend, at least 3 weeks**  
**Changing trend, less than 3 weeks**  
**Negative trend, at least 3 weeks**

# Subsea Telecom & Power Cable Data

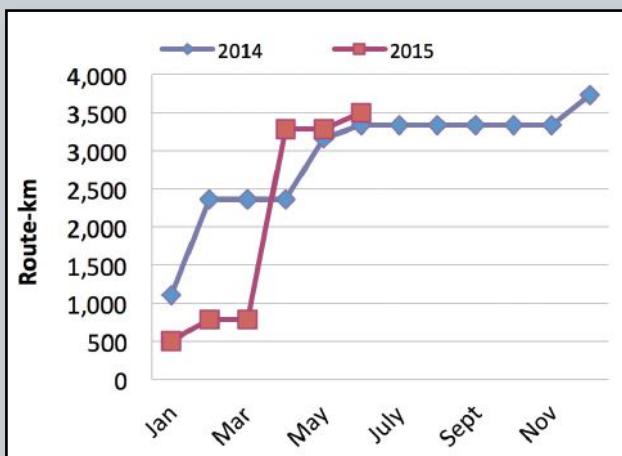
## FO Cable Awards by Month



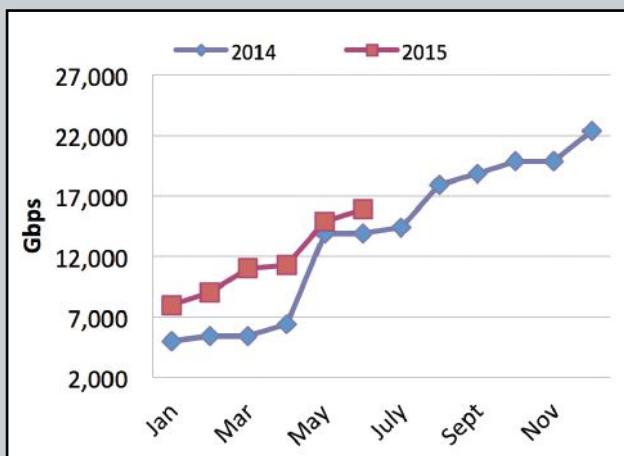
## FO Cable Announcements



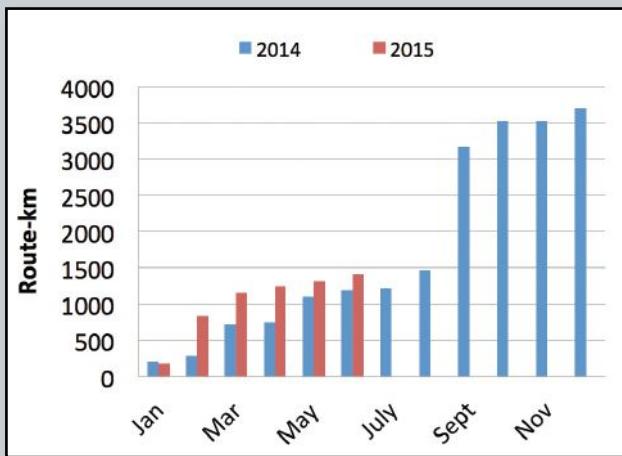
## Submarine FO Cables Entering Service in Route-km



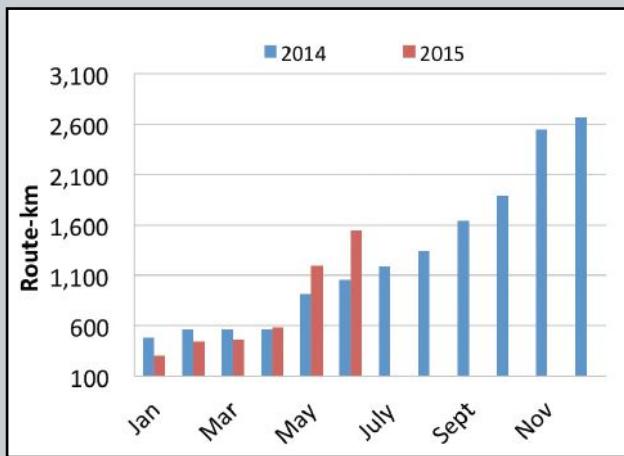
## Upgrades of Existing Cable Systems in Gbps



## 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	9,568
Anadarko Petroleum Corp.	LL	400	G23481	DIAMOND OCEAN BLACKHORNET		9,179
Petrobras America Inc.	WR	469	G16997	VANTAGE TITANIUM EXPLORER	Chinook	8,835
Anadarko Petroleum Corp.	DC	621	G23529	ENSCO 8506	Spiderman	8,087
ExxonMobil Corp.	WR	584	G20351	MAERSK VIKING	Julia	7,120
Chevron USA Inc.	WR	758	G17015	T.O. DISCOVERER CLEAR LEADER	Jack	6,960
BP Exploration & Production, Inc.	GC	743	G15607	SEADRILL WEST AURIGA	Atlantis	6,824
Union Oil Co. of California	WR	634	G18745	PACIFIC SHARAV	Saint Malo	6,803
Marathon Oil Co.	WR	225	G32668	MAERSK VALIANT		6,779
LLOG Exploration Offshore, LLC	MC	300	G22868	SEADRILL WEST NEPTUNE	Delta House	6,131
Noble Energy, Inc.	MC	948	G28030	ATWOOD ADVANTAGE	Gunflint	6,094
Murphy Exploration & Production Co.	MC	692	G34455	DIAMOND OCEAN BLACKRHINO	Thunderridge	5,917
Anadarko Petroleum Corp.	WR	51	G31938	DIAMOND OCEAN BLACKHAWK	Shenandoah	5,856
Eni U.S. Operating Co. Inc.	MC	772	G16647	ENSCO 8500	Triton	5,639
BP Exploration & Production Inc.	MC	776	G09866	SEADRILL WEST CAPRICORN	Thunder Horse North	5,636
Freeport-McMoRan Oil & Gas LLC	MC	127	G19925	NOBLE TOM MADDEN	Horn Mountain	5,467
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
Chevron USA Inc.	GC	807	G31752	PACIFIC SANTA ANA	GC 807 (Anchor Well)	5,183
BP Exploration & Production Inc.	GC	825	G09981	ENSCO DS-3	Mad Dog Phase 2	5,176
Anadarko Petroleum Corp.	GC	680	G21811	BLAKE 1007	Constitution	4,969
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
Statoil Gulf of Mexico LLC	MC	814	G34462	MAERSK DEVELOPER		4,756
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
Chevron USA Inc.	GC	640	G20082	TRANSOCEAN DEEPWATER ASGA	Tahiti 2	4,292
BHP Billiton Petroleum (GOM) Inc.	GC	609	G16764	T.O. DEEPWATER INVICTUS	Shenzi	4,288
Shell Offshore, Inc.	AT	18	G33863	STENA ICEMAX	Gnome	4,253
Anadarko Petroleum Corp.	GC	561	G16753	NOBLE BOB DOUGLAS	K-2	4,144
Chevron USA Inc.	GC	596	G16760	T.O. DISCOVERER INSPIRATION	Tahiti North	4,023
Freeport-McMoRan Oil & Gas LLC	GC	643	G35001	NOBLE SAM CROFT		3,885
Shell Offshore, Inc.	MC	809	G05868	NOBLE DON TAYLOR	Ursa	3,848
Shell Offshore, Inc.	MC	935	G07976	CAL-DIVE Q-4000	Europa	3,797
LLOG Exploration Offshore, LLC	MC	895	G33764	SEADRILL SEVEN LOUISIANA		3,682
Shell Offshore, Inc.	VK	956	G06893	NABORS 202	Ram-Powell	3,214
Shell Offshore, Inc.	MC	762	G07957	NOBLE BULLY I	Deimos	3,144
Shell Offshore, Inc.	MC	807	G07963	OLYMPUS N88	Mars (Ursa-Princess)	3,037
Shell Offshore, Inc.	GC	158	G07998	WIRELINE UNIT (HOUma DIST)	Brutus	2,985
LLOG Exploration Offshore, LLC	MC	546	G25098	NOBLE AMOS RUNNER	Longhorn MC 502 546	2,566
Shell Offshore, Inc.	GC	116	G05896	ATWOOD CONDOR	Popeye	2,046
Marathon Oil Co.	EW	873	G12136	NABORS SUPER SUNDOWNER XXI	Lobster	773
Whistler Energy 11, LLC	GC	18	G04940	NABORS MODS 201	Boxer	750
Ankor Energy LLC	MC	21	G28350	NABORS MODS 200		668
W&T Offshore, Inc.	EW	910	G13079	H&P 203		560

Deepwater prospects with drilling and workover activity: 46

Current Deepwater Activity as of Monday, 8 June 2015

### Activity by Water Depth

Water Depth (m)	Active Leases	Approved Applications	Active
0 to 200	1,361	36,130	2,316
201 to 400	96	1,127	20
401 to 800	191	892	10
801 to 1,000	328	579	9
1,000 & above	3,048	2,031	28

### Rig Activity Report 12 June 2015

Location	Week of 06/12	Week +/- Ago	Week +/- Ago	Year
Land	825	-12	837	-955 1780
Inland Waters	5	1	4	-10 15
Offshore	29	2	27	-30 59
U.S. Total	859	-9	869	-995 1854
Gulf of Mexico	29	2	27	-28 57
Canada	127	11	116	-117 244
N. America	986	2	984	-1112 2098

Activity by Water Depth Information current as of Monday, 8 June 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

## Teledyne Oceanscience launches innovative sound velocity profiling system

Teledyne Oceanscience has announced the launch of rapidCAST™, a revolutionary automated sound velocity (SV) profiling system for moving vessels. With the capability to automatically cast and recover a high quality SV probe to 500 m at 8 kts without an operator on deck, rapidCAST offers many of the benefits previously only available from large costly towed profilers while simultaneously giving surveyors the convenience and cost savings of a small and portable unit that is easy to mobilize.

Using an active line payout system with precise line tension control, the effects of vessel speed and heave are eliminated to allow the freefall SV probe to maintain extremely consistent drop behavior between casts. This innovative freefall profiling method allows the operator to precisely target the desired cast depth and be sure that the profile will be collected safely. By avoiding the need for a large conducting cable to transmit the probe depth back to the winch controller, the rapidCAST is able to offer impressive profiling depth capability with a remarkably small spool and deployment system.

The rapidCAST uses the latest Valeport Ltd rapidSV profiler with Bluetooth wireless telemetry to automatically



upload each SV profile to the survey PC on the completion of each cast, without the need for the probe to be recovered onboard. As the probe nears the ship, the Bluetooth antenna is activated and the data uploaded with the probe immediately ready for the next cast.

"We introduced our first Underway SV profiler in 2009, and as a result many surveys have benefited from improved ship time utilization and better data. However, users had to make a compromise with an essentially manually-operated system," said Adrian McDonald, sales and marketing manager at Teledyne Oceanscience. "With rapidCAST, we have stripped away the compromises to offer advanced automated profiling, while still offering the convenience, mobilization benefits, and great efficiency savings afforded by a compact system."

After testing the rapidCAST prototype, the Canadian Hydrographic Service was the first to install a rapidCAST system on a survey vessel, the CCGS Frederick G. Creed, for surveys in the Gulf of St-Lawrence and off the east coast of Canada. A CTD profiler option is expected later in 2015.

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

## Seanic announces successful field testing of electric torque tool

Seanic Ocean Systems (Seanic) is pleased to announce the successful performance of its electric torque tool following field testing. The client, a major oil company in the Norwegian sector of the North Sea, has reported highly accurate performance of the torque tool and innovative design features over the course of several jobs.

Seanic's electric torque tool, operated with rotary power provided by an electric motor, eliminates the need for a hydraulic supply provided by an ROV, Hydraulic Power Unit (HPU) or intelligent valve pack. Designed for both subsea and surface applications requiring up to 2,000 ft lbs of torque, the tool features highly accurate torque feedback, fully automated electro/hydraulic-actuated latches, and maintains consistent performance and accuracy regardless of temperature and pressure fluctuations. The electric torque tool is comparable in size to a standard hydraulic torque tool.

During testing, the tool provided convenience and efficiency in its ability to be operated without restarting the hydraulic systems on the vehicles. The tool has also proven to be cost-effective during onshore testing, as it does not need a 480V HPU.

"We are very excited about the opportunities that this new tool and its associated technologies are creating," stated Andy Quinn, vice president of operations at Seanic. "This torque tool is a great example of Seanic's reputation for meeting client expectations through engineered solutions."

Seanic's Norwegian partner, Envirent, added that they are

"pleased with the opportunity to offer a new and innovative tool to the Norwegian market."

"With increased activity in Norway (Barents Sea), we recognize our new and existing customers are demanding environmentally-friendly solutions. We are happy to offer them this fully-electric torque tool as it meets their expectations by eliminating a hydraulic leak path."

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



## CARIS HIPS and SIPS now support EdgeTech's quality control and filtering metrics

EdgeTech, the leader in high resolution sonar imaging systems and underwater technology, is pleased to announce a new quality control and filtering metric available for EdgeTech and CARIS users. With their latest software release, CARIS HIPS and SIPS now supports the EdgeTech 6205's real-time range and angle uncertainties, which help significantly cut down on processing time. The EdgeTech 6205 is a Multi Phase Echo Sounder (MPES) that uses EdgeTech's next generation bathymetric technology to provide an enhanced and fully integrated bathymetry and dual frequency side scan sonar system.



The range and angle uncertainties are commonly used to quantify how accurate soundings are and to determine the true depth at any point in a survey area from the estimated soundings. The real-time uncertainties are an integral part of the surveyor's tool kit for streamlining the post-processing stage of large scale projects since they can be used as a filtering tool, or by certain algorithms like CUBE. This new capability in CARIS HIPS and SIPS complements the EdgeTech's 6205 wide swath capabilities in shallow water, thereby offering an even more efficient surveying tool to the hydrographic community.

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

## EvoLogics integrates a USV into its demo and testing setup, creating a mobile testbed for developers

At MTS/IEEE OCEANS'15 in Genoa, EvoLogics presented its latest developments with a mobile demonstration kit that combines underwater LBL positioning with the company's unmanned surface vehicle, the Sonobot.

MTS/IEEE OCEANS'15 Conference and Exhibition in Genoa (IT) hosted two EvoLogics outdoor demo-sessions, presenting underwater information technologies in action. The company's experts showcased the capabilities of EvoLogics LBL (Long

Baseline) positioning and communication system, and faced the challenge of quickly and cost-efficiently deploying and setting up the equipment, common for live-demos at industry events.

The new solution was to simplify logistics and have the team and spectators stay on shore, instead incorporating the Sonobot USV into the demonstration setup as a mobile node for LBL calibration and a target for LBL positioning. The Sonobot, primarily a platform for hydrographic surveys, is equipped with accurate DGPS for precise positioning and a WLAN link to the control station on shore. Moreover, the USV was designed to be assembled within minutes and requires minimum launch and recovery efforts—a benefit for time-sensitive tasks like testing and demonstration.

For sessions in Genoa, the Sonobot was interfaced with a towed EvoLogics modem, configured as transponder. The on-shore PC ran EvoLogics SiNAPS navigation and positioning software and connected to the mobile transponder over the Sonobot's WLAN link. Four EvoLogics S2C acoustic modems in LBL-beacon configuration were deployed as baseline nodes around the perimeter of the demonstration site. Remotely controlled Sonobot was first used to calibrate the positioning system, establishing coordinates of the baseline nodes in absolute coordinates, and then as target for demonstrating the LBL system's performance, when its position was calculated and displayed by SiNAPS software on shore. The sessions took about one hour to set up and were an overall success.

The results proved that a light USV is beneficial not only for demonstration purposes but can be integrated into a mobile testbed for implementing new network protocols and evaluating solutions for networks with stationary and mobile nodes. EvoLogics works on integration of mobile and stationary nodes within the framework of the SUNRISE project, focusing on wireless subsea networks to enable cooperation between different underwater devices. SUNRISE, supported by the EU within the 7th Framework Program, aims at creating a web-accessible testing infrastructure that will help researchers implement and test innovative network protocol solutions at a fraction of time and cost required today.

EvoLogics will continue working on integration of its USV with underwater communication and positioning systems, opening new opportunities for numerous applications.

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

## Innovative Simrad EK autonomous echo sounder to transform ecosystem monitoring

The new Simrad Autonomous EK system has been launched with cutting edge technology to carry out continuous long term, in-depth ecosystem monitoring of the subsea environment. The Simrad Autonomous EK system uses wideband echo sounding technology to discriminate between plankton and different fish species producing high-quality, high-resolution scientific data.

The system is a fully autonomous echo sounder unit built using the same wideband technology as the latest high precision, scientific wideband echo sounder, the Simrad EK80. The battery technology and pressure rated housing is already proven Kongsberg Maritime technology used in the oil and gas industry for decades, where duration and safety is of the highest concern. Whereas traditionally multiple echo sounders working in parallel on different frequencies were needed to discriminate between marine species, the wideband technology used in the Simrad Autonomous EK system allows for transmission on frequencies from 35 to 500 kHz, depending on the transducers used in the system setup. With four independent channels and internal multiplexing, a wide combination of split beam or up to eight single beam transducers can be interfaced to the system.

The Simrad Autonomous EK system contains features such as low power consumption and an energy saving sleep mode allowing it to be deployed on the seabed for more than a year operating autonomously with internal logging. A new mission planner software has been developed as part of the system, allowing for a pre-programmed customized mission plan. The wideband frequency sweep (chirp) in combination with advanced signal processing gives exceptionally good signal-to-noise ratio and range resolution. These new features assist scientists with ecosystem monitoring enabling them to identify species more accurately.

The Simrad Autonomous EK system has been developed in conjunction with leading marine institutes with testing carried out by scientists in the Shelikof Strait in the Gulf of Alaska, where three unites were moored to the seafloor for a period of 3 months to record the passage of fish above them.

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



## Delta SubSea and Zerlux collaborate on next-generation laser based hydrate remediation technology

Delta SubSea signed a memorandum of understanding with Zerlux Hungary Kft. to intensify collaboration on laser based hydrate remediation technology.

Delta SubSea, through a partnership with ZerLux, is exploring the use of laser based technology for the oil & gas industries flow assurances needs. The laser based hydrate remediation technology is driven by the evolution of fiber and diode laser efficiency, reliability, and a large drop in laser costs.

Laser based hydrate remediation technology uses “focused warming” to create a relief path for pressure equalization and chemical flow across the hydrate plug. Pressure equalization is extremely important during hydrate remediation operations because depressurization can cause the hydrate plug to detach and move uncontrollably inside the pipeline, which can have catastrophic consequences. Similarly, laser based hydrate remediation can create a path for chemical flow across the hydrate plug. This dramatically enhances the effectiveness of the hydrate remediation methods based on chemical inhibitors, allowing the media to attack the plug on multiple sides.

Scott Dingman, Delta SubSea president/CEO, said, “Our new laser based hydrate remediation technology coupled with our already existing pipeline integrity technology, INCOTEST and EUREKA, will provide our clients with a suite of tooling solutions for all of their integrity and flow assurance needs.”

The tool is based on a string of laser heads that apply thermal energy to the subsea structure. Depending on the application the string can be composed of several laser heads, from a few units for short sections up to 72 for long sections of pipeline. The string is mounted on a ROV deployable frame equipped with syntactic foam for buoyancy and thermal insulation. The tool clamps on the pipe with hydraulic cylinders and is electro-hydraulically connected to the ROV.

Benefits of subsea laser applications are:

- Relative to competing technologies for hydrate remediation, lasers benefit from precise thermal management, compactness and efficiency;
- Higher efficiency as laser heats pipe surface directly;
- It is completely carried by the ROV and operable up to 3,000 m;
- Modular: same base modules, different applications for pipelines, flowlines, risers etc.; and
- Unique in the market

## 2 MHz channel – ASL's latest addition to the Acoustic Zooplankton Fish Profiler™ product

With its selection for inclusion in the U.S. Ocean Observatories Initiative (OOI) in 2014, the Acoustic Zooplankton Fish Profiler™ (AZFP) is rapidly becoming the global standard for autonomous scientific multi-frequency echosounders.

ASL has now added a 2 MHz channel to its product, which already includes 38, 70, 125, 200, 455 and 769 kHz. This new high-frequency, short-range channel is aimed at studies involving sediment and small zooplankton. The nominal beam angle of 7 degrees at -3dB matches the other high frequency AZFP channels, ideal for multiple-frequency studies.



The AZFP is a powerful tool for scientific research and environmental monitoring in oceans, lakes, and rivers. The ASL AZFP offers an economical way of obtaining reliable measures of marine environmental conditions in the water column. Using onboard data storage, the AZFP can collect data continuously for periods of up to 1 year at high temporal and spatial resolution and is available with up to four frequencies. It can be operated in bottom-mounted, upward looking mode, on a glider, or in downward looking mode from a buoy, and is ideally suited for taut-line mooring operation, but many other options are available. The AZFP has highly configurable sampling programs.

For more information, visit [www.aslenv.com/AZFP.html](http://www.aslenv.com/AZFP.html).

## Relocating underwater sites is easy with acoustic beacons

Attempting to relocate underwater objects in a low visibility environment can be a difficult and time consuming task. Acoustic pingers and transponders solve this problem. Not long ago, these devices were expensive pieces of equipment used primarily by the military, oil and gas industries, and oceanographic institutions. Today these underwater locating beacons are being employed by a wide range of users including commercial diving companies, public safety dive teams, universities, environmentalists, and companies in the energy industry.



One organization employing these acoustic locators is EGS Asia in the Philippines. EGS offers a broad range of technical services to the oil, gas, telecommunications, energy, and marine infrastructure markets. As part of a recent project EGS Asia had to deploy an ADCP. To ensure the ADCP could be recovered when it was time to retrieve the stored data, EGS's Roberto Ruiz attached a JW Fishers MFT-1 transponder. The transponder stays dormant saving battery power, until activated by a gun-like device called an interrogator which causes it to begin transmitting an acoustic signal. The interrogator can be carried by a diver or deployed from a boat. Once the transponder begins sending a signal, the interrogator detects it and displays direction and distance to the target. Ruiz reports, “We attach a MFT-1 to the tripod holding the ADCP before deployed in 15 to 35 m water depth. Using the interrogator the device can quickly be relocated and recovered.”

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

## Unique Buoyancy and Ballast launches the Seaflex auto-inflating vessel emergency system

Unique Group's buoyancy & ballast division has announced the official launch of an integrated system designed to neutralize the risk to life and possessions from the potential capsizing or sinking of smaller vessels. The Seaflex Auto-Inflating Vessel Emergency (SAVE) System is a product of the division's Seaflex brand, which specializes in the development and manufacture of inflatable buoyancy systems for marine and offshore applications.

By integrating existing hydrostatic valve technology and gas-based auto-inflation systems with their Inflatable Buoyancy Units (IBUs), which have been used for tasks such as inshore salvage operations since 1987, Seaflex has developed what is believed to be the first such system capable of being either



integrated at a new-build stage or retrofitted at a later date—and can also be manually triggered in the event of an impending emergency.

For more information, visit [www.seaflex.co.uk](http://www.seaflex.co.uk).

### **Webtool announces compact guide wire cutting tool for ROVs**

Webtool ROV cutting tools designed to cut steel guide wires used during sub-sea installation are announced by leading cutting tool company Allspeeds. Suitable for wire up to 30 mm diameter, the WCO30 tools are a compact and more reliable alternative to larger cuttings tools normally needed for guide wire cutting.

Guide wires are made up of fine individual steel wire strands and a polymer core that makes them difficult to cut. The heavy duty WCO30D and WCO30DLP (high pressure and low pressure versions) wire cutters are suitable for steel wire ropes up to Ø30 mm (1.181 in.) with a maximum tensile strength of 1960 N/mm and high grade wire up to Ø28 mm (1.102 in.) with tensile strength 2160 N/mm.

With its corrosion resistant stainless steel body with Nitrotec coated alloy steel cylinder, the hydraulically operated WCO30 tool is designed for use in severe working conditions. The tool's long blade and anvil life ensures that tool maintenance is kept to a minimum.

Suitable for cutting wire rope, guide wire, cables, hoses and umbilicals, the WCO30's open sided design allows for easy positioning of the cutter on the cable and ideal for operation in confined spaces.

The WCO30 cutting tool can be used at any water depth, with pressure compensation on the hydraulic supply. Weighing 13 kg in water, the high pressure WCO30D uses 700 bar maximum input



pressure. Its lower pressure version WCO30DLP weighs 17.8 kg in water and uses 210 bar maximum input pressure.

For more information, visit [www.allspeeds.co.uk](http://www.allspeeds.co.uk).

### **Ocean Signal launches RescueME EDF1 electronic distress flare**

Ocean Signal introduces the new rescueME EDF1, the world's most compact electronic distress flare, to the commercial market.

Featuring advanced LED technology, the lightweight and rugged rescueME EDF1 offers users a safe and long-lasting solution to visual signalling in an emergency.

The EDF1 has been designed by communication and safety at sea specialists Ocean Signal to provide more than six times the light coverage than other electronic flares. The light output is a beam of over 30° throughout the full 360° azimuth, plus light is also distributed throughout the hemisphere above the unit to ensure visibility from the air.

With a visibility range of up to 7 mi and up to 6 hours operation, the rescueME EDF1 has four different modes of operation—economy, high, ultra

and forward beam—plus SOS signalling.

The unique lens design combined with the use of advanced LEDs and highly efficient circuit technology ensures a constant level of light output throughout the life of the user replaceable battery.

Developed as a practical and cost effective alternative to the single use pyrotechnic flare, the unit is safe to store and operate and eliminates concerns associated with disposal.

The rescueME EDF1 is 40% smaller than other similar devices and ideal for a grab bag and life raft, measuring 187 mm by 42 mm, and weighs just 155 g. It is suitable for one-handed operation in difficult conditions and waterproof to 10 m.

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



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FOR MORE INFORMATION, PLEASE VISIT  
[WWW.UNDERWATERINTERVENTION.COM](http://WWW.UNDERWATERINTERVENTION.COM)

The following pages describe real-life examples of technology at work.

**up-close**

**in-depth**

**detailed examination of...**

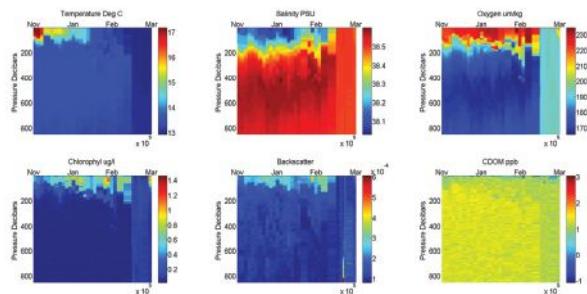
**INDUSTRY CASE STUDIES**

# Navis BGCi autonomous profiling float records Western Mediterranean overturn

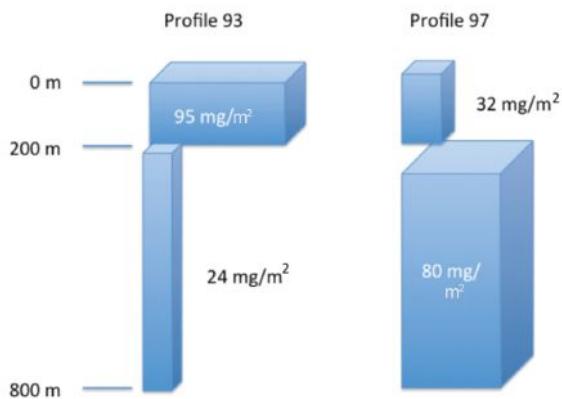
If billions of phytoplankton fall in the ocean and no one observes it, does it still result in a net sequestration of carbon? In the case of a dramatic deepwater formation event off the Gulf of Lyon in the winter of 2013, the ‘fall’ was seen by an autonomous profiling float equipped with the biogeochemical sensors needed to record the event.

Profiling floats have proven to be a stalwart technology economically increasing our fundamental understanding of the ocean. Sea-Bird Scientific’s Navis BGCi float technology advances expand the capability of floats to carry a broad suite of biogeochemical sensors. Navis floats are now collecting data on a panoply of parameters critical to understanding hot topic issues such as global carbon fluxes and ocean acidification.

Demonstrating the capability of remote autonomous profiling, a Navis BGCi float captured a rare overturn event off the Gulf of Lyon. The float was released at the BOUSSOLE site southeast of Nice, France in September 2012 and collected 270 profiles through April 2014. The float deployment was generously supported through the efforts of the Marine Optics and Remote Sensing Lab at Laboratoire d’Océanographie de Villefranche (LOV).



**Figure 2.** Cross sections of physical and biogeochemical parameters on profiles by Navis BGCi float 0028 as it traversed the continental slope off the Gulf of Lyon. The deep mixing event dramatically changes the water column in late February.

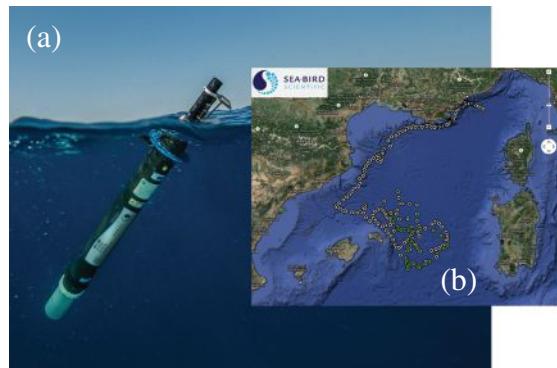


**Figure 3.** Integrated chlorophyll loads in the photic zone (0 to 200 meters) of the water column compared to the upper mesopelagic zone (200 to 800 m) for the two profiles shown in Figure 2.



**SEA-BIRD  
SCIENTIFIC**

See ad on page 3



**Figure 1.** (a) Navis BGCi float 0028 after deployment. The ECO Triplet is visible on the upper left side of the float. Photo by Christophy Gerigk. (b) The float collected 270 profiles in the Western Mediterranean over the 560 days that it operated between September 2012 and April 2014. Data from the float is available at <http://navis.seabirdscientific.com/profilemap.php?floatId=28>.

## Along Slope Sections of Physical and Biogeochemical Parameters

Between 16 and 20 February of 2013, the typical oceanic structure of a mixed layer and pycnocline above the low chlorophyll mesopelagic zone completely collapsed (Figure 2). The deep water mixing event produced a signature water column structure (or lack thereof) with temperature increasing with depth due to adiabatic heating and salinity relatively uniform throughout the upper 800 m. The extent of the overturn in space and time along the Gulf of Lyon is on the order of a month over at least 100 km, with the reemergence of near surface net primary production as indicated by an increase in the dissolved oxygen concentration after about 20 days.

The chlorophyll concentration profile also decreased by a factor of seven in the upper 100 m while increasing at all depths below the previous location of the pycnocline (Figure 2). This flux occurred rapidly, with net vertical displacements of hundreds of meters per day, resulting in much “fresher” organic material reaching the mesopelagic than through normal processes. Reinforcing this is the fact that the biogeochemical float recorded increases at depth in chlorophyll fluorescence, which is generally associated only with viable or recently senescent cells.

## Net sequestration of carbon

How large of a carbon flux event was this? Comparing the distribution of chlorophyll between a profile before the overturn (93) and one during the overturn (97), the net transport out of the photic zone per square meter is approximately 50 mg. If we assume the area of the overturn to be 100 km by 100 km, the net transport is on the order of 500 metric tons of chlorophyll. With a Chl/C ratio of 0.01 mg/mg, the net carbon flux per event is 50,000 metric tons of carbon. This is the approximate equivalent of the carbon in the 21 million gallons of gasoline used annually in 34,000 cars.

# INDUSTRY CASE STUDIES



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Over the last year, DeepSea Power & Light (DSPL) has been developing a unique transmission method for uncompressed HD-SDI video signals in subsea use, termed FleXlink™. The goal for the technology was to enable the use of more compact and robust interconnects than have previously been used for subsea HD video. This allows integrators to confidently install cameras in confined and dynamic locations. The DSPL engineers were able to design the FleXlink™ system using standard Ethernet interconnects, which most operators carry in a standard vehicle spares kit. After FleXlink™ was validated in the lab, DSPL partnered with Woods Hole Oceanographic Institution (WHOI) to conduct field trials.

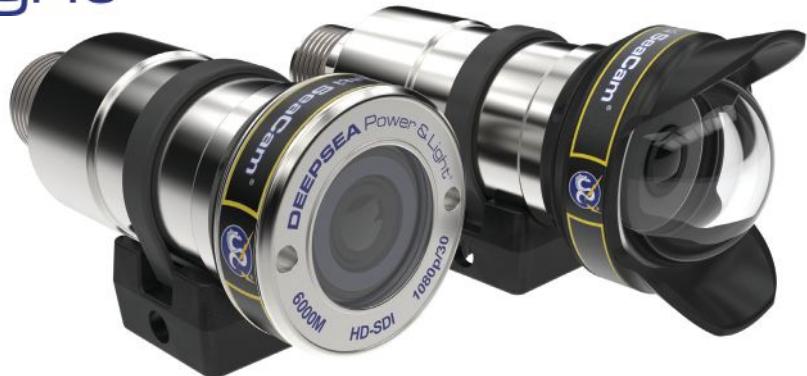
WHOI and DSPL both have a long history of pushing boundaries for subsea technology and exploration. The WHOI team aboard the R/V Roger Revelle, operating ROV Jason for the 2015 Mapping, Exploration, & Sampling at Havre expedition, conducted field trials using DSPL cameras outfitted with FleXlink™ technology. WHOI's technical team evaluated two versions of DSPL's HD Multi SeaCam® with FleXlink™ in several locations on ROV Jason. These locations included above the manipulator arms and as a context camera over the vehicle. Woods Hole engineer Korey Verhein had the following to say about their experience with the camera.



**HD Multi SeaCam® Flat port overlooking manipulator work.**  
Photo credit: Copyright Woods Hole Oceanographic Institution and Anna Louise Reysenbach of Portland State University.

"We tested the FleXlink™ system on two cruises out of Auckland, New Zealand over May and June. The first cruise, at Le Havre Volcano, was headed by chief scientists Adam Soule and Rebecca Carey. The second cruise, in the Lau Basin, was headed by chief scientist Anna Louise Reysenbach. Our test rig consisted of a FleXlink™ bottle, a 1080p wide angle dome camera, and a 1080p flat windowed "utility cam." We installed the dome camera on our overview pan and tilt and the utility cam as one of our manipulator views. Both cameras had fantastic video output. Our current

**FleXlink™**



**HD Multi SeaCam® Dome and Flat port versions available with FleXlink™,**

manipulator views have composite DSPL pencil cameras and the multiplication in definition was invaluable. The dome camera was remarkable in that its angle of view in all directions allowed for a great overview of the area in front of the ROV, which was great for piloting. The technology itself is exciting for our group. It will allow us to add numerous small form factor high-definition cameras to our system without requiring expensive hybrid fiber connectors or dealing with both a fiber and power/comms connection. It is also helpful that the media convertors are separate from the cameras themselves and use off-the-shelf SFP modules. It allows for easier management of spares and wavelength changes when needed."



**HD Multi SeaCam® Dome port overlooking front of ROV Jason.**  
Photo credit: Copyright Woods Hole Oceanographic Institution and Adam Soule of Woods Hole Oceanographic Institution and Rebecca Carey of University of Tasmania.

Through field trials, the FleXlink™ technology has been validated as a viable solution for subsea HD video transmission. When HD imaging is required for dynamic or confined spaces, FleXlink™ offers a versatile and economical solution. Besides being compact and reducing dependence on more fragile interconnect types, FleXlink™ can also minimize the diversity of required spares for a system. If you are interested in learning more about DeepSea Power & Light's FleXlink™ technology, please go to [www.deepsea.com](http://www.deepsea.com) or send an email to [sales@deepsea.com](mailto:sales@deepsea.com).

# Forum Subsea Technologies introduces new 3G Torque Tool to meet Customers' Demands

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## SUBSEA TECHNOLOGIES

Technology within the ROV tooling world is constantly evolving. The first generation of torque tools used by ROV operators were simple hydraulically operated tools. The second generation tools added sensors that provided detailed operating information back to the operator on the surface. Forum Subsea Technologies has pushed the technology forward and developed a third generation (3G) torque tool. This tool not only has the ability to give feedback information to the operator on the surface, but, in addition, can reconfigure while subsea to cover a range of operations that would previously require a number of tools to be deployed with the ROV or costly trips to the surface to reconfigure the tool.

A key stage of the development was to add functionality to enhance the operating software. The two key features are the simplification of the user's interaction with the software and improved software algorithms to improve control and accuracy. The tool addresses two of the key driving factors in the industry moving forward. Firstly, the requirement for improved productivity and efficiency, the tool offers this by providing the ability to do a range of tasks once deployed to the subsea worksite. The second driving factor is the increasing demand for personnel within a rapidly growing industry, to address this it is essential that tools are straightforward and intuitive to use.

In addition to the improvements made with the software control algorithms and GUI, there are a number of innovative mechanical developments on the tool. Torque tools require a range of torques when deployed subsea. This was previously achieved by returning to the surface to change out a gearbox or motor. Competitors have developed products that use a hydraulically switched gearbox—an acceptable solution—but the gearboxes have a tendency to lock up during operations, necessitating a return to the surface to remedy. To meet our customers' demands, Forum engineers designed a new hydraulic motor. The new motor is effectively two hydraulic motors combined into a space envelope no larger than the existing hydraulic motor. One motor is operated for low torque, the second for medium, and both for high torque. During testing it was discovered that super low torques could be achieved by driving one motor against the other, this gives an unprecedented operating range and absolutely no risk of locking up during operations.



*The unique socket housing of the 3G Torque Tool allows for easy torque changes while the tool is subsea.*

For torque tool operations different torque ranges require different socket sizes. In the past cumbersome external change out modules have been used, or a spring loaded 'nested socket'. Spring loaded sockets are a reasonable solution, but when docking onto a tree it is not clear which socket is being used, this could result in a high torque being applied to a value only intended for low torques, subsequently causing costly damage to a subsea structure. To overcome these deficiencies Forum engineers developed an innovative mechanism that changes the socket by simply rotating the nose of the tool. Clear markings on the outside of the tool that can be seen by the operator when using the tool, clearly identify the torque range being operated. To change the range subsea, the torque tool is returned to its deployment storage housing and a function is activated from the topside control software.

The patent pending tool has been successfully tested at our hyperbaric test facility in Ashington, the largest 2,400m test chamber in England. The 3G Torque Tool is available for both rental and purchase. For more information send an email to [subseatooling.uk@f-e-t.com](mailto:subseatooling.uk@f-e-t.com).



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# Electrical/Optical Flying Lead

## Product Family: Active Flying Leads

As the methods and means of communication from systems and subsea equipment continue to evolve, new and unique product technologies are needed to provide effective solutions. Teledyne Oil & Gas has previously introduced solutions that extend Ethernet reach with the use of repeaters integrated into the cable end connector, or flying lead, to significantly increase the limits of Ethernet transmission between subsea instruments.

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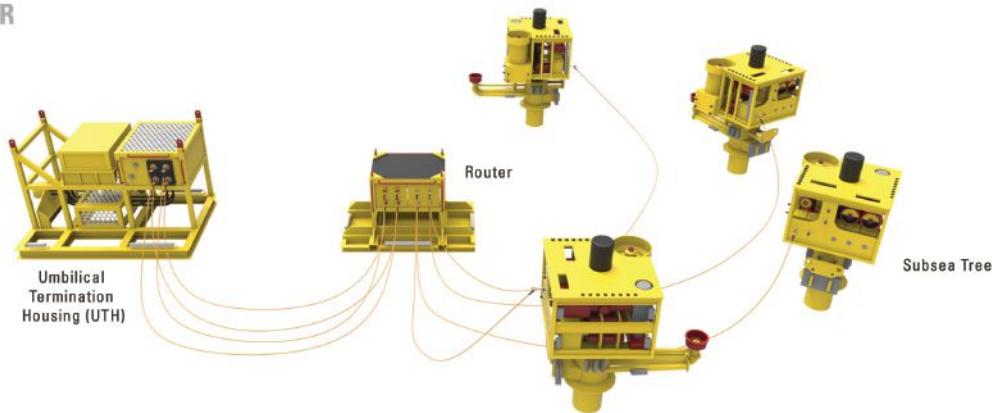


A major Oil & Gas operator partnered with Teledyne Oil & Gas to develop a new product within the Active Flying Lead (AFL) family of products. The AFL technology allows for the integration of subsea qualified equipment into a flying lead for use in communicating between various pieces of subsea equipment and, in some cases, converting from different communication protocols. Active Flying Lead technology can also be used to extend communication to lengths that were previously not possible.

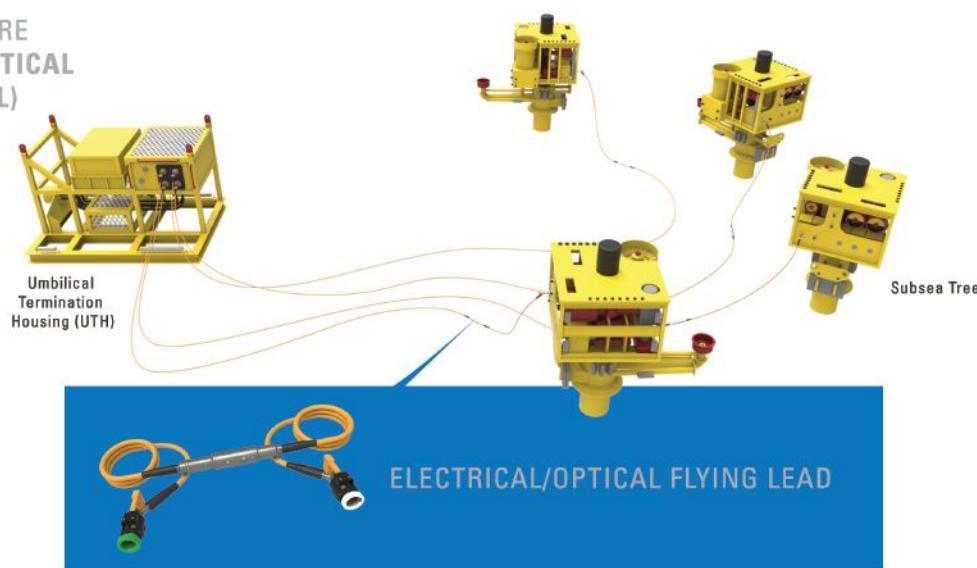
The operator's project requirements were to realize greater field architecture flexibility and a reduction in complexity in order to reduce total installation costs for a subsea field layout in the Gulf of Mexico. The challenge, in this case, was to develop a media converter that was compatible with multiple systems and able to be contained in a small environment.

The Teledyne Oil & Gas technical team designed and qualified an Electrical Ethernet to Optical Flying Lead (EOFL), which converts a fiber optic signal through a Nautilus Rolling Seal fiber optic wet-mate connector and produces an electrical Ethernet signal through a 12-way Nautilus electrical connector on the other end. The EOFL allows up to 1 Gbps data speeds over four twisted pairs to be converted to one single fiber. The conversion from optical to electrical is accomplished in a compact 1-atmosphere internal pressure chamber that is rated to an exposure of up to 10,000 PSI external pressure. The circuit boards inside the chamber have been subjected to Accelerated Life Testing (test to failure) to validate the projected life expectancy.

## FIELD ARCHITECTURE USING ROUTER



## FIELD ARCHITECTURE USING ELECTRICAL/OPTICAL FLYING LEAD (EOFL)



This new “Active” Flying Lead can be used in place of more complex equipment such as secondary nodes, junction boxes, or distribution manifolds, allowing a simplified infrastructure at reduced cost and risk. The EOFL, along with the other products within the Active Flying Lead family, are retrievable with a Remotely Operated Vehicle (ROV) for maintenance and upgrades if necessary and can also be used to place equipment or experiments further from nodes or the shore than previous technology allowed.

The client considered the EOFL solution an optimal solution, even prior to qualification completion. After qualification and analysis, it was found that the concept did indeed change the field architecture and allowed for a reduction in total installed cost.

The EOFL solution results in a simplified architecture,

reducing the amount of equipment needed to complete the field. The reliability of the system is also enhanced if the router were to fail. Ethernet is just one of the many communication protocols present in this subsea monitoring environment. Interest is increasing in using common bus systems to transmit more data in a confined geometry as well as other traditional communication methods. Having the technology capability of developing, packaging, and qualifying various communications circuitry in a compact atmospheric canister has opened the door to the next evolution in subsea communication and a new class of products. Teledyne Oil & Gas retains the industry expertise to develop a total solution for subsea electronics integration and conversion to ensure that operators are preparing their subsea fields for the technologies that will arrive in the future.



# VideoRay

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Ocean News & Technology

A VideoRay Pro 4 Remotely Operated Vehicle (ROV) spent 19 months operating continuously in the North Sea in what is believed to be the longest uninterrupted deployment of a single ROV of any class.

The unprecedented operation began in November 2013 as an experimental emergency preparedness solution for Stinger Technology AS, a subsea services provider for the offshore oil and gas sector. The Pro 4 “resident ROV” was deployed off the coast of Stavanger, Norway, but operated mainly from Stinger’s offices located nearly 250 m (820 ft) inland. The ROV remained powered on and in full operating condition for the entire duration of the deployment. Before Stinger voluntarily ended the ROV’s deployment on 20 May 2015, the submersible had not surfaced for repairs or even routine maintenance.

“Originally, we anticipated it would last about 3 months,” said Stinger CEO Bjarte Langeland. “But the Pro 4’s endurance has obviously significantly outlasted any of our expectations.”

The goal for Stinger’s resident ROV project was to test the system’s limits, determine the implications of long-term continuous use underwater, and ultimately to prove the Pro 4 ROV as an extended or resident emergency preparedness solution.

The resident ROV could begin an inspection immediately after being called into action, thanks to its “home” position on the seafloor. Having an on-call ROV system can significantly reduce the time and resources needed for an ROV operation, especially in emergency situations when every minute counts.

Stinger also wanted to test the use of a resident ROV to monitor methane gas buildup, which poses an enormous threat to offshore oil and gas operations. If left undetected, gas buildups can cause explosions, resulting in costly and even fatal damages to wells, platforms, and the environment. These buildups are especially of critical concern in Norway where methane levels have risen drastically over the last 10 years due to melting permafrost and seepage from under the Arctic seafloor.

“While the ROV is a ‘remotely operated’ vehicle, standard operations require the pilot to stay fairly close to the system,” explained Langeland. “Our resident ROV project investigates how we can further remove the pilot from the physical ROV deployment, making it possible to involve multiple experts in real-time operations.”

## VideoRay Pro 4 ROV Survives 19-Month Remote Wireless Deployment in the North Sea

ROV First Deployed November 2013 as an Experimental Emergency Response System



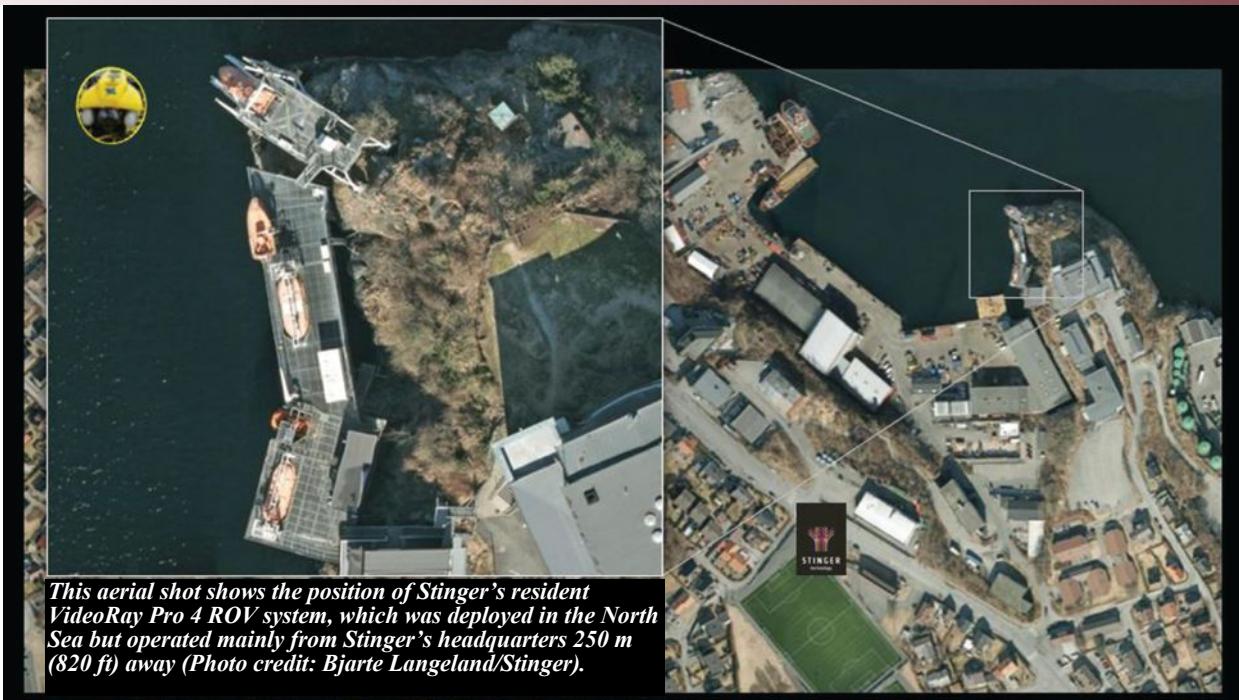
*Stinger’s resident VideoRay Pro 4 ROV system spent 19 months on the floor of the North Sea near Stavanger, Norway (Photo credit: Bjarte Langeland/Stinger).*

The resident ROV was mostly operated remotely over a WiFi or a “wide area” network instead of directly from the Pro 4 Integrated Control Box (ICB). All the standard Pro 4 equipment—submersible, ICB, and tether—was still deployed as usual, but the ROV could be piloted from locations other than the deployment site. This allowed Stinger to operate the Pro 4 from their headquarters immediately, rather than waiting until they can get a pilot on site.

“Eliminating the need for the operator to be physically near the surface unit for our ROVs has been a long-term goal at VideoRay,” said Scott Bentley, VideoRay’s founder and CEO. “Stinger’s innovation here is extremely impressive, and we are proud to partner with them on this project.”

Stinger has used VideoRay ROVs since 2010, after they conducted a technology screening to choose a small ROV to launch from a platform. “We chose the VideoRay Pro 4 because it was more powerful than any of the other options,” said Langeland.

One of the biggest challenges of distance piloting operations is maintenance. Standard preventive maintenance practices and visual inspections require the ROV to be recovered in between operations so the pilot can identify any potential issues, conduct necessary repairs, and replace any damaged or consumable parts. In lieu of standard procedures, Stinger developed new methods of maintaining their system without surfacing. The resident ROV was housed in a crate on the seafloor, which helps reduce the amount of biofouling that the



ROV might experience through natural wear and tear of being underwater and also keeps out any predators who may be too aggressively curious about its new neighbor in the North Sea. Every few days, a pilot “spun” the ROV’s thrusters to dislodge any debris that may have settled since its last deployment. Stinger also used a second Pro 4 ROV to monitor and visually inspect the resident ROV on a regular basis.

Several standard Pro 4 features lend themselves well to the successful distance piloting of the resident ROV. The VideoRay Pro 4 Cockpit control software includes several health status monitors that detect and alert the pilot to any internal malfunctions, such as leaks, overheating, or lost communications. Cockpit also features an extensive interactive engine room where pilots can monitor the status of the thrusters, power supply, and compass calibration. Other Cockpit features, such as auto-heading and auto-depth, dynamic compass and depth gauge, and tether turn counter, make it possible to keep track of the resident ROV’s position at all times.

Although the ROV was always powered on, it was only in flight when needed. This helped conserve consumable parts, especially the cartridge seals that lubricate the thrusters.

Once the submersible was surfaced last month, Stinger completed a thorough evaluation of every component—from small screws to internal electronics. Although they observed some surface growth, minor corrosion, and salt accumulation on some of the hardware, every piece was still in working condition after spending nearly 14,000 hours in the North Sea.

Although Stinger is the first VideoRay customer to use remote wireless deployment in a commercial context, VideoRay has been experimenting with this idea for more than a decade. VideoRay’s first foray into remote wireless deployment was at the VideoRay International Partners Symposium (VIPS) in 2004 with a Pro 3 ROV using PC Pilot, the predecessors to the Pro 4 and VideoRay Cockpit. The ROV was deployed in Key Largo, Florida, but could be



*Screengrab from the Stinger live feed (Photo credit: Bjarte Langeland/Stinger).*

piloted in real-time over the Internet by operators from Exton, Pennsylvania—1,250 mi (2,012 km) away. Other examples of remote VideoRay piloting include the Mini Habitat Adventure program at Marine Lab in Key Largo and a 2008 promotion for Foster’s Beer in the United Kingdom where participants around the world could control the ROV from their own computers.

“The wireless piloting set-up we used in 2004 was nowhere near as sophisticated as the Stinger system,” said Bentley. “However, the use of the PC Pilot control software instead of a built-in joystick did help determine the direction for our next generation of technology, the Pro 4. Similarly, Stinger’s innovative approach to resident ROV installation and remote wireless piloting will help inform the next generation of our technology and open doors for the rest of our users as they find new ways to implement VideoRay technology for faster, safer, and more cost-efficient operations.”

FMC Technologies, Inc. said its board of directors appointed **Douglas J. Pferdehirt** president of the company. Pferdehirt replaced John T. Gremp who remains chairman and chief executive officer. Pferdehirt previously served as executive vice president and chief operating officer. He assumed the role of president immediately, while retaining his position as COO, responsible for leading the company's three business segments. Pferdehirt has an extensive background in the oil and gas industry. Before joining FMC Technologies in 2012, he had a 26-year career with Schlumberger Ltd., where he held leadership positions.

Enso plc said that **Paul Rowsey** was named non-executive chairman of the board of directors following Dan Rabun's planned retirement on 18 May 2015, concurrent with the annual general meeting of shareholders. Rowsey has been a member of Enso's board of directors since 2000. He most recently served as lead director and remains chairman of the nominating and governance committee. Rabun served as chairman following his retirement as president and CEO in 2014. He served on Enso's board of directors since 2006 and was appointed CEO and chairman in 2007.

China National Offshore Oil Corp. Ltd. (CNOOC) appointed **Yang Hua** as chairman of the board of directors to succeed Wang Yilin. Prior to his appointment, Yang, who joined CNOOC in 1982, was vice chairman of the board of directors from 16 September 2010, to 19 May 2015, and president of the company from August 2011 to April 2015. Earlier, Yang—who has over three decades of experience in petroleum exploration and production—served as senior vice president, chief financial officer, executive vice president, president and CEO in CNOOC between 1999 to 2011. The incoming CNOOC chairman was also active in international business, mergers and acquisitions, corporate finance and capital market operations in the Company and its subsidiaries, CNOOC said in a press release. Yang, 54, graduated from China University of Petroleum with a petroleum engineering degree and received a master of business administration (MBA) degree from the MIT Sloan School of Management.



Yang Hua

Statoil CFO **Torgrim Reitan** was appointed executive vice president for development and production USA after Bill Maloney decided to not prolong his contract with Statoil. **Hans Jakob Hegge** was appointed new EVP and CFO. Hegge comes from the position as senior vice president for operations north in development and production Norway. **Irene Rummelhoff** was appointed EVP for new energy solutions, and **Jens Økland** new EVP for marketing, midstream and processing. Rummelhoff and Økland started in their new positions 1 June, while Reitan and Hegge will start in their new positions 1 August, the company said.

BP plc appointed **Paula Rosput Reynolds** and **John Sawers** as non-executive directors. Rosput Reynolds has over 25 years experience in the energy sector, including as president and CEO of AGL Resources. Sawers has had long experience in government, most recently as chief of the UK Secret Intelligence Service (MI6) and is now chairman of Macro Advisory Partners. "Paula has deep experience in the energy and financial services sectors. John brings extensive experience of international affairs and geopolitics," said Carl-Henric Svanberg, chairman of BP.

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Bollinger Shipyards announces the promotion of **Eric Bollinger** to vice president of sales. President and CEO Ben Bordelon made the announcement, stating “Eric has been a key contributor to our company’s sales efforts for over 39 years. His knowledge and understanding of our markets will benefit and support our customer service and customer relations efforts. Eric has proven himself a very dedicated employee and integral member of our team time after time, and I am excited to see the impact of his leadership on our business.”

**Hydroid, Inc.**, a subsidiary of Kongsberg Maritime, announced the appointment of **Sandor Becz** to the role of vice president of engineering. Becz will lead all engineering activities at Hydroid. This includes research and development, as well as new product development and engineering support. Becz joins Hydroid from United Technologies Aerospace Systems (UTAS), where he held enterprise-wide responsibility for component and system design, research and development, process excellence, organizational management and program execution. Prior to UTAS, Becz was head of global R&D for Lenze S.E., a leader in the development of automation and robotic systems for industrial applications. Becz holds a B.S. and Ph.D. in mechanical engineering from Worcester Polytechnic Institute and the University of Connecticut, respectively, and is a licensed Professional Engineer.

The Board of Directors of DNV GL Group has appointed **Remi Eriksen** as the company’s new group president & CEO, succeeding Henrik O. Madsen, who is retiring on 1 August. Eriksen has a solid track-record in leading positions within the company for two decades. He has gained extensive international experience in the oil & gas, maritime, and renewable energy industries, and has led our operations in Asia, Europe and the Americas.

EdgeTech announced **Evan Martzial** has joined the company to further develop their growing multiphase echosounder business. Evan comes to the company with a strong background in cartography and GIS. Having spent time as a project manager, survey manager, and most recently as a product specialist for a hydrographic data acquisition, navigation and processing software company, Evan brings a wealth of knowledge to the organization.



Bollinger



Becz

**Areva Inc.** signed an agreement with **Birns, Inc.**, a lighting design and manufacturing company, to be the exclusive distributor of its lighting systems for the North American nuclear industry. Areva will also provide its customers with engineering expertise and installation services for Birns’ lighting systems.

**Energy & Environment Holding (EEH)**, an independent consulting firm specializing in energy, environment, privatization, and sustainable development based in Doha, Qatar, and **CSA Ocean Sciences Inc.** (CSA), a firm specializing in services related to environmental impacts from offshore oil and gas and construction activities worldwide, have announced the formation of their new joint venture **CSA Ocean Sciences (Doha) LLC**. The board of directors for the joint venture is chaired by HE Sheikh Jabor bin Yusef bin Jassim al-Thani, principal holder of EEH, and includes members Roudi Baroudi, chief executive officer of EEH and Robert Mulcahy, COO of CSA.

**Viking SeaTech**, an international provider of mooring and marine solutions has completed a co-operation agreement with **DOF Subsea Survey & Positioning** UK for the provision of survey and positioning services worldwide. Viking SeaTech has recognized a client demand for a complete service offering for all marine services. The agreement will cover the provision of survey and positioning services on Viking SeaTech projects, which will include provision of personnel, equipment, data management, C3D and survey solutions.

**FloWave Ocean Energy Research Facility** at Edinburgh University and Canadian marine turbulence specialists **Rockland Scientific** will work together to develop tank-scale turbulence measurement technology, which can also be deployed at sea, on both sides of the Atlantic. The two firms—which already completed a first round of technology testing in 2014—announced the collaboration agreement at FloWave during an ocean energy trade mission from Nova Scotia organized by Scottish Development International, the international arm of Scottish Enterprise and the Nova Scotia Department of Energy.

**J2 Subsea**, an Acteon company, has opened a new subsea tooling facility at sister Acteon company, Seatronics’, subsea electronics location in Houston. North American customers can now access a comprehensive suite of subsea equipment for diver and ROV applications. The new facility includes a workshop for tool preparation, servicing and support. It will provide torque tools, analysers, cutters, manipulators, intensifier panels, grinders, dirty work packs, jetties and more.

**Global Diving & Salvage, Inc.** is pleased to announce the expansion of its California regional operations with the addition of a new office in Southern California. Located in Signal Hill near Long Beach, the new office supports Global’s core service lines: marine construction, casualty response and offshore support.

**Seatronics**, an Acteon company, has signed a rental agreement with **Neptune Oceanographics**, global leaders in the detection of leaks in subsea pipelines, risers and control systems. Seatronics now has access to Neptune’s range of leak detection systems globally. Neptune, active in subsea leak detection since 1999, offers four leak detection methods—fluorescence (long range); passive acoustics; differential temperature; and gaseous hydrocarbon detection—for both pipeline systems and seabed seepage. Long-range submersible fluorometers provide the unique solution of leak detection without the need to pass through the leaking fluid.

**Sonardyne International Ltd.**, UK, has entered into a non-exclusive agreement with **Northern Defense Industries (NDI)** to become its strategic partner for maritime security and defense projects in the U.S. Virginia-based NDI supplies integrated security solutions for maritime, energy and critical infrastructure applications both in North America and around the world. Its multi-sensor surveillance solutions, including radar, CCTV and AIS, are used to provide early warning of potential threats approaching ports, harbors, waterside power stations, ships and offshore platforms. Under the terms of the new agreement, Sonardyne and NDI will deliver systems that offer an enhanced underwater surveillance and security capability. These systems will include Sonardyne’s swimmer detection sonar, Sentinel, obstacle avoidance sonar, NOAS and other related acoustic technologies.

**Ardent** is launching a joint venture with Southern Africa’s leading diving and marine services company, **Subtech**. Subtech brings an unparalleled Sub-Saharan African presence through an extensive infrastructure network with facilities and activities that cover both East and West Africa in addition to its home territory of South Africa. Subtech’s experienced marine and subsea personnel, equipment resources, entrepreneurial business model and the support of James Fisher Group will help the joint venture to evolve and grow. The joint venture will build on an already successful track record of collaboration between Ardent and Subtech through projects such as the wreck removal of the MV SMART in Richard’s Bay and the emergency response salvage of the Vestas Wind.

# CALENDAR & EVENTS

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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     |
| C. NAVIGATION/POSITIONING        | Q. MARINE ELECTRICAL/ELECTRONICS |
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| E. OCEAN INSTRUMENTATION         | S. OCEAN RENEWABLES              |
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Ocean News & Technology

### [Teledyne TSS Ltd.](#)

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Fax: +44 (0) 1923 216061  
E-mail: tsssales@teledyne.com  
Website: www.teledyne-tss.com  
Contact: Carolyn Jones



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Email: info1@watson-gyro.com  
Website: www.watson-gyro.com  
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BC, Canada V8M 1Z5  
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Fax: +1 250 656 2162  
E-mail: asl@aslenv.com  
Web: www.aslenv.com



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*Contact : Valérie Le Pen - vlepen@nke.fr or Gouven Prud'homme - gprudhomme@nke.fr  
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Contact: Patrice Brault - pbrault@nke.fr*

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E-mail: inquiry@nortek.no

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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.

### Subsea Americas

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Berwick, LA 70342  
Tel: +1 985 714 1767 or 985 518-0055  
E-mail: charles@subseaamerica.com  
Website: www.subseaamericas.com  
Contact: Charles Mayea



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Fax: +1 508 563 3445  
E-mail: glester@hydroid.com  
Website: www.hydroid.com  
Contact: Graham Lester



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Fax: +1 508 678 0552  
E-mail: sales@ocean-server.com  
Website: www.iver-auv.com  
Contact: Jim Kirk



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## UNDERWATER VEHICLES/ROVs

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San Jose, CA 95131 USA  
Tel: +1 408 436 1102  
Fax: +1 408 436 1108  
E-mail: sales@deepocean.com  
Website: www.deepocean.com  
Contact: Bill Charbonneau



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### i-Tech

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Katy, TX 77449  
Tel: +1 281 693 9403  
E-mail: Katarina.Tehlirian@Subsea7.com  
Website: www.interventiontechnology.com  
Contact: Katarina Tehlirian



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Websites: www.qstar.es & www.rovs.eu



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### Teledyne SeaBotix

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Tel: +1 619 450 4000  
Fax: +1 619 450 4001  
Contact: Alasdair Murrie  
E-mail: SeaBotixInfo@Teledyne.com  
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Aberdeen AB22 8GT UK  
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Fax: +44 (0) 1224 226501  
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# UNDERWATER COMMUNICATION AND POSITIONING SOLUTIONS

# Evo Logics®



## S2C TECHNOLOGY: COMMUNICATION AND TRACKING COMBINED

- time, space and cost-saving solutions
- low power consumption for autonomous operations
- advanced data delivery algorithms, addressing and networking, remotely configurable settings
- extendable platform with multiple configuration options: power-saving Wake Up module, acoustic releaser, additional sensors, custom solutions, OEM versions available

## USBL POSITIONING SYSTEMS

**simultaneous** positioning and communication - no need to switch between positioning mode and modem mode

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: up to 0.04 degrees

## UNDERWATER ACOUSTIC MODEMS

reliable data transmissions even in adverse conditions, customizable R-series modems, light and compact M-series "mini" modems, **new S2CM-HS high-speed modem**, special editions for developers, S2C communication and positioning emulator - remote access or standalone device

- range: up to 8000 m
- depth: up to 6000 m
- data rate: up to 62.5 kbps

## LBL POSITIONING SYSTEMS

highly accurate, precise and stable performance, simultaneous positioning and data transmissions

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: better than 0.01 m

**NEW HIGH-SPEED  
'MINI' MODEM**  
62.5 kbps  
**AVAILABLE NOW**





## AUV AND ROV LAUNCH & RECOVERY SYSTEMS

### AUV LARS

Ramp style deployment and retrieval

Custom design for different AUV models

Increased vessel operation time



### ROV LARS

Available in 15mt,  
10mt, and 6mt  
configurations

Hydraulic or  
Electric

Active Heave  
Compensation

STOCK SYSTEMS  
AVAILABLE



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