News for the Ocean Industry
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Ocean News & Technology

June 2012

Worldwide Survey of Ocean Observing Activities

Technology Closes the Skills Gap

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VideoRay

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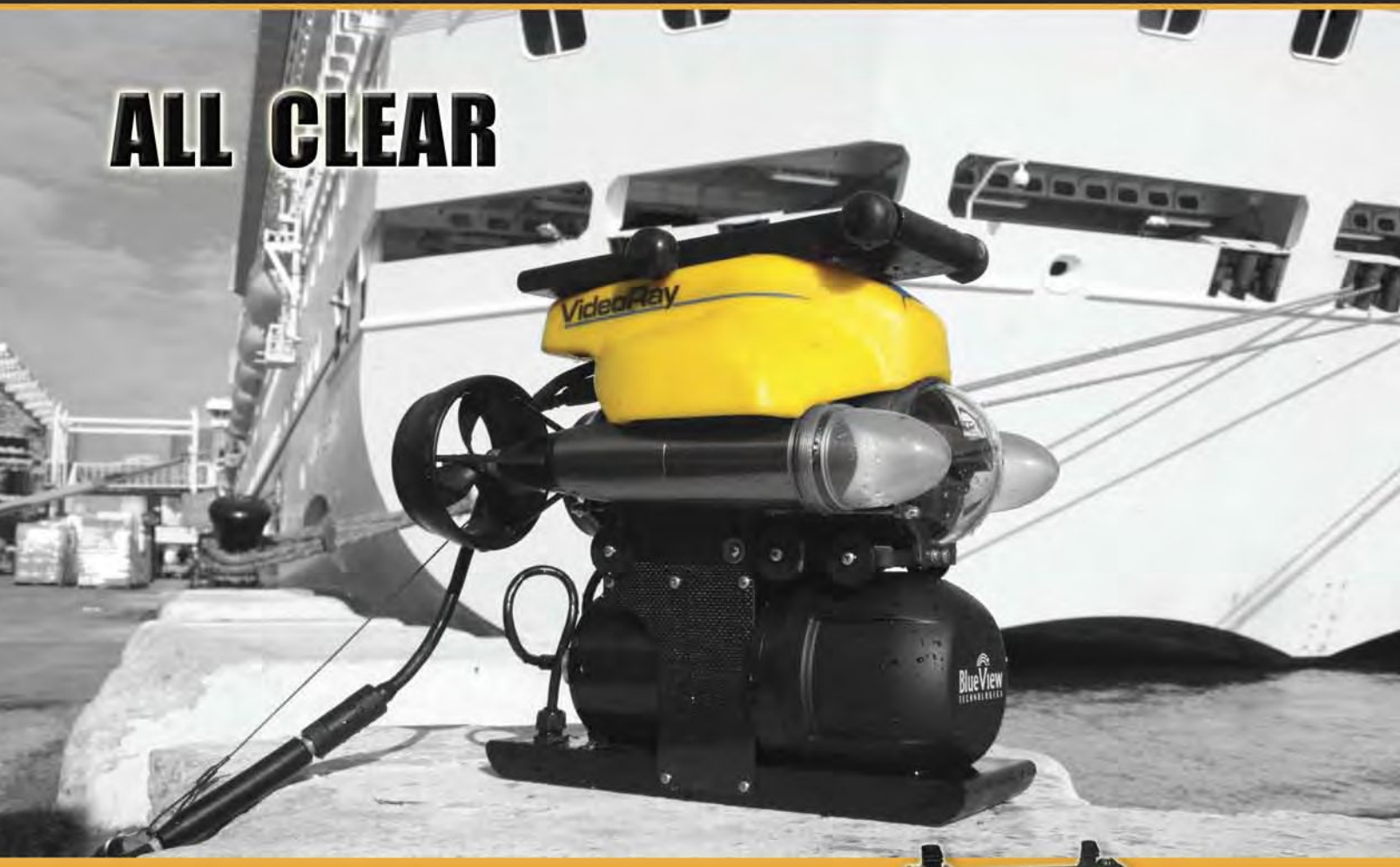
ALL CLEAR



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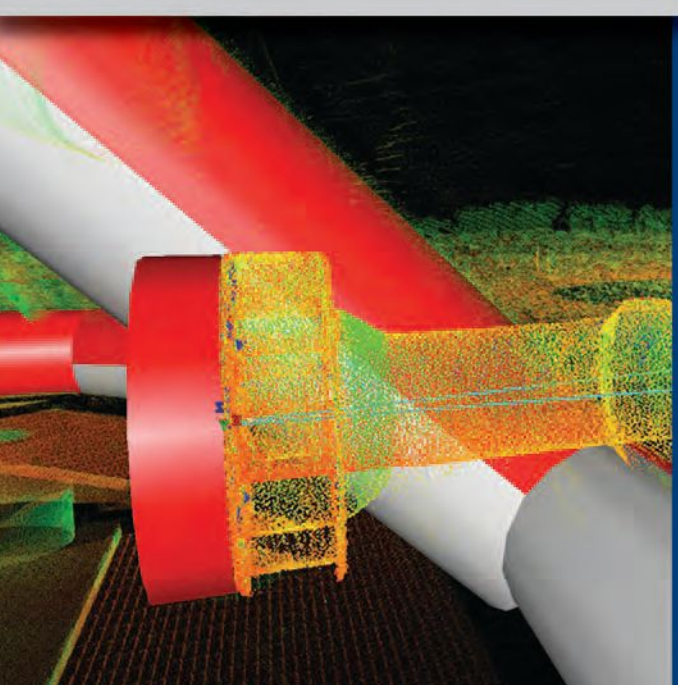

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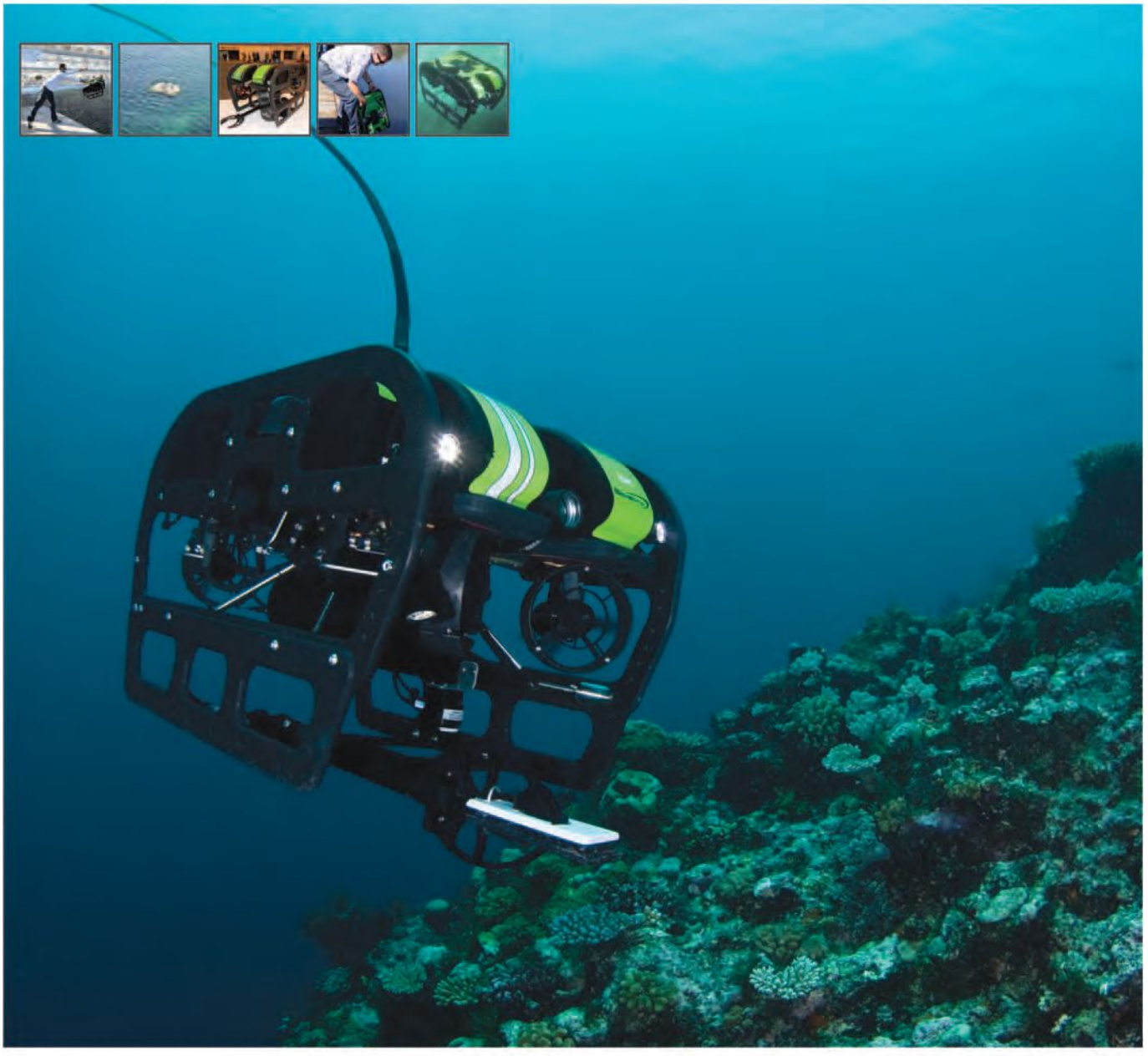

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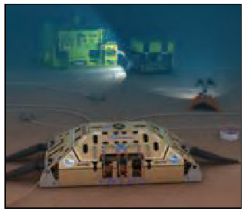

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Cover Photo

Power Source for Ocean Observatories

(Photo Courtesy Ocean Power Technologies Inc.)

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Ocean News & Technology

More News, More Technology, More Data

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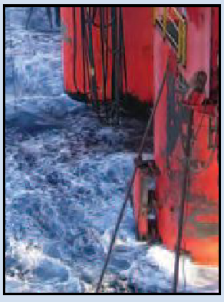

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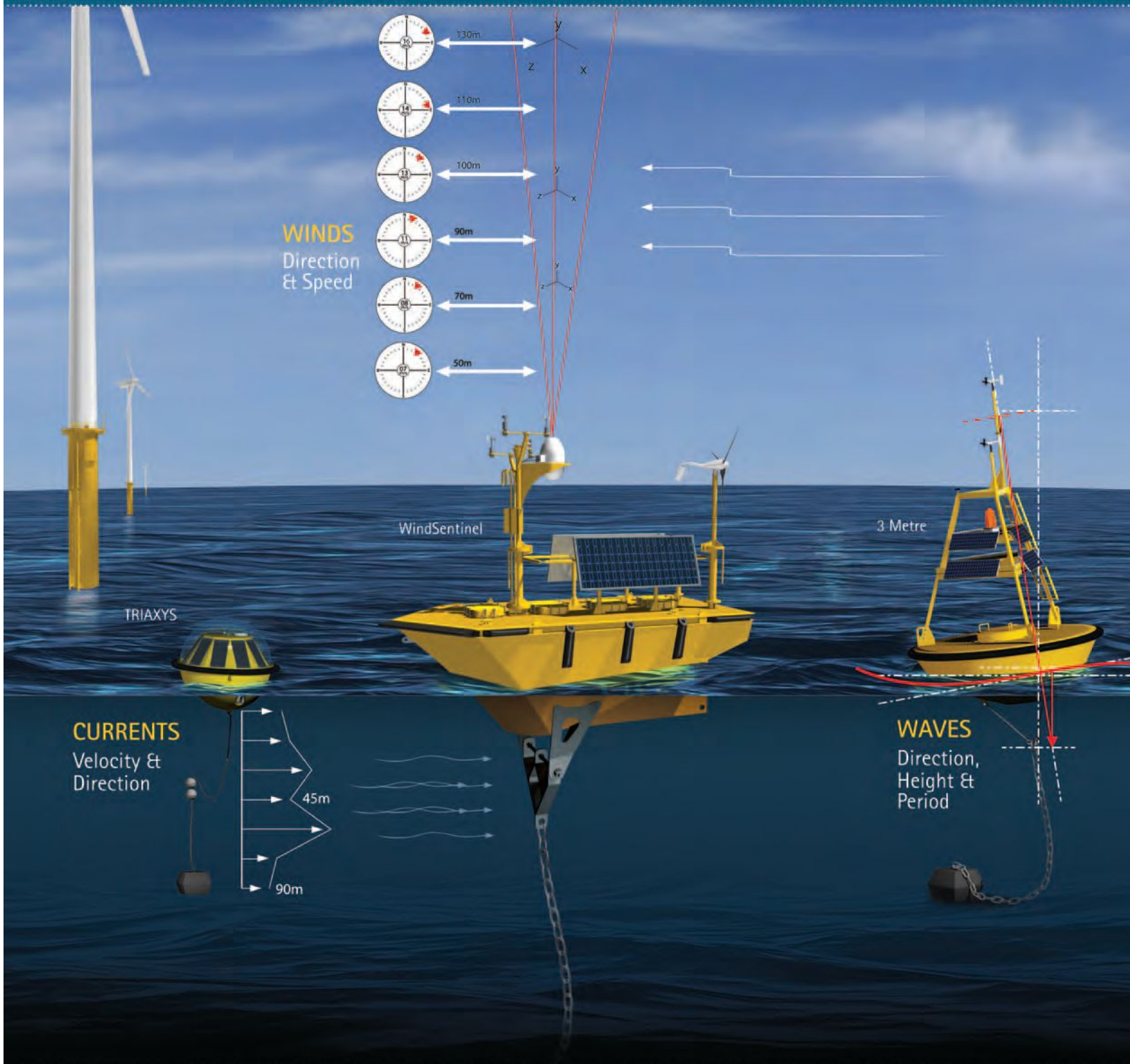

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By Ladd Borne

Ocean News & Technology

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Offshore Technology Conference

A Barometer of the Oil Industry

Thousands of people made the annual pilgrimage to Houston this past May to witness the showcase that is the Offshore Technology Conference. It is a gathering in a city that oil built, honoring that precious commodity that so many have depended on for their livelihood and that the world depends on more than ever. It is a gathering of all who are extracting this oil from increasingly difficult environments and those who support that extraction – from companies such as Shell and Schlumberger to KLM and United Airlines.

One would think that the offshore oil industry must be in decline following the 2010 massive gulf spill, the continual pummeling from environmentalists and the government, or due to the global economic crisis. One would be wrong.

With my comfortable walking shoes on, I strode every aisle of the impressive Reliant Center, the outside Parkway area, and the Reliant Arena over the course of 3 days (it takes about that long). It was immediately evident from the amount of vendors and the crowds that this event, a bellwether of the offshore oil industry, was not suffering but was flourishing. And the numbers proved it.

Attendance reached a 30-year high with 89,400 – over 10,000 more than last year's attendance of 78,645 – numbers not seen since the record year in 1982 of 108,000. And it was more global than ever, with exhibitors from the usual suspects, such as Brazil, France, and Norway, as well as not so usual ones such as Hungary, Lithuania, and Israel. The event had 2,519 companies from 46 countries, including 200 new companies, exhibiting over a record amount of 641,350sq.ft. of realestate.

Founded in 1969 by 12 engineering and scientific organizations, the first conference was held at the Albert Thomas Convention Center, seeing just 4,200 visitors. This was a time when the maximum water depth of any Gulf of Mexico drilling rig was less than 1000ft, yet it was clear that deep water drilling was the future. Today, the maximum water depth is over 10,000ft.

An interesting graphic to the right shows the historical attendance of OTC. Not surprisingly, you'll find that this attendance chart follows world oil prices, almost exactly. Higher oil prices are needed to justify the high costs of investing in the technology required to get to the deeper and hard-to-reach deposits.

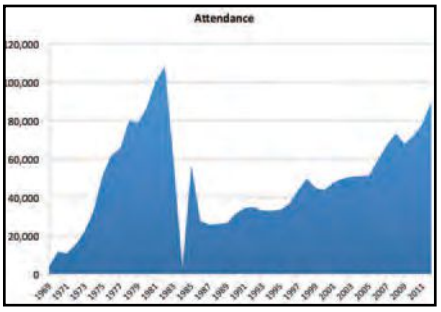
As always, there were some unique and interesting technologies showcased. The Conference recognizes innovative technologies with an aptly named "Spotlight on New Technology Award."

One award winner, Versabar, was recently featured in the March 2012 issue of Ocean News & Technology magazine for its vessel, ominously named, "The Claw." The claw is a simple idea taken to the extreme. The enormous engineering feat is only outdone by the sheer size of the beast. It is ideal for subsea salvage and decommissioning operations, which are projected to increase significantly in the coming years as older rigs require removal.

Another Spotlight on Technology winner with a similary gigantic technological marvel was Dockwise with its Dockwise Vanguard. The Dockwise Vanguard will be the largest semi-submersible vessel ever built. It allows for the transport of such large vessels as floating, production, storage, and offloading (FPSO) vessels with its capability of transporting 117,000tonnes. Although not scheduled for completion by Hyundai Shipyard until fall of 2012, it already has several large transport jobs lined up.

A bit of interesting news coming out of the OTC Conference this year, which could be a predictor of where the offshore oil industry is headed, was the result of a poll conducted by GL Noble Denton. Of the participants, 56% thought gas will replace oil over the next 18 years as America's primary energy source. Obviously, everyone is keeping a watchful eye on the unconventional production of shale gas and the plummeting drop in gas prices.

Next year, OTC will be held 6-9 May 2013. See you there!



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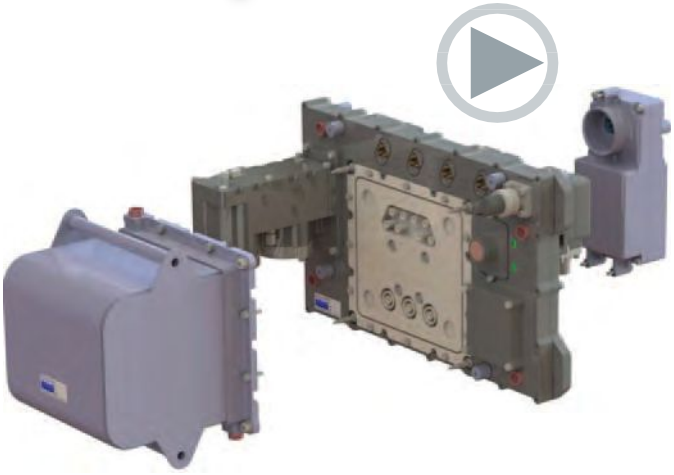
Technology Closes the Skills Gap

By Peter MacInnes, FMC Technologies Schilling Robotics

The requirement for deepwater workclass ROV operations is increasing as a result of the continued global growth in exploration; subsea oil and gas field construction; and inspection, repair, and maintenance operations. Since the ability to develop and maintain these fields relies heavily on ROVs, there is increasing demand for ROV operators with a high degree of proficiency in the skills required to manage these systems. However, learning these advanced skills can take several years in the field, and the industry will need to deploy several hundred well-trained ROV operators every year for the foreseeable future.

Although ROV technology has advanced tremendously over the last two decades – resulting in reliable systems – the complexity of ROVs has remained relatively high. This is true across all aspects of the technical design, including hydraulic, electrical, and control sub-systems. ROV operators are required to have advanced component-level diagnostic skills and perform intricate repairs in order to minimize operational downtime costs. Likewise, operators are also required to have an advanced degree of competence in flying the ROV in order to perform complex intervention tasks. While the skill requirements for operators have not changed over the last two decades, the availability of operators with those desired levels of experience has not kept pace with the growth in demand.

One of the key factors contributing to the decline in the availability of experts relates to the fact that other mature industries, such as the automobile industry, have seen dramatic changes in both operating and repair philosophies over the last two decades. There has been a clear trend in other technology markets to dramatically improve both the automatic control and the maintenance of such equipment, with the latter frequently relying on modular sub-system replacement instead of component replacement. For example, modern automobiles are diagnosed via computer, and the technicians replace faulty modules rather than the components. The result of this design philosophy is superior reliability of the product itself, and a repair methodology that enables all technicians to perform the task to the same high standard. In a similar manner, the ability to have reliable sub-systems and advanced software control enables the implementation of automated features, such as reverse parking and anti collision systems in a modern day car – which enables all drivers to perform routine tasks to the same degree of proficiency. This technology trend has, therefore, diluted the talent pool of technical personnel with skill sets that were more commonly found 10 to 20 years ago. This is now offset by significantly stronger software skills and the ability to easily grasp diagnostic skills at a sub-system level. The talent pool is further impacted by the fact that the most experienced offshore personnel are frequently promoted to management positions, removing them from the operational environment.



Integrated modular design results in significantly fewer parts, resulting in easier maintenance

HD ROV is designed to make both operation and maintenance easy to learn

With offshore vessel or rig day rates ranging up to $750,000 and the frequent reliance on the ROV to ensure uptime is maintained at 100%, ROVs clearly play a critical role in the financial economics of the offshore industry. From the perspective of ROV uptime, the two primary influences are ease of performing operations and the ease of maintaining the hardware in operational condition. Essentially, these are the same fundamental characteristics that apply to all high-tech products. With only 800 workclass ROVs in operation around the world, the application of modern design principles has taken longer to materialize in this niche market due to the economics of designing highly integrated systems.

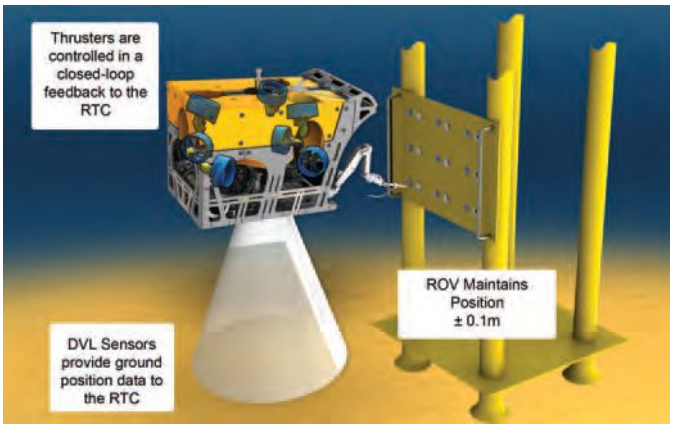
FMC Schilling Robotics has invested in developing technologies that address these two factors of ROV system uptime that ultimately make it easier for operators to become experts. From an operational perspective, the focus is to provide a highly stable base ROV system that utilizes position reference systems that provide navigational feedback to the main computer, allowing the control system to automatically adjust the position of the vehicle with precise accuracy. This results in the ROV having the ability to remain in a commanded position with virtually no perceivable movement. Having this feature as a baseline function improves control of the vehicle

through a suite of software-based functions that enable any operator to perform advanced tasks with relative ease. These tasks include the ability to automatically maintain station independent of the current and visibility conditions, follow a pre-defined survey route, move a specific distance in any axis relative to a fixed point, and maintain station at the seafloor and throughout the water column. These automated control features simplify both the everyday tasks that utilize common tooling, such as hot stabs and torque tools, as well as more complex operations, such as flying lead installation or intricate manipulator based tasks. This enables less experienced operators to quickly become proficient, while also helping experienced personnel to perform tasks more easily.

With regard to the second factor related to ease of maintenance, this aspect of system design is by far the most challenging to accomplish – but it results in an overall system that is dramatically easier to work with throughout its lifetime. Although there are hundreds of components on a workclass ROV, many can be repaired in less than 1 hr, such as changing a cable or a lamp. However, there are several critical sub-systems that typically take anywhere from 6 to 12 hr to repair. These include tether terminations, control system failures, major electrical system failures (such as the main transformer or power supplies), and the hydraulic power system. The reason behind the lengthy timeframe for repairing these sub-systems primarily is due to the fact that parts that fail are integrated at the third or fourth tier of the ROV design. In most cases, it is not possible to gain access to the failed parts in less than 1 hr, let alone actually replace them. As an example, the main electric transformer is typically situated inside an oil-filled housing, installed in the middle of the vehicle, and surrounded by other components that must be removed before gaining access to the transformer. Even if the technician is well trained and knows how to perform the task, it still takes several hours because of the system design. Also, the design itself makes it possible to frequently assemble parts incorrectly.

By taking a different approach and ensuring that the critical sub-systems are modular and located on the primary tier of the ROV design, FMC Schilling Robotics has successfully reduced the timeframe for all major maintenance tasks by an average of 6:1, with most tasks taking less than 1 hr to complete. Additionally, the repair philosophy is designed to be error-proof by the provision of kinematic interfaces that only allow parts to be assembled in the correct manner. This is particularly important due to the harsh environment that operators are working in, which can make it very difficult to perform complex maintenance procedures. A key advantage of this design philosophy is that operators can be trained in the correct diagnostic and repair techniques very quickly since the processes only require an understanding at the sub-system level rather than at the component level.

ROV Operators perform automated intervention utilizing vision recognition technology



Automated ROV position control enhances operator capabilities

Leveraging these same design principles, further advancements are being made that combine the performance fidelity of the ROV and the seven-function, position-controlled manipulator to automatically perform the most common of tasks. This utilizes vision recognition technology with images from a single camera mounted on the manipulator that are compared to 3D models of the target object. By knowing the geometry and absolute dimensions of the target object, the ROV control system can calculate the required movements of both the vehicle and the manipulator in order to execute the task autonomously. For example, common tasks such as inserting a hot stab or a torque tool into a subsea intervention panel can be accomplished by simply specifying the target receptacle on the subsea panel and executing the automated function via the control console to insert the tool in the correct location without any manual operator intervention. This level of automated functionality has been successfully demonstrated offshore in locations with relatively poor visibility. Automating such tasks will enable all ROV operators to perform the most common intervention operations efficiently, allowing them to focus on the overall mission rather than consuming unnecessary time on routine tasks. As before, the ability to provide this enhanced level of ROV automation is accomplished through software and utilizes existing hardware on the ROV.

Adopting these modern design principles in a niche industry has the same operational and maintenance benefits that are recognized in industrial and consumer markets. While it is commercially challenging to achieve this in a low-volume market, the resulting improvements in operator experience and the long term cost savings achieved through increasing uptime will further improve the cost-effectiveness of ROV operations.

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MAVS-4DL	•	•	•	•	•	•	6000 m. Logging
MAVS-4WTG	•	•	•	•	•	•	Directional Wave/Tide
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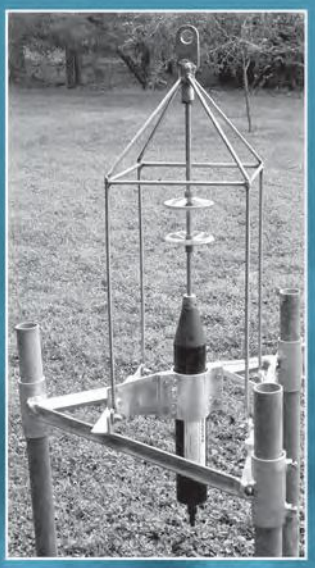

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OCEAN INDUSTRY

Hawkes Ocean Technology designed sub Virgin Oceanic completes first free dive testing

Sir Richard Branson (R) on top of the Virgin Oceanic submarine along with Chris Welsh. Each plan to pilot the just unveiled Virgin Oceanic submarine, sitting here atop its "mothership," the "Cheyenne" catamaran.

Oceanic has entered the manned test phase with the first free, off-the-hook testing. For over 2 weeks, the Virgin Oceanic team tested and improved the launch and recovery and pulled together the details necessary for the first free dive. The first manned test by Chief Pilot Chris Welsh was brief; life support was good, and launch and recovery went well. In the water, he powered forward on the surface, but had small programming issues in the fly by wire programming; this was to be expected as the system needs fine tuning that can only be fully tested under load. In parallel to new aircraft testing, this was the equivalent of high speed taxiing.

The next step will be getting back in the water with the software tuned up for first dives. The sub has three ballast states: Descent (negative 500lbs), Flight (neutral +/-), and Ascent (500lbs buoyant). The first set of tests will in Ascent mode, then Flight; the first actual dives will be powering down in Flight mode. Fully ballasted Descent mode will not take place until all other aspects of the sub are sorted out.

The sub, designed by Graham Hawkes, is the only piloted craft in existence that has full ocean depth capability. The one person sub has an operating depth of 37,000ft (7mi) and is capable of operating for 24hrs unaided.

Over the course of 2012 and beyond, Virgin Oceanic's one-person sub will journey to the deepest part of each of Earth's five oceans. The first dive will be to the deepest place on the planet: the bottom of the Mariana Trench – 11km (7mi) straight down. Unlike the bathyscaphe, Trieste, or the recent James Cameron trip in his Deepsea Challenger, this time, a sub that flies more like an airplane will allow the solo pilot, Chris Welsh, to "fly" along the bottom of the Trench an additional 10km (nearly 6mi).

The second dive – to the bottom of the Puerto Rico Trench – will be piloted by Sir Richard Branson. This trench is the deepest spot in the Atlantic Ocean at over 8km (more than 5mi). Subsequent dives will carry a human pilot to the bottom of the Arctic, Southern, and Indian oceans.

For more information, visit www.virginoceanic.com.

Deep Down awarded $8M in contracts

Deep Down, Inc., an oilfield services company specializing in complex deepwater and ultra-deepwater oil production distribution system support services announced it has been awarded multiple contracts worth nearly $8 million dollars from a major international oil and gas operator. Deep Down will design, fabricate, assemble, install, and test control systems to operate flowline isolation valves on three platforms in the Gulf of Mexico. The control systems are designed with a service life of 25 years and to survive a 1,000 year storm. The system will connect the safety system on the platform to the control valves without the need for ROVs, allowing the valves to be closed in an emergency, stopping the flow of hydrocarbons. Engineering has already commenced at Deep Down's Channelview office with delivery by end of 2012.

ABS forms independent offshore technical committee

ABS, the leading provider of classification services to the global offshore industry, continues to cultivate industry expertise for the development and modification of Rules and Guides with the formation of The Offshore Technical Committee of ABS. The goal of the recent division of The Technical Committee of ABS into separate committees was to refine the focus of each committee to facilitate information exchange for Rule and Guide development and modification. ABS is the first class society to take this approach.

38+ million acres to be offered for exploration and development in the Gulf of Mexico

The Obama Administration has provided final details for the Central Gulf of Mexico lease sale announced by President Obama in January 2012 as part of his Administration's ongoing focus on expanding safe and responsible production of our domestic energy sources. Secretary of the Interior Ken Salazar and Bureau of Ocean Energy Management (BOEM) Director Tommy P. Beaudreau announced the Final Notice of Sale for a 20 June 2012 lease sale that will make available all unleased areas in the Central Gulf of Mexico Planning Area, offshore Louisiana, Mississippi, and Alabama, including 7,276 blocks on about 38.6 million acres. The sale will take place at the Mercedes-Benz Superdome in New Orleans. BOEM estimates the sale could result in the production of over 1Bbbl of oil and more than 4tcf of natural gas.

19th century shipwreck discovered in northern Gulf of Mexico

During a recent Gulf of Mexico expedition, NOAA, BOEM, and partners discovered an historic wooden-hulled vessel that is believed to have sunk as long as 200 years ago. Scientists on board the NOAA ship Okeanos Explorer used ROVs with high definition cameras to view remnants of the ship laden with anchors, navigational instruments, glass bottles, ceramic plates, cannons, and boxes of muskets.

Equipped with telepresence technology, Okeanos Explorer reached audiences around the world through live streaming Internet video. As members of the public ashore watched live video from the ocean bottom, they became "citizen explorers," sharing in the discovery with maritime archaeologists, scientists, and resource managers from a variety of Federal, academic, and private organizations.

The NOAA-funded 56-day expedition was exploring poorly known regions of the Gulf, mapping and imaging unknown or little-known features and habitats, developing and testing a method to measure the rate that gas rises from naturally-occurring seeps on the seafloor, and investigating potential shipwreck sites.

The shipwreck site was originally identified as an unknown sonar contact during a 2011 oil and gas survey for Shell Oil Company. BOEM requested this and other potential shipwreck sites be investigated during NOAA's Gulf of Mexico expedition. Surveys and archaeological assessments are required by BOEM to aid in its decision-making prior to issuing permits for bottom-disturbing activities related to oil and gas exploration and development.

For more information, visit www.noaa.gov.

While most of the ship's wood has long since disintegrated, copper that sheathed the hull beneath the waterline as a protection against marine-boring organisms remains (Credit: NOAA Okeanos Explorer Program)

Nautronix wins first major contract in Norway

Nautronix has been awarded a 3-year contract by the Norwegian SURF contractor, Ocean Installer AS, for the supply of survey services to support their offshore construction activities.

The contract includes the provision of onshore and offshore survey services in support of tendering and project activities. Nautronix will initially mobilize survey personnel and equipment onto the Normand Clipper, Ocean Installer's long-term chartered construction vessel due to commence offshore operations in mid 2012.

For more information, visit www.nautronix.com.

Ex-BP engineer arrested in Gulf oil spill case

Kurt Mix, a former engineer for BP plc, was arrested on charges of intentionally destroying evidence requested by Federal criminal authorities investigating the 20 April 2010 Deepwater Horizon disaster, announced Attorney General Eric Holder; Assistant Attorney General Lanny A. Breuer of the Justice Department's Criminal Division; U.S. Attorney Jim Letten of the Eastern District of Louisiana; and Kevin Perkins, Acting Executive Assistant Director for the FBI's Criminal Cyber Response and Services Branch.

Mix, 50, of Katy, Texas, was charged with two counts of obstruction of justice in a criminal complaint filed in the Eastern District of Louisiana.

"The department has filed initial charges in its investigation into the Deepwater Horizon disaster against an individual for allegedly deleting records relating to the amount of oil flowing from the Macondo well after the explosion that led to the devastating tragedy in the Gulf of Mexico," said Attorney General Holder. "The Deepwater Horizon Task Force is continuing its investigation into the explosion and will hold accountable those who violated the law in connection with the largest environmental disaster in U.S. history."

His attorney, Joan McPhee, said, "The government says he intentionally deleted text messages from his phone, but the content of those messages still resides in thousands of emails, text messages and other documents that he saved," she said. "Indeed, the emails that Kurt preserved include the very ones highlighted by the government."

Wood Group Mustang awarded topsides engineering for world's largest semi-submersible facility

Wood Group Mustang has been awarded the topsides detailed engineering and procurement support for the semi-submersible central processing facility (CPF) in the Ichthys field development. The contract was awarded by Samsung Heavy Industries Co. Ltd., the EPC contractor for the CPF. The project, located off the northwest coast of Australia in 250m of water, will be operated by INPEX.

The topsides facility will weigh approximately 70,000tonnes (60,000 dry) with a topside deck footprint of 156m x 132m (514ft x 434ft), making it the world's largest semi-submersible CPF. It will be designed for a peak gas export rate of 1,657MMscf/d as well as liquids transfer to the FPSO vessel for condensate production of approximately 85,000bbl/d.

Wood Group Mustang also provided the topsides engineering and design for the Thunder Horse production and drilling platform, which is currently the world's largest semi-submersible production facility.

For more information, visit www.mustangeng.com.

Piracy drops in Somalia waters but increases in Nigeria and Indonesia

In the first quarter of 2012, 102 incidents of piracy and armed robbery have been reported with dangerously increasing numbers in West African waters, according to figures released in the International Chamber of Commerce (ICC) International Maritime Bureau's (IMB) global piracy report.

In total, 11 vessels were reported hijacked worldwide, with 212 crew members taken hostage and four crew killed. A further 45 vessels were boarded, with 32 attempted attacks and 14 vessels fired upon – the latter all attributed to either Somali or Nigerian pirates.

Ten reports were received from

Nigeria in the beginning of 2012, equalling the same number reported in Nigeria for the whole of last year. A further attack in neighboring Benin has also been attributed to Nigerian pirates.

Somalia continues to dominate figures with 43 attacks, including the hijacking of nine vessels and the taking hostage of 144 crew. Four dhows and a fishing vessel, softer targets that make for ideal motherships, were among the hijacked vessels. Somali pirates were also responsible for the hijacking of a Panamax bulk carrier at the end of March.

But while the number of 2012 incidents and hijackings is less than reports for the same period in 2011 (97 incidents, 16 hijackings), it is unlikely that the threat of Somali piracy will diminish in the short to medium term unless further actions are taken.

The report attributes the reduction in overall attacks to the disruptive actions and pre-emptive strikes by the navies in the region, which disrupted numerous pirate action groups, emphasizing the importance of the navies in both deterring and combating Somali piracy.

For more information, visit www.icc-ccs.org.

Siemens wins multi-million dollar Navy research vessel order

Siemens Industry, Inc. announced it has been awarded a contract to equip two U.S. Navy Auxiliary General Oceanographic Research (AGOR) vessels with its unique diesel electric propulsion solution at Dakota Creek Industries Inc. (DCI), located in Anacortes, Washington Seattle-based Naval architecture and marine engineering firm Guido Perla & Associates, Inc. (GPA) will design the ships. The total order value is more than $10 million.

The two advanced oceanographic research vessels, AGOR 27 and AGOR 28, will be outfitted with the Siemens Blue™ multi-drive low-voltage system that improves reliability due to failsafe features that will help the vessel owner lower maintenance costs, increase efficiency, and increase operational ease for the vessel and crew. The ship's advanced design will also decrease fuel consumption, resulting in reduced emissions of harmful greenhouse gases.

Siemens will provide the main generators, main propulsion and thruster motors, switchboards, power management system, and its Siemens automation system for alarm, monitoring, and control functions in addition to other condition-based monitoring systems for improved maintenance and reliability. Siemens is responsible for designing, engineering, project managing, and commissioning for the diesel electric and automation system.

Designed as single-hull ships, AGOR 27 and AGOR 28 are each approximately 238ft long and incorporate the latest technologies, including high-efficiency diesel engines, emissions controls for stack gasses, new information technology tools both for monitoring shipboard systems and for communicating with the world, and hull coatings to reduce maintenance requirements. Each vessel will operate with a crew of 20 with accommodations for 24 scientists.

For more information, visit www.usa.siemens.com.

World's first DP3 class crew boats
Leading U.S. offshore marine support vessel operator Seacor Marine LLC, located in Houma, Louisiana, has chosen Kongsberg Maritime to supply sophisticated dynamic positioning systems for two new 190ft CrewZer Class Crew boats (also known as fast supply vessels). Seacor Lynx and Seacor Leopard are under construction at Gulfcraft Shipyard, located in Franklin, Louisiana, and are scheduled for delivery in the first half of 2013. The Seacor Lynx and Seacor Leopard will be the first Crew boats to operate using an ABS Class DP3 system, affording them the highest degree of manoeuvring safety available. ABS Class DP3 allows for significant DP operational safety, including full protection of the system in case of fire and flooding. Kongsberg Maritime Inc., located in Houston, Texas, will install the pinnacle in DP system technology aboard the new vessels in the form of a triple redundant Kongsberg K-Pos DP3 system integrated with proprietary position reference and environmental sensor systems.

Austal opens marine support base in Western Australia
To meet the growing demand for its marine services and facilities, Austal has officially announced the opening of its Marine Support Base in Henderson, Western Australia. Located adjacent to Austal's Henderson shipyard, the Henderson Marine Support Base provides comprehensive refit, repair, and maintenance services to private, commercial, and defense operators. The site boasts four 90m berths, six sheds ranging between 85 and 120m in length, workshop and fabrication facilities, 11,200sq.m of hardstand and capacity to lift vessels up 180tonnes. The launching of Austal's existing site as a dedicated Marine Support Base is a continuation of the company's regionalization strategy that involves providing local services to local operators.

Malaysian positioning contract for Veripos
Veripos has been awarded a new 3-year contract by Kuala Lumpur-based Orogenic Geoexpro for continued provision of GNSS positioning services to the Malaysian company's fleet of vessels engaged on geophysical surveys, rig moves, and major construction support projects throughout Southeast Asia. Services provided by Veripos under the contract include a combination of its dual-beam Standard and Ultra Precise Point Positioning (PPP) facilities supported by shipborne hardware comprising 30 LD3SG1 and 10 LD3G2 integrated mobile receivers. Also available is a series of proprietary software modules for real-time monitoring, control, and QC operations.

exactEarth and VesselTracker strike agreement
exactEarth Ltd., a leading provider of global maritime vessel data, is pleased to announce a new partnership agreement with VesselTracker GmbH, a leading provider of global coastal AIS data and maritime information. Under this agreement, VesselTracker will market services deploying exactAIS® satellite data into the global commercial applications market through their world-leading web services platform. VesselTracker currently sells to a wide range of markets such as port authorities, fleet management, insurance, and ship brokering. This deal will enable VesselTracker to fully globalize their services, providing visibility into ship movements out of the range of existing coastal stations. A new custom data solution will be available to provide a wide variety of solutions based on XML Web Service data delivery that can suit specific customer requirements.

Jumbo transports MOF caissons for Gorgon project

Jumbo's engineers and the crew of HLV Jumbo Jubilee have successfully transported and discharged 14 of the 25 MOF caissons for the Chevron-operated Gorgon Project on Barrow Island, Australia. So far, the operation was performed as planned with respect to every detail: safety, environmental conservation, transportation, mooring, and tidal discharging.

The contract for the transport and discharge of the MOF caissons was awarded to Jumbo by DB Schenker on behalf of the Saipem Leighton Consortium. The heavy lift vessel has a unique deck lay out, enormous hold capacity, and is allowed to sail with open hatches. This makes it possible to make optimum use of the capacity and transport seven MOF caissons at once while maintaining a minimum ship drought.

In four shipments, the Jumbo Jubilee will transport a total of 25 caissons from Port Klang, Malaysia to Barrow Island, Australia. The caissons, weighing from 600t up to 700t (D: 12.5m and H: 16.8m), will be lifted from a barge and placed in the hold of the vessel for transport.

Barrow Island is a Class A Nature Reserve. Jumbo developed and implemented a strict quarantine compliance plan, including an extensive familiarization and environmental training program. The captain and crew of the Jumbo Jubilee received a certificate of appreciation for their vigilance in ensuring the ongoing compliance of the vessel with Gorgon quarantine requirements.

The Gorgon Project is one of the world's largest natural gas projects and the largest single-resource project in Australia's history. It is operated by Chevron and is a joint venture of the Australian subsidiaries of Chevron (approximately 47%), ExxonMobil (25%), Shell (25%), Osaka Gas (1.25%), Tokyo Gas (1%), and Chubu Electric Power (0.417%).

For more information, visit www.jumboshipping.nl.

First order for Damen Shiprepair Brest

Director André Hollander and sales manager Theo Kloosterman proudly announced the first shiprepair order of Damen Shiprepair Brest (France) by sounding the bell in the traditional way. It is the first vessel booked under the new management and comes in the second week after the acquisition of the former Sobrena Yard in Brest by the Damen Shipyards Group.

The order was granted by the French offshore and subsea service provider Bourbon Offshore Surf, which specializes in Subsea Umbilicals Risers Flowlines (SURF) services and the docking of the Alcyon, one of Bourbon's Anchor Handling Tug Supply vessels.

The docking consists of the 30-year survey, including all normal items, a complete external paint program, repair of tank coatings, and major steel renewal in fore peak area.

Damen Shiprepair Brest is a well-established repair yard with modern facilities. It has three graven dry-docks and sufficient repair berths. The biggest dry-dock measures 420m x 80m and is one of the biggest in Europe, allowing the yard to accommodate almost any ship in the world.

The shipyard offers a broad range of services for any vessel type, including LNG tankers, oil tankers, semi-submersibles, shuttle tankers, FPSOs, offshore construction vessels, jack-up rigs, ro-ro vessels, and ferries. The highly skilled workforce is particularly well-known for its LNG tanker expertise.

For more information, visit www.damen.nl.

Wärtsilä donates controllable pitch propulsion system to the U.S. Merchant Marine Academy

Wärtsilä, the marine industry's leading solutions provider, has donated a controllable pitch propulsion system to the Engineering Department at the U.S. Merchant Marine Academy. A dedication ceremony served as recognition of the full-scale training equipment that will be installed in an engineering lab at the USMMA campus in Kings Point, New York.

The donated equipment includes a Wärtsilä 4D 775 controllable pitch propeller (CPP), 3.4m (11.2ft) in diameter, complete with the propeller shaft, stern tube with bearings, forward and after stern tube seals, rope guard, and a hydraulic shaft coupling. Wärtsilä has also donated the Lipstronic 7000 propulsion control system, bridge, wing, and engine room control stations; operator's display; and power supply to provide the complete CPP system. This propulsion package offers the Midshipmen of USMMA the hands-on experience of understanding and managing such equipment as future leaders of the shipping industry.

For more information, visit www.wartsila.com.

New tidal optimization reveals significant bunker savings

Applied oceanography specialist Tidetech has introduced tidal optimization as a critical tool for improving efficiency on coastal shipping routes.

In simulations developed for transits through the English Channel, a time difference of 12.8% was shown between "best case" and "worst case" passage times when using optimal tide and current (based on an 8000 TEU container ship steaming at 21kt). This is the approximate equivalent of $9,400 of bunker costs saved on one journey.

Speed optimization using accurate tidal stream data differs from weather and route optimization in that it is about choosing the best time to transit a passage where a choice of route is limited or restricted (channel transits, controlled shipping lanes, ferry routes, etc.).

For more information, visit www.tidetech.org.

A Worldwide Survey of Recent Ocean Observatory Activities: 2012 Update

Contributed by the Ocean Observing Systems Committee, MTS

This year marks the fourth annual update of worldwide ocean observatory activities first reported in ON&T in 2009 by the Marine Technology Society's Ocean Observing Systems Committee. We would like to extend a special thanks to all those who have made contributions, and we look forward to receiving updates for next year's report.

Europe

ESONET

The Network of Excellence (NoE) European Seafloor Observatory Network (ESONET), completed in 2011 after 4 years, and was successful in establishing 6 observatories, promoting standards such as the ESONET Label, and constituting subsea interfaces of Global Monitoring for Environment and Security (GMES). Activity continues with the ESONET-Vi ("the vision") network, which will be the basis for the large, ongoing research infrastructure supported by the European Commission (EC) and several funding agencies in Europe that make up the European Multidisciplinary Seafloor Observatory (MSO).

The primary objective of ESONET is permanent and long-term monitoring of hydrothermal activity in the Mid-Atlantic Ridge. Hydrothermal circulation at mid-ocean ridges impacts the transfer of energy and matter from the interior of the Earth to the crust, hydrosphere, and biosphere. On the fractured seafloor, seawater circulates through the permeable oceanic crust, exchanges chemicals with the surrounding rocks, and is heated to temperatures reaching 400°C. This hot fluid flows up and is expelled at hydrothermal vents, forming emissions of different physico-chemical properties (from black smokers to diffuse venting). The unique faunal communities that develop near these vents are sustained by chemosynthetic micro-organisms that use reduced chemicals (i.e. H_2S and CH_4) present in the hot fluids as energy sources.

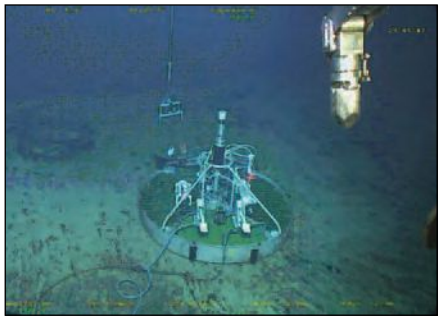

Figure 1 *SEAMON West, the geophysical node on Lava Lake (Courtesy of ESONET)*

Monitoring the Mid-Atlantic Ridge, (MoMAR) is one of the permanent observatories stood up by ESONET. It is located in the Lucky Strike zone south of the Azores islands. This IFREMER-designed observatory consists of two sea monitoring nodes (SEAMON) that acoustically transmit data to a buoy connected by satellite link (Figure 1). This observatory is supported by both French institutes and the University of Azores. Instruments include seismometers provided by the Institut de physique du Globe Paris, chemical analyzers and a camera. Data are stored on site and transmitted daily to the data management system onshore. Maintenance visits to the observatory are conducted annually.

CYCOFOS & TWERC – Cyprus

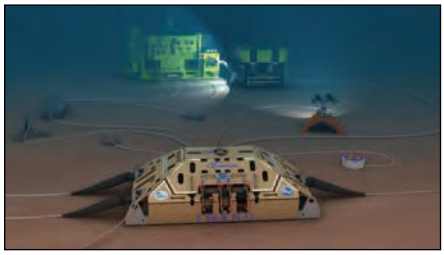

Figure 2 *Rendering of OCB TWERC node supporting offhore operations*

Completion of the successful deployment of the prototype Tsunami Warning and Early Response system array for Cyprus (TWERC) was reported in last year's ON&T update. This system is hosted on the CSnet International, Inc. Offshore Communication Backbone (OCB), a seafloor ocean observatory network that is operated and maintained by HARRIS CapRock Corporation (HCC). Since initial deployment of the OCB, the installation of sensor packages has progressed on schedule. CSnet has signed a memorandum of understanding with the University of Cyprus that establishes a frame of reference for collaborating on collecting, analyzing, and disseminating data retrieved from this observatory. So far this year, sensor packages have been successfully deployed at Node 4 and (at the time of this submission) Node 1. These packages comprise Guralp CMG-3T Ocean Bottom Seismometers (OBS) and Sonardyne 8174 Tsunameters (bottom pressure recorders). The installations on Nodes 1 and 4 provide the maximum separation distance across the seafloor network of nearly 140km. CSnet is also currently recovering the CYprus Coastal Ocean Forecasting and Observing System (CYCOFOS) buoy and sensors, which have been operating concurrently with the OCB since September 2010, after 7 years of operation.

North America

NEPTUNE Canada

The North-East Pacific Time-series Underwater Networked Experiments (NEPTUNE) Canada (NC) observatory (www.neptunecanada.ca) continues to provide vital tools and infrastructure for gathering scientific data. In January, two instrument platforms connected to NC's Folger Passage node recorded data from a storm with wind gusts up to 110km/hr and waves reaching 18m. Scientists are using this data to study ocean biogeochemistry, land-ocean interactions, phyto- and zooplankton, fish, and marine mammals.

On 20 March 2012, a seafloor pressure sensor at NC's ODP 1027 location recorded pressure waves from a magnitude 7.4 earthquake that struck Oaxaca, Mexico at 12:02 local time. The recorded waves took 24min to propagate from the epicenter, which was located above a tectonic plate boundary where the Cocos Plate is being subducted under the North American Plate at a rate of 6.4cm/yr.

In addition, pressure-sensitive microphones connected to NC are used to listen to seismic activity and tectonic plate movement, as well as everything from whales to shipping traffic. These sound data are shared freely with scientists all over the world via the Internet. The LIDO website (www.listentothedeep.com) shares live sounds from NC and 14 other ocean floor networks around the world. In one related study, two students at the University of Washington are analyzing seismic sound waves recorded from NC and the Keck Seismic Network (a prototype to NC's seismic network) to count, locate, and track fin whales. Fin whales are the second largest whale species after the blue whale and are found in both the northern and southern hemispheres, including the North East Pacific.

This year, the NC science and engineering team's focus is to build a suite of core instruments for the network and expand the Endeavour, 889, and 1027 sites. Meanwhile, NC's software team is improving data access and tools for both scientific research and experimental learning in the classroom. One example utilizing NC data is the Digital Fishers (DF), a joint project between Ocean Networks Canada and the Centre for Global Studies (CfGS), that allows the public to view clips of undersea video and give a description of what they saw using a game-like application that has levels and rewards at dmas.uvic.ca/DigitalFishers.

VENUS

The Victoria Experimental Network Under the Sea (VENUS) Phase II project continues with the subsea upgrades (now complete) and new instruments being integrated into the system. A successful maintenance cruise in December 2011 installed new equipment, conducted ship-based sonar surveys, and performed antenna calibration for the first shore-based CODAR station. Figure 3 depicts a new digital still camera (DISCo) deployed in Saanich Inlet as part of a broad, international experiment to monitor the benthic community over long periods with varying levels of habitat change and dissolved oxygen concentrations. Two webcams were also deployed in the Strait of Georgia as a continuation of the forensics research led by Simon Fraser University. February 2012 marked the 6th anniversary of the VENUS node in Saanich Inlet.

Figure 3 *New digital stills camera (DISCo) deployed in Saanich Inlet (Courtesy VENUS/Ocean Networks Canada)*

OTN

The Ocean Tracking Network (OTN) is a Canada Foundation for Innovation (CFI) - International Joint Ventures Fund global research and technology development project headquartered at Dalhousie University, Halifax, Nova Scotia. In 2008, the OTN began deploying state-of-the-art acoustic receivers and oceanographic monitoring equipment in key ocean locations to document the movements and survival of marine animals carrying acoustic tags. The objective is to learn how these animals are influenced by oceanographic conditions. OTN deployments will soon occur in all of the world's five oceans and span seven continents. The species tracked are marine mammals, sea turtles, squid, and fishes including sharks, sturgeon, eels, tuna, salmon, and cod (Figure 4). The Natural Sciences and Engineering Research Council of Canada (NSERC) supports OTN-Canada, a national network of researchers that works with the OTN infrastructure. The Social Sciences and Humanities Research Council of Canada (SSHRC) funds the participation of social scientists in the OTN work. Over 200 international researchers from 15 countries are currently participating in the global network. OTN hosts a Data Warehouse that serves as a repository for data collected by OTN researchers, and is working to develop interpretation and visualization tools for tracking data. OTN industrial partners include Vemco/Amirix, Lotek Wireless, Satlantic, Romor, and Kintama Research. OTN assists these partners with the development of new technologies and uses their products and services in its operations. OTN operates a fleet of underwater autonomous vehicles in support of oceanographic and tracking research.

Figure 4 *Dr. Steve Wilson, Stanford University, implants a pop-up satellite archival tag while crewman Carl Cameron (left) and Captain Dennis Cameron (right) monitor the fish. (Photo by Naomi Pleizier, Dalhousie University Science Co-op Program)*

OOI, CGSN & RSN

The Ocean Observatories Initiative, (OOI) project, funded by the National Science Foundation (www.nsf.gov), has made significant progress on a number of technical test and development fronts. During 2011, the OOI team conducted at-sea tests for the coastal and global arrays; installed the extensive undersea fiber optic cable off the coasts of Oregon and Washington; procured essential instrument platforms (gliders, AUVs), sensors, and equipment; and made substantial progress developing the OOI's cyberinfrastructure and software interfaces that will allow access to ocean data from computers and mobile devices.

One of the most significant events over this past year is the initiation of glider operations for the Coastal Global Scale Node (CGSN) part of the OOI program. CGSN operations and delivery of data to users will begin in 2012 with the initial deployment and start of sustained operations of coastal gliders at the Endurance Array off the coasts of Washington and Oregon and the Pioneer Array off the New England coast. OOI data from sensors on moored buoys, AUVs, and gliders will be supplemented by data from surface radars and airborne and satellite sensors obtained from other programs to provide a unique and extensive observational context for the coastal component of the CGSN. The global component includes a network of buoys to support sensors for measurement of air-sea fluxes of heat moisture and momentum; physical, biological, and chemical properties throughout the water column; and geophysical observations made on the seafloor. The CGSN is being constructed by Woods Hole Oceanographic Institution (WHOI), Oregon State University, and Scripps Institution of Oceanography (Figure 5).

The Regional Scale Nodes (RSN) component of OOI achieved a number of major milestones since last year's update: completion of the two horizontally directionally drilled conduits approximately 1mi in length each; installation of 540mi of backbone cable off the coast of Oregon; and outfitting of the Pacific City shore facility with power feed and optical transmission equipment. Installation of the primary nodes is scheduled for fall 2012. Each primary instrumented site will offer two-way communication between land and sea and will be supplied with up to 10Gbps of telecommunications bandwidth and 8KW of power. The University of Washington is responsible for the RSN component of the OOI. Instruments,

Figure 5 *The OOI team loads the Global Hybrid Profiler on R/V Oceanus for at-sea testing off the New England coast (Photo courtesy Tom Kleindinst, Woods Hole Oceanographic Institution)*

moorings, and sensors on the RSN high-power, high bandwidth fiber optic cable will create a large aperture natural laboratory for conducting a wide range of experiments. Initial study sites for the RSN will be at Axial Volcano and Hydrate Ridge off the Oregon and Washington coasts.

Meanwhile, the OOI's unique cyberinfrastructure (CI) continues to emerge with progressive software releases and continuing developments. The University of California, San Diego is building the OOI's CI. At the end of 2011, the CI team completed the first release of software that provides the fundamental computing and data distribution infrastructure. The OOI's Integrated Observatory Network (ION), which will connect and coordinate the operations of the OOI marine components with the scientific and educational pursuits of oceanographic research communities, is now running and available. The CI team also has begun the second software release to build the OOI's managed instrument network. By October 2012, the CI team plans to be in a position to activate control of platforms (buoys, gliders, or cabled sensors) to produce data products for users.

In addition, the OOI Education and Public Engagement (EPE) team is building a variety of software interfaces and web-based tools to allow educators to bring the ocean into their learning environments. Rutgers, the State University of New Jersey, is leading the development of educational capabilities for the OOI. The EPE team is constructing a series of software and web-based social networking tools to engage a wide range of users, including faculty, graduate, and undergraduate students; informal science educators; and the general public. The software will be designed to provide science educators with a suite of tools, allowing them to enhance their graduate and undergraduate education activities and engage the general public using ocean observation data from the OOI.

U.S. IOOS

The U.S. Integrated Ocean Observing System (IOOS®) has launched a new Glider Asset Map to track underwater robotic vehicles and deliver historical marine data (www.ioos.gov). The Map provides a current snapshot of the gliders' locations at sea. Once the gliders return from a mission, users can scroll over visualizations of collected data. Historical collection of data can also be retrieved from previous missions, dating back to 2005, collected from Southern California (SCCOOS), Northern Pacific (NANOOS), Central and Northern California (CeNCOOS), and Mid-Atlantic (MARACOOS). This site will eventually provide access to glider data for all IOOS regions and their partners, allowing scientists easier retrieval of data to inform models and forecasting tools. It is also an initial step toward establishing baseline standards for glider operations and data. IOOS delivers the data and information the decision makers need to take action to improve safety, enhance the economy, and protect the environment. These data provide a larger picture of the interaction between the ocean and global climate systems and advance our understanding of potential climate change impacts on our marine ecosystems and coastal communities.

AOOS

In the fall of 2011, Alaska Ocean Observing System, (AOOS) drafted a 10-year build out plan for ocean observatories in Alaska. The plan is intended to ensure initial, barebones capabilities to address three regional priority needs: 1) marine operations; 2) climate and ecosystem variability and change; and 3) coastal hazards. The framework of the plan is organized around the 3 large marine ecosystems, 7 sub-regions, and 15 "areas" shown in Figure 6.

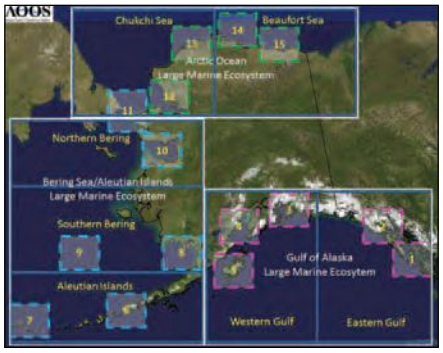

Figure 6 *AOOS build out strategy for the future (Courtesy AOOS)*

Last summer, an AOOS-funded glider broke records by continuously sampling ocean properties in the Chukchi Sea for over 9 weeks, collecting over 11,000 vertical profiles of pressure, temperature, and salinity covering 1,000km of ocean. The glider was equipped with high-capacity lithium batteries, which enabled it to stay in the water for over 2 months while continuously collecting and transmitting real-time data. The 2011 mission marked the second year of studies on the hydrographic properties of Arctic waters led by Dr. Peter Winsor at the University of Alaska Fairbanks (UAF) and funded by the Bureau of Ocean Energy Management (BOEM), Conoco Phillips, and Shell Oil.

Figure 7 *Eugene Bodfish (Olgoonik Oilfield Services), Peter Winsor (UAF), and Andrew Mullen, (undergraduate intern from Notre Dame University), prepare to launch a glider from C/V Tukpuk off Wainwright, Alaska (Courtesy of Hank Statscewich, UAF)*

Deployments took place from Wainwright on 31 July 2011 following last year's inaugural surveys, which covered over 1,000km of ocean and collected more hydrographic data than all previous studies combined (Figure 7). The glider program is part of a larger project lead by Tom Weingartner at UAF, which includes land-based high frequency (HF) radars, drifters, and moorings. The HF radars are capable of mapping surface currents over a huge area of the Chukchi Sea and streaming these data in real-time. Near-future goals are to continue glider operations in the Chukchi Sea, but work toward developing the capability of under-ice AUV operations to better understand the hydrography and circulation of the Beaufort and Chukchi Seas, which remain ice covered for large portions of the year. An extra benefit will be developing the capability to detect the presence of oil, map its extent, and locate its source under sea ice, which will be a key tool for future oil development in these areas.

Asia

DONET - Japan

The installation of the Dense Oceanfloor Network System for Earthquakes and Tsunamis (DONET) was completed in July 2011. Developments began in 2006 and, in total, 20 observatories have been installed on the seafloor around the Nankai trough, together with the 250km length of backbone cable and five science nodes. Each observatory is able to detect seismic and tsunami activities with high accuracy, and the data are transferred to the Yokohama Institute for Earth Sciences of JAMSTEC in real-time. Beginning in August 2011, the seismic data have been provided to the Japan Meteorological Agency and the National Research Institute for Earth Science and Disaster Prevention, Japan, where the data are used for earthquake early warning. In parallel with DONET construction, DONET2 (the second phase) was launched in 2010 (Figure 8). The monitoring area will expand to the west side of DONET, and 29 observatories are scheduled to be installed at offshore the Kii peninsula, Japan.

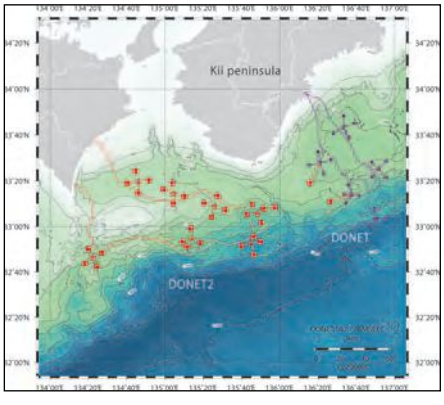

Figure 8 *DONET 1 and 2*

Indian Ocean Observing System

National Institute of Ocean Technology Ministry of Earth Sciences, India continues to maintain 12 metocean buoy networks in the Indian seas. Six next generation buoy systems named OMNI were deployed last year to provide real-time subsurface data for the first time in the Indian Seas. The OMNI buoys are equipped with a suite of sensors, including MRU and ADCP, which collect and transmit salinity, temperature, and current data at discrete depth intervals through the water column (5, 10, 15, 20, 30, 50, 75, 100, 200, and 500m). Eleven disparate sensors are used to measure wind speed, wind direction, air temperature, air pressure, relative humidity, rainfall, radiation (long wave / short wave), sea surface temperature, conductivity, wave and ocean current profiles.

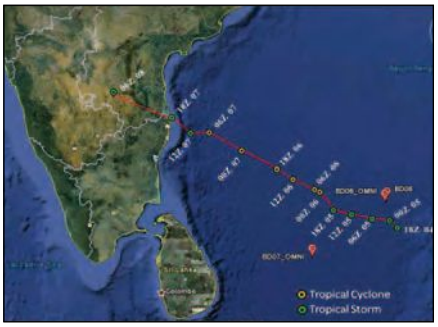

Figure 9 *Path of cyclone Jal*

These OMNI buoys withstood severe cyclones, including both Jal and Thane, recording valuable data prior, during, and post-cyclone (Figures 9 and 10). This provided vital information to India's Meteorological Department, Coast Guard, Navy, and other operational agencies. Phenomena of interest in the area include the freshening of the northern bay due to heavy fresh water discharge through rivers like Brahmaputra and Ganges, barrier layer formation due to the Northeast Monsoon, cyclone genesis, and oceanic impact to the subsurface levels.

Apart from operational activities, the OOS team is also developing IDAS (Indigenous Buoy Data Acquisition System) for a metocean buoy, a wave buoy, and a tsunami buoy–all progressing toward development of IDA's system for integration with its OMNI buoy.

Major challenges faced in this region have been deliberate acts of vandalism and piracy. Despite efforts to safeguard the buoys by creating awareness to fisherman, fitting the buoys with a radar reflector and beacon light, adding a slippery (smooth) protective hood, and using difficult to remove fixtures and fasteners, vandalism continues to occur. Deployment and maintenance of data and tsunami buoys in the Arabian Sea is also becoming a big challenge due to piracy. According to national guidelines on piracy, cruises on the Arabian Sea are carried out with the support of armed guards, which leads to additional costs and ship time. Among these challenges, this group continues to deliver its commitment by maintaining the buoy network and providing valuable data to both national and international scientific communities. This represents the first time such an exercise has been successfully implemented in India. The motivation for this work came from many reports that rising sea surface temperatures (SST) caused by global warming has resulted in extensive coral bleaching. Andaman and Nicobar Islands are bestowed with the richest coral diversity among all Indian reefs. Increased SST can have significant impacts on marine life, especially in these tropical waters. SST plays a critical role and can affect marine food web productivity and sustainability, especially in these vulnerable locations and ecosystems.

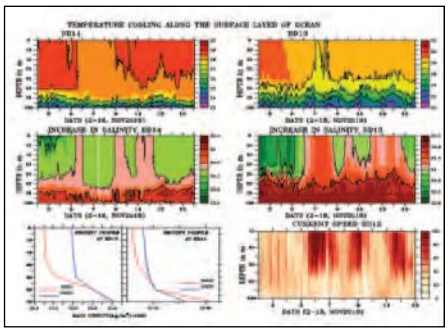

Figure 10 *Data collected from cyclone Jal*

Under the next 5-year planning period (2012-17), new observational tools and methods will be proposed and a substantial increase in funding is expected for ocean observation in the Indian Seas.

LORI – Oman

The Lighthouse Ocean Research Initiative (LORI) has reached two major milestones this past year. LORI I, the flagship system, celebrated its sixth year of continuous operation and the newer LORI II system passed its second anniversary. The cutting-edge cabled observatories – installed in 2005 and 2010 in the Sea of Oman and Arabian Sea, respectively (Figure 11), provide marine environmental

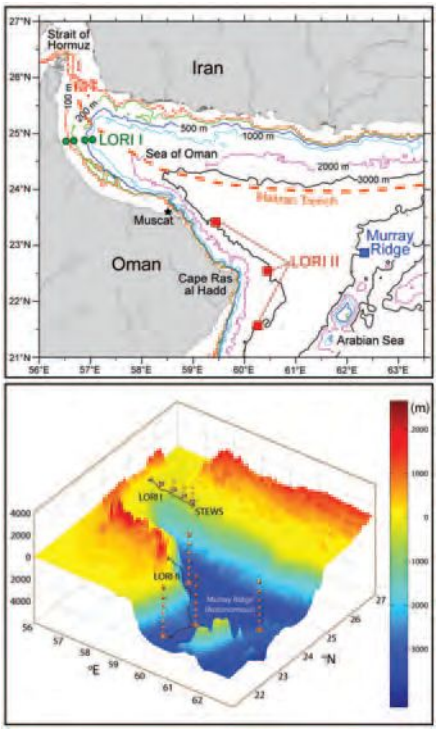

Figure 11 *The top map shows the locations of LORI I and LORI II moorings and the Murray Ridge autonomous mooring; STEWS is located near the easternmost LORI I mooring. Seismicity along the Makran Trench (dashed orange line) has triggered tsunamis in the historical past. The bottom plot reveals the 3D topography and bathymetry*

information on a real-time basis. LORI I is composed of four nodes connected to a single 85km trunk cable. Each node serves between one and three fully-sensored Doppler current profilers at depths from 67 to 1,050m. LORI I was expanded in 2007 to add a fifth node at 1,350m to incorporate a Seismic Tsunami Early Warning System (STEWS) developed in conjunction with WHOI. The LORI II system consists of a single 345km cable connecting three nodes, all at 3,000m depth, serving three moorings with an array of Doppler current profilers. Prior to cabling, autonomous moorings were present in the same locations, meaning this region also has a 6+ year time-series record of physical oceanographic data.

The cabled networks that Lighthouse R&D Enterprises have developed produce multidisciplinary data for the ocean surface, water column, seafloor, and subseafloor, allowing the earth and ocean to be examined as an integrated system. Both cabled observatories have another 25 years of operational capability providing continuous, insitu data for a region of the world that is poorly understood. The 6-year operational history of the project means that scientists may now differentiate natural seasonal or annual fluctuations from unusual events. Easier identification of unusual events leads to faster, more appropriate action being taken by decision makers to mitigate the often harmful consequences of inaction. The long deployment times of these systems have provided Lighthouse with many lessons learned, which will be incorporated in future designs, leading to significant improvements and decreases in costs.

Oceania

IMOS – Australia

The Integrated Marine Observing System (IMOS) is designed to be a fully-integrated, national system that observes physical, chemical, and biological variables at ocean-basin and regional scales. IMOS facilities, operated by 10 institutions within the National Innovation System, are funded to deploy equipment and deliver data streams for use by the entire Australian marine and climate science community and its international collaborators.

IMOS has a National Science and Implementation Plan that draws on the intellectual strength of its six science nodes – a "Bluewater and Climate Node" focused on the open ocean and five "Regional Nodes" covering the continental shelf and coastal seas of Western Australia, Queensland, New South Wales, Southern Australia, and Tasmania. There are five major research themes that unify IMOS: 1) multi-decadal ocean change; 2) climate variability and weather extremes; 3) major boundary currents and interbasin flows; 4) continental shelf processes; and 5) ecosystem responses (rows in Table 1). A number of different technologies are employed to gather information on these themes (columns of Table 1). Highlights of 2010-2011 IMOS activity are available on the publications page of the website www.imos.org.au.

TASCAM – New Zealand

TASCAM, first reported in last year's update, is used to remotely collect physical and biological data on the water quality of Tasman Bay. This coastal monitoring platform, built by Cawthron Institute, is the first buoy in New Zealand waters to utilize inductive instrument technology that has been developed in collaboration with the Monterey Bay Aquarium Research Institute (MBARI). The monitoring platform records long-term data on simple but significant parameters such as temperature, salinity, turbidity (sediment), and chlorophyll – all indicators of the quality and productivity of coastal waters. TASCAM's aim is to meet the needs of multiple stakeholders, providing information on the local marine environment to researchers, local councils, and day-to-day end users (i.e., mussel farmers and recreational fishers).

Located in western Tasman Bay, TASCAM has been situated to build on the wealth of knowledge gained during the multi-year Integrated Catchment Management Programme, but has been largely funded by Cawthron. The goal is that TASCAM and others like it will form a nationwide network to provide standardized data sets to track events and trends within New Zealand waters.

For more information about this article or to make a contribution, contact dkocak@harris.com.

	Argo Floats	Ships of Opportunity	Deep Water Moorings	Ocean Gliders	AUVs	National Mooring Network	Ocean Radar	Animal Tagging & Monitoring	Wireless Sensor Network	Satellite Remote Sensing
Multi-decadal ocean change	✔	✔	✔	✔		✔		✔		✔
Climate variability	✔	✔	✔							✔
Major boundary currents	✔	✔	✔	✔		✔	✔			✔
Continental shelf processes				✔		✔	✔		✔	✔
Ecosystem responses		✔	✔	✔	✔	✔		✔	✔	✔

Table 1 *Technologies used to collect data to address IMOS five major research themes*

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Ocean Science

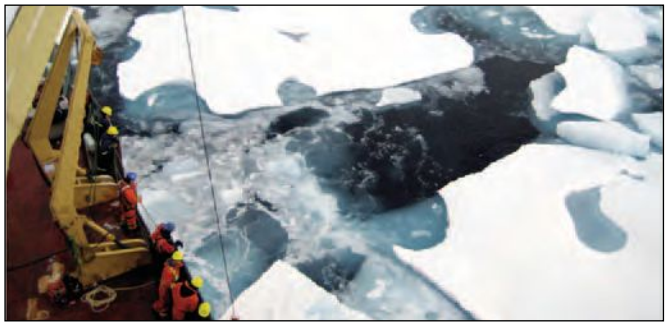
Fugro to survey in vicinity of Krenitzin Islands, Alaska for NOAA
Fugro has been awarded a task order under its 5-year Indefinite Delivery Indefinite Quantity (IDIQ) contract with U.S. National Oceanic and Atmospheric Administration (NOAA) to survey around the Aleutian Chain's Krenitzin Islands, Alaska in summer 2012. The survey, which will utilize multi-beam echo sounder-based bathymetric data collection from a mother ship and survey launches, is in support of NOAA's National Ocean Service (NOS) Office of Coast Survey (OCS) to update nautical charts around Akun and Tigalda Islands. Since 2006, Fugro has successfully completed 24 task orders for NOAA. While the data collection phase of the project is expected to be complete by August 2012, data processing and product creation is expected to run through the remainder of 2012.

Innovative new iPhone app for fishermen
Fish Rules 2012 Edition uses the brains of an iPhone to significantly simplify recreational saltwater fishing regulations. By using your phone's GPS and calendar, Fish Rules shows only the regulations you need. With Fish Rules on your iPhone you have recreational saltwater fishing regulations for federal and state waters from North Carolina to Texas. With a glance at the app you'll know if your fish is in season, how many you can keep, how big they have to be, and more. Fish Rules was developed and field tested by real fishermen, so it is both intuitive and functional. The app works with or without a cell signal! Fish Rules includes a functional fishing log, and it is fully integrated with Facebook. With this app you can take a photo, log your fish, and post it to Facebook in just seconds. It's never been easier to verify your catch is legal to harvest and then brag about it on Facebook. Fish Rules includes crisp illustrations and great photos so you can accurately identify your catch.

New analysis shows 8% of U.S. marine waters protected
New analysis of updated data has shown that 8% of U.S. waters are currently designated as Marine Protected Areas (MPAs), with the vast majority of these areas open to fishing and other activities, according to NOAA. New analyses of U.S. data show that the majority of our nation's MPAs allow human uses, including fishing, swimming, and kayaking. The 8% figure does not include MPAs specifically established to sustain fisheries production, which often have specific restrictions on fishing gear over large ocean areas. Other inventory analyses including these fishery MPAs, however, show that 92% of the area within U.S. MPAs allows some type of activity, and 85% is open to fishing.

Plastic trash altering ocean habitats
A new study led by a graduate student researcher at Scripps Institution of Oceanography at UC San Diego and published in the 9 May online issue of the journal Biology Letters reveals that plastic debris in the area popularly known as the "Great Pacific Garbage Patch" has increased by 100 times in the past 40 years, leading to changes in the natural habitat of animals such as the marine insect Halobates sericeus. These "sea skaters" or "water striders" inhabit water surfaces and lay their eggs on flotsam. Naturally existing surfaces for their eggs include, for example, seashells, seabird feathers, tar lumps, and pumice. In the new study, researchers found that sea skaters have exploited the influx of plastic garbage as new surfaces for their eggs. This has led to a rise in the insect's egg densities in the North Pacific Subtropical Gyre. Such an increase, documented for the first time in a marine invertebrate in the open ocean, may have consequences for animals across the marine food web.

WHOI scientists provide baseline measurements of carbon in Arctic Ocean



Scientists from the Woods Hole Oceanographic Institution (WHOI) have conducted a new study to measure levels of carbon at various depths in the Arctic Ocean. The study, recently published in the journal Biogeosciences, provides data that will help researchers better understand the Arctic Ocean's carbon cycle – the pathway through which carbon enters and is used by the marine ecosystem. It will also offer an important point of reference for determining how those levels of carbon change over time and how the ecosystem responds to rising global temperatures.

"Carbon is the currency of life. Where carbon is coming from, which organisms are using it, how they're giving off carbon themselves – these things say a lot about how an ocean ecosystem works," says David Griffith, the lead author on the study. "If warming temperatures perturb the Arctic Ocean, the way that carbon cycles through that system may change."

Griffith's team sampled suspended particles of organic matter, as well as organic carbon and carbon dioxide (CO_2) dissolved into the surrounding water. This is the first time that researchers have focused broadly on measuring multiple types of carbon at the same time and place in the Arctic Ocean – due to its remote location and the challenges of operating in sea ice, few comprehensive carbon surveys had been conducted there before this study.

For more information, visit www.whoi.edu.

Innovative Liquid Robotics and Sonardyne technology deployed in the Gulf of Maine.

In a joint project with NERACOOS, U.S. IOOS, the University of Maine's School of Marine Sciences, and Sonardyne, Inc., a Wave Glider has been launched near Monhegan Island in the Gulf of Maine. Over a period of 6 to 8 weeks, it will collect information on water conditions in the Gulf, including temperature, salinity, and wave height. Two of Sonardyne's long-life subsea sensor logging nodes, called Fetch, have been deployed onto the seafloor where they will make regular subsea measurements using their onboard suite of environmental sensors. When requested to do so, the stored data will be transmitted wirelessly up to the Wave Glider for onward transmission via a satellite link to the shore for near real-time assessment. This project demonstrates how the combination of Fetch and Wave Glider technologies can expand the spatial and temporal resolution of the installed Ocean Observing System. After the initial deployment in the Gulf of Maine is completed, the Wave Glider will transit to waters off the mid-Atlantic for additional missions, including tsunami detection.

For more information, visit www.liquidr.com.

Tuna may have transported Fukushima radiation

Pacific bluefin tuna appear to have transported Fukushima-derived radioactivity from Japan to California, a study finds.

Daniel Madigan and colleagues measured the levels of two radioactive isotopes of cesium in 15 bluefin tuna caught off the coast of San Diego, California, in August 2011. The authors found that the fish contained modestly elevated levels of radioactive cesium-134 and cesium-137; by contrast, pre-Fukushima bluefin tuna, which migrated from Japan to California before the Fukushima disaster, and post-Fukushima yellowfin tuna, which primarily inhabit the Eastern Pacific Ocean, had no measurable cesium-134 and only background levels of cesium-137.

Because cesium-134 was undetectable in Pacific Ocean seawater and marine life before the Fukushima Daiichi disaster, the findings suggested to the authors that the radioactivity in the post-Fukushima bluefin tuna derived from the Fukushima discharge. The authors emphasize that the elevated radioactivity in the 2011 bluefin tuna should not endanger public health as the reported radiocesium levels are more than an order of magnitude lower than the Japanese safety limit, and provide lower doses of radiation than other isotopes naturally present in the fish, such as potassium-40, which showed comparable levels in all tested fish. The findings reveal a potentially useful tool to trace the migration patterns of marine species, according to the authors.

For more information, visit intl.pnas.org.

Intelligent robotic fish detect pollution

SHOAL, the pan-European ICT project, part funded by the EU, has successfully developed and delivered intelligent robotic fish capable of working together to detect and identify pollution in ports and other aquatic areas.

Luke Speller, Project Leader of SHOAL and Senior Research Scientist at BMT Group commented: "SHOAL has introduced the capability of cutting the detection and analysis of pollutants in sea water time from weeks to just a few seconds. Chemical sensors fitted to the fish permit real-time in-situ analysis, rather than the current method of sample collection and dispatch to a shore based laboratory. Furthermore, the Artificial Intelligence which has been introduced means that the fish can identify the source of pollution enabling prompt and more effective remedial action."

The last 3 years has seen no less than 5 key areas of major development. These include Artificial Intelligence, Robotic Design, Chemical Analysis, Underwater Communication and Hydrodynamics.

Artificial Intelligence has been developed and introduced to enable the fish to manage multiple problems including avoiding obstacles, knowing where to monitor pollution, finding the source of a pollution, maintaining communication distance from the other fish and returning to be recharged. Each individual robotic fish has an array of sensors and external information that will allow it to navigate the environment.

For more information, visit www.roboshoal.com.

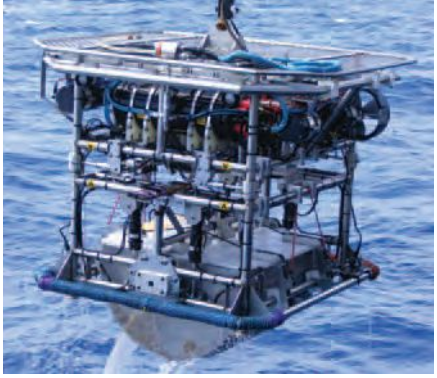
HyBIS system used for gas hydrate sampling in the Arctic

German marine research centre, GEOMAR, has placed an order for HyBIS, an underwater inspection and sampling vehicle, from UK subsea tooling and manipulator manufacturers, Hydro-Lek Ltd.

HyBIS, a mnemonic for Hydraulic Benthic Interactive Sampler, enables seabed sampling in depths of up to 6,000m, together with video instrumentation observation. Highly robust, flexible, and inexpensive, HyBIS is designed to operate in conjunction with existing deck handling and cable systems used on extended towed sonar arrays, thereby eliminating the need for additional and costly ROV deck handling equipment. It also enables sonar surveys to be followed up with localized observation and sampling during the same voyage.

The GEOMAR system will be used later this year off the Svalbard archipelago in the European Arctic to sample gas hydrates and map ecosystems related to this environment.

HyBIS allows alternative subsea equipment such as manipulators, core samplers, seismic instruments, and data



logging devices to be fitted efficiently and economically.

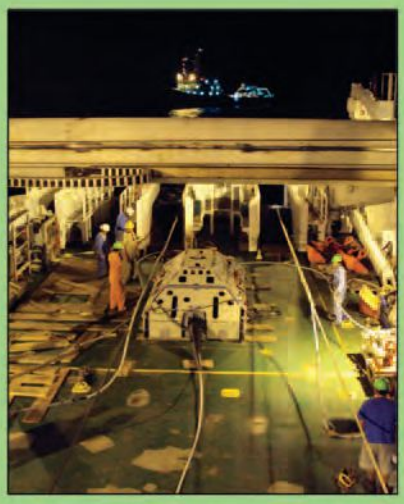
For more information, visit www.hydro-lek.com.

CSA completes 5-year beach nourishment monitoring program

CSA International, Inc. (CSA) recently completed a 5-year monitoring program of nearshore hard bottom habitats in relation to the Sectors 1 and 2 Beach Nourishment Project (2007), offshore Indian River County, Florida. This program was a storm recovery project to replace sand losses following Hurricanes Frances and Jeanne in 2004. CSA was contracted by Indian River County through Applied Technology and Management to conduct a pre-construction baseline survey in 2007, followed by an immediate post-construction survey in 2008, and three subsequent annual post construction monitoring surveys in 2009, 2010, and 2011. Maintenance dredging of the Sebastian Inlet in the spring of 2012 resulted in placement of additional beach fill within the Sectors 1 and 2 fill template.

Erosion of Florida's sandy beaches occurs due to the creation and deepening of navigational inlets; construction of jetties, seawalls, and other coastal structures; and natural causes such as severe storms and hurricanes. Beach restoration programs have been at the forefront of Florida's beach management programs in order to restore sandy beach resources and protect upland properties. Environmental services associated with beach restoration projects throughout Florida have been an integral component of the Coastal and Ocean Sciences Business Line for over 30 years, and current projects are underway in Broward, Indian River, Martin, Sarasota, and St. Lucie Counties. These projects, which typically include several years of environmental monitoring, are often conducted under subcontract to engineering firms.

For more information, visit www.csaintl.com.



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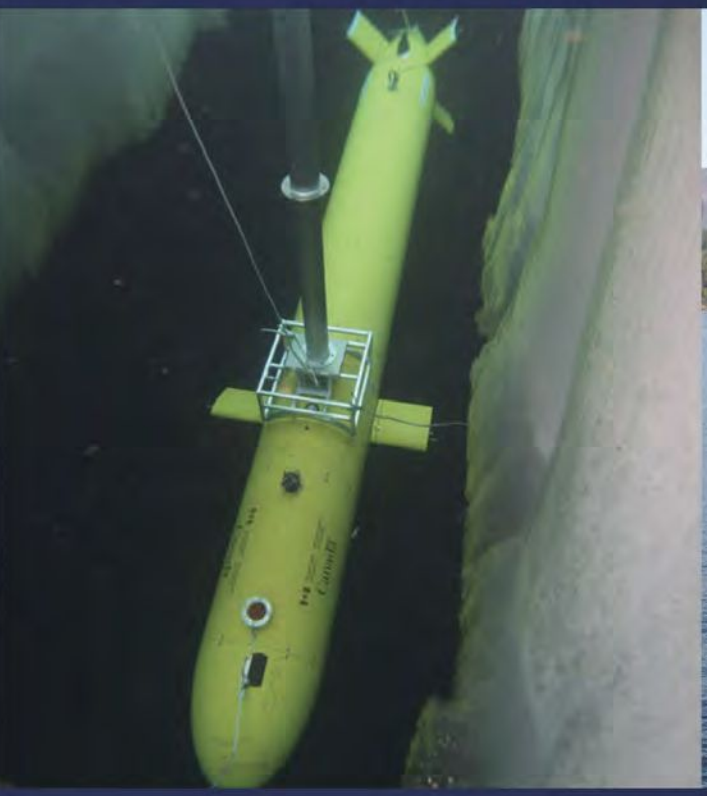

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Gamesa scraps wind project off Virginia coast

Gamesa announced a freeze on the offshore prototype project in Cape Charles, Virginia. The milestone to design a competitive offshore turbine in the R&D centre in Virginia has been fulfilled, but the prospects for the U.S. offshore market and its regulatory conditions in this segment so far do not justify the next step, the installation of a prototype. "The offshore wind power market is developing at a firm pace. However, demand is being tempered by economic and financial factors and the difficulties being encountered by developers in accessing credit. The authorities are firmly committed to the development of offshore wind power in major markets such as the UK, Germany, France, and China. Based upon the current situation, the U.S. market appears to be set to develop later than others," said Jorge Calvet, Chairman and CEO of Gamesa. As a result, the Offshore Wind Technology Centre, opened jointly with Newport News Shipbuilding, will wind down at the end of the year as the design of the G11X- 5.0MW offshore platform is completed.

Aquamarine Power wins major European Commission award

Wave energy moved center stage in Europe when wave energy developer Aquamarine Power won a major European Commission environment award. European Commissioner for the Environment, Janez Potočnik, gave the Edinburgh company first prize in the "product" category for its innovative Oyster wave energy technology. The company is currently commissioning its Oyster 800 device at the European Marine Energy Centre in Orkney. The company received the prize at a ceremony held at the Royal Museum of Art and History in Brussels. The awards were one of the highlights of Green Week, the European Commission's annual conference on environment policy.

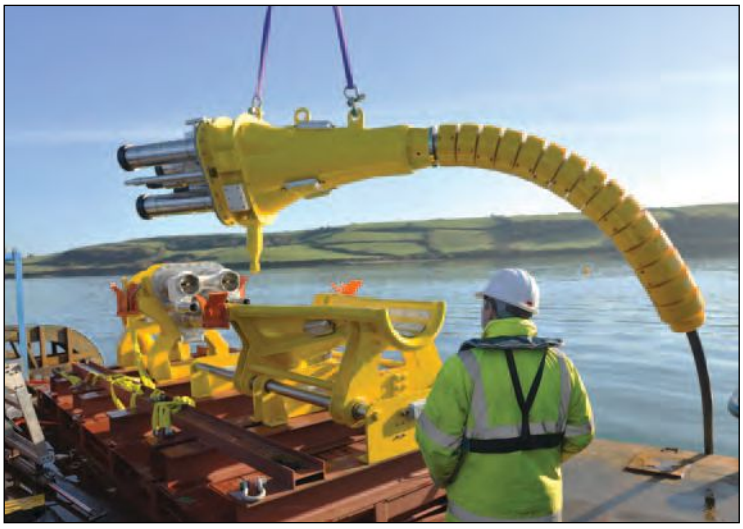
First export of power to the UK national grid

In the latest of a series of onsite tests at EMEC Stromness-based Scotrenewables, Tidal Power Limited has successfully generated and exported power into the UK national grid for the first time. The SR250 full-scale prototype was towed to the EMEC Fall of Warness tidal test site and connected to its mooring system and electrical cable at slack tide ready for generation. The turbine began to generate and export power with the turn of the tide – in doing so, the SR250 prototype has become the world's first floating tidal turbine to achieve export of power to the national grid.

Kongsberg Maritime participates in wind turbine project

Kongsberg Maritime is the owner of the Windsense Project, which aims to develop a new and flexible instrumentation system for wind turbines. The system will help to make wind power more economically competitive. The project, which amounts to 22 million NOK, has been initiated through collaboration within the instrumentation cluster Norwegian Centers of Expertise Instrumentation (NCEI). Windsense will develop a system that will make wind turbines more effective by reducing unplanned shutdowns, thus achieving higher reliability of the power plant. The system also makes it possible to temporarily run the turbines at a lower capacity in anticipation of required maintenance, which further reduces expensive downtime.

Connecting renewable energy convertors with MacArtney wet mate connector



MacArtney has developed a new type of medium voltage wet mate connector designed especially for the offshore renewable energy market. The new MacArtney 11kV (7.6MW) wet mate connector makes interconnection and connecting dynamic cables from offshore renewable energy converters to hubs and export cables faster and easier.

Up to now, disconnecting or connecting cable terminations offshore has been a time-consuming and, consequently, expensive business that required bringing cables up on deck.

Funded by ETI, MacArtney has developed, produced, and tested the new connector solution. MacArtney's wet mate connector eliminates the need to surface the cable for mating and de-mating, shortens the time needed for connection, and makes it possible to operate in waters with limited time windows. This is particularly important for renewable energy devices where changing tides or wave action is often a critical factor in marine renewable deployments.

The MacArtney 11kV (7.6MW) wet mate connector system is a fully tested and EN/CEI/IEC 60502-4 compliant connector solution specifically designed to meet the needs of the marine renewables industry and requirements from grid owners and utilities. Tests were witnessed by DnV (Det Norske Veritas) and real-sea tests performed off Falmouth, UK.

For more information, visit www.macartney.com.

Boskalis acquires wind park and offshore related contracts worth EUR 110 million

Royal Boskalis Westminster N.V. (Boskalis) has acquired three energy-related contracts for projects in Northwest Europe with a combined contract value of approximately EUR 110 million.

Boskalis signed a contract with partners DONG Energy and Scottish Power Renewables for the partial construction of the West of Duddon Sands offshore wind park in the Irish Sea. The work comprises the preparation of the seabed and the transport and placing of 108 wind turbine foundations. The project will be carried out by Boskalis Offshore and SMIT Marine Projects in collaboration with partner Volker Construction International. The project includes the transport of the foundations, consisting of monopiles and transition pieces, from Aalborg in Denmark to Belfast in North.

For more information, visit www.boskalis.com.

Jumbo installs first TPs from Anholt Offshore Wind Farm

Jumbo's DP2 heavy lift vessel Jumbo Javelin has successfully installed the first transition pieces (TPs) for the Anholt Offshore Wind Farm in Denmark. The operation was performed as planned with respect to every detail: transport, installation, accessibility of the TP, grouting, and safety. Once again, Jumbo proved to have an efficient concept for the transport and installation of wind farm foundations with the use of only one free floating vessel on DP.

After loading the first nine TPs in Aalborg, Denmark, they were transported to the offshore location. There, the Jumbo Javelin positioned itself on DP next to the pre-installed monopiles and lifted the TPs from her hold onto the monopiles. After leveling the TPs to their final position, the grouting procedure was executed.

Anholt Offshore Wind Farm is being built by DONG Energy. Jumbo is working for the Danish contractor MT Højgaard, who is in charge of installation of the foundations.

For more information, visit www.jumbo-offshore.nl.

DONG Energy to test new next-generation turbines in the UK

DONG Energy has received full consent to test two next-generation offshore wind turbines at their Gunfleet Sands site in Southeast England. It is the first time that the Siemens 6MW turbine will be tested offshore and DONG Energy's first demonstration project in the UK.

The two Siemens 6MW machines will be installed at DONG Energy's Gunfleet Sands 3 demonstration project. The project forms an important part of DONG Energy's drive to further industrialize the offshore wind industry and bring down the cost of energy.

The new turbines will be installed by November 2012 with construction starting in May 2013, and will be connected through a dedicated export cable. DONG Energy will be looking to verify turbine performance, reliability, and functionality. The Gunfleet Sands 3 demonstration project is located 8.5km southeast of Clacton on Sea.

A prototype of the 6MW turbine is also being tested at an onshore test centre at Hovsore, Denmark.

For more information, visit www.dongenergy.com.

Interior advances offshore Atlantic transmission line

Advancing President Obama's "all of-the-above" strategy to develop domestic energy resources, Deputy Secretary of Interior David J. Hayes and Director of the Bureau of Ocean Energy Management (BOEM) Tommy P. Beaudreau announced a finding of no competitive interest for the proposed Mid-Atlantic offshore wind energy transmission line. The decision clears the way for the project to move forward with the environmental review necessary to grant the company, Atlantic Grid Holdings, LLC, a right-of-way for the proposal to build a "backbone" transmission line that would enable up to 7,000MW of wind turbine capacity to be delivered to the grid.

The proposed project is a high-voltage, direct-current subsea transmission

system that would collect power generated by wind turbine facilities off the Atlantic coasts of New York, New Jersey, Delaware, Maryland, and Virginia. The first such offshore infrastructure proposed in the U.S., the system's parallel, redundant circuits would total about 790mi in length. Major investors in the Atlantic Wind Connection proposal include Google, Inc.; Good Energies II, LP; Marubeni Corporation; and Elia.

Before proceeding with the review of this project, BOEM had to determine whether there were other developers interested in constructing transmission facilities in the same area. Last December, BOEM put out a request for competitive interest in order to gather that information.

BOEM also solicited public comment on site conditions and multiple uses within the right-of-way grant area that would be relevant to the proposed project or its impacts, yielding nearly 60 public comments that will help inform future decisions. Following the 60-day open comment period, BOEM has determined that there is no overlapping competitive interest in the proposed right-of-way grant area off the Mid-Atlantic coast, clearing the way for consideration of the Atlantic Wind Connection.

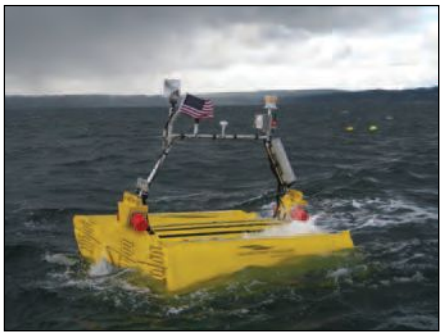
The proposed transmission line would be constructed in phases to connect offshore wind power to the grid based on the company's estimates of when offshore wind generation facilities will be in place. A right-of-way grant occupies a corridor 200ft wide, centered on the cable with additional widths at the hubs. The right-of-way grant corridor is anticipated to extend about 790mi (statute). Full construction of all phases of the multi-stage project would take about 10 years.

For more information, visit www.boem.gov.

InterMoor wins mooring contract for wave energy system

Columbia Power has awarded InterMoor, an Acteon company, the contract to design a cost-effective and survivable mooring system for its StingRay offshore wave energy converter (WEC) prototype.

The project, which has already started with some advanced modeling and design work, will last for 2 years, with high potential for further work. InterMoor will provide analysis along



with the design for the WEC's mooring system, field engineering, and operational logistics for deployment and recovery procedures in addition to overseeing offshore marine operations. InterMoor, which is recognized globally in the oil and gas industry as a deepwater mooring technology pioneer, will draw on its vast offshore experience to deliver the necessary expertise in engineering, project management, and advanced numerical analysis for its first wave energy project.

The design will be targeted for offshore locations in the U.S., Western Europe, and other high-energy sites around the world.

Designed to produce energy on a utility scale, the Sting Ray has been hydrodynamically optimized to produce energy with just a few moving parts. The device comprises a three-piece, fiber-reinforced-plastic hull and two high-torque, low-speed, large-diameter direct-drive rotary generators. It targets simple operation and inherent survivability to reduce operating and maintenance costs and to produce electricity at prices competitive with other legacy and renewable energy sources with minimal environmental impact.

For more information, visit www.intermoor.com.

Tidal turbine powers up in Orkney

An underwater turbine that is set to be used in Scotland's first and only consented tidal power project has successfully completed an initial testing period in Orkney and is providing electricity for homes and businesses on the island of Eday, one of Orkney's northern isles.

The 1MW power generator was installed last December, in some of the worst weather conditions Scotland has experienced in more than a decade, and has since been undergoing a range of tests in the fast-flowing tidal waters around Orkney. The initial testing period has been very positive, with the device achieving full export power.

The test device in Orkney aims to fully prove that the technology can operate efficiently in Scotland's fast-flowing tides, that monitoring and maintenance operations can be honed, and to help drive down costs in operations and installation. ScottishPower Renewables (SPR) plan to use this technology as part of the world's first tidal turbine array in the Sound of Islay. The company plans to develop a 10MW tidal array in Islay received planning consent from the Scottish Government in March 2011.

The HS1000 tidal turbine has been developed by ANDRITZ HYDRO Hammerfest, whose majority shareholder is Andritz Hydro and also includes partners Iberdrola and Hammerfest Energi. The 1MW machine can power the annual electricity needs of 500 homes.

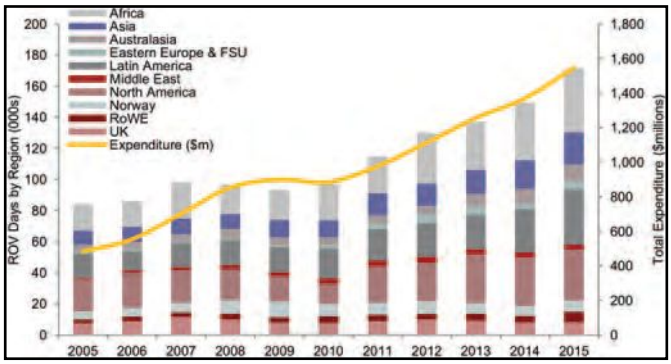
For more information, visit www.scottishpowerrenewables.com.

Strong Growth Forecast for Workclass ROV Support

By Matt Loffman, Douglas-Westwood

Douglas-Westwood's latest edition of the World ROV Market Forecast 2011-2015 shows that all of the fundamental market drivers for the ROV business are in a period of growth, which is likely to continue for the foreseeable future. Total annual expenditure on workclass ROV support of underwater operations is expected to grow from $891 million in 2010 to $1,692 million in 2015 - a CAGR of nearly 12%. Strong growth is forecast in almost all regions, with Africa set to be the largest market, followed by Latin America and North America.

In the primary offshore oil and gas activity sector, a long period of high oil prices and surging deepwater activity has driven orders for offshore drilling rigs to numbers not seen for decades. These rigs, together with large numbers of subsea construction vessels, are driving a new surge in ROV orders.



Market for workclass ROV operations

Competitive landscape

Today, the world fleet of workclass ROVs consists of 641 units operated by 21 companies. The ROV industry has historically been subject to much merger and acquisition activity. Most recently, in early 2011, there was a major market consolidation when Subsea 7 and Acergy completed a $5.4 billion merger, with the new company being called Subsea 7 SA. The resulting organization has the world's second largest work-class ROV fleet.

However, the largest player is Oceaneering, whose vehicles are primarily used in the drill support market. Since 2007, the company has ordered 124 new ROVs as it continues to invest heavily in upgrading and expanding its fleet to meet the growing demands of working in ever deeper and more challenging offshore environments.

Oceaneering currently owns 241 workclass ROVs, 32% of the global total; while the other nine other largest players own 410 workclass ROVs (55%), with the remaining 96 (or 13%) being owned by a large number of smaller players (many of whom mainly focus on inspection activities using small so-called "eyeball" ROVs).

Expansion among the smaller players has been significant over the last few years as they took advantage of the then-booming ROV operations market, the increased requirement for workclass units in deep waters, and in rapidly developing territories (including Asia Pacific).

It is possible that given the apparent appetite for continued consolidation within the industry, that smaller players will step-up their fleet development and further expansion of the competitive landscape will occur. Furthermore, rapidly expanding subsea service providers such as DOF Subsea, who has invested heavily in newbuild offshore support vessels in recent years, are growing their workclass ROV fleet organically to meet growing operational demands.

ROV market growth

Growing global energy demand is the main underlying driver for the commercial ROV market. The offshore oil and gas production required to meet this drives an increase in drilling activity as new reserves are developed and operators seek to maximize outputs from existing basins and maintain existing assets:

- Offshore exploration, appraisal, and development drives expenditure in ROV support of drilling operations.
- Installation of subsea equipment determines ROV construction support expenditure.
- The large and growing offshore infrastructure of platform installations, subsea wells, flowlines, cables, etc. drives expenditure in the use of ROVs in the subsea inspection, repair and maintenance market.

Of particular significance will be the ROV requirements of the large number of deepwater drilling rigs and installation vessels on order for work offshore Brazil and in the other deepwater geographic sectors. Overall, the market will continue to be dominated by the requirements of the drilling sector followed by construction support. Total annual market expenditure for work class ROV operations is expected to grow from $885 million in 2010 to $1,546 million in 2015,

Africa is set to remain the largest regional market with annual expenditure growing from $201 million in 2010 to $362 million in 2015. Increased exploration and subsea field development activity in deepwater are expected to have a significant impact on the use of ROVs in the region.

North America and Latin America will continue to be significant markets, growing to $264 million and $190 million in 2015, respectively. However, Asia is expected to overtake Latin America as the third largest market due, in large part, to substantial growth in shallow-water activity offshore China.

Expenditure in the mainly shallow-water Middle East will decline. The Norwegian market is also expected to see a decline post-2011 as North Sea fields continue to mature.

In total, the number of ROV units used in the offshore oil and gas industry are expected to grow from 450 in 2011 to 671 in 2015, with Africa and Latin America set to increase their fleets dramatically.

Conclusions

Globally, strong growth in demand for workclass ROV support is anticipated over the forecast period of 2011-2015.

As with any other industry, the greatest threat to business comes from external factors. The financial crash of 2008 caused a fall in oil prices and a reduction in some activities such as exploration drilling. However, as oil prices rapidly recovered, so did offshore drilling and the ROV sector.

Despite continuing turmoil in financial markets, it seems that the offshore oil and gas industry is facing a future of significant growth. In addition, new, albeit much smaller, markets are developing in sectors such as offshore windpower. The next 5 years look good for ROV operators, and beyond that is the promise offered by development of the ultra deepwater "pre-salt" oil reserves of Brazil and perhaps West Africa.

For more information, visit www.douglas-westwood.com.

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USS Essex, USNS Yukon collide at sea
The USS Essex (LHD 2) collided with USNS Yukon (T-AO 202) on 16 May during an approach for a routine underway replenishment approximately 120mi off the coast of Southern California due to an apparent steering malfunction aboard Essex. While both ships reported some damage, no one was injured, there was no fuel spilled, and the ships' fuel tanks and systems were not compromised. The Navy will conduct a thorough investigation into the cause of the collision, and a full assessment of any damage is ongoing. Essex is scheduled to return to San Diego after completing 12 years as the Navy's only permanently forward-deployed amphibious assault ship in Sasebo, Japan. The crew of USS Bonhomme Richard (LHD 6) took over Essex last April during a planned hull swap. USNS Yukon is a Military Sealift Command fleet replenishment oiler operating out of San Diego.

Navy completes underwater manned diving system test
The Naval Sea Systems Command completed the at-sea certification of its Saturation Fly Away Diving System (SATFADS), pressurizing the hull to a depth of 1,000ft off the coast of Panama City, Florida. NAVSEA's Supervisor of Salvage and Diving (SUPSALV) successfully completed the unmanned diving phase, and divers began their pressurization for manned diving – reaching a milestone in bringing a new salvage and recovery capability to the Navy. The entire system measures 40ft by 80ft and includes a decompression chamber, manned dive bell, handling system, command and control center, two auxiliary support equipment containers, and bulk helium and oxygen storage racks. Living quarters are located in the decompression chamber. The system is air transportable, allowing it to be rapidly transported anywhere in the world and loaded onto a vessel of opportunity to conduct diving operations.

SAIC awarded contract by U.S. Space and Naval Warfare Systems Command
Science Applications International Corporation (SAIC) announced it was awarded a prime contract by the U.S. Space and Naval Warfare Systems Command (SPAWAR) to produce the Battle Force Tactical Network (BFTN) system. The contract has a 1-year base period of performance, four 1-year options, and a contract value of approximately $57 million, if all options are exercised. Work will be performed in Sterling, Virginia. As the Navy's Information Dominance Systems Command, SPAWAR designs, develops, and deploys advanced communications and information capabilities. The BFTN system provides secure connectivity to the maritime operational environment for Navy and joint forces. Under the contract, SAIC will provide engineering and technical services in support of BFTN systems, as well as production of BFTN rack systems.

U.S. Navy awards submarine escape suits contract to Survitec
Survitec Group is delighted to announce it has agreed to an initial equipment order worth over $25 million to supply Submarine Escape Immersion Equipment (SEIE) to the U.S. Navy. This firmly places Survitec's RFD Beaufort Mk11 suit as the only technically acceptable product to meet the strict U.S. Navy requirements for product quality and submariner safety. The initial order for several thousand RFD Beaufort SEIE Mk11 suits has the opportunity to extend to a total contract value of over $60 million over the next 5 years. This success follows the recent contract award from the Royal Canadian Navy, also for the SEIE Mk11 suit, and reinforces Survitec's commitment to safety, integrity, and product quality.

Navy commissions amphibious transport dock ship San Diego

The Navy commissioned the newest San Antonio-class amphibious transport dock ship San Diego during a ceremony on 19 May 2012 in San Diego, Calif.

Three previous ships have carried the name San Diego – the armored cruiser named in 1914, the World War II-era cruiser commissioned in 1942, and the combat stores ship commissioned in 1969.

Adm. Mark Ferguson, vice chief of naval operations, delivered the ceremony's principal address. Additional remarks were given by Jerry Sanders, mayor, City of San Diego; Sean J. Stackley, assistant secretary of the Navy (research, development, and acquisition); Vice Adm. Richard W. Hunt, commander Naval Surface Forces; Maj. Gen. Ronald Bailey, commanding general, 1st Marine Division; and Rear Adm. David H. Lewis, program executive officer - ships.

Linda Winter, wife of Former Secretary of the Navy Donald C. Winter, is serving as the ship's sponsor. In a time-honored Navy tradition, she gave the order to "man our ship and bring her to life!"

Designated as LPD 22, the USS San Diego is the sixth amphibious transport dock ship in the San Antonio class. The principal mission of LPD 17 San Antonio-class ships is to deploy combat and support elements of marine expeditionary units and brigades. With the capability of transporting and debarking air cushion or conventional landing craft and augmented by helicopters or MV-22 vertical take-off and landing aircraft, these ships support amphibious assault, special operations, and expeditionary warfare missions. The USS San Diego will provide improved warfighting capabilities, including an advanced command-and-control suite, increased lift capability in vehicle and cargo-carrying capacity, and advanced ship survivability features.

Cmdr. Kevin P. Meyers, a native of Baltimore, is the commanding officer of the ship, leading a crew of approximately 377 officers and enlisted personnel. Upon commissioning, the USS San Diego will be homeported in San Diego, California, as a part of the U.S. Third Fleet.

Built by Huntington Ingalls Industries in Pascagoula, Mississippi, the USS San Diego is 684ft in length, has an overall beam of 105ft, a navigational draft of 23ft, displaces about 24,900tons, and is capable of embarking a landing force of about 800 Marines. Four turbo-charged diesel engines power the ship to sustained speeds in excess of 22kts.

U.S. Navy and General Dynamics unveil model of Knifefish UUV

Representatives from the U.S. Navy's Program Executive Office, Littoral Combat Ships Unmanned Maritime Systems Program Office and General Dynamics unveiled a quarter-scale model of the Surface Mine Countermeasure Unmanned Undersea Vehicle (SMCM UUV), known as "Knifefish," at the Navy League's Sea-Air-Space Exposition held at the Gaylord National Resort. Knifefish is a heavyweight-class, minehunting, unmanned undersea vehicle designed for deployment by forward operating forces and will be a part of the Littoral Combat Ship Mine Countermeasures Mission Package.

The SMCM UUV system will allow Navy commanders and sailors to detect and identify mines in high-clutter underwater environments without putting sailors in harm's way, including mines that are suspended in the ocean, resting on the seafloor, or buried. Additionally, it will gather environmental data that can provide intelligence support for other mine warfare systems.

"Knifefish represents a major step forward for unmanned undersea technology and will provide sailors with a reliable, safe, cost-efficient capability that is not currently a part of the Navy's portfolio" said Nadia Short, vice president for Strategy and Business Development at General Dynamics Advanced Information Systems. "Our team took advantage of extensive open architecture expertise to develop a design that ensures Knifefish will continue to evolve with the Navy, as mission needs change and advance."

Knifefish recently completed a successful system requirements review on schedule and will progress through the preliminary design review in May. Knifefish is expected to attain initial operational capability in 2017.

The development and manufacturing work on this program is performed in Greensboro, North Carolina, Fairfax, Virginia, Quincy, Massachusetts., Braintree, Massachusetts., and Panama City, Florida.

For more information, visit www.gd-ais.com.

Austal JHSV USNS Spearhead completes builder's sea trials

USNS Spearhead (JHSV 1), the innovative high-speed catamaran transport ship under construction by shipbuilder Austal in Mobile, Alabama, successfully completed Builder's Sea Trials (BST) on 19 April in the Gulf of Mexico. The trials encompassed over 50 demonstration events that enabled the shipbuilder to rigorously test the ship and all of its systems in preparation for final inspection by the U.S. Navy before delivery.

Notable achievements during the trials included a demonstration of major systems along with first-of-class standardization and maneuverability trials, reaching a top speed in excess of 35kts.

A series of high-speed ahead and astern maneuvers in the Gulf of Mexico demonstrated the effectiveness of the ship's four steerable waterjets. In the course of repeated high-speed turns, the ship demonstrated the stability and agility of the catamaran hullform, with the JHSV exhibiting virtually no heeling motions throughout the radical turns.

Austal is currently under contract with the U.S. Navy to build nine 103m JHSVs under a 10-ship, US$1.6 billion contract and five 127m Independence-variant Littoral Combat Ship (LCS) class vessels, four of which are a part of a 10-ship, US$3.5 billion contract.

For more information, visit www.austal.com.

SeeByte announces sale to the Royal Netherlands Navy

SeeByte, the global leader in creating smart software technology for unmanned systems, has announced that it will provide the Royal Netherlands Navy with 20 new licences of SeeTrack Military.

This significant purchase has come after the Royal Netherlands Navy's successful use of SeeTrack Military over the past 6 years. The licences will be deployed to the Diving and Explosive Ordnance Disposal Group in Den Helder, the BE/NL Minewarfare school Eguermin in Ostend, Belgium and to researchers at the Netherland's TNO.

SeeByte's SeeTrack Military software is an open-architecture platform solution for rapid on-site analysis and data fusion that can be easily adapted for specific user needs. Developed as a mission-planning, monitoring, and post-processing tool, this software technology has been successfully deployed on numerous surveys, military and security operations, and scientific experiments. It is also easily integrated to allow data export into other tactical software, like MEDAL or MINTACS, as was proven with the COIN solution used by the U.S. Navy's Explosive Ordnance Disposal teams.

For more information, visit www.seebyte.com.

Future USS Mississippi successfully passes sea trials

Pre-Commissioning Unit Mississippi (SSN 782), the nation's newest and most advanced nuclear-powered attack submarine, arrived at General Dynamics Electric Boat following its successful completion of Alpha and Bravo sea trials.

Testing evolutions completed during Alpha sea trials included diving to test depth, conducting an emergency surfacing, and testing the submarine's propulsion plant. These tests were designed to evaluate the ship's seaworthiness and operational performance.

Bravo trials consisted of testing Virginia's acoustic performance and combat systems.

The ninth ship of the Virginia-class, Mississippi is on track to deliver up to 1 year early of its contract delivery date. All Virginia-class submarines currently under construction are scheduled to deliver earlier than their original contract delivery dates.

Shark Marine awarded contract by the Royal Australian Navy

Shark Marine Technologies Inc. of Canada has been awarded the Underwater Navigation Integrated Sonar Units (UNIS) contract for the Royal Australian Navy (RAN). The UNIS contract is for the supply of 34 diver sonar reconnaissance systems. UNIS will be based on the Shark Marine Navigator and provide the Royal Australian Navy divers with the latest technology to conduct underwater navigation, object identification, and beach reconnaissance duties.

The UNIS contract is for 34 systems with spares and dedicated training packages. Delivery of the systems will begin in June 2012.

For more information, visit www.sharkmarine.com.

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Ocean Renewable Energy Group

By Chris Campbell

It was just 30 years ago that Canada's Atlantic coast was planning for offshore oil and gas development. The first decade was one of storefronts for, or joint-ventures with, North Sea and Gulf Coast petroleum experience. In the following years, branch operations of international companies and clusters of service and supply companies grew in Halifax and St John's. Smaller oil field and early gas production peaked, and, while other fields have been developed during the past several years, the lesson took hold that the offshore must reinvent itself through new discoveries if its business and economy is to thrive in the future.

A history and future in tidal energy

Just under 40 years ago, Nova Scotia Power installed hydro generators in a causeway being built across the Annapolis Basin and began generating electricity delivered by the tides twice daily. With minor interruptions and repairs, this 20MW tidal energy plant was a world pioneer and, even now, is one of only three such developments worldwide.

With experience in marine service, fabrication, and operations to the offshore industry and the early renewable tidal energy experience, it is entirely logical to contemplate that the renewable energy world could be the longer-term sustainable opportunity for that offshore oil and gas experience. When you recognize that each tide in the Bay of Fundy delivers 100 billion tonnes of seawater in and out of the Bay – more than the combined flow of the world's freshwater rivers – it is not hard to see why the region's political, industry, and utility leaders are seeing this as a bright opportunity that can last for generations.

Early estimates suggested that the Bay of Fundy's tidal resource could offer several hundred megawatts, perhaps 5% to 15% of Nova Scotia's current generation capacity. As researchers in the region have further engaged in studying the resource and the potential effects of energy extraction, it is now thought that the first commercial-scale development will be 300MW, with discussions of potentially realizing 2,000MW.

In December 2011, and again in February 2012, tidal projects got the go ahead under the most favorable tidal energy market in the world, Nova Scotia's tidal COMFIT (Community Feed-in Tariff) set at $652/MWh. These small, community-controlled projects are part of a strategy that began with a Strategic Environmental Assessment in 2007 and have gained further support with a Renewable Electricity Plan established in 2010 that called for the COMFIT and a market for the first pilot power arrays. Support for tidal energy will continue to grow with an industrial development strategy, Marine Renewable Energy legislation, and rules for the power array market expected to be rolled out in 2012.

In 2010, Nova Scotia Power experimented with an OpenHydro generator in Minas Passage as one of the trials underway at the Fundy Ocean Research Center for Energy (FORCE). FORCE was created to develop experience with three or four world-leading modern modular tidal technologies. It has received all regulatory approvals for these devices and is installing offshore cabling for this phase and the next, allowing for the first power arrays to deliver 64MW to the Nova Scotia grid. FORCE is incubating the industry by planning ahead and undertaking the strategic research needed by technology and project developers, regulators, and an interested community.

Installation of clean current tidal turbine generator

Minas Basin Pulp and Power is an independent power producer working at FORCE with the intent to deploy the next generation of Marine Current Turbines (now majority owned by Siemens). Alstom will deploy the first commercial-scale development of Vancouver's Clean Current Power Systems in-stream tidal generator. Atlantis Resources Corporation, with Morgan Stanley and Lockheed Martin, will be a third player.

Nova Scotia Power's parent company, Emera, is taking the lessons learned at FORCE, and the concept of working with multiple technologies, in order to rapidly refine a commercial approach. Nova Scotia Power has withdrawn from their berth at FORCE which presents a new opportunity to attract another project developer with their choice of technology to FORCE. Emera is now working on plans that address the industrial R&D and testing required to move toward an initial 300MW development.

A path forward – Canada's marine renewables roadmap

In 2010, the Canadian marine renewable energy sector came together and, by early November 2011, a Marine Renewable Energy Canada Roadmap (a U.S. roadmap was released on the same day) was collaboratively developed and presented to Federal Minister of Natural Resources, Joe Oliver. The Canadian Roadmap clearly focuses on building a marine renewable energy industry. It reviews the tactics that have been evident in the Nova Scotia story and demonstrates the strategy that has been followed. It sets ambitious targets

for installed capacity. Most significantly, it acknowledges that the strategy of aiming where world-leading UK was headed has paid off in capturing much of that lead and making a target of Canadian engagement in 50% of the world's marine renewable energy projects by 2030 a real possibility.

The Roadmap sets priorities on accelerating the reduction of risk and cost. It puts a premium on sharing infrastructure (e.g., FORCE's cables, permitting, or strategic research), collaboration ,or multiple technical approaches working in common environments and technology transfer of the fit-for-purpose experience and technology from related industries. The Roadmap also calls for incubation of an industry that will deliver viable solutions.

Leadership in river-current technologies

In the field of freshwater hydrokinetics, the Roadmap identifies a sector for real leadership by Canada. New Energy Corporation has sold generators to Alaska and India after Canadian deployments. RER has an operating unit in the middle of Montreal Harbour. Clean Current is planning field tests of their unidirectional generator system this summer. Several very low head hydro projects are in development by Coastal Hydropower, and Quebec may establish a potential hydrokinetic development target of 200MW. As part of the evidence that this is not simply a coastal preoccupation, Manitoba Hydro is part of a consortium with researchers and industry creating a hydrokinetics development site to build on test-site experience from the last few years.

Wave energy potential

The Pacific coast wave resource in Canada is massive – the west coast island beaches of Haida Gwai and Vancouver Island each have an average energy equivalent to BC Hydro's 10,000MW installed generation capacity (the passes between many islands also offer a tidal resource of 4,000MW). The innovative wave technology developments by SyncWave and Wave Energy Technologies have been paused pending new investment (for marine renewables, we have coined the term "chasm of death" for the usual, but larger challenges in financing ocean energy technology development!). At any given time, there are usually a couple of the international players in wave energy generator development who are looking at these west coast prospects.

Capitalizing on our strengths

Characterizing marine renewable energy resource opportunities is one area in which Canadian efforts may help drive the entire industry forward. Whether it is creating the integration of device-level computational fluid dynamics with wave or tidal models, understanding or measuring turbulence, or developing regional tidal resource models or wave models that drive down to site-level assessment, industrial academic collaborations are working toward new approaches.

One of the other areas of expertise to be applied to the high energy marine environments of wave and tidal is the sensor and ocean observing system strengths found in the ocean technology cluster with geographic nodes on east and west coasts. While experience with ocean science, offshore oil and gas, and the observatories like VENUS and NEPTUNE is clearly world class, working in turbulent currents and the active wave zone offers new challenges that will open new market opportunities.

Canada's international engagement

Canada, the founding chair of the IEC TC114 marine energy standards initiative, recently passed on leadership, but remains active in eight work areas and leads one of these areas. Having chaired the International Energy Agency's Ocean Energy Systems (IEA-OES) group, Canada remains active, and Canadian experts have made significant contributions to IEA-OES' review and work programs. In addition to these policy initiatives, Canadian companies have been involved in resource and project assessments as far away as Chile and Korea. Power system integration work by Powertech labs is defining standards, and Axys Technologies resource monitoring equipment has become a standard in the wave energy sector.

Axys buoy

Canada's national association, the Ocean Renewable Energy Group (OREG), made its first international foray at EnergyOcean 2005 in San Diego. OREG has its own national events, attracting key players from across the country and around the globe – in September 2012 the annual conference will be in Halifax, Nova Scotia. In October, the association is hosting a Marine Renewables Canada pavilion at the world industry-building International Conference on Ocean Energy in Dublin. OREG has been involved in organizing this biennial event previously held in Bremerhavn, Brest, Bilboa, and, hopefully, in Halifax for the first time outside Europe in 2014.

So, here we are 30 years after a recognition that fishery was only one of Canada's marine economic opportunities. In the decade approaching 2020, we are going to see that the new offshore oil and gas industry has prepared us for the future marine renewable energy industry, one which should endure for millennia! It is also one where we can provide solutions and expertise worldwide.

For more information, visit www.oreg.ca.

Innovative range of remotely operated intervention equipment

SMD is one of the world's leading manufacturers of remote intervention equipment operating in hazardous environments worldwide. It has a strong heritage in subsea engineering, dating back to the 1970s when it pioneered the design and manufacture of seabed ploughs. Following the acquisition of Hydrovision in 2003, SMD has grown to be the world's Number One independent designer and manufacturer of workclass and specialist subsea remotely operated vehicles (ROVs). SMD underwent a management buy-out in 2008 funded by the private equity group Inflexion. It is headquartered near Newcastle in the UK, with additional facilities in Malton (UK), Houston (U.S.), Singapore, and Macaé (Brazil).

SMD is organized into five key business streams: ROVs, trenching, mining, renewables, and nuclear. These business streams are each led by a dedicated Business Stream Manager reporting into one of the two joint managing directors.

SMD's products and services

SMD supplies an innovative range of remotely operated remote intervention equipment, associated deck and handling equipment, control systems, and the Curvetech™ suite of ROV components. End solutions vary from one-off bespoke engineering systems to a standard range of workclass ROVs. SMD customers operate its equipment in hazardous environments from the deep sea to radioactive buildings, and value the fact that it is robust, reliable, and easily maintained.

The equipment is of diverse size and complexity, ranging from 250tonne tracked mining machines to 2tonne free-flying ROVs. In 2010, SMD delivered the world's largest free stream tidal turbine to Atlantis Resources Corporation. Currently, it is designing and manufacturing the world's first deep seabed mining vehicles for Nautilus Minerals, Inc.

New technology

SMD has recently entered into partnership with SeeByte, which will provide exceptional benefits for all SMD workclass ROV customers, delivering enhanced vehicle control for ROV-conducted subsea tasks. SeeByte is a software company that has created advanced awareness control systems for the latest generation of unmanned systems, including autonomous underwater vehicles (AUVs) and ROVs since 2001. These technologies have been successfully integrated into solutions for the military and security and offshore and subsea sectors.

The partnership aims to push the boundaries for sophisticated autonomous and pilot-assisted systems. These solutions have been shown to make workclass operations for drill, survey, and construction support more efficient. SeeByte and SMD are now bringing this technology to the market by integrating SeeByte technology with SMD's new DVECSII control platform. This relationship builds upon the successful delivery of the world's first mid-water dynamic positioning application for rock-dumping on behalf of the Jan De Nul Group.

By partnering SMD's workclass ROVs with SeeTrack CoPilot, the increasingly demanding environments in which these vehicles are operated will become less challenging for the user, the ROV data products will be improved, and many complex operations will be carried out in a fraction of the time. SeeTrack CoPilot enables semi-autonomous, pre-programmed ROV missions while dealing with current surge and tether effects so that they no longer pose difficulty. Through a simple point and click interface, SeeTrack CoPilot enables dynamic positioning options for ROVs such as station keeping, cruise control, survey control, and sonar track, with easily controlled auto transit and stop-and-hover applications.

SMD's values

SMD has a passion for excellence, backed by proven engineering expertise and solid customer support. It offers a full range of assistance to its customers, including a 24-hr hotline, operational and engineering support, spares, and service and training support including a specially developed workclass-ROV simulator for pilot training. SMD works in partnership with its customers to ensure the best possible solution. It works with open communication and values honesty and respect in dealings with all of its stakeholders. SMD is committed to safety and quality.

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

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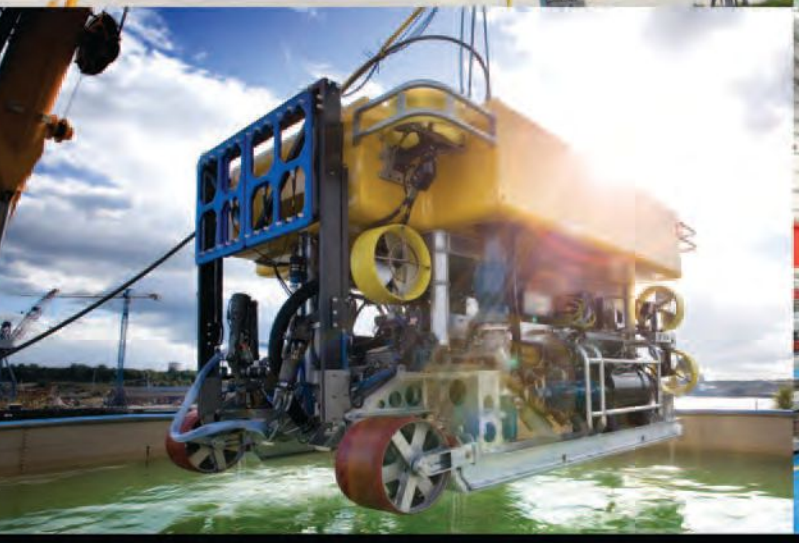

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OFFSHORE INDUSTRY

Exxon, Rosneft to pursue $500B joint venture in Arctic, Black Sea

ExxonMobil and Russia's Rosneft unveiled an offshore exploration partnership in mid-April that could invest upward of $500 billion in developing Russia's substantial energy reserves in the Arctic and Black Sea.

"Experts say that this project, in terms of its ambitions, exceeds sending man into outer space or flying to the moon," Russian Deputy Prime Minister Igor Sechin, told a briefing for analysts in New York.

Under the deal, Exxon and state-controlled Rosneft will seek to develop three fields in the Arctic with recoverable hydrocarbon reserves estimated at 85Bboe/d. A final investment decision on the projects in the Kara Sea, in the center of Russia's north coast, is expected in 2016-17, Rosneft said.

Three-dimensional seismic surveys of 20 promising structures in the Tuapse block of the Black Sea have, meanwhile, found estimated recoverable reserves of 9Bbbl.

Rosneft will have a two-thirds stake in the venture, while Exxon would own a third and shoulder the initial exploration costs. If the reserve base is confirmed, total investments could exceed $500 billion in the coming decades, Rosneft said. Rosneft will get 30% minority stakes in Exxon-led projects to develop hard-to-recover reserves in West Texas, the Canadian province of Alberta and the U.S. Gulf of Mexico.

MIT's new method of preventing hydrate buildup in subsea wells

Researchers at the Massachusetts Institute of Technology (MIT) appear to have found at least a partial solution to the chronic buildup of frozen methane hydrates inside deep ocean oil and gas wells. Sometimes these frozen hydrates can restrict or even block the flow, at enormous cost to well operators.

"The oil and gas industries currently spend at least $200 million a year just on chemicals" to prevent such buildups, said Kripa Varanasi, an associate professor of mechanical engineering at MIT. Industry sources say the total figure for prevention and lost production due to hydrates actually could be in the billions of dollars.

Present prevention efforts include expensive heating or insulation of the pipes or additives such as methanol dumped into the flow of gas or oil. "Methanol is a good inhibitor," Varanasi said, but is "very environmentally unfriendly" if it escapes.

Varanasi decided to explore the potential for creating what he calls "hydrate-phobic" surfaces to prevent hydrates from adhering tightly to pipe walls. His team's new method would use passive coatings on the insides of the pipes that are designed to prevent the hydrates from adhering. Varanasi and his colleagues were able to reduce hydrate adhesion in the pipe to one-quarter of the amount on untreated surfaces. The test system they devised also provides a simple and inexpensive way of searching for even more effective inhibitors, MIT said.

Subsea hardware expenditure expected to climb 14% to $135B

Expenditure of almost $135 billion is forecast over the next 5 years on subsea hardware, an increase of 14% over the preceding 5-year period, according to Douglas-Westwood's latest edition of World Subsea Hardware Market Forecast 2012-2016.

The "Golden Triangle" of subsea will continue to dominate upstream hardware expenditure – West Africa, Gulf of Mexico, and Brazil, with Africa remaining the largest market. Growth offshore Brazil is driven directly by Petrobras' long-term deepwater and ultra-deepwater strategy. Developments in water depths greater than 500m will account for over half of total forecast market spending, illustrating the increasing importance of harder-to-produce reserves, Douglas-Westwood said.

For additional information regarding company reports visit www.douglas-westwood.com.

World outside U.S. holds 565Bbbl of undiscovered, recoverable oil

Excluding the U.S., the world holds an estimated 565Bbbl of undiscovered, technically recoverable conventional oil; 5,606tcf of undiscovered, technically recoverable conventional natural gas; and 167Bbbl of undiscovered, technically recoverable natural gas liquids (NGL), according to a recent assessment by the U.S. Geological Survey.

The report includes mean resource estimates in 171 geologic provinces of the world, including both onshore and offshore areas. The assessment does not include reserves that have been discovered, are well-defined, or are considered economically viable.

The assessment results indicate that about 75% of the undiscovered, technically recoverable conventional oil of the world, exclusive of the United States, is in four regions: South America and the Caribbean (126Bbbl); sub-Saharan Africa (115Bbbl); the Middle East and North Africa (111 Bbbl); and the Arctic provinces portion of North America (61Bbbl).

This new assessment represents a complete reassessment of the world since the last World Petroleum Assessment in 2000 by the USGS, which estimated 649Bbbl, 4,669tcf of gas, and 207Bbbl of NGL in 128 geologic provinces. Many new areas were included in the current study, defining and assessing 313 assessment units throughout the world, as compared to 246 in 2000.

"In the 12 years since the last assessment, the steady progress in technology now allows additional resources to be regarded as technically recoverable," said USGS Director Marcia McNutt. Unconventional oil and gas resources, such as shale gas, tight oil, tight gas, coalbed gas, heavy oil, and oil sands, may be significant around the world, but are not included in the study, USGS noted.

Deepwater discoveries, surging demand to drive oil industry

Maturing conventional oil fields and a surging demand for crude oil are intensifying exploration efforts in the hope of boosting production, according to a new report by energy analysts GBI Research.

The new report shows that a substantial increase in investment within the exploration and production (E&P) industry means that global oil discoveries have grown exponentially in number. This is exemplified through the many deepwater discoveries made over the past year, particularly in the South American region.

The E&P industry was devastated by the global economic crisis, and a lack of funds, coupled with low crude oil prices, caused many major projects to be delayed or even cancelled. However, the elevated demand for crude oil and improved prices have encouraged a strong recovery within the industry, according to GBI.

There was a substantial increase in oil discoveries worldwide during 2011, when 183 oil discoveries were announced. Asia-Pacific led with a 29% share, followed by South and Central America with 23%, and Middle East and Africa with 22%. Brazil holds the highest number of discoveries for one country, with most of these finds being made in deepwater areas.

South and Central America will play an increasingly important role in meeting global oil demands, as enormous heavy oil reserves in Venezuela and discoveries in Brazil will help to meet global crude oil needs in future years, GBI said, noting that over the past 2 years, Brazil has discovered the world's most promising fields since the discoveries made in Kashagan, Kazakhstan in 2000. South and Central America is, therefore, anticipated to be one of the most sought-after locations for future E&P investments.

World crude oil reserves increased from 1,268.8Bbbl in 2000 to 1,620.3 Bbbl in 2011, at an average annual growth rate (AAGR) of 2.5%.

InterMoor beats mooring depth record offshore Brazil at 6,650ft.

As part of a 1-year project to provide mooring and positioning support operations for Shell, InterMoor recently beat the depth record for conventional mooring offshore Brazil with a water depth of 6,650ft. The project is for the mobile offshore drilling unit Noble Clyde Boudreaux and will run through mid-2012. Operations focus on the Campos and Santos basins, but could be in any location off Brazil's southeast coast in water depths ranging from 1,968 to 7,545ft.

"There are challenges, so we have

Noble Clyde Boudreaux offshore Brazil

worked with Shell to plan everything in minute detail," InterMoor project manager Andre Oliveira said. "This planning is essential if we are to continually break new boundaries such as the previous water depth record for conventional mooring offshore Brazil at 6,610ft (well depth) and two of the eight anchors moored at 6,650ft."

The contract covers the provision of engineering mooring analysis reports and conventional mooring. InterMoor designs mooring patterns for the Noble Clyde Boudreaux at every drilling rig location, involving a mix of open-water exploration work and mooring around subsea assets.

InterMoor assisted Shell in defining the anchor-handling vessel specifications for the program based on the final mooring system design and supplies mooring coordinators, engineers, and survey personnel on the rig and anchor-handling vessels to supervise and direct mooring system deployment, retrieval, and connection to the rig.

Conservatism drives M&A outlook down, appetite for divestment up

The sixth Ernst & Young Global Capital Confidence Barometer has found that despite higher oil prices, improving access to capital, increasing economic optimism, and a generally more favorable deal environment, oil and gas executives are still cautious about engaging in mergers and acquisitions.

Just 31% of the 141 oil and gas executives surveyed in April said they expected to pursue an acquisition in the next 12 months, down from 48% in October 2011, and the lowest figure since the barometer began in 2009.

By contrast, the number of businesses looking to sell assets has risen by more than 27% – a clear sign that companies regard portfolio management and a renewed focus on their core business as a priority.

"While oil and gas executives are in a more confident frame of mind, they are still applying caution to M&A. Economic outlooks remain uncertain, and geopolitical instability continues to be a concern," said Andy Brogan, global transactions advisory services leader for oil and gas at Ernst & Young.

Over half of the oil and gas executives surveyed view the global economy as improving, more than double the 22% in October 2011. Supporting this is the positive current sentiment around corporate earnings and economic and employment growth, with 91% of oil and gas companies expecting to maintain or increase their current workforce in the next 12 months.

Only 31% of oil and gas executives stated that they plan to pursue acquisitions in the next 12 months, compared with 48% in October 2011. Approximately 39% of respondents expect the price or valuation of M&A assets to increase over the next 12 months, while 46% believe that operating cost synergies are the most challenging to delivering deal value.

7,276 blocks up for grabs in oil and gas lease sale in Central U.S. Gulf

Companies will have until 19 June to file their bids for Federal Central Gulf of Mexico Oil and Gas Lease Sale 216-222, the U.S. Interior Department announced.

As many as 7,276 blocks covering about 38.6 million acres will be up for grabs in the sale to be conducted at the Mercedes-Benz Superdome in New Orleans on 20 June. It will mark the final sale in an existing 5-year Bush-era plan for leasing the outer continental shelf that ends on 30 June.

The acreage includes areas ranging from three to 230mi offshore, with water depths up to roughly 11,115ft in the Central U.S. Gulf.

The Interior Department postponed Gulf lease sales after the 2010 oil spill in part to update required environmental reviews of the region that took the disaster into account. The sale that will be held in June is a combination of two such planned sales that were delayed by the post-spill environmental analysis.

Wilton Engineering secures major North Sea project with Subsea 7

Wilton Engineering Services Ltd., an international design, engineering, and fabrication business, has secured a multi-million pound contract with Subsea 7. Wilton Engineering, a Wilton Group company, is constructing support clamps for work on DONG Energy's SIRI caisson support project in the Danish sector of the North Sea.

Subsea 7 announced last year it had won an offshore engineering and construction frame agreement with DONG Energy in support of the project.

The Wilton Group, which employs 700 people at businesses in Aberdeen, Dundee, Teesside, Great Yarmouth, and Brazil, has secured oil and gas contracts worth more than $89 million in the past several months.

"This latest project serves to underline our capabilities to work with global companies to deliver design, engineering, and fabrication solutions," Wilton business development director Des Hatfield said.

"Our enhanced capabilities mean we can provide an integrated solution for clients and its turnkey projects," added Wilton Engineering Managing Director Steven Pearson.

Work has already started on the project at the Port Clarence Offshore Base.

Wilton Engineering is carrying out the major task of fabricating large caisson clamps. This permanent solution consists of installing three piles next to the SIRI subsea storage tank and connecting them to the caissons with the fabricated clamps including cable stays. This is part of an ongoing program. SIRI is located in the Northwest part of the Danish sector of the North Sea. The SIRI platform is moored in 197ft of water and is a combined wellhead, processing, and accommodation facility.

Wilton Engineering provides bespoke, high-quality engineering and fabrication solutions to the offshore and petrochemical industries from its 50acre Port Clarence offshore base on the River Tees.

Wilton Engineering is one of four businesses that make up the Wilton Group. Together with other group companies – PD&MS Energy, Wilton Dundee, and Universal Coatings – it can offer fully integrated turnkey packages across a range of onshore and offshore engineering sectors.

UK continental shelf drilling in Q1 rises 22% versus a year earlier

A survey has found that 11 exploration and appraisal wells were drilled in UK continental shelf (UKCS) between 1 January and 31 March of this year, indicating a 22% rise in drilling activity compared with the same period in 2011.

However, the report by Deloitte Petroleum Services noted a 15% drop in drilling activity during the final quarter of 2011 as well as a 42% decline in the number of wells spudded during this period, compared with the first quarter in the last 5 years.

Data from the study also shows that exploration and appraisal activities are still 66% lower than in the first quarter of 2008. Despite the decline in offshore activity, Deloitte's analysts said there were signs of a positive year ahead for the oil and gas industry.

Deloitte Petroleum Services Group managing director Graham Sadler said more recent figures for March indicate an increase in drilling, with seven spuds in March compared with four during both January and February.

"The tax relief measures announced by the UK Government in last month's (March) budget have been welcomed by the industry, and this may result in renewed confidence over the course of this year," Sadler said.

Elsewhere in Europe, the trend is mixed, with a decrease in activity in Norway and little change elsewhere. Deal activity in quarter one of 2012 fell 18% compared with the same period of 2011, with a total of 37 deals recorded throughout northwest Europe. Of those, 60% were on the UKCS, with farm-ins and asset acquisitions remaining the most common type.

Royal Dutch Shell paid $22.6B last year in corporate taxes

Royal Dutch Shell plc paid $22.6 billion in corporate taxes to governments worldwide last year, and collected some $88.1 billion in excise duties and sales taxes from fuel and other products on behalf of the states where the company operates, the company said.

The highest amount of income tax paid by Shell was to the governments of Nigeria and Denmark. Taxes paid on upstream production were highest in the West African country, at $6.07 billion, with the UK receiving $3.53 billion in tax from its activities in the North Sea.

The figures, published for the first time, were released as part of a move to encourage greater transparency by resource-producing companies, Shell said.

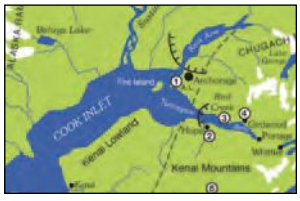
Alaska Cook Inlet lease sale draws bids on 44 tracts, $6.8M in bonuses

The state of Alaska leased 44 Cook Inlet tracts for oil and gas exploration and development 16 May in a sale that saw established companies Apache, Hilcorp, and Cook Inlet Energy adding to their acreage positions.

Preliminary results show that the Alaska Division of Oil and Gas received 52 bids from five bidding groups on tracts encompassing about 197,795 acres. Winning bonus bids totaled $6,865,835, making this sale the second largest Cook Inlet lease sale, based on bonus bids, since the areawide sale model was adopted in 1999.

In addition to Apache, Hilcorp, and Cook Inlet Energy, successful bidders included Buccaneer Alaska LLC and William Crawford.

"This year what you're seeing is three primary players ... basically doing some fill-in work around some of their existing lease," said State Division of Oil and Gas director Bill Barron. "So that's all real positive, people are solidifying land holdings to continue to do their exploration and development activities."



To incentivize new activity in Cook Inlet, the State caps the tax on oil production at zero and on natural gas at 18 cents per thousand cubic feet for new production. Producers pay a low 5% royalty on any new discovery in the inlet for the first ten years. In addition, the State offers investment tax credits and a special incentive for the first three exploration wells drilled from a jack-up rig.

WorleyParsons to manage Hebron topsides
ExxonMobil Canada Properties has contracted WorleyParsons for the topsides on the Hebron project offshore Newfoundland and Labrador. Previously, WorleyParsons provided front-end engineering and design services. ExxonMobil has now exercised its option to subsequently award detailed engineering, procurement, and construction (EPC) services. The Hebron oil and gas field is 217mi offshore St. John's. WorleyParsons estimates its revenue under the EPC contract at $360 million over 5 years. The company will cooperate with Fluor to provide overall project management, with subcontracts to be awarded to various third parties with a focus on assigning work in Newfoundland and Labrador. Chief executive John Grill said the company would apply "our proven expertise in sub-Arctic floatover topsides"

Seatronics increases pool with 6G Compatts
Offshore equipment rental company Seatronics increased its commitment to Sonardyne's sixth-generation (6G) technology platform with a major order for subsea acoustic positioning hardware. The equipment will be added to Seatronic's equipment pool in Aberdeen, UK, from where it will be made available for use on projects across Europe and Africa. The order is for a consignment of Sonardyne's most advanced subsea positioning and data telemetry transponder, the Compatt 6, which is configurable to meet any subsea positioning requirement Seatronics' customers might have. This includes template installation, hydrographic surveying, and high-accuracy pipeline metrology.

The first project earmarked for the new equipment is a deepwater gas field off the Nile Delta, where it will be used in conjunction with Sonardyne's subsea inertial navigation system SPRINT during the initial construction phases of the development. "Our existing stock of 6G equipment has proved to be an adaptable and reliable platform that enables subsea tasks to be completed in less time than was previously possible," Seatronics operations manager Phil Middleton said.

Total awards contract for Angola 4D seismic
French-based CGGVeritas (CGV) was awarded a 5-year contract by Total to carry out a 4D processing program on Block 17, off the coast of Angola. The deal has been signed with Total Exploration and Production Angola and Angola-based Sonangol for an undisclosed sum. Using the Girassol FPSO, CGV will process more than 6,000km² of seismic data, tracking five of Total's deep offshore fields over the contract period, namely Girassol/Jasmim, Rosa, Dalia/Camelia, Pazflor, and CLOV. The scope of the works includes 4D seismic processing as well as imaging of all annual and biennial monitor surveys planned at the block.

BP plc working to prevent another Deepwater Horizon

By Bernard Looney
BP executive vice president of developments

We at BP have just marked the second anniversary of the Deepwater Horizon accident, where 11 men lost their lives and dozens more were injured. It was an accident none of us will ever forget and one we are working tirelessly to help prevent from happening again.

Some predicted the accident would force BP to leave the Gulf of Mexico, but that would have meant turning our back on thousands of our employees and their families and decades of experience in one of the world's great energy basins. If North America is to achieve energy self-sufficiency by 2030, as BP projects, the Gulf of Mexico has a vital role to play. So we have assimilated and shared the lessons we have learned and are back at work in the Gulf of Mexico today.

Our first order of business has been keeping our commitment to help economic and environmental restoration efforts in the Gulf Coast region. Progress is encouraging. Beaches and waters are open, tourism has rebounded, and the government says Gulf seafood is safe to eat. That is not to say there are no issues -- there is work yet to be done -- but the area's distinctive way of life is still there. To date, BP has spent over $22 billion to fund response operations, clean-up and claims.

Bernard Looney

We are also committed to further enhancing safety and risk management throughout our global operations. For example, our new Safety and Operational Risk Organization reports directly to the CEO and will soon be 600 strong, staffed with experts from within and outside the industry. Deployed across our global operations, its primary role is to advise, but it is also empowered to intervene and halt work if necessary. We've adopted new voluntary drilling standards in the Gulf of Mexico that go beyond current regulatory requirements.

Our continuous effort to enhance safety is essential to our ongoing work in the deepwater Gulf of Mexico. Over the last five years, BP has invested around $4 billion a year there and we hope to maintain at least that level over the next decade. This level of investment is consistent with our position as the leading producer of oil and gas in the Gulf of Mexico and America's leading energy investor overall.

We estimate that between 10-20Bbbl worldwide lie beyond the existing technological limit of 15,000psi of pressure and 275°F. To reach these resources, BP recently announced Project 20K, which will take us to 20,000psi, and between 350-400 degrees F. Achieving that goal will require an industry-wide effort to pool our brain-power and resources, so as to develop the equipment needed to operate at these depths. It will also require us to further raise our safety standards to maintain the trust of the public and regulators.

I am pleased that the industry is moving in this direction. Newly established entities such as the Center for Offshore Safety and the Marine Well Containment Company, both based here in Houston, are strong examples of the collaboration that is needed. But all of us can do more. The International Association of Drilling Contractors, for example, has identified an urgent need to establish certification standards for subsea engineers. BP is contributing to this effort and working with our industry partners to put in place a rigorous program for certification and training.

Deepwater exploration will always carry risks, but the potential benefits are enormous. I am optimistic that both BP and the industry can manage the risks ever more effectively, while bringing the people of America and the world the energy we need to grow and prosper.

The drillship Pacific Santa Ana

Drillship brings new technology to U.S. Gulf for Chevron work

A first-of-its kind deepwater drillship, which adds a measure of safety by closely matching natural pressures, was set to start drilling in the Gulf of Mexico, Chevron Corp. said. The Pacific Santa Ana, under contract to Chevron from Pacific Drilling of Luxembourg, employs a dual-gradient design developed by Chevron and licensed to Pacific Drilling.

Dual-gradient technology fills the drilling system with mud and fluid of two different weights, as opposed to conventional deepwater systems that only use one fluid weight, Chevron said. The dual-gradient system syncs more closely with natural pressures above and below the seafloor.

The $800 million Pacific Santa Ana was completed in December by Samsung Heavy Industries in South Korea. It can drill in a maximum water depth of 12,000ft, which has become the industry standard for new deepwater drillships.

Chevron said the dual-gradient system allows drillers to detect and react more quickly to pressure changes in the well bore. Dual-gradient drilling "has the potential to change the way deepwater wells are drilled," Chevron vice chairman George Kirkland said in a statement.

Besides matching pressures with environmental conditions, the technology reduces the number of cement joints needed in well casing, said Don Van Nieuwenhuise, director of the professional geo-science programs at the University of Houston.

BP plans to add three U.S. Gulf of Mexico drilling rigs in 2012

BP plc had five drilling rigs running in the Gulf of Mexico 2 years after its Macondo oil spill and planned to add three more by the end of 2012, Bernard Looney, executive vice president of development at BP's London headquarters, said at the recent annual Offshore Technology Conference in Houston. He said that the drilling will include exploratory, appraisal, and production wells.

Last October, U.S. regulators granted BP its first permit to drill a new well since the largest offshore spill in U.S. history, which spewed more than 4Mbbl of crude oil into the basin in 2010.

The permit for a well in BP's Kaskida field came after regulators were satisfied that BP's well design and safety practices met more stringent post-spill standards. Kaskida was a 2006 discovery that could hold up to 3Bbbl. Other permits are split between BP's established Thunder Horse and Atlantis fields.

Technip awarded key engineering contract for Mad Dog Phase 2

Technip was awarded a front end engineering design (FEED) contract by BP Exploration & Production Inc. The contract covers the design of a spar hull and mooring systems for the Mad Dog Phase 2 project, located near Green Canyon Block 825 in the Gulf of Mexico.

This first award comes under the framework of the 10-year spar platform master services agreement signed in 2011. The Mad Dog Phase 2 spar will be located near the first Mad Dog spar delivered by Technip for BP in 2004 and installed on Green Canyon 782. Detailed engineering for the new spar is scheduled to start during the second half of 2012.

Sete orders five deepwater drilling rigs from Keppel Offshore for Brazil

Sete Brasil Participações S.A. has signed a letter of intent with Keppel Offshore & Marine Ltd. to design and build five semi-submersible drilling rigs for $4.12 billion.

The rigs will be based on Keppel's DSSTM 38E design rated to drill in 9,842ft of water. The rigs will have eight azimuthing thrusters and meet DP-3 criteria.

"It is full steam ahead for us in growing our fleet of rigs and vessels to support the E&P activities in offshore Brazil," said Joao Carlos Ferraz, Sete's chief executive officer.

North Atlantic orders further ultra-deepwater drilling rig

North Atlantic Drilling has awarded Jurong Shipyard a $650 million turnkey construction contract to build a new harsh environment semi-submersible drilling rig. This will be a Moss Maritime CS60 design, N-Class compliant, and fully winterized to cope with conditions in the North Atlantic areas, including the Barents Sea. It is scheduled for delivery by early 2015.

Moss Maritime C60 is an enhancement of the Moss Maritime CS50E MKII harsh-environment, ultra-deepwater semis West Pegasus and West Leo, which Jurong delivered to North Atlantic parent company Seadrill in March 2011 and January 2012.

The new design is suited to water depths of up to 10,000ft, with a maximum drilling depth of 40,000ft.

The rig will have DP-3 and complete anchor handling capabilities and will provide accommodation for up to 150 people while working offshore Norway, although elsewhere its complement will be 180. To comply with high safety and operational standards, it will be outfitted with a six-ram blowout preventer stack, with capacity for storing and handling of a second BOP.

Aker Solutions wins $1.9B contract to launch new rig type

Aker Solutions has entered a $1.9 billion contract with Statoil to launch a new type of rig designed to increase oil recovery from existing operating fields in the Norwegian Continental Shelf (NCS).

The Category B rig, which falls between light intervention vessels (Category A) and conventional rigs

Artist rendition of Category B rig

(Category C), has been adapted to carry out well intervention and drilling operations in existing subsea wells. Statoil executive vice president of technology, projects, and drilling Margareth Øvrum said the new rig will make it possible to produce oil and gas that otherwise would be lost.

"The Category B rig is the result of long-term, targeted technology development to increase subsea well recovery rates," Øvrum said.

The rig will be in service for 8 years and is expected to start operating in 2015. The contract also includes rental of the necessary equipment and services to carry out well intervention, sidetrack drilling, ROV operations, well testing, and cementing.

Craig Group wins contracts for four new D class ERRV vessels

A $56.5 million investment by Craig Group in four new vessels has already secured major, multi-million dollar contracts for the Aberdeen, Scotland global shipping and energy services company.

The new-build D-Class emergency response and rescue vessels (ERRVs), which will be managed by Craig Group division North Star Shipping, will take to the waves throughout the year on charter to major oil and gas operators. The new ERRVs are designated NSS-IMT 950s, designed by IMT of Montrose, and (each) equipped with one or two daughter craft and one fast rescue craft.

The ERRVs – named the Grampian Don, the Grampian Dee, the Grampian Discovery and the Grampian Defiance – represent a continued drive by the group to operate the largest British wholly owned fleet engaged in the UK offshore industry, supporting 50 installations in the Northwest European Area (NWEA).

The Grampian Dee has been awarded a contract by Valiant Petroleum for exploration drilling support in the Central North Sea. The Grampian Discovery has secured a contract with Shell to support various North Sea drilling operations, and the Grampian Don will go on a 5-year charter to another major operator in the North Sea. The last vessel in the series, the Grampian Defiance, will commence a contract with DONG E&P UK, from September 2012 through the end of the year.

"The award of these contracts secures our position as market leader in the provision of emergency response and rescue vessels in the North Sea," North Star managing director Callum Bruce said. "Our major investment in state-of-the-art vessels supports the UK offshore industry as well as our continued support for British shipping."

The four new vessels will lead to an additional 120 jobs in the North Sea marine sector.

"Securing these major contracts for our vessels, which were built speculatively, is an endorsement of the confidence in the market and of our continued investment in a safe, modern, and efficient fleet," said Douglas Craig, chairman and managing director of Craig Group.

The ERRVs are being built at the Balenciaga Shipyard in Northern Spain ,which has now delivered 20 vessels to Craig Group in the last 9 years. This investment in D Class vessels is part of the $347 million newbuild program by the Craig Group, which began in 2003.

At present, the fleet stands at 35 vessels and includes a mix of platform supply, tanker assist, ROV survey, and ERRVs. ERRVs have advanced greatly and today provide frontline cover for thousands of workers in one of the harshest environments in the world and are essential for the support of offshore operations, particularly where mass evacuation of an installation is required. The vessels also provide other vital services, such as anti-collision surveillance, pollution control-oil recovery, emergency towage, and tanker assist duties.

The ERRV vessel Grampian Dee

Rosneft, Eni sign pack to jointly explore Black and Barents Seas

Russia's Rosneft and Italy's Eni have signed an integrated cooperation agreement to jointly explore fields in the Russian sectors of the Black and Barents Seas. The agreement involves an exchange of technology and staff and could extend to Rosneft's participation in Eni's international projects.

Specifically, the two companies will form a joint venture to explore the Fedynsky and Central Barents fields in the Barents Sea and the Western Chernomorsky field in the Black Sea. According to Rosneft, the fields could potentially contain 36 Bboe recoverable.

Eni will have a 33.33% participation in the venture and will finance geological exploration work to establish the fields' commercial value. The government also offered guarantees that a favorable tax regime would remain in place for a prolonged period.

Appraisal well confirms Bohai Bay discovery among largest

China National Offshore Oil Co. (CNOOC) said it successfully confirmed the Penglai (PL) 9-1 oil-bearing structure in Bohai Bay, discovered in 2010. The appraisal confirmed that this is the largest oilfield discovery in recent years in the region.

PL9-1 is in the Miaoxibei uplift in the eastern part of Bohai, in an average water depth of 82ft. One appraisal well, PL9-1-5, encountered oil pay zones in buried hill with total thickness of more than 656ft., and on tested flowed around 700bbl/d.

CNOOC also discovered oil in the PL15-2 structure, 5mi to the south. The PL15-2-1 well intersected oil pay zones with total thickness of 272ft, and the test indicated an average rate of more than 1,200bbl/d.

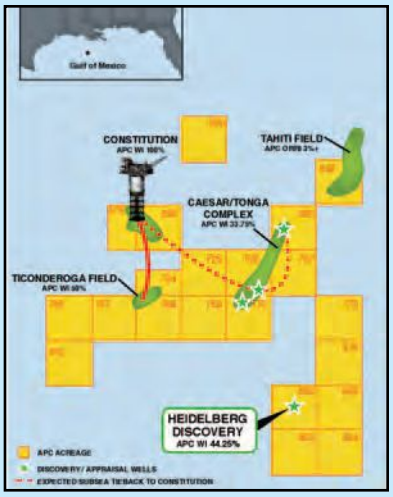
Wintershall makes oil discovery at Skarfjell prospect in North Sea

German oil and gas company Wintershall made an oil discovery at its Skarfjell prospect in the Norwegian North Sea. The company said that the Wildcat Well 35/9-7, located in production licence 418, found Upper Jurassic reservoir sands of good quality, containing light oil with a significant oil column.

The well was drilled using the Songa Delta rig, located just north of the Titan discovery and 17km southwest of the Gjøa Field. The well was drilled to a vertical depth of 2,976m below sea level, and finished in the Middle Jurassic Brent Group-Rannoch Formation.

The company estimates a preliminary resource range between 60 and 160Mbbl of recoverable oil.

Due to limitation in the rig slot length, the well was not tested, but reservoir and fluid sampling have given valuable data on the new discovery. The Skarfjell probe will now be permanently plugged and abandoned, after which the rig will move on to drill an appraisal well 33/6-3S for Suncor Energy. Wintershall Norge holds a 35% interest in license 418, while Bayerngas Norge and Agora Oil and Gas each have a 20% stake, Edison International Norway has a 15% interest, and RWE Dea Norge holds 10%.



Heidelberg sidetrack well confirms field extension of up to 1,500 acres

A Heidelberg sidetrack appraisal well in the deepwater Gulf of Mexico successfully confirmed an extension of up to 1,500acres, field operator Anadarko Petroleum Corp. said.

"This well extends the oil-water contact down structure by approximately 700ft, and continues to validate the field's estimated resource range, while providing support for the option of a stand-alone development," said Chuck Meloy, Anadarko's senior vice president of worldwide operations.

The Heidelberg discovery is said to hold an estimated 200mmbbl of recoverable oil resources.

Anadarko and Heidelberg's co-owners have initiated pre-FEED (front-end engineering and design) work to evaluate development solutions with the objective of advancing commercialization of the emerging mega project.

The Heidelberg sidetrack appraisal well in Green Canyon Block 903 is located about 1.3mi. from the Heidelberg discovery well. The well was drilled to a total depth of about 30,440ft. in water depths of approximately 5,260ft.

Anadarko holds a 44.25% stake in the block. Co-owners include Apache Deepwater LLC, a subsidiary of Apache Corp. (12.5%), Eni (12.5%), Statoil (12%), ExxonMobil (9.375%) and Cobalt International Energy, L.P. (9.375%).

Department of Energy accepts oil, gas bids for offshore Philippines

The Philippines Department of Energy has accepted bids for 5 oil and gas exploration contracts out of 16 bids from local and international firms for 15 oil and gas blocks located between the western coast and the South China Sea.

Energy Undersecretary Jay Layug said $7.5 billion dollars in investments are expected for 15 energy contracts being offered. He said the accepted bids will be evaluated and contracts will be awarded within the year. Originally, 38 companies were prequalified. Bidding was opened for 12 contracts. Only 9 of 16 bids met requirements for 5 of the exploration blocks.

"This is even more than what we received in previous PECRs, which totaled 12 bids. This is the most successful PECR," said Layug.

Layug said three blocks northwest of Palawan Island up for bidding on 31 July are "the most prospective", and more bids are expected for those.

Statoil begins exploration effort in Skrugard area of Barents Sea

Statoil ASA, together with partners Eni Norge AS and Petoro AS, has established a plan for further exploration drilling in the Skrugard area. The exploration campaign will comprise four new prospects and is scheduled to commence late 2012.

The objective is to follow up on the Skrugard and Havis discoveries and to test further upside potential in this area of the Barents Sea, including production licences PL532 and PL608.

"We are very satisfied with our recent exploration achievements in the Barents Sea," said Knut Harald Nygård, Statoil vice president for exploration in the Skrugard area. "In less than a year, we have made two substantial oil discoveries in PL532, proving 400 to 600mmbbl of recoverable oil. We have also drilled a successful appraisal well on Skrugard, confirming volume estimates and collecting data for field development planning."

The four prospects will be drilled back to back with the West Hercules drilling rig, which will be winterized to meet the weather conditions in the Barents Sea.

Tamar gas project offshore Israel on track for production in 2013

Delek Group said the deepwater Tamar gas field in the Levantine basin remains on track for production during the first half of 2013.

Gas will flow from Tamar through two 16in. subsea pipelines to the nearshore Tamar platform, which is linked to an existing pipeline to the onshore terminal at Ashdod.

Among recent agreements signed by the Tamar partners, the most notable was a 15-year take-or-pay agreement under which Israeli utility IEC will purchase up to 2.75tcf with an option of up to 3.5tcf from the project. Cumulative revenues from this transaction could reach $23 billion if the option is exercised.

The partners have also signed a memorandum of understanding with Daewoo Shipbuilding concerning construction of a floating LNG terminal.

The marketing company (a joint venture between Daewoo & Next Decade LLC) signed a letter of intent last month with Gazprom Marketing & Trading Switzerland AG, enabling non-exclusive and non-binding negotiations for acquisition and sale of LNG produced at the proposed terminal. Elsewhere in the Israeli offshore sector, Noble Energy halted drilling operations at the Leviathan-1 well after finding natural gas. Drilling was planned to continue to a depth of about 21,400ft, but was stopped at 21,000ft upon encountering higher pressure. The company said it will integrate the data from the Leviathan well into its model to design a drilling plan to test the deep oil concept.

Noreco starts production from Oselvar field in North Sea

Norwegian Energy Co. (Noreco) has started production from the Oselvar field located in licences PL274 and PL274CS in the southern part of the Norwegian North Sea. The Oselvar field has been developed with a subsea template, tied back to the BP-operated Ula field located 23km from Oselvar.

The start-up is based on production from two horizontal production wells, while the third is currently being drilled and will be completed in the coming months. Oil from the field will be sent to Teesside on the UK's east coast for onward sale, while the gas is re-injected into the Ula reservoir. Oselvar has an expected production life of around 20 years and total estimated reserves are 53Mboe. The field is operated by Dong, which holds a 55% interest, while Bayerngas Produksjon Norge holds 30% and Noreco has a 5% stake in the field.

Gulf of Suez NS377 field delivers first oil to Petreco Oil Center

Oil has started flowing from the NS377 field in the North Shadwan concession in the shallow water Gulf of Suez, offshore Egypt. Production is connected via a tie-in to Petrobel's nearby Ras Ghara oil facility, before passing through a pipeline to the main Petreco Oil Center at Abu Rudeis, 74mi to the north.

BP Exploration (Delta) is the development operator, in partnership with Beach Petroleum and TriOcean Energy Co. According to Beach, initial production through the pipeline will be restricted to around 1,000Bbbl/d, with further output to be handled via a trucking operation expected to start before mid-year.

In the nearby NS385 oil field, planning is under way for drilling of a first development well, again expected to spud before mid-year.

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TSC Technology Systems Corporation

Shah Deniz Stage 2 gas export project enters FEED phase

BP and its partners have approved the start of front-end engineering and design (FEED) on the $25 billion Shah Deniz Stage 2 project in the Caspian Sea. The Shah Deniz field, 43mi offshore, contains estimated resources of more than 30tcf of gas.

Currently, Shah Deniz Stage 1 delivers around 9Bcm/yr, but Shah Deniz 2 should add 16Bcm/yr for export to markets in Turkey and Europe, opening up a southern gas corridor. The target for start-up is toward end-2017.

Stage 2 will likely feature two new bridge-linked production platforms; 26 subsea wells (drilled by two semi-submersible rigs); 500, 310mi of subsea pipelines in water depths of up to 1,804ft; a 16Bcm/yr upgrade for the South Caucasus Pipeline (SCP); and expansion of the Sangachal terminal.

Further pipelines are to be built and expanded to transport Shah Deniz gas through Turkey and Europe.

Technip to lay shallow-water pipeline for CNOOC project

Technip has won a pipeline installation contract from Offshore Oil Engineering Co. Ltd. for the Liwan 3-1 project in the Pearl River Mouth basin of the South China Sea. Some 186mi south of Hong Kong, the 162mi long pipeline will link the Liwan gas platform to China National Offshore Oil Corp.'s Gaolan gas plant.

Technip's contract covers the shallow-water portion and includes installation of 100mi of 30in. export oil-gas two-phase pipeline from the platform to a water depth of 230ft. The contract is scheduled for completion by year-end using the Global 1201 pipelay vessel. Saipem has the contract to install the deepwater portion of the pipeline.

Stone Energy to buy Anadarko's stake in U.S. Gulf Pompano field

Stone Energy entered into a definitive agreement to purchase Anadarko's 25% working interest in the deepwater Pompano field in the U.S. Gulf of Mexico for $67 million.

The deal also includes a 22% working interest in Mississippi Canyon (MC) Block 29, plus a 10% working interest in portions of MC 72.

Net production from the Pompano field is about 1,000bbl/d and 3Mcf/d of natural gas each day.

Stone said its estimate of proved reserves attributable to the acquisition is about 5.9Mboe, based on Netherland, Sewell & Associates year-end reserve estimate for Stone's portion of the Pompano field.

The company said the estimate has been proportionately reduced for the different working interest. The acquisition is subject to preferential rights (MC 29 and MC 72 only) and other closing conditions. It was expected to close in the second quarter of 2012.

Kvaerner wins $1.3B contract from Lundin for Edvard Grieg field

Norwegian engineering firm Kvaerner Stord has won a $1.3 billion engineering, procurement and construction (EPC) contract from Lundin Norway to construct topside installations for the Edvard Grieg development in the North Sea.

Lundin Norway is the operator for PL338, which contains the Edvard Grieg field (formerly known as Luno), with its partners Wintershall Norge and RWE Dea Norge owning 30% and 20% stakes, respectively. The contract excludes options for offshore hook up and commissioning assistance. The topside consists of deck frame, utility module, 4,500ton process module, and living quarters.

The topside contract for the Edvard Grieg project is the largest component of the field development. Kvaerner Stord will construct a deck frame and utility module; Aker Solutions will provide engineering services; Aker Egersund will build the process module; and Apply Leirvik will be responsible for the living quarters.

The modules will be delivered and commissioned in 2015 for installation on the jacket in May 2015. First production from the Edvard Grieg field, comprising both the Luno and Tellus discoveries, is expected in 2015. Lundin said the design capacity of the platform will accommodate 160,000boe/d.

Keeping close tabs on ocean mooring lines

Pulse Acoustic INTEGRIpod™ deployed on chain hawse

The market is demanding systems that will tell the crew where a mooring line is and also determine how it is performing, said Richard Kluth, managing director of Pulse Structural Monitoring.

"Mooring line integrity management is extremely important, as the potential production losses from coming off station are very significant," he explained.

The company recently gave a presentation on the monitoring of mooring lines at MCE Deepwater Development 2012 in Paris, France. The presentation described Pulse's experience of designing and installing MoorASSURE, a real-time mooring line monitoring system.

The MoorASSURE system was developed for a floating production, storage and offloading (FPSO) unit now deployed offshore Brazil. The system is part of Pulse's range of mooring monitoring equipment and uses inclinometers to measure the angle of the mooring line. The system then uses these measurements to calculate the tension experienced by the mooring line.

Acoustic communication connects the system to the vessel, which enables the measuring devices to be positioned outside the load path of the mooring line and eliminates the risk of damage to cables. The system provides a reliable indication of the tension a mooring line is experiencing that can help to inform the operations team about the line's performance.

Kluth also mentioned Pulse's new mooring line monitoring device, the Inter-M Pulse, which Pulse has developed in partnership with sister Acteon company InterMoor.

"The Inter-M Pulse can provide a direct measurement of the tension experienced by a mooring line," he said, noting that the device has performed well during trials.

The product was launched at this year's annual Offshore Technology Conference in Houston, Texas.

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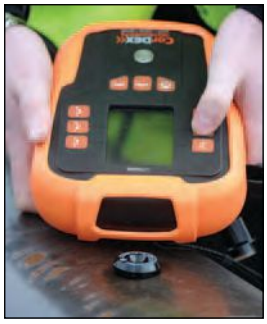
CorDex unvails next generation device for monitoring corrosion

CorDEX Instruments launched its next generation corrosion monitoring device, which streamlines readings gathered in the field and enables users to monitor integrity levels at specific points on an asset or pipeline.

The latest UT5000 Intrinsically Safe Thickness Gauge was unveiled at the Offshore Technology Conference in Houston. The hand-held device, which can be used for non-destructive testing to establish the extent of corrosion, boasts several updates, including intelligent measuring technology able to record multiple readings at specific locations.



A total of nine multi-point readings can now be saved against each Radio Frequency Identification (RFID) tag on the asset or pipeline, which greatly reduces time spent in the field and increases the effectiveness and efficiency of corrosion monitoring.

The device, which provides accurate thickness readings to the nearest thousandth of an inch, now also uses the latest Echo-Echo technology, which has the ability to read metal thickness levels, even through a painted surface.

For additional information, visit www.cordexinstruments.com.

Halliburton recognized by OTC for sand control technology

Halliburton was recognized by the 2012 Offshore Technology Conference's Spotlight on New Technologies program for its EquiFlow® autonomous inflow control device (AICD). The EquiFlow AICD addresses the problem of unwanted water or gas production and solves the inefficiency in current ICD designs.

The OTC Committee chose the technology for the Spotlight award based on four criteria: it is new and innovative; it has proven full-scale application; it has broad interest and appeal for the industry; and there is significant benefit to the industry beyond existing technologies.

The EquiFlow AICD, the only known product of its kind offered in the industry today, now makes it possible to restrict unwanted fluid production and boost oil production at the same time. The device has no moving parts or elastomeric seals, and does not require communication to surface or the need for surface intervention. After installation, the AICD can be left to function autonomously for the life of the well. The EquiFlow AICD, therefore, will improve completion reliability, increase completion life, reduce disposal cost and potential environmental issues, and increase wellbore recovery in oil producing fields around the world.

"We believe this technology will provide tremendous value to our customers through the ability to optimize their production over the life of the well, with no intervention or remote operations required," said Jerry Wauters, vice president of Halliburton's completion tools business line.

For more information, visit www.halliburton.com/equiflow.

Oldham's OLCT IR infrared gas detector receives IP67 certification

Oldham said that its OLCT IR infrared fixed gas detector has been tested according to IEC/EN 60529 and has been awarded the IP67 protection degrees. The tests were conducted by INERIS, one of the two IECEx Certification bodies in France. The design protects the OLCT IR against dust and the effect of immersion in up to 1m of water.

Reinforced ingress protection, stainless steel SS 316L enclosure, dual source, four-beam technology, and heated optics

make the OLCT IR one of the most reliable infrared gas detectors available. It is suitable for use in harsh environments, such as offshore oil and gas platforms, refineries, LNG/LPG plants, gas terminals, FPSO vessels, gas compressor stations, and gas turbine power plants. A low temperature version allows operation down to -50°C for the harshest industrial environment. To learn more, visit www.oldhamgas.com.

Moyno® EF stuffing box designed to prevent environmental issues

Robbins & Myers Energy Services Group has developed the Moyno EF (Environmentally Friendly) Leakless stuffing box that is designed to reduce costs and prevent the risks associated with unwanted environmental issues caused by leaking stuffing boxes.

Stuffing box leakage is a controllable

Moyno® EF Leakless Stuffing Box

issue that can be easily addressed with the installation of a Moyno EF Leakless stuffing box. Unwanted stuffing box leakage results in costly loss of product, unnecessary clean-up expenses, and potential fines for environmental damages. This environmentally friendly solution is critical for all field installations. With a cost-effective return on investment, the money saved with this stuffing box goes directly to the bottom line.

A simplified clamping system ensures quick and easy installation – whether in a new installation or retrofitting an existing installation – to minimize downtime and reduce incurred costs. The Moyno EF Leakless stuffing box is adaptable to most electric or hydraulic driveheads for optimal versatility in preventing unnecessary fluid leakage at the wellsite. It is also designed to provide increased bearing support for enhanced stability and to eliminate premature internal drivehead wear, saving time and money.

For more information, visit the company website at www.rmenergy.com.

WesternGeco unveils new ObliQ broadband seismic technique

WesternGeco has introduced ObliQ sliding-notch broadband acquisition and imaging technique to enhance low frequencies in marine seismic data without compromising high-frequency data. Optimized seismic bandwidth is achieved by combining variable streamer depth acquisition with a proprietary deghosting method and a new broadband seismic source. This proprietary processing is applied early in the sequence, making the data suitable for both time- and depth-domain analysis. ObliQ can also be used with other WesternGeco technologies, such as Coil Shooting and Dual-Coil Shooting full-azimuth acquisition, to combine broad bandwidth with full-azimuth, long-offset acquisition.

For more information, visit www.slb.com/services/westerngeco.aspx.

Damen Marine develops single weld Nozzle Spinning Machine

Damen Marine Components (DMC) has developed a pioneering nozzle production method based on a single weld seam on the inner side of the nozzle. This makes the process much more efficient and environmentally friendly. The new Nozzle Spinning Machine can deliver nozzles up to 4.5m at short notice.

Based in Hardinxveld in the Netherlands and part of the Damen Shipyards Group, DMC has invested in new spinning machinery for its facility in Gdansk.

The spinning machine can produce nozzles with an inside diameter ranging as far down as 1,000mm. Using a completely automated system, the machine can handle stainless steel, duplex steel, and special steel materials. The new machine is also able to handle the demand for shorter delivery times.

Under the traditional construction method, the inner side is constructed from several small welded parts. This is now history, and the new method results in a much smoother surface. The new machine is already proving very successful with both existing and new customers.

Propeller nozzles are a sustainable product by definition, because they significantly reduce fuel consumption and thus cut down on CO_2 emissions.

For additional information, visit www.damen.nl.

AETI's new drilling control system to enable efficient, safer operations

American Electric Technologies, Inc. has introduced its new M&I® DrillAssist™ Drilling Control System. Based on field-proven control system software AETI acquired from Amnor Technologies in March 2012, the DrillAssist Drilling Control System is designed for managing, controlling, and monitoring drilling rig operations. DrillAssist was recently demonstrated at the Offshore Technology Conference in Houston, Texas.

DrillAssist enables operators to optimize drilling operations while increasing rig floor safety and incorporates the following key control system elements:

Draw works control-AutoDriller with WOB, ROP, standpipe pressure, and torque control functionality.

Mud pump control including anti-synch, pause-resume control and auto auxiliaries control.

Top drive/Rotary table monitoring;

Power system management with integrated power limiting for optimizing and managing all rig power equipment including gen sets, VFDs, and motor control center.

And rig monitoring and communications including integrated CCTV/data logging and talk back integration.

DrillAssist runs on multiple PLC platforms, including Siemens and Allen Bradley.

AETI's SEC filings, news, and product/service information are available at www.aeti.com.

Autonomous PowerBuoys: Wave Energy Converters as power sources for the next generation of ocean observatories

By Phil Hart, Chief Technology Officer, Ocean Power Technologies, Inc.
Scott Glenn, Hugh Roarty, Coastal Ocean Observation Lab., Rutgers University

The recent move in oceanographic academia to long-time series measurements at a specific location has been led by the introduction of cabled underwater observatories. Historically, an expedition was launched to monitor a location for perhaps a few weeks and a snapshot data set of the local environment was obtained. The cabled observatory, while still to some extent the new kid on the block in the world of oceanography, has changed the art of the possible by extending this snapshot from what used to be only a few weeks to many years. This is akin to the difference between a still image and a feature film!

Being able to access a long-time series of continuous data has allowed the formation of data trends that, until recently, were just not possible. However, this was achieved at a price – the old, nagging villain "Economics." Cabled observatories are not cheap, with the simplest installation (apart from local shoreline applications) costing millions of dollars, often tens or hundreds of millions of dollars. In some locations and economic environments, the payback in terms of achieved learning, basic research outcomes, and world-changing information makes the investment a justifiable proposition — see MARS, VENUS, NEPTUNE, and the Regional Scale Nodes as examples in the U.S. and Canada. However, as economic circumstances throughout the world have tightened, finding investments of this magnitude in an academic subject area that does not often generate huge cash paybacks has become extremely challenging. The future of large-scale cabled oceanography is, therefore, not as rosy as the more forward-looking and scientifically inquisitive among us might hope. A more cost-effective solution seems, therefore, to be required – one that for a much reduced cash cost offers at least matching performance – no challenge there then!

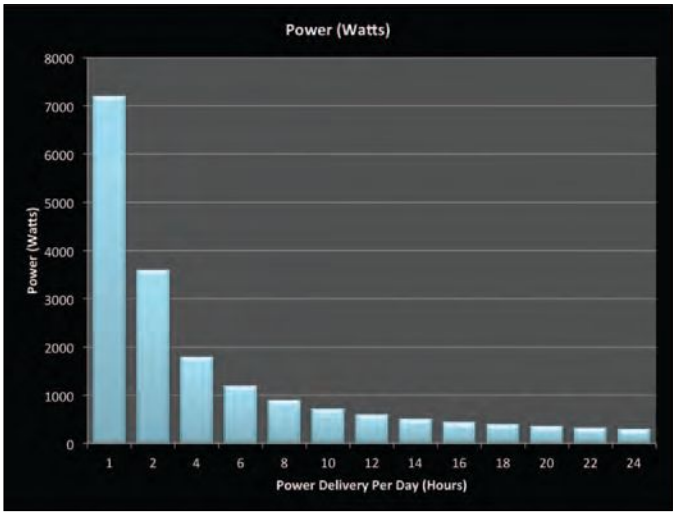
The Autonomous PowerBuoy® is a derivative of Ocean Power Technologies (OPT) core wave energy converter technology. After 15 years of development, these devices are now commercially available, offering applications in many industries that require long-term, cost effective monitoring of almost any marine location. This article discusses the technology and applications of the Autonomous PowerBuoy®, using the example of a deployment from 2011 in which HF RADAR was used to measure oceanographic parameters off the coast of New Jersey. In addition, other potential applications are discussed.

What is a PowerBuoy®?

OPT's PowerBuoy® technology fits into a category of wave energy converters referred to as a Point Absorber – defined in our industry as a device that presents a small projection in comparison to a wave. The device relies on the differential motion between two hull forms: one designed to react slowly and the other designed to act quickly when forced by a water wave. The differences in motion represent mechanical energy, which can be harnessed and transferred onto any power producing mechanism (commonly referred to as a Power Take Off [PTO]). PTOs vary with device, but can be grouped into the predictable suspects of pneumatic, hydraulic, and direct mechanical machines. Regardless of the strengths and weaknesses of each PTO approach, it is typical to transmute into electrical energy at some point. Indeed, all of OPT's current wave energy converters export or deliver electrical energy from the buoy itself. The manner in which this change in energy type is performed has an extremely important influence on the overall efficiency of power delivery. After years of development, which continues, the efficiency of these devices is now very impressive.

Figure 1 *Photo of the PowerBuoy® after deployment in the foreground along with the USCG buoy tender that deployed it in the background*

While all of this sounds easy, the devil is incredibly well-embedded in this particular engineering challenge, as earlier papers and authors have testified. Suffice to say, necessary design details, hydrodynamic understanding, mechanical nuances and requirements, electrical finesse, and control theory on such devices is unexpectedly complex in order to get the maximum performance out of a device.



For the types of autonomous applications discussed here, where we seek to offer an alternative to a cable from shore, the governing design specifications include a requirement to deliver power to whatever sensor pack is utilized 100% of the time, regardless of prevailing wave conditions. Consider the case where (and the experimenters' frustration if) a unique oceanographic event occurs when the ocean was calm and no wave energy was being harvested to supply the payload. To avoid this, we must have access to power regardless of wave condition or the usefulness of the device is dramatically reduced. The PowerBuoy® must, therefore, harness power efficiently, store it effectively, and delivery it reliably. Happily, the defense provenance of these devices, which has extremely stringent and nearly identical availability and reliability requirements, has allowed this technology to be successfully developed and fully achieved. Current commercially available PowerBuoy® devices can deliver power to a payload even after a period of more than 7 days of flat calm seas and have built-in control algorithms that allow this period to be extended significantly by adaptive power management techniques.

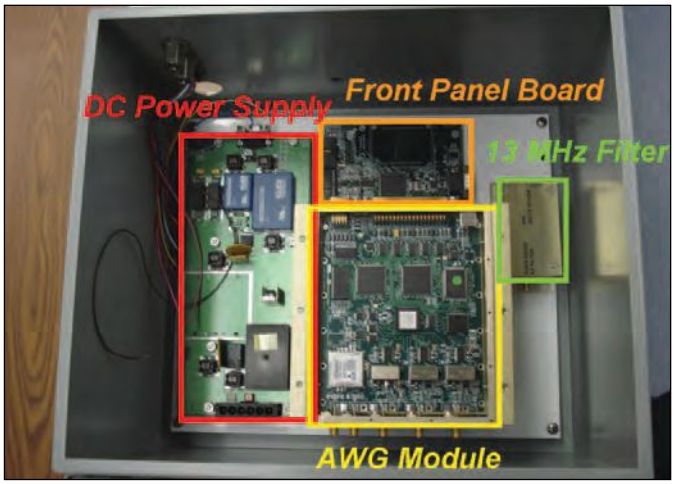


Figure 2 *Components of the bistatic transmitter DC power supply (red), front panel board (orange), advanced waveform generator (AWG) module (yellow), and 13MHz filter (green)*

Importantly, the whole suite of available autonomous PowerBuoy® devices has been designed to be a technology agnostic platform, in that they can power any (practically constrained) payload without foreknowledge of the purpose of any such payload. The practical considerations include how large and heavy the payload is, where the sensor is to be housed (internal or external to the buoy), and the power characteristics for the payload. For most intents and purposes, autonomous PowerBuoy® devices can be envisaged as a self recharging battery housed on a floating platform and capable of supporting, housing, or supplying a sensor suite selected by the customer. The way the power is used depends on customer requirements, constrained in exactly the same fashion as would be the case with a store-bought rechargeable battery. This gives the user the capability to draw on the available power in many different ways; for example, to have 100% power delivery 24 hrs/day (say 300 to 500W continuous), or take all the available energy over say 1 hr/day for a high-powered application (e.g., 4 to 5kW continuously over that hour), or to do any power draw intermediate of these approaches. The graph shows the power draw characteristics that might be applicable for a conservative wave energy site.

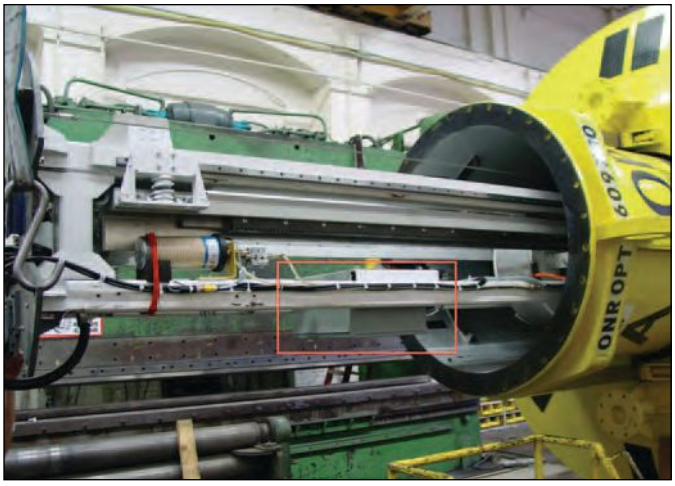


Figure 3 *Picture of the 13MHz bistatic transmitter package (outlined by the red rectangle) installed inside the LEAP buoy*

Similarly flexible is the physical system configuration for the payloads. Customer sensors can be housed within the PowerBuoy®, on the external surfaces (above and/or below the water) or remote to the device fed by an umbilical cable from the buoy. Hence, the power platform is extremely flexible and configurable and offers the chance to power today's known suite of payloads and any future requirements that might emerge as the applications expand.

Example application

In the summer of 2011, the first 500W continuous Autonomous PowerBuoy® was demonstrated off the coast of New Jersey. Developed under a U.S. Navy contract, the project was named the Littoral Expeditionary Autonomous PowerBuoy® (LEAP). The LEAP program sought to extend the range and provide additional directional capabilities to an existing shore-based High Frequency (HF) radar network by using a bistatic transmitter system augmented by an HF transmitter placed 35km offshore on the PowerBuoy®.

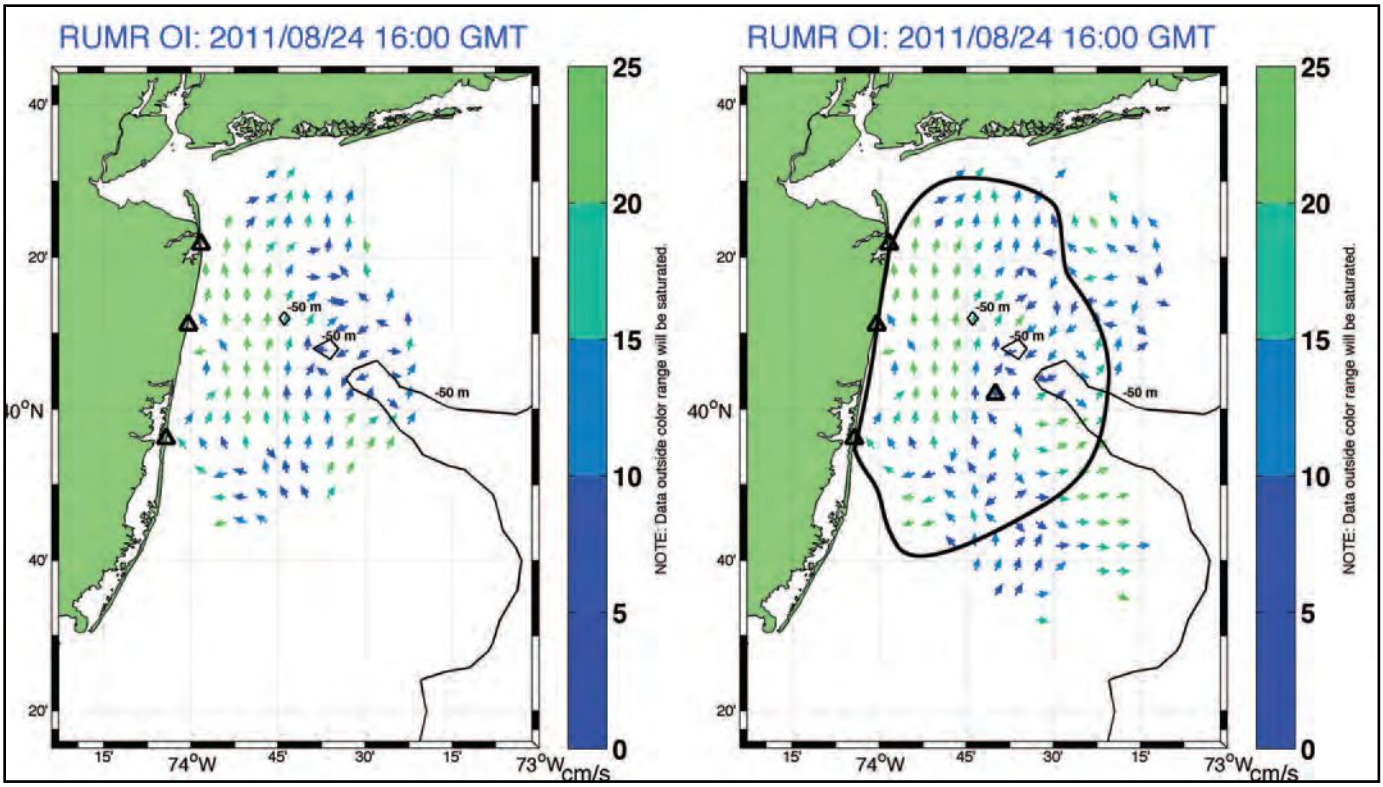


Figure 4 *Map of surface currents captured by the Rutgers HF radar network on 24 August 2011 at 16:00 GMT. The location of the radar sites and PowerBuoy® are shown as the black triangles. The figure on the left depicts the currents measured by the three radars in monostatic mode. The figure on the right show the currents measured by the three radars in bistatic mode (the three monostatic signals along with the signal from the bistatic buoy measured at all three radar shore stations). The thin black line is the 50m isobaths, and the thick, black line indicates the coverage in monostatic mode.*

Under the LEAP program, OPT integrated its autonomous PowerBuoy® with the HF radar network and communications infrastructure from Rutgers University's Coastal Ocean Observation Laboratory (RUCOOL). The LEAP system was deployed on 11 August 2011 (Figure 1) by a U.S. Coast Guard (USCG) vessel and was ocean-tested approximately 20mi off the coast of New Jersey until its recovery on 31 October 2011. It was integrated with the Rutgers University-operated, land-based radar network that provides ocean current mapping data for the National Oceanographic and Atmospheric Administration (NOAA) and USCG search and rescue operations. Rutgers is also developing the dual-use capability of the radar for environmental monitoring and vessel detection. The ocean test of the LEAP system enhanced the dual-use capability of the radar network.

The payload bay on this PowerBuoy® platform is modular, and the payload for this exercise was a bistatic transmitter manufactured by CODAR Ocean Sensors located in Mountain View, California. The payload consisted of a small enclosure that housed the radio transmitter, power supply, and radio filters (Figure 2) connected to a 20ft fiberglass antenna. The enclosure was placed inside of the spar section of the PowerBuoy® (Figure 3), and the antenna was placed atop the superstructure of the buoy. The enclosure had a volume of 1ft3 with a weight of 25lbs. The system had a continuous power draw of 120W, 45W being used for the signal generation.

HF radars are increasingly configured as distributed networks of multiple radars operating in monostatic mode, where the radar transmitter and receiver are collocated in space. Each monostatic radar site generates a map of the radial component of the ocean currents. By combining the radial current data from multiple radars with different look angles, a map of the total velocity vectors can be generated. Bistatic operation is an advance that enables the HF radar transmitter and receiver to be separated in space. In bistatic

Figure 5 *Communcations relay buoy - the Micro-Buoy*

Figure 6 *PowerBuoy with cabled arrays*

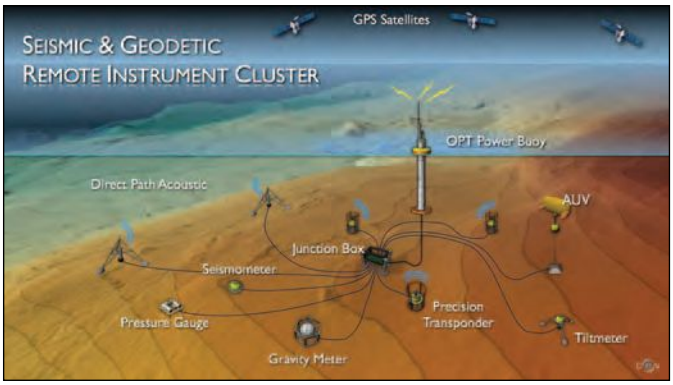


Figure 7 *Seismic & geodetic remote instrument cluster*

mode, a receiver can acquire radar signals from any transmitter within range. For this example, three shore stations in northern New Jersey received the signal from the PowerBuoy®. The bistatic data provide current component observations from additional look angles, increasing the range and robustness of the total vector maps. In this case, the PowerBuoy® increased the coverage of the HF radar network by 55% (see Figure 4).

Other ocean observatory application concepts

Autonomous PowerBuoys® have been constructed to be a payload platform. As such, while the HF radar application discussed above proves the concept and power performance characteristics, this is not a full picture of the offering. The table below represents some other potential uses.

Potential Payloads
Acoustics (passive and active)
CTD
Video (visible/IR) and lights
Seismometers
RADAR
Communications (satellite, VHF, acoustic, cellular, WiFi, etc.)
AUV docking
Mini-ROV power and communications
Environmental quality and chemistry sensors
Seafloor monitoring
Wave and current monitoring

For the majority of ocean-observing applications, a connection to the seabed is required. In the normal manner of a cabled observatory, a main connection interface center would link distributed to the power and communication feed. A wide variety of communication protocols can be supported, depending on customer preference, transmission distance, and data rates – although, DSL has been recognized as a cheap and effective solution in similar applications. In this circumstance, such a line would be fed directly from the PowerBuoy®, which as well as feeding power, provides the means of transmitting the data back to a central land site. Some example arrangements are shown in Figures 6 and 7.

Multiple LEAP-sized PowerBuoys® can be deployed in the same area, depending on the geographic spread and power requirements of the system. Distributed systems can be arranged with essentially any physical distance between main nodes being supported simply and easily.

One of the key benefits of this type of arrangement over a cabled system is scalability; the day one configuration can be enhanced or grown as required over time. In addition, if the demands change and the site is no longer of interest (perhaps the experiments have run their course), the equipment can be easily recovered and redeployed to a site of the customer's choice.

Therefore, the return on capital cost can be realized not only over many years, but potentially in many physical locations as well – offering the potential for a group of academic organizations to have access to a bank of resources, similar to what is achieved with the UNOLS vessel fleet.

Where high bandwidth transmission back to shore is required (i.e., beyond the range of the Iridium satellite system), a chain of wave energy-powered communications relays can be placed, providing a robust and cost-effective means of transmitting data at very high bandwidth. These "microbuoys" (Figure 5) are designed to be deployed simply and easily from a small boat with a minimal anchoring system, and, thus, represent a very minor capital cost. They also offer the potential to communicate to multiple LEAP-style higher PowerBuoy® locations (nodes), which presents the option for deployment as a mesh-type communications network and supplying both maximum bandwidth and maximum redundancy/reliability. If only modest data bandwidth requirements exist, then Iridium or other satellite-based communications can suffice to fill the requirement directly from the main node. This becomes possible in many applications by making use of the in-buoy payload spaces to house data processing equipment to perform data processing and manipulation locally, reducing the data set by applying data-sifting or compacting algorithms prior to transmission.

Conclusions

As the economic climate tightens or, perhaps more accurately, remains prohibitively tight, ways must be sought to support oceanography professionals as they seek to push the knowledge set forward. The drive for long-time series measurement of the oceans is critical to the development of knowledge about the earth system as a whole. Therefore, cost-effective ways must be found to allow this critical knowledge to be gathered.

While the "A+" option has been seen as a cabled observatory, technology has advanced such that a PowerBuoy® system can now offer a very compelling alternative that can meet or, in some cases, exceed the performance of such systems. Wave energy-powered observatory systems, offering 90% of the functionality at a fraction of the cost of a cabled system, may provide a solution where research can continue and perhaps even expand – even within the current economic constraints.

The future of ocean exploration: The EXOSUIT

The EXOSUIT, the next huge leap forward in the world of the undersea exploration, was unveiled at North America's largest diving show, Beneath the Sea, by Dr. Phil Nuytten, designer and manufacturer of the revolutionary submersible.

Developed and built in North Vancouver by Nuytco Research Ltd, this hard metal dive suit allows divers to operate safely down to a depth of 1,000ft and yet still have exceptional dexterity and flexibility to perform delicate work. The amazing technology of the EXOSUIT atmospheric diving system (ADS) maintains a cabin pressure of the surface and still allows the suit to bend due to a unique rotary joint invented by Dr. Phil Nuytten.

The EXOSUIT, looking more like a spacesuit than a diving suit, incorporates an advanced design with operational capabilities far exceeding existing present day undersea technologies. The suit is a fully-certified submarine in the shape of a human being. It has its own life support, which is capable of sustaining an operator for up to 50hrs. There is a fiber-optic tether supplying full network capability between the EXOSUIT operator and the surface. This allows suit telemetry (the monitoring of life-support systems, sonar management, and communications), and high-definition video to be sent to the surface. The EXOSUIT "flight pack" has thrusters that are more powerful and yet more sensitive to the operator's inputs than previous one-atmosphere hard suits, allowing the pilot of the submersible to fly effortlessly through our oceans.

The EXOSUIT is a natural successor to Nuytco Research's original Newtsuit. Like its predecessor, the EXOSUIT will become an invaluable tool for research scientists around the globe as well as commercial dive companies, military organizations, and explorers.

For more information, visit www.exosuit.com.

UTEC acquires second AUV to increase global productivity

UTEC has completed factory acceptance tests and taken delivery of an additional Teledyne Gavia AUV (#27) to expand its AUV fleet. UTEC's fleet of 1,000m-rated AUV systems are licensed for use in 67 countries from UTEC's Houston base.

Recently, UTEC formally extended its agreement with the University of Delaware, which provides access to the University's Gavia AUV "DORA." The parties intend to build upon the established relationship, now in its third year, to continue to share knowledge and benefit from increased asset availability.

The AUVs incorporate many key features, including a nosecone-mounted digital stills camera and Imagenex obstacle avoidance sonar and the Inertial Navigation System-T-24 IMU by Kearfott DVL, which is aided by 1,200kHz Doppler Velocity Log from Teledyne RDI. Additionally, both of UTEC's AUVs have a side-scan sonar – dual-frequency (900 to 1,800kHZ) by Marine Sonics Technology Ltd., and a multi-beam echo sounder – Geoswath Plus by GeoAcoustics.

For more information, visit www.UTECSurvey.com.

Unique supplies Hydra 09 SDS to DCN Diving

Unique System FZE, a Unique Maritime Group Company and one of the world's leading integrated turnkey subsea and offshore solution provider, announced a new project with DCN. It has been awarded the contract to supply the Hydra 09 saturation diving system.

Hydra 09, an ABS Classed 9 Man Saturation System complete with HRC, is built by Unique Hydra in South Africa. The contract provides DCN, over a period of time, with a cost-effective way of securing ownership of this dive system. The first deployment will be in Spain, and Unique will also assist in the mobilization of the system onto the dive platform for DCN.

For more information, visit www.uniquegroup.com.

Smart ROV tools safeguard the environment

Checking for residual fuel in a 70 year-old sunken wreck without opening the tanks and risking an environmental catastrophe needed a clever solution.

The ingenious answer came from Global Diving and Salvage who created a unique sampling system that is mounted on a Saab Seaeye Cougar XT ROV and can penetrate a sealed container and extract a sample without creating a leak point.

They were contracted by the U.S. Coastguard to determine if oil was present aboard the S.S. Montebello, a tanker torpedoed in 1941 off the coast of California.

During their investigations, Global fitted-out the Cougar with a range of tools to perform 3D modeling, sonar inspection, thickness gauging, a backscatter investigation, the physical sampling of the ship's fuel tanks, and sediment sampling of the general area.

A Tracerco neutron backscatter system was used to help determine the likelihood of oil in the wreck's cargo holds. This backscatter tool is a non-invasive, contents-sensing device, something like an x-ray that emits neutron particles capable of passing through insulation material and carbon steel to determine the presence of content. It was mounted on a skid attached to the ROV and integrated with the vehicle's control package. The ROV's powerful and responsive thrusters held the system steady while the backscatter operation was carried out.

Due to 275m water depth, and the potential risk of leakage of the tank contents, the development of Global's unique sampling tool system to extract a sample was paramount to the success of the operation. The innovative feature meant that when the hole was drilled through the tank and a sample taken, the hole was then sealed – all in one leak-proof operation without fittings or valves. It was essential that the sampling system was held steady by the ROV's responsive power and suction cups whilst the sample was taken and the surface sealed.

The mission discovered that no oil was present in the wreck and that it offers no threat to the ecological environment.

For more information, visit www.seaeye.com.

Hydroid launches AUV designed for survey applications

Hydroid, Inc., a subsidiary of Kongsberg Maritime, announced its newest AUV, the REMUS 600 Survey (REMUS 600-S) – at the XVIII International Hydrographic Conference (IHC) in Monaco. The REMUS 600-S is a high performance version of the successful REMUS 600 AUV and features advanced technology that has only previously been available in Kongsberg's accomplished HUGIN vehicles, making it ideal for applications such as International Hydrographic Organization (IHO) quality surveys. Specifically, the REMUS 600-S incorporates a Kongsberg EM 3002 multibeam echosounder (MBES) operating at 300kHz. The MBES has previously been shown to exceed the feature-detection requirements of the IHO standard S-44 for Order 1a surveys.

The vehicle also features Kongsberg's Navigation Processing Suite (NavP), which improves timing accuracy to 1ms or better and provides complete time synchronization of all onboard sensors, and the Navigation Laboratory (NavLab) software, which enhances the NavP by

increasing navigational integrity.

The REMUS 600-S benefits United Nations Convention on the Law of the Sea (UNCLS) surveys, search and recovery operations, emergency response surveys, rapid environmental assessment and military survey operations by providing a transportable and reliable platform to gather high-resolution data.

The vehicle comes equipped with a full suite of communications options, including Iridium, Wi-Fi, and acoustic communication; Hydroid's flexible vehicle interface program; and an EdgeTech 2200-S sidescan sonar.

For more information, visit www.hydroid.com.

Kongsberg Evotec LARS selected for new Forland Shipping vessel

Kongsberg Evotec, has been selected to supply its sophisticated new Launch and Recovery System (E-LARS) for Remotely Operated Vehicles (ROV), for installation on a new Forland Shipping AS subsea vessel currently under construction at Havyard Leirvik, Norway.

The Kongsberg Evotec's E-LARS installation for Forland Shipping's new 110m long, 22m wide subsea vessel, which is due for delivery in 2013, consists of both an "overboard" system and a "moon pool" system. The system is designed to handle workclass ROVs, with or without a tether management system to depths below 4,000m.

Kongsberg Evotec designed E-LARS in close cooperation with end users, umbilical manufacturers, and ship designers in order to provide improved ROV handling capabilities, with emphasis on operational environment and safety for both operator and equipment. Based on this, the innovative design and application of technology results in better personnel safety and optimal ROV uptime in addition to simplified system maintenance and longer service intervals.

Technical highlights of the new system include the use of permanent magnet motor (PM) technology and an innovative control system designed to achieve significant operational benefits by providing the operator with continuous real-time information about capacity and umbilical status and history. E-LARS also features Kongsberg Evotec-developed Active Heave Compensation that operates on minimal power consumption.

For more information, visit www.kongsberg.com.

Ezra Marine awards Rapp Hydema contract for ROV moon pool

The contract covers the delivery of two complete ROV Moon Pool (MP) handling systems for Ezra's new build vessel Constellation. The systems to be supplied by Rapp are the latest generation of ROV MP handling systems designed for workclass ROV operations down to 4,000m in harsh weather. All winches are fully electric, and each system has full redundancy and active heave compensation (AHC) for optimum operational safety.

Rapp's ROV MP handling systems utilize a subsea snubber that is launched beneath the vessels keel line. This design secures a softer latching of the tether management system and secures a safer launch and recovery in harsh weather. The advanced Pentagon™ control system from Rapp has both automatic launch and recovery modes. In automatic mode, all of the winches involved in the operation are automatically controlled and synchronized in sequences by the PLC control system. This feature allows for safe operation by a single operator.

For more information, visit www.rappmarine.com.

International Submarine Engineering Ltd. Underwater vehicle specialists since 1974

Arctic Explorer AUVs on board MV Researcher during trials

Overview

ISE was founded in 1974 by Dr. James R. McFarlane, OC, CD, P.Eng., FCAE. Dr. McFarlane and his team build Remotely Operated Vehicles (ROVs), Autonomous Underwater Vehicles (AUVs), submersibles, autonomous semi-submersibles, robotic manipulators and control systems. Based in Port Coquitlam, BC, Canada, ISE has delivered 240 underwater vehicles as well as over 400 robotic manipulator systems to more than 20 countries around the world.

ROVs

ISE was initially formed to design and build Remotely Operated Vehicles (ROVs). ISE vehicles are in use worldwide in support of offshore oil and gas, military operations, search and recovery, and oceanographic research. One of the first pipeline inspection vehicles that worked in the North Sea off the coast of Scotland was an ISE TROV.

Since ISE began manufacturing ROVs they have been a leader in the development of subsea technology. ISE's ROVs are produced to ISO 9001:2008 standards which provide the QC/QA procedures required to provide vehicle and control systems that are manufactured to the highest standards of quality. Many of ISE's vehicles have provided operational service for over 20 years.

ROVs are not limited to the subsea environment. There are also diverse land-based systems. ISE has developed and manufactured innovative solutions to meet a wide array of customer requirements since its inception. Today, ISE continues to produce robust ROVs with over 37 years of technical expertise.

AUVs

In 1981 ISE identified the potential for a new type of underwater system, Autonomous Underwater Vehicles (AUVs). ISE began a development program to diversify business and utilize substantial experience derived from building manned submersibles and ROV technology.

ISEs first AUV development was ARCS that is widely recognized as the first truly autonomous submersible system. From 1982 until its retirement in 1999 ARCS provided a robust development platform that hosted over 100 different sensor packages. In 1996 ISE, developed the AUV THESEUS to lay fibre-optic cable in the Arctic for the Canadian and US Navies. In 1998, Theseus was deployed in the Arctic and laid a 175km fibre optic cable on a single mission and then returned the 175km to the hole in the ice it had been launched through. Theseus is the largest AUV in operation and held the record for the longest AUV mission, 350km, all of which was under ice.

Now that AUVs have proven themselves as viable commercial tools, ISE again leads the technology with its Explorer AUV line. Explorer is recognized as a stable and reliable survey platform capable of carrying a myriad of payload sensors. Explorer is available in various configurations, with depth ratings to 5000m and endurance options up to 85hrs.

Customer Support

Since ISE was formed we have built strong and lasting relationships with our diverse list of customers, suppliers and other organizations around the world. ISE provides training services and ongoing technical support for all of the ISE products; HOVs, ROVs, AUVs, manipulators, robotics and control systems at the factory and in the field.

Innovative Solutions

In order to ensure ISE's products feature the most up to date designs and technology we place special value in research and development. Since 1984 ISE has developed hydrodynamic models, vehicle controllers and positioning algorithms, mission specific sensors, power sources and vehicles.

In addition to ISE's core products of ROVs and AUVs, ISE has developed robotic products and has been heavily involved in new concepts and designs. Some developments include: SmartPump – a gas station for refuelling passenger cars for the Shell Oil Company; a ten passenger private luxury submersible certified by the American Bureau of Shipping to 365m operational depth; PRMS – the Pressurized Rescue Module System for US Navy Submarine evacuation; and a testbed manipulator system for the Canadian Space Agency astronaut robotic arm manipulator training station and remotely controlled mining vehicles.

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

Shin Nippon Kaiji (SNK) HAKUYO - 150HP ROV - 3000 M Depth

SES-4 satellite now operational
SES S.A. announced that the SES-4 satellite is now fully operational and ready for service at the orbital location of 338° East longitude, providing support for maritime communications users and other customers. SES-4 was successfully launched from the Baikonur Cosmodrome in Kazakhstan onboard an ILS Proton Breeze M booster on 15 February 2012. SES-4 replaces the NSS-7 satellite at 338° East longitude and provides replacement as well as incremental capacity at this well-established SES orbital slot over the Atlantic Ocean. SES-4 is a 20KW satellite manufactured on the flight-proven Space Systems/Loral 1300 platform, with 52 C-band and 72 Ku-band transponders. It has C-band beams serving the eastern hemisphere of Europe and Africa and providing full coverage of the Americas, plus a global C-band beam to support mobile and maritime customers. Four high-power, regional Ku-band beams provide service to Europe, the Middle East, and West Africa, as well as North and South America, with extensive channel switching capability between C-band and Ku-band transponders for enhanced connectivity. The satellite is designed to deliver services for 15 years or more.

Comtech EF Data receives 2011 product of the year award
Comtech EF Data Corporation announced that its Advanced VSAT Solutions received the 2011 Product of the Year Award from Satellite Spotlight, a leading website delivering satellite technology news operated by TMC. The Advanced VSAT Solutions portfolio provides high-performance satellite-based communication solutions for a diverse range of applications, including mobile backhaul with RAN optimization, IP trunking and backhaul, maritime and offshore networks, corporate and enterprise networks, and emergency and disaster recovery. Incorporating advanced technologies developed by Comtech EF Data, AHA Products Group, Memotec, and Stampede, the solutions provide unmatched performance, industry-leading bandwidth efficiencies and network optimization, while minimizing total cost of ownership. The Advanced VSAT incorporates industry-leading optimization at every layer. DVB-S2 and VersaFEC with ACM/VCM enable efficient physical layer without compromising latency, while the ultra low overhead Streamline Encapsulation and Enhanced GSE enable efficient link layer. Header compression and lossless payload compression enable efficient transport for IP datagrams, and RAN optimization minimizes the bandwidth. The Advanced QoS and Group QoS ensure the highest quality of service with minimal jitter and latency for real-time traffic, priority treatment of mission critical applications, and maximum bandwidth efficiency.

Cornet, Hose-McCann team on all IP shipboard solution
Cornet Technology, Inc. (CTI) and Hose-McCann announced that they are working together to combine their individual communications solutions both optimized for size, weight, power, and cost (SWAP-C) into a single all-IP communications offering ideal for the U.S. Navy and Coast Guard. Cornet Technology, an expert in secure/non-secure communication subsystems, will be providing the all-IP exterior communication systems, while Hose-McCann will lend its communications expertise to the interior IP communications system. The two systems will be tied together via CTI's CT-5200 VoIP communications terminal. Through the CT-5200's efficient and highly programmable user interface, users will have access to alarms, public address systems, conferences, phones, radios, and entertainment.

Boatracs becomes KVH value added service provider for mini-VSAT

KVH Industries, Inc., has named Boatracs Inc. the first Value Added Service Provider (VASP) for its mini-VSAT Broadband℠ service. This collaboration will deliver an end-to-end fleet management package for the commercial workboat and fishing markets, bringing Boatracs' market leading software applications to vessels via a reliable broadband connection in a single package. Sold under the name "Boatracs Broadband Fleet Management Solution," this innovative package includes a KVH TracPhone® V3 and mini-VSAT Broadband℠ service for global broadband connectivity as well as Boatracs maritime software platforms, Boatracs BTConnect® and Boatracs BTForms™.

The TracPhone V3 is the world's smallest maritime VSAT antenna, designed for vessels as small as 30ft. With airtime rates 1/10th the cost of L-band systems, the TracPhone V3 offers downloads as fast as 2Mbps at $0.99/MB and phone calls worldwide at only $0.49/min. The TracPhone V3's small size, fast data rates, and affordable service have brought the power of satellite communications within reach for commercial vessels.

Boatracs BTConnect is a web-based solution that integrates message and mapping functionality, providing access to fleet-wide data from anywhere, on any device. With features such as route planning, custom landmarks, and global map layers, this solution ties together the critical functions of visually managing a fleet with two-way messaging to improve dispatching, accelerate invoicing, and streamline shore side operations. Boatracs BTForms is an electronic forms solution that automates and simplifies vessel data collection for operations, reporting, and compliance record keeping.

For more information, visit www.boatracs.com.

Harris CapRock picked as provider to Royal Caribbean Cruises

Harris CapRock Communications has signed a 5-year agreement with cruise operator Royal Caribbean Cruises Ltd. to provide communications services onboard its fleet of 34 ships in the Royal Caribbean International, Celebrity Cruises, and Azamara Club Cruises brands. The hybrid satellite and terrestrial communications solution will enable Royal Caribbean to dramatically improve overall communications performance while enhancing guest experience and crew morale.

To meet Royal Caribbean's needs for vessel administration, guest satisfaction, and crew welfare, Harris CapRock will deploy a fully managed, end-to-end Very Small Aperture Terminal (VSAT) and terrestrial communications solution that will enable access to Royal Caribbean's corporate network and business applications, broadband Internet, and telephone services. Royal Caribbean will receive equipment, installation, maintenance, service, and 24/7 proactive monitoring and support from Harris CapRock's global Customer Support Center.

The hybrid solution combines Ku-band, C-band, and shore wireless connectivity, designed so that the ships can switch seamlessly from one preferred platform to another to maximize service availability and avoid downtime. Each ship will be equipped with two or three of Harris CapRock's stabilized VSAT antenna systems to provide the optimal level of flexibility and availability.

For more information, visit www.harriscaprock.com.

First appointments for XpressLink dealer network

Inmarsat announced the first appointments for its global network of XpressLink dealers. Twelve of the world's most-respected maritime communications specialists have been approved to sell XpressLink, providing access to shipping fleets worldwide through sales teams based in North America, Europe, the Middle East, and Asia.

Inmarsat issued an invitation to distribution partners, service providers and system integrators in early March to confirm interest in becoming an XpressLink dealer, with a positive response from more than 80%. Negotiations with the majority of applicants are now at an advanced stage. The initial 12 dealers that have completed the rigorous selection process are: Anchor Marine Equipment & Repair Company, AND Group, Arskom Marine, DH-INTERCOM, Elcome, Hellenic Radio Services, Navarino, One Net, Otesat-Maritel, Satlink, Station Satcom, and Tile Marine.

XpressLink offers a fully-integrated Ku-band and L-band solution for a fixed monthly cost. A complete solution managed by Inmarsat, it delivers a compelling combination of broadband speed, a reliable and high-quality service, and global coverage. XpressLink supports always-on data speeds of 768kbps, with a committed information rate of 192kbps, when the VSAT service is active.

For more information, visit www.inmarsat.com.

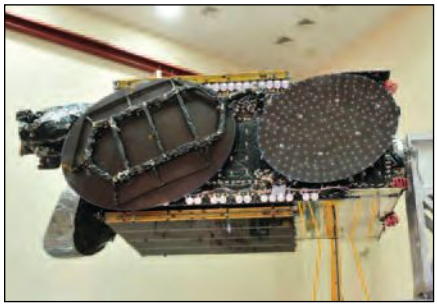
Space Systems/Loral completes Intelsat 19

Space Systems/Loral (SS/L) announced that the Intelsat 19 satellite, designed and built for Intelsat S.A., the world's leading provider of satellite services, has arrived at the Sea Launch homeport in Long Beach, California. The satellite will be launched aboard a Zenit-3SL rocket from Sea Launch's launch platform Odyssey at its equatorial launch site, located at 154° West longitude in the international waters of the Pacific Ocean.

Intelsat 19 will provide commercial satellite services to high-growth regions around the Pacific Rim, replacing Intelsat 8, which hosts one of Intelsat's premier video neighborhoods. The satellite also features beams that contribute to Intelsat's global mobility network, which, when complete in early 2013, will make Intelsat the first satellite operator to offer continuous worldwide broadband coverage on a single fleet to maritime and aeronautical customers.

From its orbital location at 166° East, Intelsat 19 will offer primary C-band capacity for enhanced distribution of media content to the Pacific Ocean region with connectivity via the U.S. to Europe. It will also provide Ku-band Direct-to-Home (DTH) platforms and network service applications for pan-global Australia.

Based on the highly reliable Space Systems/Loral 1300 platform, the satellite has 34 Ku-band transponders that can be switched between four footprints that cover Australia and the Pacific Ocean region in addition to 24 C-band transponders that will be connected to a high-power footprint covering Australia, New Zealand, Southeast Asia, Japan, and the western U.S. The satellite is designed to deliver service for 15 years or more.



For more information, visit www.ssloral.com.

Vizada, SRH to equip Danaos shipping fleet

Vizada, recently acquired by Astrium, and Vizada Elite Partner SRH Marine Electronics S.A. have signed a 24-month agreement with Danaos Shipping Co. Ltd to equip the company's fleet of vessels with a full broadband communications system. The partners will provide 1GB connectivity over Inmarsat FleetBroadband terminals; connectivity will be further enhanced by Vizada XChange and the Vizada Crew PC for optimal Internet usage.

Danaos Shipping Co. Ltd is a Greece-based ship manager that provides ship management services to one of the world's largest fleets of containerships, while supervising many technically demanding and geographically diverse shipbuilding projects. Thanks to the recently signed deal with SRH Marine Electronics S.A. and Vizada, their fleet of 63 vessels will benefit from high speed internet and telephone connectivity via FleetBroadband for their business and crew communications needs.

SRH will provide the Thrane & Thrane Sailor FleetBroadband terminals. Vizada will enhance the satellite connectivity while providing the all-in-one maritime communications platform Vizada XChange. Vizada XChange, through the onboard box hardware in conjunction with the user interfaces, will allow Danaos IT managers or captains to choose settings and configurations to make the best use of the FleetBroadband connectivity, including web compression and filtering and optimized connectivity switching features.

Vizada will also equip the vessels with Crew PC, the slim, plug-and-play computer solution that is completely preconfigured to match the communication needs of Danaos' crew. Crew can enjoy web browsing, surfing, and chatting with friends and loved ones during their downtime aboard.

For more information, visit www.vizada.com.

Delta Wave introduces new global dispatch solution

Delta Wave Communications, LLC is proud to announce that it is offering a new global dispatch solution. An unprecedented offering, it offers Push to Talk (PTT) and dispatch over satellite, with global coverage utilizing the Inmarsat satellite network.

While the existing satellite based dispatch solution consists of limited coverage in North America, the new technology offers global coverage and gives the end user on-the fly control when it comes to managing user access. IP-based, it eliminates the necessity of base station equipment, as the software allows the dispatcher to easily create talk groups on the fly. The dispatcher has full control, and can be mobile, since it works anywhere an IP connection exists. It eliminates the need for the dispatcher to remain at one location. Additionally, the technology offers least cost routing, which automatically and seamlessly switches over to 2G/3G/4G networks, further reducing costs to the end user. The technology allows field personnel to access the dispatch network via a smartphone's Bluetooth or Wi-fi connection, creating even greater versatility and range of use. It is a suitable alternative to the existing G2 technology.

Ideal for maritime customers as well as disaster recovery and emergency preparedness personnel, the service utilizes Thrane and Thrane's land, vehicular, and marine-based Inmarsat terminals. Thrane BGAN terminals are portable, very easy to set up, and require minutes to deploy in the field or acquire Internet connectivity. Additionally, the equipment also allows the field personnel to access the Internet as well as send/receive e-mail globally in remote locations where terrestrial or cellular networks do not exist.

For more information, visit www.deltawavecomm.com.

Boatracs receives NOAA type approval for HMS fisheries

Boatracs Inc. has received type approval from the National Oceanic and Atmospheric Administration (NOAA) for its enhanced Vessel Monitoring System (VMS) to be used by Atlantic Highly Migratory Species (HMS) permit holders in the Gulf of Mexico.

Recent updates to the National Marine Fisheries Service (NMFS) rules require an increased number of HMS commercial fishermen to install and operate enhanced communications systems for position reporting as well as communicating onboard gear and target species. The type approval of Boatracs' Fishing Mobile Communication Terminal GPS (FMCTG) for this fishery gives fishermen in the Gulf of Mexico a reliable, cost-effective, and easy-to-use solution to efficiently manage their boats while staying compliant.

In addition to the VMS solution, fishermen have the option to sign up for Boatracs' new web-based mapping and messaging software, Boatracs BTConnect™, which enables boat owners to track and message their vessels from any Internet connected device, including mobile phones, tablets, and PCs.

For more information, visit www.boatracs.com.

Globecomm Systems to provide Navy's first onboard IP video entertainment system

Globecomm Systems Inc., as a Cisco Service Provider Video Technology Partner, has been selected to deliver an enhanced communications distribution infrastructure for the Navy's newest nuclear supercarrier, Gerald R. Ford (CVN78). The contract, valued at $3.5 million, represents a significant technological upgrade to the Navy's existing analog system for video acquisition and onboard content delivery.

As a turnkey solutions provider/systems integration (SI) subcontractor to Huntington Ingalls Industries' Newport News Shipbuilding operation, the Globecomm/Cisco team has employed best-in-class solutions from Cisco's digital media suite. The design consists of a multi-functional, satellite-based entertainment system for a ship under construction–the first of the new Ford-class supercarrier. The new enhanced SITE TV–the first IP video system for the U.S. Navy fleet–will provide tremendous cost savings, along with enhanced quality, scalability, and flexibility to add new capabilities and services in the future. Globecomm and Cisco will document the architecture for publication to potential customers, illustrating the enticing business case of enhanced services and the potential for OPEX reductions.

A 10G Cisco backbone will support the system as well as the ship's video surveillance capabilities, providing sailors with access to live streaming media options, multimedia programming access while at sea, and pier-side cable services. It will also provide an interface to the ship's onboard video production studio where live or pre-recorded broadcasts can be accessed and viewed. Other capabilities include video on demand (VoD), digital signage, and collaborative access via Cisco's Show and Share webcasting and video sharing application.

For more information, visit www.globecommsystems.com.

Jotron Group merges all Norwegian operations

The Jotron Group will merge their Norwegian companies: Jotron AS, Jotron Phontech AS, and Jotron SatCom AS. The name of the new company will be Jotron AS.

Kongsberg Maritime has, as previously announced by the two companies in March 2012, already acquired 100% of the shares in Jotron Consultas AS.

Jotron AS will be organized according to the following market segments:

- Maritime & Energy: Customer division responsible for all business with maritime and energy customers worldwide.
- ATC & Coastal Communication: Customer division responsible for all business with Air Traffic Control, (ATC) customers as well as coastal (shore to ship) communication projects.

After the merger, Jotron AS will have annual turnover of 305 MNOK and 150 employees. The new organization will officially take affect 1 July 2012.

For more information, visit www.jotron.com.

Subsea Cables

ABB wins offshore wind connection order in Germany

ABB has won a significant order from the Dutch-German transmission grid operator TenneT to supply an AC power transmission link connecting Nordergründe, an offshore North Sea wind farm, to the mainland grid in Germany. The order was booked in the first quarter. The link has a capacity to transmit 111MW of clean wind power – enough to serve the needs of more than 100,000 households and help save up to 500,000tons of CO_2 emissions per year, once commissioned in 2013, by replacing fossil fueled generation. As part of the project scope, ABB will design, engineer, supply, and install the 155kV land and submarine cable system, the onshore and offshore shunt reactors, the onshore 155/220 kV power transformer, and the extension of an existing 220kV substation. The cable system comprises 3x4km of single-core AC land cable and 28km of three-core AC submarine cable with integrated fiber optics. ABB has previously received three large orders from TenneT for offshore wind connections with its efficient HVDC Light technology. BorWin1 has already been commissioned and DolWin1 and DolWin2 are under execution. These three connections and Nordergründe were planned before 2011.

APTelecom appointed as pre-sales manager for Pacific Fibre

APTelecom announced the addition of Pacific Fibre to its growing roster of submarine cable pre-sales consulting clients. As part of the engagement, APTelecom will be tasked with managing a significant portion of the pre-sales efforts for Pacific Fibre's soon-to-be-constructed subsea cable system. Expected to go live in 2014, the Pacific Fibre cable will be one of the longest and most technically advanced cable systems. The cable system will link Los Angeles directly to Auckland, New Zealand and then continue to Sydney, Australia via a trans-Tasman link; it will offer the fastest route from Australia and New Zealand to the U.S. With an initial design speed of 10.2Tbps using 40Gbps technology, it will have the largest forecast capacity of any cable in the region.

Alcatel-Lucent to build Tonga-Fiji cable

Alcatel-Lucent has been selected by Tonga Cable Limited to deliver an undersea cable link between the Kingdom of Tonga and its neighbor Fiji, bringing to the Tongan islands broadband services such as streaming video and high-speed Internet access to residents and tourists alike. The 837km link with Fiji will provide Tonga with access to the Southern Cross Cable, the main trans-Pacific link between Australia and the U.S. It will significantly boost connectivity and substantially increase the availability of broadband services for Tonga's 100,000 residents and help spur economic growth. Under the agreement, Alcatel-Lucent will deploy its advanced submarine optical solution based on the OALC-5 cables, repeaters, and the 1620 Light Manager (LM) submarine line terminal – which can accommodate 10G/40G/100G wavelengths in the same platform. The installation will be performed by Alcatel-Lucent's Ile de Ré cable ship, which is based in the region and is specialized for laying and maintenance operations.

SubCom completes TGN-EA and TGN-Gulf

TE SubCom has completed construction of the TGN-EA (Jeddah) and TGN-Gulf undersea cables for Tata Communications. TGN-EA (Jeddah) connects Saudi Arabia, Egypt, and India, while TGN-Gulf links Oman, India, United Arab Emirates, Saudi Arabia, Qatar, and Bahrain. Both TGN-EA (Jeddah) and TGN-Gulf are high-capacity, multi-terabit systems that will add diversity to Tata Communications' existing undersea network infrastructure and connect it to key business hubs in the region.

Study to look at UK-Denmark power interconnector

National Grid and Denmark's Energinet.dk have announced the start of a study to look at the possibility of a first electricity power connection between Great Britain and Denmark.

Work will start immediately with the aim to compete the study by the end of 2012. This new "pre-feasibility" study is a very early stage to examine the possibilities for a new subsea cable, which would offer an option for interconnector trading between the two countries.

The study will look at different technical solutions, possible project benefits, potential routes and landing points, the capacity of the cable, and potential commissioning timetable. It will also examine how the new cable would help countries export and import renewable power as well as be part of a future North Sea "super grid" to connect offshore wind power.

Great Britain currently has three operational cable interconnectors with Ireland, France, and the Netherlands, and there are projects looking at connections with Norway and Belgium and increasing capacity with France and Ireland.

Denmark has interconnectors with Norway, Sweden, and Germany and is currently building a new interconnector to Norway and investigating the possibility of establishing an interconnection between Denmark and the Netherlands.

For more information, visit www.energinet.dk.

Tata to become anchor tenant customer on Seaborn

Tata Communications and Seaborn Networks, the developer and operator of the first direct submarine fiber optic cable between the U.S. and Sao Paulo, Brazil, announce Tata Communications' intent to become an anchor tenant customer on Seaborn Networks' cable system.

Seaborn Network's cable system, Seabras-1, will enable Tata Communications to provide fully integrated network services from Brazil to its networks in the U.S., Europe, Africa, Asia, and India.

As Brazil prepares to host the 2014 World Cup and the 2016 Summer Olympics, the country is experiencing landmark development requirements in its telecommunications industry. The 2011 telecommunications investments in Brazil exceeded US$11.8 billion, according to a recent report from Telebrasil, and Pioneer Consulting forecasts that international submarine capacity demand for Latin America will be more than 32Tbps by 2020.

Seaborn Networks plans for the Seabras-1 system to be ready for service in the fourth quarter of 2014.

For more information, visit www.seabornnetworks.com.

GBI uses first 100G repeatered link from Xtera

Gulf Bridge International (GBI) and Xtera Communications, Inc. (Xtera) have announced what they believe to be the first commercial repeatered submarine cable system in service with 100G technology. Xtera deployed its multi-purpose Nu-Wave Optima™ platform in a submarine line terminal equipment (SLTE) configuration delivering 100G waves on a fiber pair in the Mediterranean Sea on the network connecting Egypt to Italy.

The Mediterranean has its first 100G submarine cable, with GBI offering routes from Europe to the Middle East and onto Asia. GBI is counting on the most advanced optical networking technology developments to deliver new services to the Middle East and beyond. The 100G line transmission rate deployment, which was announced 6 months ago, will play a key role in GBI's service delivery strategy.

Xtera's Nu-Wave Optima™ platform is a unique modular optical transport system designed to lower the total cost of ownership by using a common, integrated set of modules for long-haul, unrepeatered and regional repeatered submarine applications. The Nu-Wave Optima™ configuration for regional repeatered submarine cable system includes a line monitoring module used for the supervision of the submerged repeaters.

Being the first and only 100G equipment in the field since 2011 with soft-decision Forward Error Correction (FEC), Xtera's Nu-Wave Optima™ offers the industry's most advanced 100G solution that is available today for multiple optical networking applications. For terrestrial backbone networks, the Nu-Wave Optima™ equipment delivers an unrivalled line capacity of 15Tbps on more than 3,000km. For unrepeatered applications, a capacity of 34 x 100G was recently transmitted over a cable attenuation exceeding 74dB.

For more information, visit www.xtera.com or www.gbiinc.com.

PCCW Global and ITC sign strategic alliance agreement

PCCW Global, an operating division of HKT (Hong Kong's premier telecommunications service provider), and Iraq's Investment & Technology Group Company (ITC) have signed a strategic alliance agreement.

ITC has won a 15-year investment license from Iraq Telecommunication and Post Company (ITPC) to market transmission capacity over the new Gulf Bridge International (GBI) fiber optic cable network connecting all the Gulf coast countries with Europe and Asia. GBI is a privately-owned fiber optic cable company backed by sovereign wealth funds from the Middle East region. ITC's largest shareholder is Al Mal Investment Co., one of the largest investment management companies in Kuwait, which owns 50% of ITC.

The collaboration enhances Iraq's connection to the rest of the world via PCCW Global's extensive and robust network, which is already connected to over 1,800 cities in 120 countries. PCCW Global's customers worldwide, especially those based in the Middle East-Africa region (MEA), can now access virtually all cities and locations in Iraq through a combination of copper, fiber, microwave, and satellite solutions offered by PCCW Global and ITC.

For more information, visit www.pccw.com.

Iceland-Europe power cable proposed

The Icelandic energy provider, Landsvirkjun, one of Europe's leading renewable energy companies, may help supply Continental Europe with renewable energy via a North Atlantic submarine power cable.

Iceland currently holds a unique position among European nations in its potential to increase reliable electric energy production from renewable energy resources. This increased energy production could be used to conduct business through an interconnector – a submarine cable to Europe across the North Atlantic seabed.

Landsvirkjun proposed additional analysis and research over the next few years into the potential impact on social, environmental, legal, and technical issues that will be undertaken in cooperation with interested parties, including the Icelandic authorities, universities, interest groups, and energy and transmission companies.

Oddny Harthardottir, the Icelandic Minister of Finance, announced that a working group will be appointed to research the feasibility of laying a submarine cable between Iceland and the British Isles and or mainland Europe.

For more information, visit www.landsvirkjun.com.

Prysmian Group secures Vietnam contract

Prysmian Group has been awarded a contract by the Vietnamese utility EVNSPC (Southern Power Corporation under Vietnam Electricity) worth a total of Euro 67 million for the design, supply, installation, and commissioning of a submarine power cable link to connect Phu Quoc Island to the national power grid in Vietnam.

Situated 45km west of Ha Tien town, Kien Giang province in southern Vietnam, Phu Quoc Island is home to some of the most beautiful beaches in Vietnam and the submarine cable link will play a major role in developing the island as a tourist paradise. Once completed, the Phu Quoc link will be the first submarine power cable link to have been installed by a utility company in Vietnam.

The Phu Quoc cable connection comprises some 58km of 3x630mm² 110kV copper, single wire armored XLPE insulated submarine cable, which, under the contract, will also be laid and subsequently protected. Delivery and commissioning of the Phu Quoc interconnector is scheduled for the first half of 2014.

As the leading supplier of high voltage underground cables in Vietnam and a long tradition – dating back to the mid 1960s – of installing submarine cable links throughout the Asia Pacific Region (with milestone projects such as Penang Island in Malaysia, the Java-Bali link in Indonesia, Cheju Island in Korea, and the Basslink interconnector in Australia), Prysmian Group has secured this latest submarine cable project against stiff competition from Asian manufacturers.

With the goal of continuing to meet the needs of high potential growth markets for the development of new infrastructure, the Group is moving ahead with a major investment program to expand production capacity and to multiply the use of innovative technologies such as HVDC (High Voltage Direct

Current) cables that let large quantities of energy be transmitted over long distances. Furthermore, following the acquisition and integration with Draka, the Group has strengthened its portfolio of connections to mainland grids and interarray connections between turbines, also thanks to cables manufactured at the Drammen plant in Norway.

For more information, visit www.prysmian.com.

Global Marine Energy expands installation capability

Global Marine Energy Ltd., has invested in the refit and development of Cable Enterprise, a barge built specifically for the installation of power cables for offshore wind farms.

Cable Enterprise, which will be officially launched in Middlesbrough in the Northeast of England, will be used for a range of offshore installation projects, including export cables and interconnect cables. The increase in offshore electricity transmission has triggered a need for vessels which are designed to adapt to the specific requirements of offshore windfarms and their accompanying conditions and challenges.

The Cable Enterprise's first project will be to lay the export cable for Gwynt y Môr, located off the Welsh coast. Gwynt y Môr is one of the largest offshore wind farms currently in construction and is being built by RWE npower renewables. When complete, energy generation from Gwynt y Môr is expected to be equivalent to the average annual needs of around 400,000 homes.

Global Marine has invested £25 million on updating the barge and a further £3 million on new equipment, including a plough capable of burial up to 3m making it ideal for deploying a variety of cables, including HVAC and HVDC systems. Cable Enterprise is equipped with a 4,000ton carousel, 6-point mooring system and a single drum winch with pulling force of 18tons.

Global Marine Energy Ltd., a British company, has been instrumental in the development of offshore wind over the past decade, and as a result, is now growing and expanding its presence both in the UK and around the world. Global Marine Systems Ltd. made a conscious decision to diversify several years ago into the energy sector, having worked on many of the world's largest and most high profile offshore projects such as Kentish Flats, Horns Rev, and Horns Rev 2.

For more information, visit www.globalmarinesystems.com.

Balfour Beatty Utility Solutions awarded offshore cabling contract

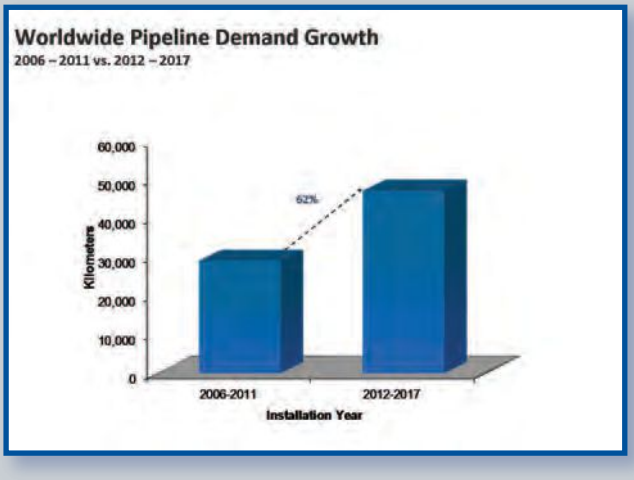
The contract, worth around £19 million, will involve the design and installation of a 30km section of underground 132kV cable that will be used to connect the Humber Gateway offshore wind farm to a new onshore substation at Hedon in East Yorkshire. E.ON's £736 million Humber Gateway wind farm, situated 8km off the Yorkshire Coast close to the mouth of the Humber Estuary, will consist of a 73 turbine array that will generate up to 219MW of electricity – enough energy to power up to 170,000 homes. Balfour Beatty will begin cabling work in summer, and E.ON's entire Humber Gateway project is expected to be complete in the spring of 2015.

For more information, visit www.bbusl.com.

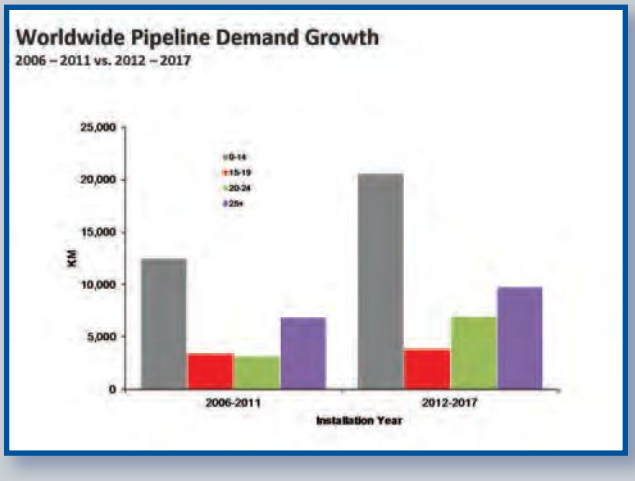
Offshore At-A-Glance

Quest Offshore Activity Report

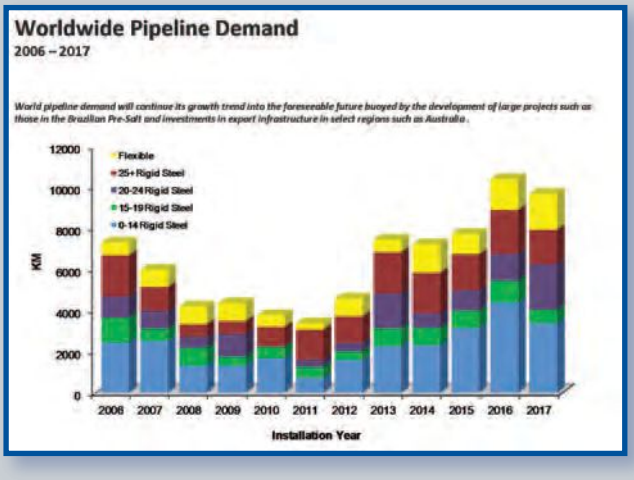
Worldwide Pipeline Growth



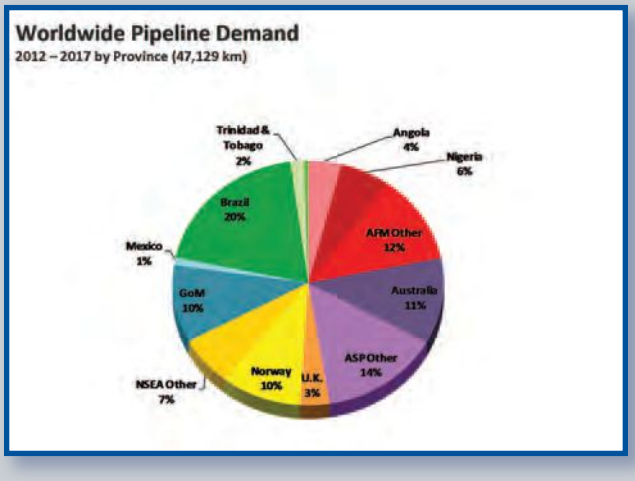
Worldwide Pipeline Growth



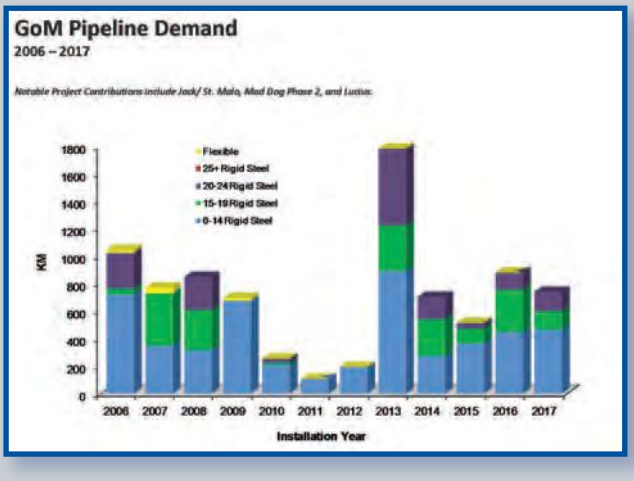
Worldwide Pipeline Demand



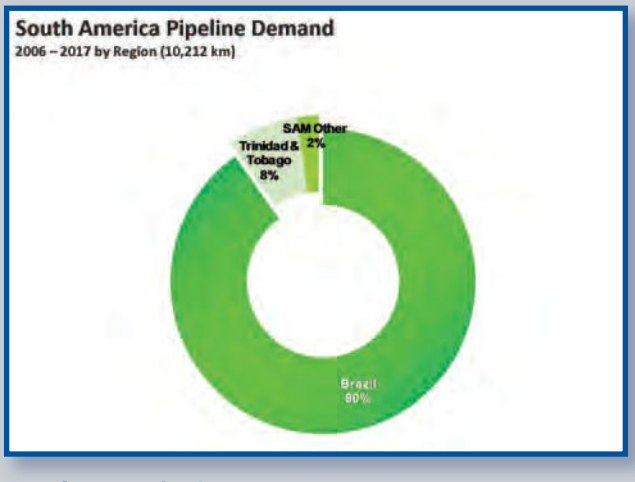
Worldwide Pipeline Demand



GoM Pipeline Demand



South America Pipeline Demand



FOR MORE DETAILED INFORMATION PLEASE CALL
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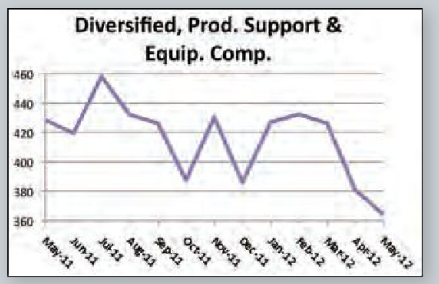
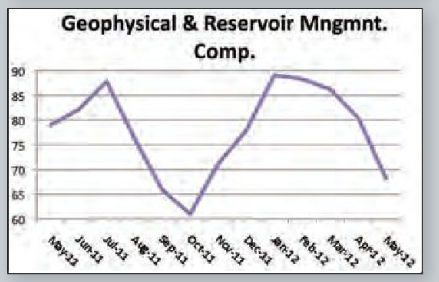
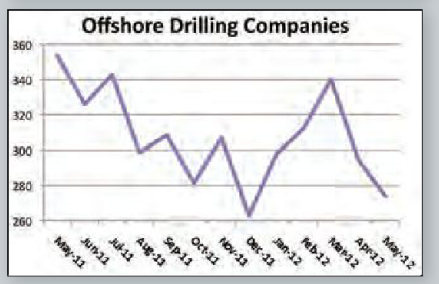
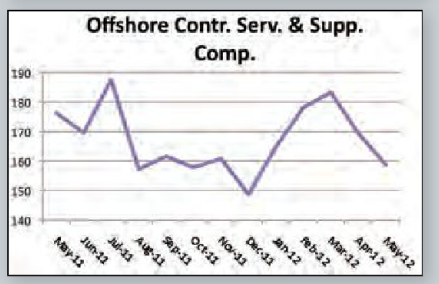
Oil & Gas Industry Trends

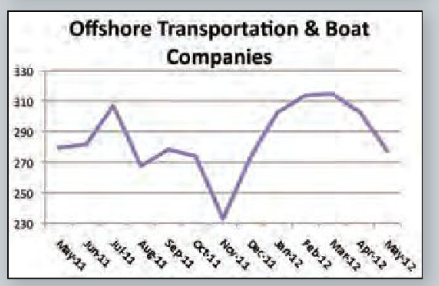
Stock Watch

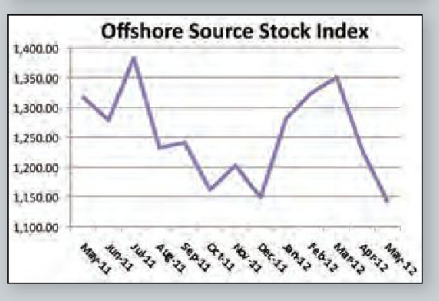




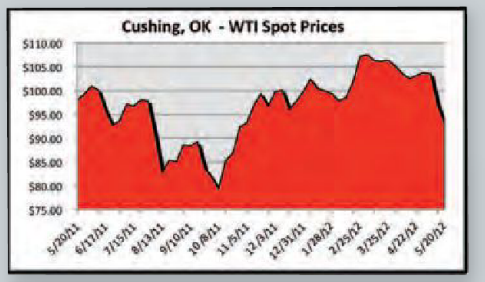


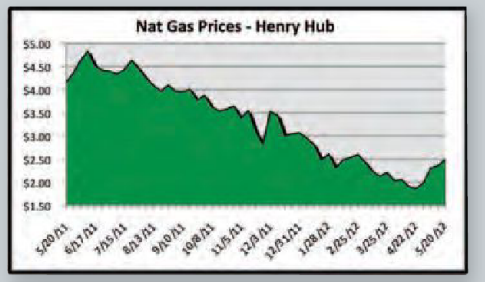


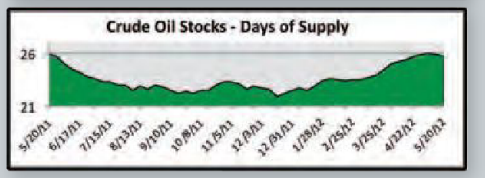


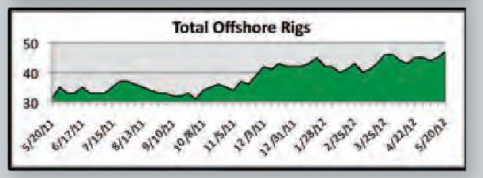


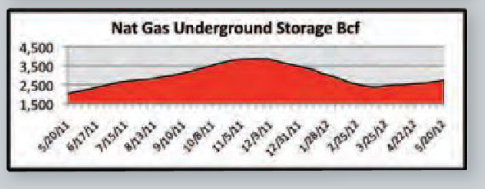
Monitoring the pulse of the US Offshore Oil & Gas Industry

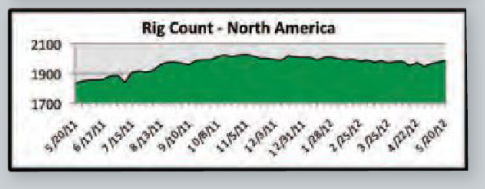












positive trend at least 3 weeks
changing trend < 3 weeks
negative trend at least 3 weeks

Baker Hughes Rig Report

North American Rotary Rig Count
May 25, 2012

Location	Week of 5/25	+/-	Week Ago	+/-	Year Ago
Land	1913	-4	1917	117	1796
Inland Waters	22	0	22	6	16
Offshore	48	1	47	13	35
U.S. Total	1983	-3	1986	136	1847
Gulf of Mexico	47	1	46	12	35
Canada	158	35	123	-21	179
N. America	2141	32	2109	115	2026

Gulf of Mexico Data
Current Deepwater Activity

Operator	Area/	Block	OCS Lease	Rig Name	Prospect Name	Water Depth(ft)
Petrobras America Inc.	WR	206	G16965	PRIDE DEEP OCEAN MENDOCINO	Cascade	8,143
Shell Offshore Inc.	AC	857	G17565	H&P 205	Great White	7,815
Shell Gulf of Mexico Inc.	MC	391	G26252	T.O. DEEPWATER NAUTILUS	Appomattox #3	7,157
Union Oil Co. of California	WR	677	G18753	T.O. DISCOVERER INSPIRATION	Saint Malo	7,040
Anadarko Petroleum Corp.	WR	793	G33982	ENSCO 8500	Sparticus	7,008
Chevron USA Inc.	WR	758	G17015	T.O. DISCOVERER CLEAR LEADER	Jack	6,960
BP Exploration & Production Inc.	GC	744	G15605	T.O. DEVELOPMENT DRILLER II	Atlantis	6,523
Statoil Gulf of Mexico LLC	KC	698	G33343	T.O. DISCOVERER AMERICAS		6,285
LLOG Exploration Offshore, LLC	MC	300	G22868	NOBLE AMOS RUNNER	Marmalard	6,113
Noble Energy, Inc.	MC	948	G28030	ENSCO 8501	Bob	6,060
BP Exploration & Production inc.	MC	778	G14658	THUNDER HORSE PDQ	Thunder Horse South	6,040
BP Exploration & Production inc.	KC	292	G25792	SEADRILL WEST SIRIUS	Kaskida	6,031
Cobalt International Energy, LP	GC	814	G32534	ENSCO 8503	Ligurian	5,837
Anadarko Petroleum Corp.	WR	52	G25232	ENSCO 8505	Shenandoah	5,815
Murphy E&P Co.	MC	734	G21778	T.O. DEEPWATER PATHFINDER	Thunderhawk	5,712
BP Exploration & Production inc.	GC	743	G15607	T.O. DEVELOPMENT DRILLER III	Atlantis	5,405
Chevron USA Inc.	WR	29	G16942	T.O. DISCOVERER INDIA	Big Foot	5,187
BHP Billiton Petroleum (GOM)	GC	654	G20085	GSF C.R. LUIGS	Shenzi	4,337
Hess Corp.	MC	725	G22898	STENA FORTH	Tubular Bells	4,321
Chevron USA Inc.	GC	640	G20082	T.O. DISCOVERER DEEP SEAS	Tahiti 2	4,292
BHP Billiton Petroleum (GOM) Inc.	GC	610	G16764	T.O. DEVELOPMENT DRILLER I	Shenzi	4,275
Apache	GC	867	G33858	ENSCO		4,260
Shell Offshore Inc.	MC	940	G31534	NOBLE DANNY ADKINS	Vito	4,004
ATP Oil & Gas Corp.	MC	941	G16661	NABORS 202	Mirage	4,000
BP Exploration & Production Inc.	VK	914	G08785	T.O. DISCOVERER ENTERPRISE	Nile	3,535
Shell Offshore Inc.	GC	248	G15565	NOBLE DRILLER	Glider	3,440
Statoil USA E&P Inc.	GC	404	G28076	MAERSK DEVELOPER	Kilchurn	3,146
Shell Offshore Inc.	MC	807	G07958	NOBLE BULLY 1	Mars B	3,030
Shell Offshore Inc.	GC	158	G07995	H&P 202	Brutus	2,978
Shell Offshore Inc.	GB	426	G07493	AUGER	Auger	2,862
W&T Energy VI, LLCC	MC	243	G19931	NABORS SUPER S.D. XIX	Matterhorn	2,816
Deep Gulf Energy LP	GB	506	G26664	NOBLE JIM DAY	Kathleen	2,815
Shell Offshore Inc.	GB	427	G07493	NOBLE JIM THOMPSON	Cardamom	2,719
Devon Energy Production Co., LP	GC	114	G20034	CAL DIVE Q-4000	Gretchen	2,685
Chevron USA Inc.	GC	205	G05911	NABORS 85 (MAYRONNE 162)	Genesis	2,590
Anadarko Petroleum Corp.	VK	826	G06888	NABORS P-10	Neptune	1,932
Hess Corp.	GB	260	G07462	NABORS S.D. XVI	Baldpate	1,648
Exxon Mobil Corp.	MC	355	G02964	DIAMOND OCEAN VICTORY	Zinc	1,458
Union Oil Co. of California	EB	160	G02647	COIL TUBING UNIT (L.J. DIST)	Cerveza	940

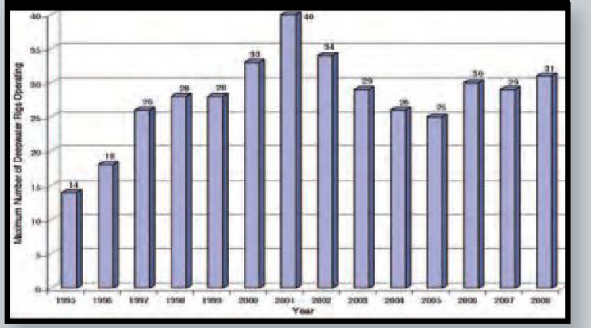
Deepwater prospects with drilling and workover activity: 39

Current Deepwater Activity as of Monday, May 21, 2012

Activity by Water Depth

Water Depth in Meters	Active Leases	Approved Applications	Active
0 to 200	1,736	34,258	2,970
201 to 400	118	1,111	20
401 to 800	272	842	10
801 to 1,000	397	539	9
1,000 & above	3,331	1,741	26

Rig activity by year



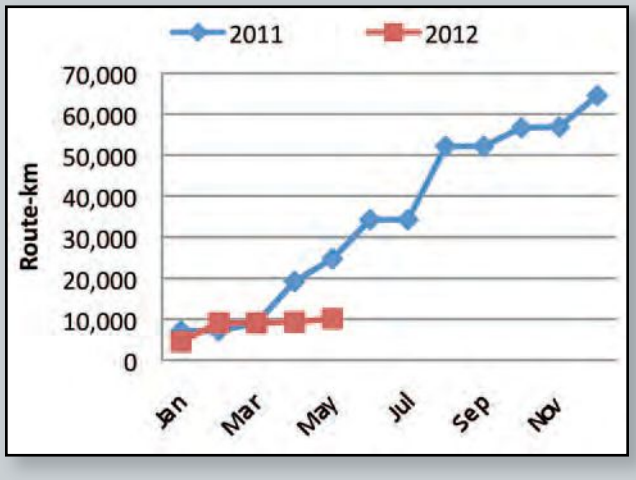
Activity by water depth Information current as of Monday, May 21, 2012

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.

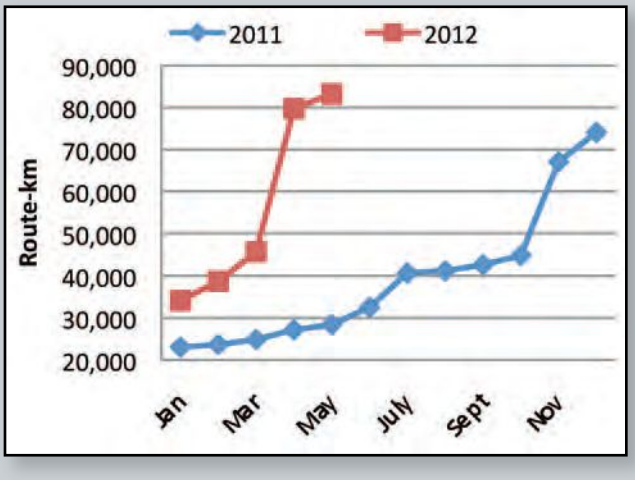
Information provided courtesy of the U.S. Bureau of Ocean Energy Management

Subsea Telcom & Power Cable Data

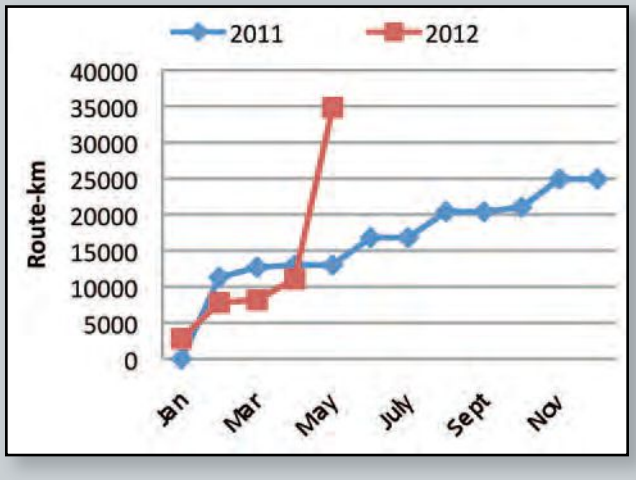
FO Cable Awards by month



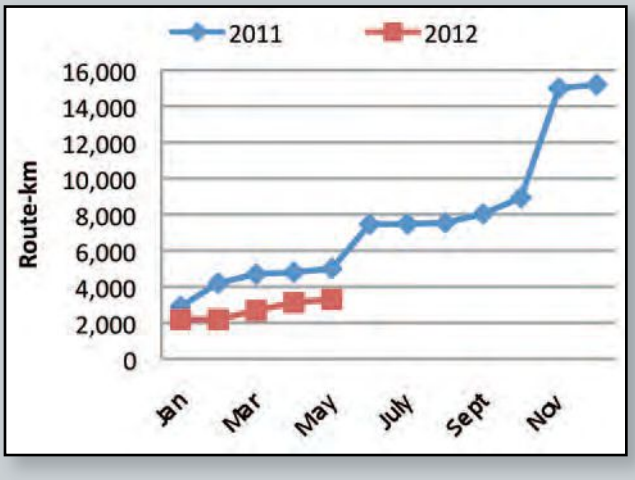
FO Cable Announcements 2011



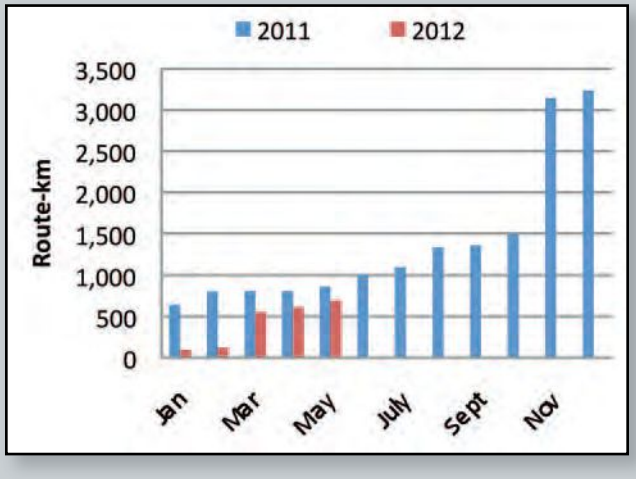
Submarine FO Cables Entering Service 2011 in route-km



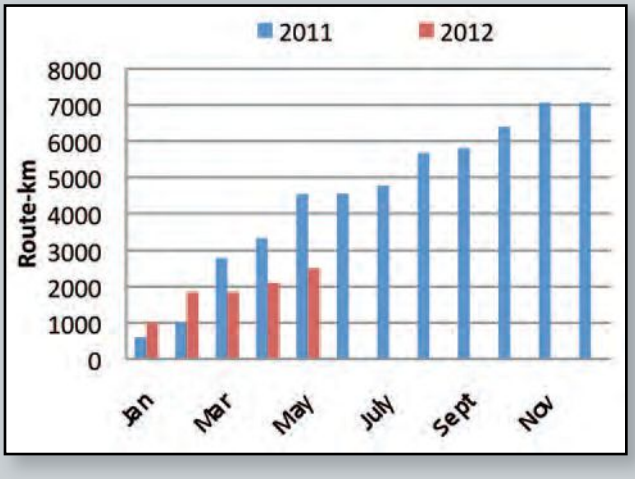
Upgrades of Existing Cable Systems in Gbps



Submarine Power Cable Awards 2011 in route-km



Submarine Power Cable Announcements 2011 in route-km



OSIL introduce new Oil in Water Monitoring buoy

OSIL is delighted to introduce their new Oil in Water Monitoring buoy, a rapid deployment option for localized spill events and preventative monitoring.

The compact and rugged buoy system is designed for short-term monitoring (up to 24months) and emergency deployment in sheltered coastal and inshore areas where deployment from a small vessel, or by a single person, may be required. The lightweight and low-cost buoy is easily handled by one person in the field, weighing just 25kg, and measuring only 60cm in diameter and 2m in overall length.

Detection of hydrocarbons in the water column is performed by a submersible sensor. Sensors are available for both crude oil and refined fuels and are protected from collision damage within the robust central structure. This has been designed to accommodate a multiparameter sonde or similar instrument, meaning the system can also be equipped with a range of sensors to measure and report other water quality parameters.

The system itself is powered by two 5W solar panels and is equipped with battery backup, navigation and warning lights, and any other markings, as necessary. A range of telemetry options are available (UHF/VHF, GSM, GPRS, Satellite), selected to suit both the location and application requirements. OSIL provides a complete data telemetry solution, including either desktop or web-based software packages to access the data, ensuring constant and immediate data collection.

Alert messages advising of unexpected rises in hydrocarbon levels or other parameters can be transmitted to mobile devices, vessels, or other remote users.

The detection of crude oil is a parameter that managers, researchers, and consultants continue to add to their required suite of measurements taken during environmental monitoring projects. Monitoring of aquatic environments for refined oils (fuels) is another way to provide awareness of increasing contaminations so that protocols may be implemented to avoid hazardous situations.

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

ASL Acoustic Zooplankton Fish Profiler™

ASL Environmental Sciences (Victoria, BC, Canada) successfully launched the Acoustic Zooplankton Fish Profiler™ (AZFP) at Oceanology International 2012 London, UK. The AZFP™ offers a new, economical way of obtaining reliable measures of marine environmental conditions in the water column. The AZFP™ can monitor the presence and abundance of zooplankton and fish within the water column by measuring acoustic backscatter returns at multiple ultrasonic frequencies. Other sonar targets realized from the sonar backscatter data include bubbles and suspended sediments.

The AZFP™ has an unmatched combination of multiple frequency operation with low power and long endurance that fits any budget. The AZFP™ is a powerful tool for scientific research and environmental monitoring in oceans, lakes, and rivers.

Using onboard data storage, the AZFP™ can collect data continuously for periods of up to 1 year at high temporal and spatial resolution. The AZFP™ is available with up to four frequencies in a single transducer housing.

It can be operated in bottom-mounted, upward looking mode 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.

TE Connectivity launches circular HD product line

TE Connectivity introduces the new Circular High Density (HD) connector product line as a low-cost alternative to 38999 and other circulars for rugged non-Mil Spec applications. The Circular HD family offers more than 400 options in a wide range of cable and panel mounting options, shell sizes, insert configurations, and gender options.

Offering the ease of push-to-latch/pull-to-unlatch mating, the small, high-density connectors have the advantage of blind mating into small spaces that may normally require clearance for hand tightening. They are ideal for military and commercial use, including radio equipment, medical equipment, test equipment, audio and video equipment, data acquisition, and industrial control.

For more information, visit www.te.com.

T.D. Williamson unveils remote-controlled subsea hot tapping machine

T.D. Williamson announced the successful development and field deployment of the Subsea 1200RC Tapping Machine, its new compact remote-controlled subsea hot tapping machine. The system, which is extremely lightweight, allows hot tapping to be carried out from the safety of a Diving Support Vessel (DSV) or platform, resulting in significant safety benefits and improvement in operational control.

The new subsea system has demonstrated the feasibility of conducting the critical tapping operation entirely by remote control. But the system offers more than just reduction in diver activity, the safety benefits of which are obvious. The further benefits of the new technology are that it offers total control and visibility of the tapping operation where there was none before. Built-in sensors allow continuous recording of actual pressures, temperatures, rotation ,and movement of the pilot drill and cutter. They shed light on what is going on inside the enclosed space right at the heart of the cutting operation. The laptop-based program facilitates control remotely, rather than relying on the divers' manual handling of the cutting process. The end result is a level of accuracy and quality that is not possible in diver-based operations.

For more information, visit www.tdwilliamson.com.

FMC Technologies awarded loading arm systems contract

FMC Technologies, Inc. announced that it has signed an agreement with Technip France, on behalf of the Technip Samsung Consortium (TSC), to supply offshore loading arm systems as part of the Shell Prelude Floating Liquefied Natural Gas (FLNG) Project.

FMC's scope of supply includes seven offshore footless marine loading arms: four for liquefied natural gas and three for liquefied petroleum gas. FMC's Loading Systems business in Sens, France will design and manufacture the equipment.

FLNG opens up new business opportunities for countries looking to develop their gas resources, bringing more natural gas to market. Shell is the first to go ahead with such a project, Prelude FLNG.

The Prelude facility will be built by TSC at the Samsung Heavy Industries shipyard in Geoje, Korea. It will measure 1,600ft (488m) from bow to stern and weigh around 600,000tonnes when fully loaded. It will be moored over 120mi (200km) from land and will produce gas from offshore subsea fields. The facility will treat and liquefy the gas onboard via a cooling process before storing and exporting the LNG via conventional LNG carriers.

For more information, visit www.fmctechnologies.com.

Titan Survey opts for two more Applied Acoustics' boomers

Titan Survey has been involved in marine surveys in the UK and worldwide for over 30 years and is increasingly involved in offshore renewable energy schemes, particularly wind farm projects where an accurate interrogation of the subsea geology is crucial to turbine foundation design, as well as route selection for the cabling to shore. The company has found the Applied Acoustics' seismic survey equipment, the CSP energy supply, and sound source known as a boomer particularly useful for this nearshore sub-bottom survey work.

Titan's recent purchase of two further compact CSP-P bang boxes confirms its confidence in the Applied Acoustics' systems that enable the company to quickly deploy a survey team to any site in the UK and beyond in response to its varied work load.

Being able to offer this sort of flexibility and efficiency alongside excellent data quality has enabled Titan Survey to offer its services to over 20 offshore wind

farm projects, including (most recently) the huge Dogger Bank project, 60mi east of Scarborough, UK where the surveyors made use of a 1000J seismic power source from Applied Acoustics.

The CSP-P unit from Applied Acoustics is part of a family of sub-bottom profiling systems that range in output from 50 to 12,000Joules. Similar units to the ones owned by Titan Surveys are in operation across the globe for similar surveys in locations such as off Canada's Atlantic coast, the Baltic Sea and South China Sea.

For more information, visit www.appliedacoustics.com.

Optech introduces CZMIL, a state-of-the-art environmental and bathymetric system

Optech, the world leader in the development, manufacture, and support of advanced Lidar and camera survey instruments, is pleased to announce the release of the new airborne Optech CZMIL Coastal Zone Mapping and Imaging Lidar system.

Optech CZMIL is an innovative airborne coastal zone mapping system that produces simultaneous high-resolution 3D data and imagery of the beach and shallow water seafloor, including coastal topography, benthic classification, and water column characterization. CZMIL performs particularly well in shallow, turbid waters. Its bathymetric Lidar is integrated with a hyperspectral imaging system and digital metric camera. Optech's highly automated workflow includes a powerful integrated end-to-end software suite, Optech HydroFusion, that handles all three sensors simultaneously – from mission planning to the production of fused lidar and imagery data sets.

Optech CZMIL was designed by Optech for the U.S. Government under the auspices of the U.S. Army Corps of Engineers (USACE) and the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX). It was built and tested by Optech with the assistance of the University of Southern Mississippi (USM).

Optech CZMIL systems are being delivered to the U.S. Army Corps of Engineers in May 2012 and to the U.S. Navy in July 2012.

For more information, visit www.optech.com.

Empirica launches new surface logging technologies

Empirica, a rapidly growing surface logging company and a member of Reservoir Group, is launching two new technologies that will dramatically cut the time it takes to sample and view well data.

Dual Flame Ionized Detection (Dual FID) technology is a high-speed chromatograph, and Live Logging is a real-time cloud-based system that allows operators and geologists to interact with wells from any computer or device anywhere during the drilling process.

Dual FID is an industry-leading measurement system, with unique high-speed chromatograph technology. The 36s chromatograph significantly improves on the current industry average of 45s to 65s and provides 100% resolution between components.

The high speed equates to more sampling per foot at a fast rate of penetration and can help differentiate laminated sands and low resistivity pay – allowing operators to make quicker decisions and saving time and money.

Live Logging allows for instanta-

neous interaction, potentially saving time and money and, most importantly, optimizing the well construction process. It is the first system to capture the human component of surface logging.

It allows geologists to interact with the personnel at the wellsite and gives them access to static data instantaneously as well as the ability to see the notes, pictures, and interpretations made by the mudlogging engineer. This provides a full picture of what's happening on the rig, enabling operators to make better decisions about their asset.

For more information, visit www.empirica-logging.com.

Seatronics orders state-of the-art multibeam sonar for portable survey package

Seatronics, an Acteon company, has ordered Teledyne Odom's new MB1 multibeam sonar system. This is Seatronics' first order for the system and it plans to purchase more during the year.

Dave Currie, managing director for Seatronics, said, "We can see that a lot of thought has gone into the design of MB1. The price and performance are

perfectly suited to our new portable survey package as well as several other applications. We are always keen to add the latest equipment to our rental pool and Teledyne Odom has shown us that it has really thought about the customer's needs when designing the MB1."

The MB1 offers

- A 170 to 220kHz operating frequency
- 120° swath coverage
- Up to 512 beams
- Phase and amplitude bottom detection
- Up to 100m water depth sounding.

For more information visit www.seatronics-group.com.

Sophisticated new Simrad scientific echo sounder

Simrad, a division of Kongsberg Maritime AS and the world's leading manufacturer of hydro acoustic products for commercial fishing vessels and scientific research, has expanded its market leading scientific echo sounder portfolio with the introduction of the new multi-transceiver Simrad EK15. With the ability to connect up to 15 fixed or mobile transceivers by cable or over a wireless network, the new Simrad EK15 is suitable for a wide range of applications, from fish stock assessment and fish protection to river surveys, environmental monitoring, and offshore oil and gas operations.

The Simrad EK15 is based on a small and ruggedised single beam transceiver and a dedicated transducer. The operational frequency is 200kHz, which ensures very high resolution and accuracy, with easy built-in, *insitu* calibration. By using multiple transceivers in parallel with either simultaneous or sequential pinging it is possible to monitor large areas with only a single echo sounder system.

For more information, visit www.simrad.com.

Ocean News & Technology

2012 EDITORIAL CALENDAR

January/February 2012
Editorial: Inspection & Light Work Class ROVs, Oceanography & Meteorology
Distribution: NACE • Oceanology International
Deadline: January 15th
Product Focus: Diving Equipment & Buoyancy Materials

March
Editorial: Defense & Naval Systems, Maritime Security, Decommissioning, Plug & Abandonment
Distribution: Decommissioning & Abandonment Summit
Deadline: February 15th
Product Focus: Navigation, Mapping & Signal Processing; Diver Detection Systems

April
Editorial: Offshore Technology
Distribution: Global Marine Renewable Energy • OTC
Deadline: March 15th
Product Focus: Connectors, Cables & Umbilicals

May
Editorial: AUVs & Gliders, UW Imaging & Processing, Acquaculture & Marine Resources,
Distribution: UDT Europe • Anti-Submarine Warfare
Deadline: April 15
Product Focus: Cameras, Lights & Imaging Sonars

June
Editorial: Workclass ROVs, Wave & Tidal, Ocean Observing Systems
Distribution: EnergyOcean Int'l
Deadline: May 15th
Product Focus: Subsea Tools & Manipulators

July
Editorial: Offshore Mooring, Subsea Fiber Optic Networks, Corp. Showcase
Distribution: Offshore Northern Seas • AUVSI
Deadline: June 15th
Product Focus: Tracking & Positioning Systems, Seismic Monitoring

August
Editorial: Ocean Mapping & Survey, Subsea Telecom, Deepwater Pipeline Repair & Maintenance
Distribution: TBA
Deadline: July 15th
Product Focus: Multibeam & Side Scan Sonars

September
Editorial: Coastal Engineering, Environmental Assessment & Monitoring, Offshore Wind
Distribution: Oceans MTS/IEEE • Ocean Innovation
Deadline: August 15th
Product Focus: Buoys & Monitoring Instrumentation

October
Editorial: Offshore Communication, Offshore IRM, OTEC
Distribution: Offshore Communications • Subsea Survey IRM • Clean Gulf • North Sea Decommissioning
Deadline: September 15th
Product Focus: Acoustic Modems, Releases & Transponders, Marine Communications

November
Editorial: Offshore Vessels, Marine Construction
Distribution: International Workboat
Deadline: October 15th
Product Focus: Workboats, Diving Systems

December
Editorial: Year in Review, Marine Salvage Operations, Commercial Diving
Distribution: Underwater Intervention
Deadline: November 15th
Product Focus: Handling Equipment, Winches & Control Systems, Battery Technology

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QUADRANS selected by French Navy

A program to bring more than 30 ships of the French Navy up to date will include fitting iXBlue's class-leading QUADRANS gyrocompass and attitude reference systems.

iXBlue has won a contract to supply the French Navy with 35 QUADRANS gyrocompass and attitude reference systems. The Navy will take delivery of the units over a 3 year period starting later this year. They will replace obsolete navigation aids on a number of smaller ships, notably including the Navy's first Aviso class vessel, the Commandant Bouan, built in 1984.

The QUADRANS units, which are IMO and IMO-HSC certified, are based on iXBlue's highly regarded fiberoptic gyroscope technology and offer a series of advantages. They are fully strap-down units, small and lightweight, with low power requirements; they can be quickly set under all conditions to provide accurate data at a rapid rate with precise time stamping; and they are easy to use, highly reliable, and maintenance-free during their service life.

For more information, visit www.ixblue.com.

Ashtead Technology partners with The Oceanscience Group

World leading marine rental company, Ashtead Technology – Offshore Division, announced an exclusive agreement with The Oceanscience Group to offer the UnderwayCTD and UnderwaySV systems for the rental market. For the first time, the revolutionary profiler is available for short or long-term hire with systems supplied out of Ashtead Technology's three regional bases – Houston, Aberdeen, and Singapore.

The UnderwayCTD/SV is a free-fall profiling system that offers research quality conductivity / temperature / depth (CTD) or sound velocity (SV) profiles from a vessel moving at up to 14kts. Profiles over 1,000m are achievable at 4 to 5kts and with a turnaround time of only about 30min for a full depth cast, there is no faster way to gather affordable and high-quality data.

For hydrographic survey projects, the exceptionally simple installation process and minimal infrastructure requirements make the UnderwayCTD/SV an ideal profiling system.

For more information visit www.ashtead-technology.com.

Coastline Surveys orders DATEM 5000 CPT system

As part of continual company growth and development, Coastline Surveys Ltd has placed an order for the purchase of a DATEM 5000 CPT system. The DATEM 5000 unit is a coiled rod design offering the latest technology and increased push capability compared to similar CPT designs available. The unit is compact enough for deployment from smaller vessels making it a versatile and adaptable system for most soil types.

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

Nobska receives OOI COL award

Nobska has received an OOI COL award to deliver Titanium MAVS-4 to the project. Deliverables will go to University of Washington. Nobska was also chosen by McLane Research labs and approved by OOI for providing MAVS-4-MMP to McLane for installation in the OOI MMP Profilers.

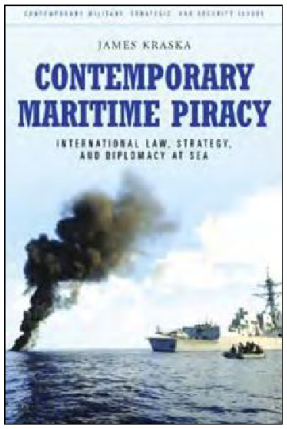
Located in Woods Hole and Falmouth, MA, NOBSKA provides high resolution 3-D acoustic current meters, directional wave and tide gauges, and multiple instrument data loggers.

For more infomation, visit www.nobska.net.

Media Reviews

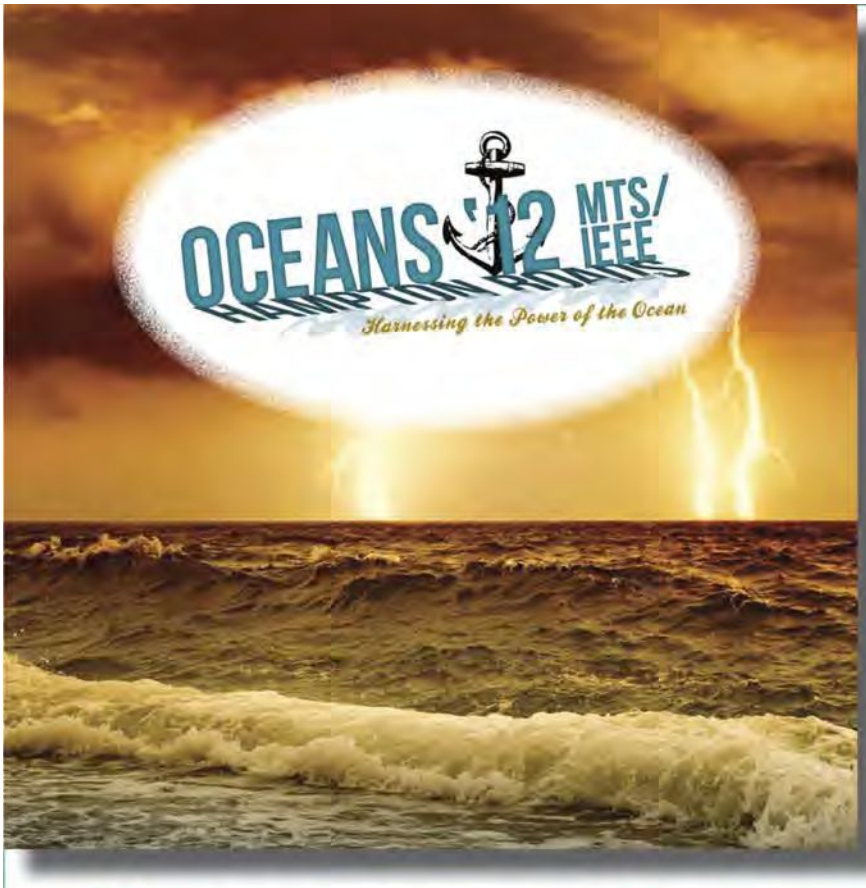
Contemporary Maritime Piracy
International Law, Strategy, and Diplomacy at Sea

By James Kraska



This volume provides a concise introduction to the issues and debates regarding modern piracy, including naval operations, law, and diplomacy, and focuses on the recent surge of attacks off the coasts of Africa and Asia. In the waters off the Horn of Africa, Somali pirates endanger critical oil shipping. The area is so vast that international naval patrols have proved relatively futile. In Asia, pirates not only hijack vessels, but often murder the entire crew, steal ships' cargoes, and re-register captured vessels under new names as "ghost ships" without a legitimate past record. In the past decade, the incidence of maritime piracy has exploded. The first 3 months of 2011 were the worst ever, with 18 ships hijacked, 344 crew taken hostage, and 7 crew members murdered. The four Americans onboard the sailing vessel Quest were shot at point-blank range. The economic costs are also staggering, reaching $7 to $12 billion per year, as insurance costs skyrocket, ransoms double and then quadruple, and ships are forced to hire armed security for protection. Pirates operating off the Horn of Africa disrupt shipping traffic through the strategic Suez Canal, siphoning transit fees from an unstable Egypt, while the seizure of supertankers in the Indian Ocean underscores the vulnerability of the world's oil supply. Governments, private industry, and international organizations have mobilized to address the threat. This is the first volume to examine their work in developing naval strategy, international law and diplomacy, and industry guidelines to suppress contemporary maritime piracy. *Contemporary Maritime Piracy: International Law, Strategy, and Diplomacy at Sea* comprises three sections, the first of which contains chapters on historical and contemporary piracy, international law and diplomacy, and coalition strategies for combating future piracy. The second and third parts provide collections of historic profiles and relevant documents.

ISBN: 978-0-313-38724-1 Published by Praeger, June 2011
6 1/8x9 1/4 inches, 253 pages, Hardcover, Price $49.95



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01 August 2012
On-line Registration
late May 2012

Call for Papers

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- Marine Renewable Energy
- Coastal and Marine Spatial Planning
- Marine Vehicle Autonomy
- Sea Level Rise and Coastal Inundation

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People & Company News

Crowley Maritime Corp. said that **Julia Shemesh** was promoted to vice president and deputy general counsel. Shemesh will remain in Seattle, Washington, and will continue reporting to Michael Roberts, senior vice president and general counsel, who works out of Crowley's corporate headquarters in Jacksonville, Florida. In her new role, Shemesh will primarily be responsible for providing advice and support on legal issues affecting company business on the West Coast, including petroleum distribution, marine solutions, and harbor ship assist and tanker escort services. She will also play an active role assisting in the continued expansion of Jensen Maritime, a Crowley subsidiary specializing in full-service naval architecture and marine engineering services.


Shemesh

Tidewater Inc. said that **Dean Taylor**, president and chief executive officer since March 2002, retired as an executive officer of the company effective 31 May 2012, after a 34-year career with Tidewater. Taylor will remain on the board of directors and serve as Tidewater's non-executive chairman of the board. **Jeffrey M. Platt** is to become Tidewater's new president and chief executive officer effective 1 June 2012. Platt has been Tidewater's chief operating officer, overseeing Tidewater's domestic and international marine operations, since July 2006.

Greene's Energy Group (GEG) named **Lance Bolds** chief legal counsel. Bolds joins GEG from Global Industries Offshore, LLC, where he was employed as an in-house senior legal counsel. Based in Houston, Texas, Bolds will provide general counsel for Greene's Energy Group operations worldwide. He is a member of the State Bar of Texas and licensed to practice before all State courts in Texas in addition to the Southern District Court in Houston. He has more than 15 years of combined business and legal experience in dealing with an array of matters particular to complex infrastructure and offshore oil and gas construction projects.


Bolds

InterAct PMTI, an Acteon company, has broadened its environmental capabilities and services with the recent appointments of **Cynda Maxon** and **F. Charles (Skip) Newton**, who join the company as senior project director and senior scientist, respectively. This is part of a strategic move to augment services, draw on global experience, and forge stronger collaborative links with other Acteon group companies. Maxon has more than 20 years of experience as an environmental chemist, ecological risk assessor, and project manager specializing in coastal and offshore marine environments. Newton has more than 30 years of experience in marine biology, spanning coastal and deepwater environments, intertidal and benthic ecology, and aquatic toxicology.


Maxon


Newton

Paradigm Flow Services appointed **Fergus Clark** as the company bolsters its subsea, pipeline, and umbilical services division. Clark joins Paradigm Flow Services from Halliburton Pipelines & Process where he worked for 4 years as senior offshore supervisor. As crew chief, Clark will focus on the delivery of subsea services as well as overseeing the deployment of Paradigm's groundbreaking technology in offshore projects. Clark has also worked for PSL Energy Services in pipeline services. With 12 years' oil and gas industry experience, Clark has worked with a number of operator and service company clients throughout his career, including BG Group, BP, Shell, Subsea 7, Talisman, and Total.

Global energy services company, Senergy, appointed **Alasdair Buchanan** as its chief operating officer and managing director of the group's energy services division. He will lead Senergy's day-to-day operations. He will build on the company's rapidly-evolving track record for delivering diverse energy projects and solutions that harness its industry-leading capabilities and technical expertise.

Buchanan

Channel Technology Group announced that **Gary Douville** will join CTG as its new vice-president of manufacturing operations. He will be responsible for CTG manufacturing, procurement, planning and materials management, quality and continuous improvement. CTG is a vertically-integrated designer, manufacturer, and supplier of piezo-electric ceramics, transducers, systems, and services. CTG is owned by private equity firm Blue Wolf Capital Partners, LLC.

Douville

Pipeline Services International LLC is pleased to announce that **Craig Levy** has joined the company as sales representative, specifically for offshore sales as of 2 May 2012. Levy's experience in the diving, offshore construction, and plug and abandonment services in addition to his attention to clients' needs will strengthen PSI's core.

The winch and deck machinery specialist, **Rapp Hydema AS**, a Rapp Marine Group company, has expanded into the southwest coast of Norway with the opening of a location in Stavanger, Norway, and appointed key personnel to manage the new office's operations.

Tunem

Rapp Hydema AS has named **Runar Tunem** as the winch division's new offshore sales manager who will lead their efforts in Stavanger. Based in Stavanger, Tunem will manage the offshore sales and marketing operations for the company worldwide.

Having a college degree in Process Automation and long and relevant work experience, Tunem has achieved and proved high technical know-how.

Teledyne Oil & Gas is pleased to announce the Grand Opening of its new 10,000sq.ft Asia Regional Support Center in Johor Bahru, Malaysia. The new facility is located in the Setia Business Park – Nusajaya, Malaysia, a green business park, and will support electrical jumper final assembly, test, repair rework of assemblies, and sensor integration & test, and will become the Asia Field Service Center for all Teledyne oil and gas products. Additional expansions are being planned for 2013 to include a new hyperbaric test capability along with support for all optical and feedthrough systems.

ECOS Canarias is an environmental consulting company with a growing technological department. Located on the Canary Islands, the company is in the middle of an increasing marine sector, pushed by the Oceanic Platform of the Canary Islands (PLOCAN). PLOCAN is a public consortium between the Spanish National and the Canary Islands Regional Governments, with the main objective to construct and operate a fixed offshore oceanic platform to support research, technology development, and innovation in the marine and maritime sector.

SIDUS Solutions, LLC is proud to announce opening of its Houston Area office as part of 2012 expansion plans.

Local sales and operations activities will be headed by Chris Howerter, who joined SIDUS Solutions in October 2011 and brings with him over 14 years experience in engineering and business development for harsh environment and subsea products. He has worked for both Oceaneering and MacArtney Underwater Technologies. His experience, furthermore, spans the space, subsea, defense, and medical industries. The new Houston area office will soon handle sales and engineering services over the entire product and services offering.

Calendar

June 19-21, 2012:
EnergyOcean International 2012
Boston, MA
www.energyocean.com

June 26-27, 2012
Ocean Energy 2012
Brussels, Belgium
www.greenpowerconferences.com

August 6-9, 2012:
AUVSI's Unmanned Systems N.A.
Las Vegas, NV
www.auvsi.org

August 28-31, 2012:
Offshore Northern Seas
Stavanger, Norway
www.ons.no

September 11-12, 2012:
MAST Europe
Sweden
www.mastconfex.com

October 8-10, 2012:
MTS Dynamic Positioning 2012
Houston, TX
www.mtsociety.org/conferences

October 14-19, 2012:
MTS/IEEE Oceans 2012
Virginia Beach, VA
www.oceans12mtsieeehamptonroads.org

October 21-24, 2012:
Ocean Innovation 2012
Canada
www.oceaninnovation.ca

October 30-31, 2012
4th Annual Marine Renewable Energy Technical Conference
Providence, RI
www.mrec.umassd.edu/event

November 5-8, 2012:
Subsea Survey IRM 2012
Galveston, TX
www.subseasurvey.com

November 6-8, 2012
Oilcomm
Houston, TX
www.oilcomm.com

November 13-15, 2012
Clean Gulf
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December 5-7, 2012
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January 15-17, 2013
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839 Ward Dr., Santa Barbara CA 93111 USA
Tel: (805) 967-0171; Fax (805) 683-3420
E-mail: ciisales@channeltech.com;
Website: www.channeltechgroup.com
Contact: K.Ruelas, pres.; K.Atlies, Director of Business Development; E.Bickel, technical sales

Piezoelectric ceramics - Channel Industries, A Division of Channel Technologies Group (CTG) is a custom manufacturer of piezoelectric ceramics in lead-zirconate and barium titanate compositions. Since 1959 Channel Industries ceramics have been at the heart of thousands of underwater acoustic applications and systems. Hydrophones, towed arrays, modems, side-scan sonar, etc. Military and commercial applications worldwide for over 50 years.

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Ocean Specialists, Inc (OSI) provides a broad range of capabilities and services to the Offshore Oil & Gas, Submarine Telecom, Government and Scientific markets, including: Market analysis, project consulting, submarine fiber cable systems, subsea technology development, & corporate services.

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Fax: +44(0)1224 783407
Email: michael@m-are.com
Website: www.m-are.com
Contact: Mike Kernaghan

*MaRE provides an **International Brokerage and Equipment Sourcing** service to the underwater industry. We are the world's leading source of used ROV systems and components. **"DeepSearch"**, a free-issue database, is distributed monthly highlighting used ROVs and associated equipment for sale worldwide. Our **Procurement** department offers an equipment and spares sourcing service which compliments the brokerage side of the business. MaRE also provides **Consultancy** on all aspects of remote underwater technology.*

SONAR SYSTEMS

BlueView Technologies, Inc.
2515 N. Northlake Way, Suite 214
Seattle, WA 98103, USA
Tel: (206) 545-7260
E-mail: info@blueview.com
Website: www.blueview.com
Contact: Beto Campos - Director, Global Commercial Sales

BlueView delivers state of the art, compact acoustic imaging, measurement, and automation solutions for defense, energy, civil engineering, transportation, and port security applications worldwide. BlueView's advanced acoustic systems support underwater operations from a wide variety of platforms, including ROVs, AUVs, surface vessels, fixed mounts, portable tripods, and diver handheld systems.

Imagenex Technology Corp.
209-1875 Broadway St., Port Coquitlam
BC, Canada, V3C 4Z1
Tel: (604) 944-8248, Fax: (604) 944-8249
E-mail: imagenex@shaw.ca
Website: www.imagenex.com
Contact: Steve Curnew

Imagenex is an innovative company specializing in advanced acoustic underwater sensors. The company's products include multibeam, mechanical scanning, and sidescan sonars. The Delta T is a compact, cost-effective multibeam sonar, small enough to fit on most underwater vehicles for obstacle avoidance, navigation and profiling applications. The profiling versions feature an output for real-time 3D plotting and are compatible with third party post-processing software. The Model 881A is a small multi-frequency sonar for imaging or profiling applications. There is an Azimuth Drive available for the 837B Delta T and the 881A for profiling applications from stationary platforms. The Model 881L features improved performance via Ethernet communications. Two sides-can sonars, the SportScan and the YellowFin, feature a revolutionary price/performance ratio. For more information please visit www.imagenex.com

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869 Ward Dr. Santa Barbara, CA 93111-2920 USA
Tel: (805) 683-1431; Fax (805) 683-4862
E-mail: marketing@sonatech.com
Website: www.channeltechgroup.com
Contact: K.Ruelas, pres.; R. Franklin, v.p., nav & range sys; M. Shaw, v.p., sonar & transducer sys; B. Febo, Director of Business Development

Sound Engineering Solutions – Sonatech, A Division of Channel Technologies Group (CTG) develops innovative solutions for underwater acoustic applications. Existing technologies span a wide variety of acoustic systems, including sonar systems, navigation systems, and custom acoustic solutions. Our solutions are based on a 36-year career of developing high-performance, high-reliability undersea systems that are continually improved through research and development.

Sound Metrics Corp.

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E-mail: sales@soundmetrics.com
Website: www.soundmetrics.com
Contact: Jeanne Dorsey

Founded in 2002, Sound Metrics Corporation is one of the first manufacturers of high resolution imaging sonars. These units are used in virtually every marine industry by some of the most recognized companies around the world. In addition to being the technological leader in image quality, Sound Metrics has built a reputation for support and for innovative solutions around their customers' applications.

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E-mail: info@saivas.no
Website: www.saivas.no
Contact: Gunnar Sagstad

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Morgan City, LA
Tel: 985-385-6789
E-mail: bill.new@newindustries.com
Website: www.newindustries.com
Contact: Bill New

New Industries (NI) provides quality fabrication services to the offshore oil & gas and marine industries. NI focuses on large diameter, pressure vessels and deepwater subsea equipment such as jumpers, PLETs, PLEMs, suction piles and ROV components.

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Seanic Ocean Systems

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E-mail: contact@seanicusa.com
Website: www.seanicusa.com
Contact: Karen North

Seanic Ocean Systems is an industry leader in providing simple, rugged and reliable subsea tooling for remote intervention.

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E-mail: sales@seacon-ap.com
Website: www.seacon-ap.com

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E-mail: sales@itc-transducers.com
Website: www.channeltechgroup.com
Contact: K.Ruelas, pres.; B.Dolan, Director of Business Development; E.Kunstal, eng. mgr.

The Science of Sound Performance – ITC, a Division of Channel Technologies Group (CTG), designs and manufactures both custom and off-the-shelf underwater, air, and ultrasonic acoustic transducers, projectors, hydrophones, hydrophone/preamp, side-scan arrays, OEM and end-item products for commercial and military applications.

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E-mail: sales@cygnusinstruments.com
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E-mail: perry.sales@f-e-t.cm.com
Website: www.f-e-t.com/Subsea

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E-mail: Info@SeaBotix.com
Website: www.SeaBotix.com

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10642 West Little York, Suite 100
Houston, Tx, 77041-4014, USA
Tel: +1 713 329 8730, Fax: +1 713 329 8299
E-mail: sub-atlantic.slaes@f-e-t.com
Website: www.f-e-t.com/Subsea

Forum Energy Technologies' sub-Atlantic brand manufactures world class ROVs ranging from portable units to light work class systems. Sub-Atlantic also supplies thrusters, hydraulic power units, valve packs, compensators and pan and tilt systems to other ROV manufacturers. Sub-Atlantic is part of the FET subsea group and has facilities in the US and UK and sales offices and agents around the world.

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Tel: (610) 458 3000, Fax: (610) 458 3010
E-mail: info@videoray.com
Website: www.videoray.com
Contact: Brian Luzzi

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UNDERWATER VEHICLES — Continued

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Tel: 919-405-3993, Fax: 919-495-3994
E-mail: frochleder@irobot.com
Website: www.irobot.com
Contact: Friedrich Rochleder, Sales Account Manager

iRobot designs and builds robots that make a difference. iRobot's family of unmanned underwater vehicles (UUVs), including the iRobot 1KA Seaglider and iRobot 15A Ranger, perform a variety of missions for researchers, oceanographers and military planners including physical, chemical and biological oceanography, persistent surveillance, marine environmental monitoring and other missions.

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Campus 1, Science & Technology Park, Balgownie Road, Bridge of Don, Aberdeen, AB22 8GT, UK
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Fax: +44 (0)1224 226598
E-mail: km.camsales.uk@kongsberg.com
Website: www.kongsbergmaritime.com
Contact: Bill Stuart

Kongsberg Maritime Ltd is a world leader in providing harsh environment underwater camera & imaging technology and marine CCTV systems to the Offshore Oil Field & Renewable Energy, Power Generation, Scientific, Maritime and Military sectors.

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E-mail: sales@sharkmarine.com
Website: www.sharkmarine.com
Contact: Jim Honey

Since 1984 Shark Marine Technologies, has been manufacturing Remotely Operated Vehicles and accessories, Winches, Handling & Control Systems, Underwater Cameras and Diver Held Sonar Systems, for operations including surveying, oil and gas, security and defence, search and recovery and archaeological investigations. We also provide on-site operations and consultation, software development and custom manufacturing.

SIDUS Solutions, Inc.
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Tel: (281) 658-2555
E-mail: info@sidus-solutions.com
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WINCHES, HANDLING & CONTROL SYSTEMS

Hawboldt Industries
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Chester, Nova Scotia, Canada B0J 1J0
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E-mail: paul.phillips@hawboldt.ca
Website: www.hawboldt.ca
Contact: Paul Phillips

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W. ___ SUBMARINE TELECOM
X. ___ EQUIPMENT RENTAL
Y. ___ MANUFACTURERS' REPRESENTATIVE
Z. ___ OTHER (Please specify below)

_____

_____

4 Which category best describes your job function? (check only one)

1. ___ OWNER / EXECUTIVE
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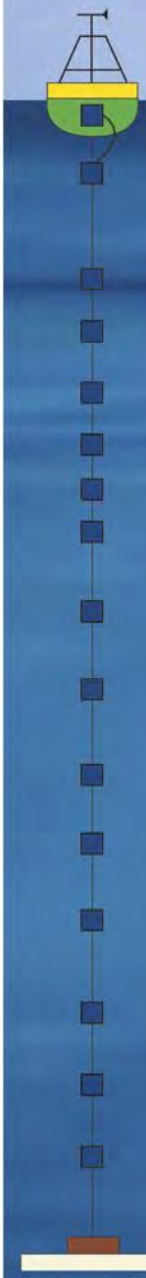

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