Ocean News & Technology

April 2016

35 YEARS

www.oceannews.com

News for the Ocean Industry

AUV-Based Structural Integrity Management for Deepwater Fields

Feature Story - Page 10

VideoRay

CONFIDENCE UNDERWATER

Your success drives everything we do. That's why we've engineered every aspect of our ROV systems with you in mind. VideoRay offers affordable, reliable, and robust ROV systems that get the job done right the first time. There's a reason why more customers have chosen VideoRay inspection class ROVs than any other ROV solution on the market. From our unparalleled customer service to our innovative training programs, VideoRay gives you confidence underwater.

www.videoray.com


THE BEST PERSON FOR THE JOB
ISN'T ALWAYS ONE.
AT LOCKHEED MARTIN,
WE'RE ENGINEERING A BETTER TOMORROW.
To help us go further than ever before, Lockheed Martin is developing systems that keep us from having to go at all. These unmanned solutions for air, land and sea keep operators away from danger no matter what the mission is.
Learn more at lockheedmartin.com/unmanned
© 2016 LOCKHEED MARTIN CORPORATION
LOCKHEED MARTIN

OPERATIONAL EXPERTISE. GLOBAL REACH. PROFESSIONAL RESULTS.

Our marine services team provides extensive operational experience

GEOPHYSICAL

- Side-scan sonar
- Subbottom profiling
- Bathymetry/single-beam
- Magnetometer capabilities

PHOTODOCUMENTATION

- Diver-held HD video and still camera capabilities
- Self-contained advanced diver navigation systems
- Towed HD video and still cameras
- Ground-truthing services

GEOTECHNICAL

- Vibracoring
- Sediment sampling
- Cone penetration testing

REMOTE SURVEY PLATFORMS

- Unmanned surface vehicles
- ROV systems, including HD cameras
- Wide array aerial survey platforms
- Easy transportation

METOCEAN

- Oceanographic surveys
- Water quality data collection
- Meteorological measurements
- Acoustic Doppler current profiler data collection

CSA Ocean Sciences Inc.

FLORIDA | LOUISIANA | TEXAS | CALIFORNIA | TRINIDAD | QATAR | BRAZIL | CYPRUS | SINGAPORE | AUSTRALIA

www.csaocean.com/services

Extraordinary Quality
High Affordability

- High Resolution
- Highly Robust and User Friendly
- Highly Cost-Effective Swath Bathymetry System

EchoSweep Multibeam Echosounder

- ► Number of Beams: 140
- ► Range: up to 280 m
- ► 140° Swath Coverage
- ► Free Software for Real-time Operation and Post-processing

- Highly Robust and Accurate Acoustic Doppler Technology
- Significantly Longer Range
- Highly User Friendly And Cost Competitive

FlowQuest Acoustic Current Profilers

- ► Range: up to **900 m**
- ► Depth: up to 6,000 m
- ► Accuracy: up to 0.25% ± 2.5 mm/s
- ► Data Fusion and Acoustic Modem Options

- The World's Smallest DVL
- Ideal For Underwater Precision Navigation
- Significantly Longer Range
- Smallest Minimum Altitude

NavQuest Doppler Velocity Logs (DVL)

- ► Range: up to **300 m**
- ► Minimum Altitude: 0.3 m
- ► Depth: up to 6,000 m
- ► Accuracy: up to 0.2% ± 1 mm/s

- The Best Selling USBL Systems In The World
- Broadband Acoustic Spread Spectrum Technology
- Highly Accurate, Robust and Cost Effective

TrackLink USBL Tracking Systems

- ► Range: up to 11,000 m
- ► Depth: up to 7,000 m
- ► Targets: up to 16
- ► Accuracy: up to 0.15 degree
- ► Price: from $15,000

- The Best Selling Acoustic Modems In The World
- Broadband Acoustic Spread Spectrum Technology
- Transport 95% of The World's Acoustic Communication Data

High Speed Underwater Acoustic Modems

- ► Data Rate: up to 38,400 baud
- ► Bit Error Rate: < 10^{-9}
- ► Range: up to 10,000 m
- ► Depth: up to 7,000 m

LinkQuest Inc.

www.link-quest.com

Tel: (858) 623-9900, 623-9916 Fax: (858) 623-9918
6749 Top Gun Street, San Diego, CA 92121, USA
Email: sales@link-quest.com

in this issue

Ocean Industry

Offshore Industry

Feature Story

Editorial Focus

Company Spotlight

Departments

Cover Photo

Aerial of the Åsgard B a semi-submersible gas and condensate processing platform located on the Halten Bank in the Norwegian Sea, around 200 kilometres off mid-Norway.
Photo credit: Øyvind Hagen - Statoil ASA

OCEAN NEWS & TECHNOLOGY
www.oceannews.com

More News, More Technology, More Data

in the next issue

Editorial Focus
- UW Imaging & Processing
- Marine Salvage/UW Archeology

Product Focus
- Magnetometers;
- Water Dredges & Airlifts
- Diving Services

TSC Technology Systems Corp.

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

Printed in the USA. PRINTED WITH SOY INK

Authors:

Stephanie Ingle, PhD,
Geoscience Consultant,
Fugro Marine Geoservices, Inc.

Jamshid Gharib, PhD,
Geoscience Consultant,
Fugro Marine Geoservices, Inc.

OCEAN NEWS & TECHNOLOGY
www.oceannews.com

EDITOR IN CHIEF
Ladd Borne

SUBMARINE CABLE EDITOR
John Manock

PRODUCTION COORDINATOR
Suzanne Short

ART DIRECTOR
Suzanne Short

COPY EDITOR
Robyn Schuricht

CIRCULATION
Jessica Lewis
Jlewis@tscpublishing.com

ADVERTISING SALES

NORTH AMERICAN AD SALES:
Lisa Chilik
Tel: +1 (574) 261 4215
Fax: +1 (574) 255 1006
Lchilik@tscpublishing.com

INTERNATIONAL AD SALES:
Mimi Shipman
Mob: +44 (0) 777 6017 564
Ph: +44 (0) 1460 242 060
mshipman@tscpublishing.com

Meeting Exploration and Development Commitments in the Current Low-Cost-of-Oil Environment

Let's face it – the cost of offshore exploration and development is not a joyous topic to ponder these days. Commitments for exploration and development work on offshore leases span years to decades – when you bought that block, you were looking at returns well above your breakeven point, and now, well most of us would rather not talk about it… Nonetheless, those commitments remain and thus we are left to consider how to do the work less expensively while also maximizing long-term data value and minimizing risk. Decreasing cost, increasing value, and reducing risk can be complementary when the efforts are considered simultaneously and early in the project's lifespan – in fact, these concepts should be considered core values and cannot be taken into consideration too early.

Exploration seismic data is the geologists' go-to dataset at the early-concept / site-selection stage, and necessary at the development stage; however, the cost for 3D exploration seismic acquisition to cover a large area in deepwater can be prohibitive. Anecdotally, we have personally had colleagues working at major operators tell us "I stopped asking for better 3D seismic a long time ago." Thus, in these belt-tightening times, we must consider alternatives to blanketing entire blocks with high-quality 3D seismic. Ideally, these alternatives would also guide us as to where to focus our future, more expensive exploration and development efforts.

Echosounders are used to measure the depth to the seafloor by using the properties of acoustic waves. The principle of echosounders is based on the two-way travel time between the acoustic waves transmitted from the sea surface and those reflected from the seafloor. These bathymetry-determining instruments can be single-beam or multibeam echosounders (MBES), depending on the number of depth point measurements collected at the same time. MBES can be mounted beneath the hull of a vessel to acquire a swath of bathymetric information; at vessel speeds of 10 kts or more, thousands of km^2 may be mapped in days to weeks. Variations in the composition of the seafloor can be measured using the strength of the multibeam's acoustic return. Sound hitting a muddy seafloor will be largely absorbed, thus the returning signal will be significantly dampened. In contrast, a rock or calcareous seafloor will absorb very little sound and a strong signal will be returned. The resulting record yields a variable pattern that will help inform the interpretation of the seafloor's composition.

Ships bearing MBES systems can simultaneously acquire side scan sonar and sub-bottom profiler data. These additional tools yield further insights about the material and texture on the seafloor and the structure of the uppermost subseafloor, respectively. Furthermore, many modern vessels outfitted with the above instrumentation are also capable of acquiring high resolution 2D seismic data and even sampling (coring) specific locations of interest for later study. The result: a map covering much of the shallow portion of the entire lease area, at a very cost-effective rate. From this information, a ground model can be developed and promising prospects identified for follow up work, significantly reducing the area requiring more detailed – and costlier – examination.

Exploration cost considerations are especially important in frontier regions: areas in remote regions of the earth, far from markets and infrastructure, and sometimes in harsh climates or deep water, where little drilling or seismic acquisition may have been carried out. Frontier deepwater developments take decades to bring to fruition, thus investment decisions are often not based on concurrent market evaluations. In these regions, blanketing the area with a high-quality map makes particularly good economic sense. Map it once – and use it again and again. Whether for concept selection, site development, extraction or even later life-of-field efforts, these data prove useful in guiding smart decisions by reducing risk and cost and thereby demonstrate long-term value.

Let's talk Subsea.

In today's challenging environment, you need a partner you can count on.

Forum offers the world's most comprehensive range of remotely operated vehicles used for inspection, survey and deep water construction under the well-known Perry and Sub-Atlantic brands.

Our associated product suite includes LARS, tethering systems, hot stabs, PIG launchers, simulation software, data acquisition softwear and geoscience product management.

Talk to us about our Subsea Technologies at
f-e-t.com/yourforum

OUR SOLUTIONS INCLUDE:

Trenchers	Work Class ROVs	Buoyancy Foam
Visualsoft	GEMS	Moffat Engineering
ROV Tooling	Project Management	LARS and Winches
Ovservation ROVs	VMAX Project Simulation	Equipment Rental

FORUM™

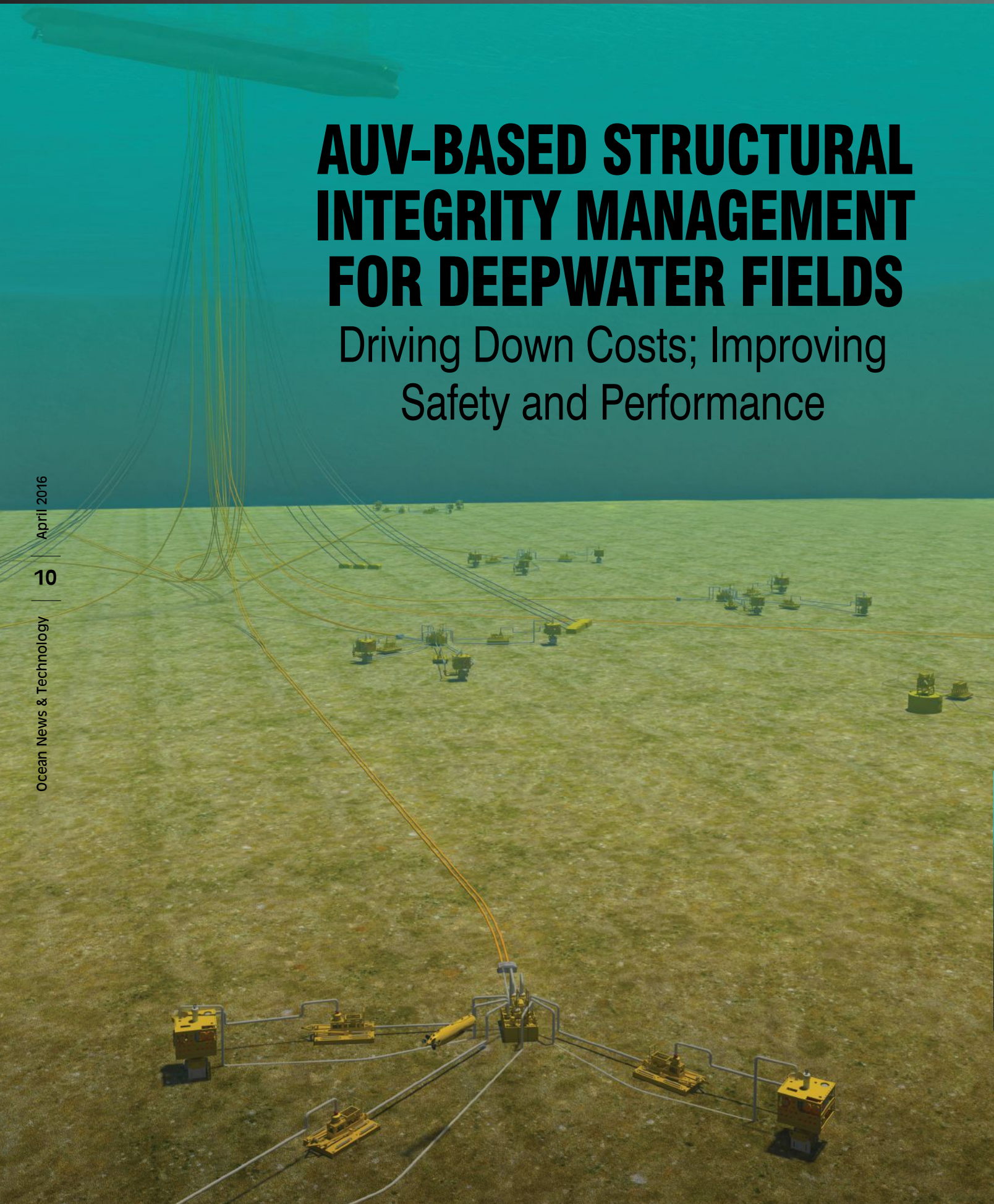
SUBSEA TECHNOLOGIES

everything remotely possible™

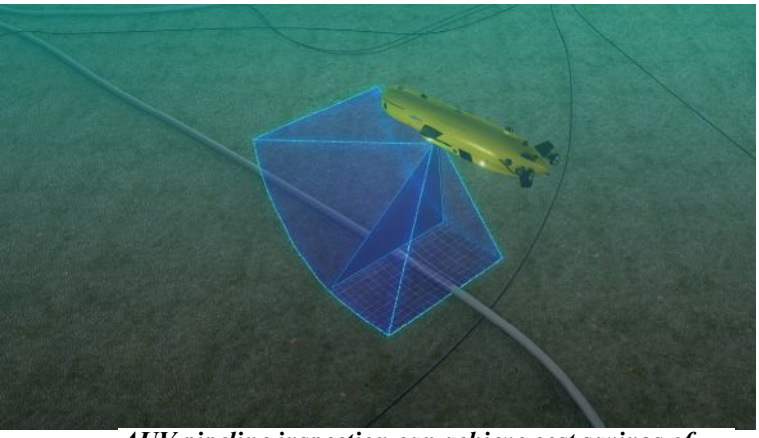
To learn more about our products and services, visit us at f-e-t.com/subsea

AUV-BASED STRUCTURAL INTEGRITY MANAGEMENT FOR DEEPWATER FIELDS

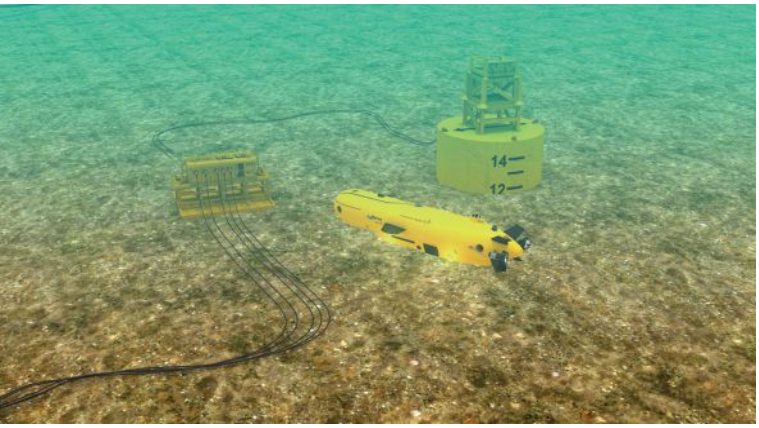
Driving Down Costs; Improving Safety and Performance



By: *John Jacobson and Dan McLeod, Lockheed Martin Corporation*



AUV pipeline inspection can achieve cost savings of 50% to 70% over ROV inspections.



Field resident AUVs will provide a persistent presence to monitor structural integrity conditions and potentially save millions of dollars per year in O&M costs.

High bandwidth through-water communications using Free Space Optical technology will enable video transmission and tetherless control of AUVs for inspection and light intervention operations.

In the current economic environment, oil & gas operators are demanding steep reductions in operations and maintenance (O&M) costs and dramatic improvements in operating efficiencies to achieve viable financial returns on their deepwater field operations. Autonomous Underwater Vehicles (AUVs) hold the potential to meet this challenge through cost-effective deployment of advanced subsea sensor, navigation, and communications technologies. But while technology breakthroughs continue to occur at an incredible pace, critical technology gaps remain. Rapid adaptation and integration of these evolving technologies is a huge challenge for AUV developers, who are tightly constrained by payload, energy and hydrodynamic packaging considerations.

Today, O&M costs for structural integrity management in deepwater fields are driven by the use of high-powered work-class remotely operated vehicles (ROVs) and tether management systems deployed from large, high-specification ROV support vessels (ROVSV). ROV systems employed for deepwater facilities inspection typically include launch & recovery system, winch and umbilical, and operations and support vans that can easily total 75 to 90 tonnes on deck. When coupled with a dynamically positioned ROVSV with adequate deck space and crew accommodations, O&M costs can easily exceed $150,000 per day and require a crew of 35 to 50 offshore personnel. In addition, ROV umbilical and tether management in high sea state and currents can create hazardous conditions for both shipboard and subsea equipment.

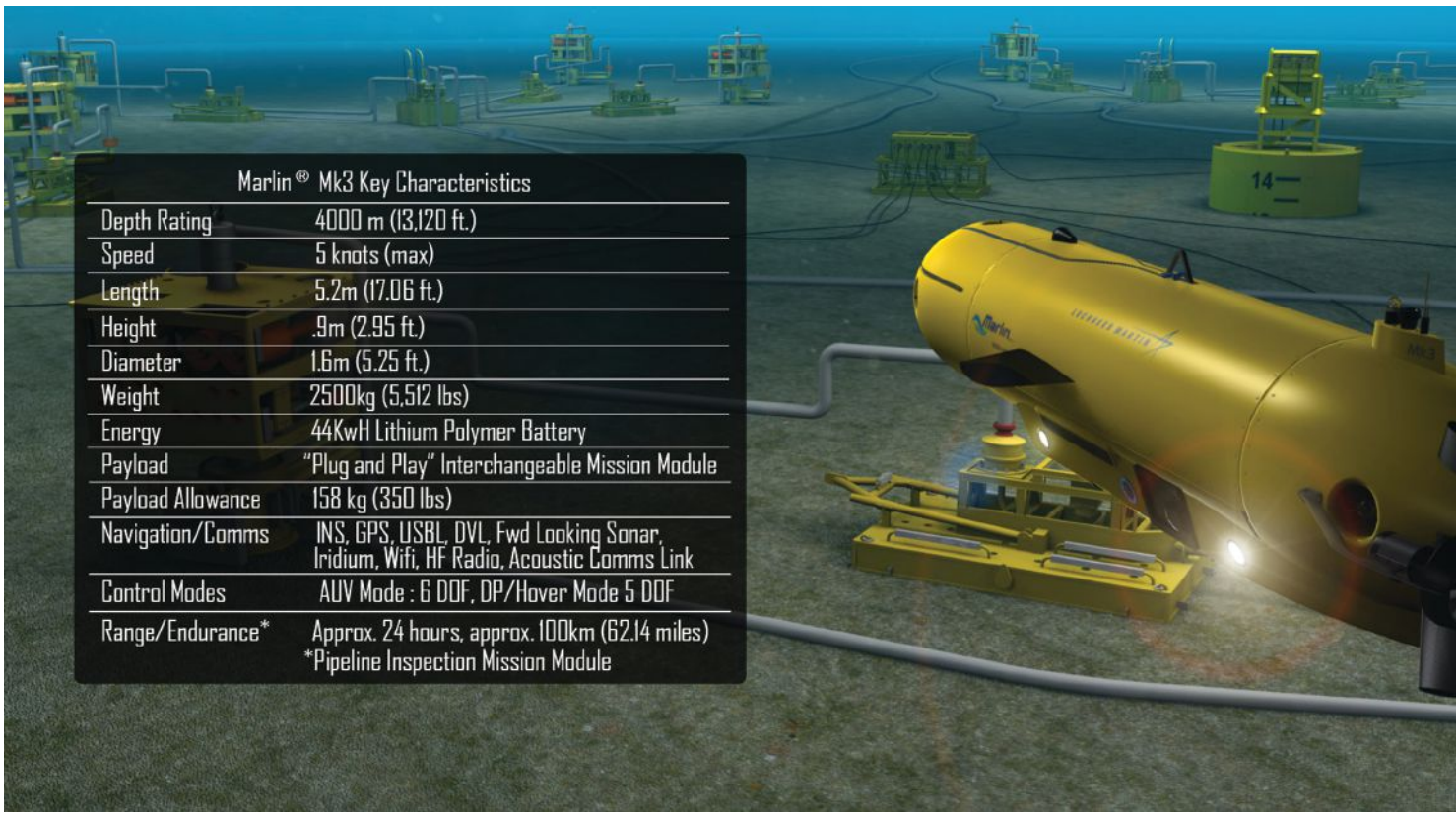
In the future, AUVs will offer significant improvements in safety and operating efficiencies as well as substantial reductions in cost over current inspection methods. They will be deployed from smaller vessels, employ smaller crews, and ultimately operate from field resident subsea docking stations, thereby reducing the number of people at sea and reducing or eliminating the number of vessel days required. Because AUVs are inherently faster and more stable platforms than ROVs, they are capable of deploying a wide range of sensor technologies (including video, sonar, laser, ultrasonic, magnetic, and others) and collecting higher quality data at much higher rates.

When all these advantages are combined, missions such as deepwater pipeline inspection can be accomplished by AUVs at rates 2 to 4 times faster than ROVs and result in cost savings approaching 50% to 70%. As AUV dynamic mission planning, deepwater navigation, and on-board data processing technologies improve, there is also high potential to substantially reduce the time and costs associated with post-mission data processing. The end result will be a potentially dramatic reduction in O&M costs and improvements in operating efficiencies. Ultimately, AUVs will become "field resident," residing on the seabed in subsea fields for months at a time, providing a persistent presence to monitor structural integrity conditions and potentially saving field operators millions of dollars per year on O&M costs through reduction or elimination in vessel days.

In order to achieve this vision for AUV-based structural integrity management, a number of mission-critical capabilities must be developed, demonstrated, and qualified for use in or near subsea production facilities. These include:

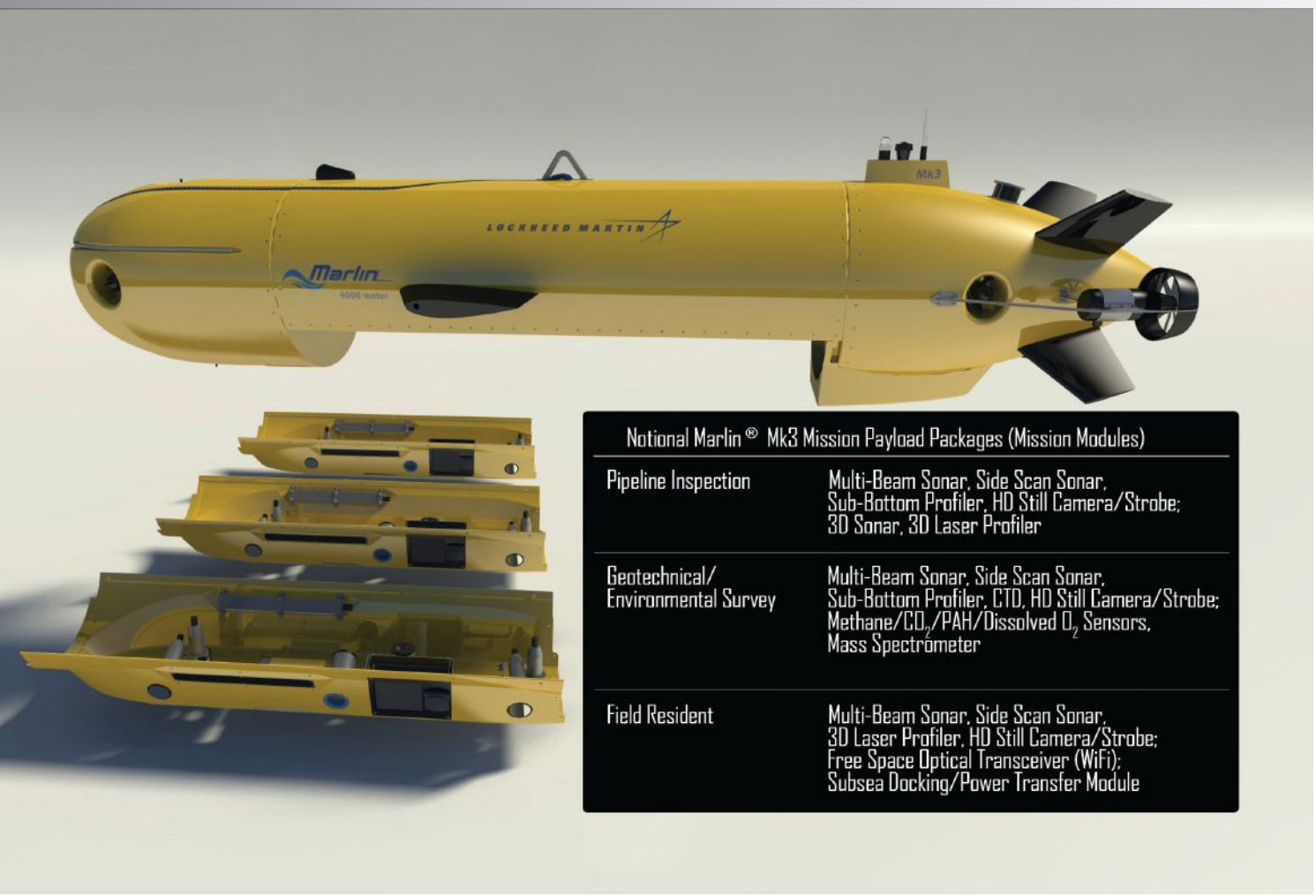
- Dynamic mission planning: Autonomous perception of the environment and autonomous mission re-planning in response to real-world changes to the environment and AUV faults;
- Deepwater field navigation: Navigating safely and accurately for many tens of kilometers while maintaining precise positional awareness, avoiding known and unknown structures, and arriving at designated destinations within acceptable navigational error parameters;
- Close-in navigation: Precise positioning and feature-based navigation to achieve "close-in" subsea equipment inspections;
- Seabed and structural inspection using video, sonar, laser, photogrammetry, CP, NDT, etc.;
- Pipeline/flowline tracking, following and inspection while maintaining IHO survey standards;
- Riser/mooring line inspections;
- Hydrocarbon leak detection, classification and localization;
- High bandwidth through-water communications, enabling "Wi-Fi" capabilities such as wireless video transmission and tetherless control of AUVs for inspection and light intervention operations;
- Data harvesting from embedded sensors;
- Subsea docking, wireless power and data transfer; and
- Long-term submersion.

Many of these individual mission capabilities have been demonstrated by AUV developers in laboratories, test tanks or at offshore test facilities up to Technology Readiness Level (TRL) 3 to 5 (refer to API RP 17N). A critical challenge, however, is to deploy a mature, mission-capable AUV that integrates existing, field-proven capabilities while also providing adequate flexibility and growth to rapidly adopt new technologies that enable additional mission capabilities and provide additional step jumps in the AUV value proposition. In response to this challenge, Lockheed Martin has developed the Marlin® Mk3 AUV, featuring "swappable" mission



Marlin® Mk3 Key Characteristics

Depth Rating	4000 m (13,120 ft.)
Speed	5 knots (max)
Length	5.2m (17.06 ft.)
Height	.9m (2.95 ft.)
Diameter	1.6m (5.25 ft.)
Weight	2500kg (5,512 lbs)
Energy	44KwH Lithium Polymer Battery
Payload	"Plug and Play" Interchangeable Mission Module
Payload Allowance	158 kg (350 lbs)
Navigation/Comms	INS, GPS, USBL, DVL, Fwd Looking Sonar, Iridium, Wifi, HF Radio, Acoustic Comms Link
Control Modes	AUV Mode : 6 DOF, DP/Hover Mode 5 DOF
Range/Endurance*	Approx. 24 hours, approx. 100km (62.14 miles) *Pipeline Inspection Mission Module



packages and a modular architecture that enables rapid implementation of evolving sensors, energy, communications and autonomy technologies to deliver value-driven solutions for deepwater structural integrity management. Designed to perform autonomous survey and inspection operations in water depths up to 4,000 m, the Marlin® Mk3 employs dual control modes (DP/hover mode, AUV mode) that enable close-in inspection with full hover capability as well as efficient, high-speed survey operations. The Marlin® Mk3 will conduct high accuracy navigation in and around deepwater oilfield production facilities using map-aided, terrain aided, and feature-based navigation and will conduct seabed and infrastructure survey and inspection using a wide range of "plug-and-play" acoustic, optical, and environmental sensors and tooling.

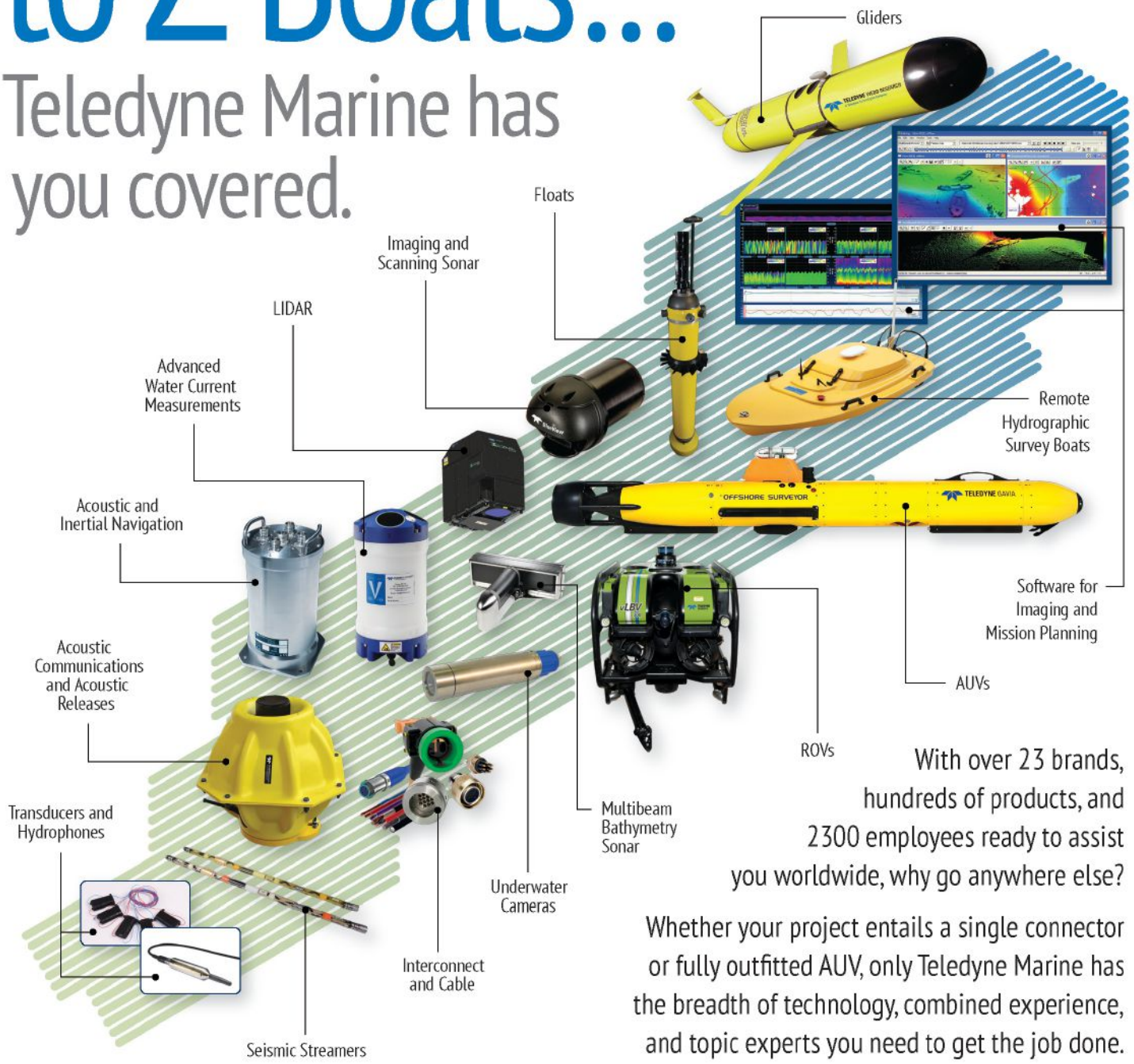
The Marlin® Mk3 will employ high-resolution 3D sonar and/or 3D laser sensors and Lockheed Martin's field-proven, proprietary real-time model building algorithms to conduct structural inspections, generate geo-registered 3D models, and detect and localizing structural changes against a reference model. When these modeling techniques are applied in-situ to the seabed and field infrastructure using survey data collected and models generated on prior inspections, the result is the ability to identify changes in structural integrity conditions "on the fly," and to autonomously re-plan the mission to collect additional data on the anomalous condition. In addition, upon completion of the mission, the AUV operator will be provided with immediate notification of potential structural integrity issues that were detected on the survey mission.

The Marlin® Mk3's interchangeable payload module will enable it to perform a wide range of inspection, repair, and maintenance (IRM) missions using both current and future technologies. Near-term missions will include bathymetric and geophysical survey, subsea facility inspection and monitoring, pipeline and riser inspection, and hydrocarbon seep detection. In the future, high bandwidth wireless subsea comms, subsea docking technologies, and long-term submersion technologies will enable such capabilities as field resident structural integrity monitoring and light intervention (robotic tool manipulation) cleaning and maintenance activities.

Over time, AUVs will ultimately achieve significant improvements in safety and operating efficiencies as well as dramatic reductions in cost over current inspection methods. The path to achieving this vision, however, will include many small, incremental steps as AUV technologies mature, become accepted in deepwater fields and are adopted by operating companies as valuable inspection tools. The Marlin Mk3 offers a unique combination of innovative, leading-edge capabilities and critical modularity and growth capacity that will enable continuous expansion of the value proposition for AUV-based structural integrity management for deepwater fields.

From Acoustics to Z-Boats...

Teledyne Marine has you covered.



With over 23 brands, hundreds of products, and 2300 employees ready to assist you worldwide, why go anywhere else?

Whether your project entails a single connector or fully outfitted AUV, only Teledyne Marine has the breadth of technology, combined experience, and topic experts you need to get the job done.

IMAGING • INSTRUMENTS • INTERCONNECT • SEISMIC • VEHICLES

TELEDYNE MARINE

Everywhereyoulook™

www.teledynemarine.com

OCEAN INDUSTRY

in this section

The mystery of the missing USS Conestoga is solved

NOAA and the U.S. Navy announced the discovery of the USS Conestoga (AT 54) in the Greater Farallones National Marine Sanctuary off San Francisco, 95 years after the Navy seagoing fleet tugboat disappeared with 56 officers and sailors aboard. The discovery solves one of the top maritime mysteries in U.S. Navy history.

The officers and crew of USS Conestoga, in San Diego, California in 1921. Lost for 95 years, the tug was discovered in the Greater Farallones National Marine Sanctuary off San Francisco. Credit: Naval Historical Center Photograph NH 71503.

"After nearly a century of ambiguity and a profound sense of loss, the Conestoga's disappearance no longer is a mystery," said Manson Brown, assistant secretary of commerce for environmental observation and prediction and deputy NOAA administrator. "We hope that this discovery brings the families of its lost crew some measure of closure and we look forward to working with the Navy to protect this historic shipwreck and honor the crew who paid the ultimate price for their service to the country."

On 25 March 1921, Conestoga departed the Golden Gate en route to Tutuila, American Samoa via Pearl Harbor, Hawaii. When Conestoga failed to reach Hawaii by its anticipated arrival date the Navy mounted a massive air and sea search around the Hawaiian Islands, the tug's destination. Nearly two months later, on 17 May a merchant vessel found a battered lifeboat with the letter "C" on its bow off the Mexican coast leading to a search there.

For months, the ship's mysterious disappearance gripped newspapers across the country. Unable to locate the ship or wreckage, the Navy declared Conestoga and its crew lost on 30 June 1921. This was the last U.S. Navy ship to be lost without a trace in peacetime.

In 2009, the NOAA Office of Coast Survey, as part of a hydrographic survey near the Farallon Islands off San Francisco, documented a probable, uncharted shipwreck. In September 2014, NOAA launched a two year investigation codirected by Delgado and Robert Schwemmer, West Coast regional maritime heritage coordinator for NOAA's Office of National Marine Sanctuaries, to document historic shipwrecks in the Greater Farallones sanctuary and nearby Golden Gate National Recreation Area. In October 2015, NOAA confirmed the identification and location of Conestoga during a mission that included an archaeologist from the Naval History and Heritage Command, as well as several senior Navy officers.

"Thanks to modern science and to cooperation between agencies, the fate of Conestoga is no longer a mystery," said Assistant Secretary of the Navy for Energy, Installations and Environment Dennis V. McGinn. "In remembering the loss of the Conestoga, we pay tribute to her crew and their families, and remember that, even in peacetime, the sea is an unforgiving environment."

For more information, visit www.sanctuaries.noaa.gov.

MTS executive director position announcement

The executive search firm of JDG Associates, Ltd. has been selected to conduct the search for the executive director position at MTS. Headquartered in Rockville, MD, JDG will be receiving resumes for the position through 22 April. However, since search committee interviews of finalists could take place in early May, those interested in the position are urged to submit their resume as soon as possible. Those wishing to suggest someone else for the position are similarly urged to do so on an ASAP basis.

To view the position description, visit www.mtsociety.org/pdf/hr/MTS%20PA.pdf

Resumes and nominations for the position should be sent directly to:
Paul Belford, Principal
JDG Associates
1700 Research Boulevard
Rockville, MD, 20850
belford@jdgsearch.com

Ocean Networks Canada to coordinate earthquake early warning system British Columbia

Earthquake early warning has received a big boost in British Columbia. Ocean Networks Canada (ONC), an initiative of the University of Victoria, will develop a regional earthquake early warning system for southern British Columbia—home to over 50% of the province's residents—with funding from the province.

The Honorable Naomi Yamamoto, Minister of State for Emergency Preparedness, announced that $5 million will go to Ocean Networks Canada (ONC) and their partners to ensure that communities have the best chance to protect themselves and find safety when a major earthquake occurs.

This funding enables ONC to expand its seismic sensor network on land, and importantly, on the seafloor off the coast, where large earthquakes occur. ONC will also coordinate a variety of regional data to be hosted on Oceans 2.0, its world-leading data management system that collects and archives vast amounts of diverse data, in real-time, from ONC instruments and infrastructure.

With an expanded sensor network and proven delivery system, ONC is uniquely positioned to bring together the right players to deliver a comprehensive earthquake early warning system in British Columbia. ONC's cabled observatories collect data from ultra-sensitive offshore and land-based seismic sensors, effectively monitoring seismic activity 24/7 from the Cascadia subduction zone where earthquake risk is high.

Collaborating with other agencies, including the British Columbia Ministry of Transportation and Infrastructure, Natural Resources Canada and the University of British Columbia, ONC will be able to monitor earthquakes from other risk areas as well.

For more information, visit www.oceannetworks.ca.

2,000 km AUV under the sea ice challenge

The World Climate Research Program (WCRP) and the Prince Albert II of Monaco Foundation (FPA2) are jointly promoting a Polar Challenge, which will reward the first team to complete a 2,000 km continuous mission with an AUV under the sea ice in the Arctic or Antarctic.

Bonuses can be gained with optional demonstrations. The WCRP-FPA2 Polar Challenge, with prize money totalling 500,000 CH, is a global competition challenging teams to push the boundaries of polar ocean monitoring capabilities.

The guiding rationale of the competition is to promote technological innovation (including, but not limited to, in AUV endurance, positioning, data collection and transmission) towards a future, cost-effective, autonomous and scalable observing network for sea-ice covered regions based on a fleet of such platforms. In this respect, any attempt at completing the challenge should in principle be scalable to the above-envisioned, larger-scale network of an autonomous under-ice observation system, or at least significantly reduce the amount of outstanding innovation needed to make such a system possible.

All prospective competitors MUST submit an application form which will be reviewed by the Polar Challenge Committee. Applications can be submitted anytime during the competition period before a mission attempt, as long as the corresponding prize has not been awarded yet. Late registrations posterior to a team's mission start will not be considered.

The competition consists of the following challenges:

Main mission (mandatory): 400,000 CHF prize

• A continuous 2000 km AUV mission under the sea-ice

• Autonomous and accurate navigation Regular observations of temperature and salinity from the near-surface to 700m

Bonus demonstration 1 (optional): 50,000 CHF prize

• Regular observations of sea ice thickness or draft

Bonus demonstration 2 (optional): 50,000 CHF prize

• Successful under-ice transmission of position and environmental data via WIS/GTS

The stated amounts may evolve during the course of the competition if additional resources are mobilized to that effect. The organizers intend to hold an award ceremony during which Prizes for any successfully completed challenge tasks will be delivered. For reasons related to contractual arrangements with some of the Challenge's sponsors, the Prize money associated with any successful mission will not be awarded sooner than 1 Jan 2018, even if any of those missions are validated earlier.

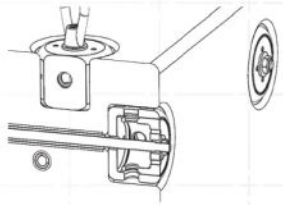
There is no participation fee associated with the Polar Challenge. Competitors are to bear all costs related to their participation in the Challenge, including the mandatory purchase and installation of the mission verification tag.

Proposed attempts to the challenge will have to demonstrate a best effort to minimize the impact on the environment. Any aspect of the planned mission that has an unacceptable impact or potential risk on the environment is prohibited.

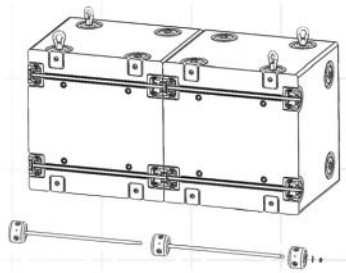
For more information, visit www.wcrp-climate.org/polarchallenge.

FlexSEA

Modular Flotation Like Never Before

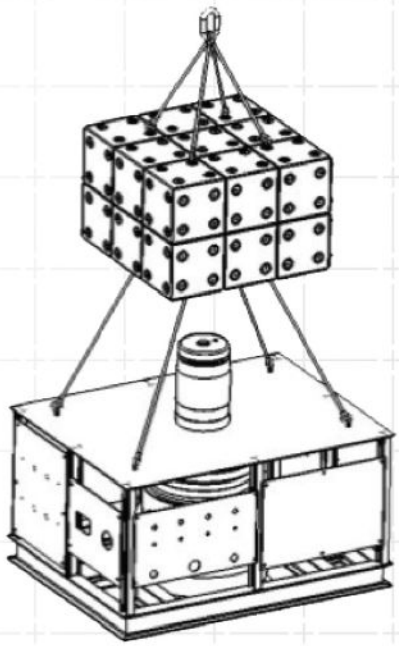


Detachable connection and positioning allow for a variety of geometries.



The connection hardware facilitate attachments to maintain structural integrity of the array.

Introducing the FlexSEA™ Modular Flotation System available for rent exclusively from Okeanus Science & Technology. We offer FlexSEA™ flotation modules in a variety of sizes to supply different amounts of buoyancy for a variety of payload sizes and weights. Our unique modules may also be configured to form arrays suitable for a wide variety of subsea modules, tools, instrumentation packages, vehicles and submersibles including ROV mounted intervention packages.



OKEANUS
SCIENCE & TECHNOLOGY

CREATING VALUE AT ANY DEPTH

2261 Denley Road • Houma, Louisiana • 70363 | 985-346-4666

www.okeanus.com

Harvey Gulf delivers North America's first LNG marine fueling terminal in Port Fourchon, Louisiana

Harvey Gulf has once again shown its commitment to utilizing LNG as a marine fuel with the opening of the first marine LNG fueling terminal in North America. Less than a year after the delivery of the M/V Harvey Energy, America's first LNG-powered vessel, Harvey Gulf accomplished another first when it completed a successful LNG bunkering of the Energy from the newly constructed LNG terminal facility at its operation base in Port Fourchon, Louisiana. The bunkering included the transfer of 43,000 gallons of LNG in approximately 2.25 hrs without incident.

The terminal is designed to meet the requirements of 33 CFR part 127 NFPA 59A and able to deliver LNG at a pumping rate of 550 GMP. The total on-site storage is approximately 270,000 gallons contained in three 90,000 USG type "C" vacuum insulated tanks.

Shane Guidry, chairman and CEO of Harvey Gulf, commented: "This a testament to Harvey Gulf's commitment to promoting the use of LNG, a clean, abundant, and cost-effective alternative marine fuel. With the completion of our LNG terminal at Port Fourchon, we are able to provide a LNG bunkering point at the epicenter of marine operations for the Gulf of Mexico, which is vital to continuing the shift to LNG as a marine fuel."

The M/V Harvey Energy and her sister ship the M/V Harvey Power, both LNG-powered Offshore Supply Vessels, are under charter to Shell and support Shell's Gulf of Mexico assets.

For more information, visit www.harveygulf.com.

Maersk Container Industry develops reefer solution to save container operators millions

The StarConomy reefer control software designed by Maersk Container Industry (MCI), in conjunction with fruit multinational Dole, supports reefer container operators by allowing them to maximize the value of their refrigerated cargoes in MCI's Star Cool units. The software's aim is to reduce operating costs and ultimately meet the industry's sustainability objectives to reduce CO_2 emissions.

If a typical fruit multinational operating their own fleet of four vessels with 500 reefers each were to upgrade to the software, the annual financial savings on a single route, such as Ecuador to the UK, would be over USD $2 million. For a container line with a six-vessel service from Ecuador to Russia, also with 500 plugs, the annual savings would be an estimated USD $3.2 million.

StarConomy can be installed on all new Star Cool units while a simple software update can make it available on all existing Star Cool units installed in operations of more than 40 operators. MCI conducted the field test on Dole's weekly South America to Europe route.

With the new software, MCI's R&D team in Denmark answered the protracted challenge of maintaining the same precise temperature control inside the reefer while matching the airflow to the varying requirements of specific cargoes. StarConomy's revolutionary feature is its ability to control both compressor and fan speed at the same time.

Wärtsilä to supply ship design for new type deep water dive support vessel

Wärtsilä has signed a contract with Shanghai Bestway Marine Engineering Design Co Ltd to design a new type of deep water dive support vessel. The ship is to be built for China state-owned Shanghai Salvage Bureau (SSB), one of the largest professional salvage companies in China. The contract with Wärtsilä was signed in January.

The Wärtsilä design features a unique combination of capabilities, including deep water (6,000 m) salvage operations, deep water pipe laying and construction work, and saturation (SAT) diving operations for 24 divers using two diving bells. SAT diving is a technique that allows divers to reduce the risk of decompression sickness when working at great depths for extended periods of time. All the design features are based on a single platform operating with DP3, the highest class of dynamic positioning. When built, this will be the world's first SAT diving support vessel with multi-lay and ultra deep water construction capabilities.

Wärtsilä has proven experience and an impressive track record in designing similar vessels of this type. The contract with SSB covers initial and basic design of the ship, meaning that class and flag authority-related drawings for the purpose of finalizing the necessary approvals and certifications, will be supplied. Wärtsilä will also provide the basic references for future, more detailed engineering requirements for building the vessel.

For more information, visit www.wartsila.com.

New Kongsberg simulators installed for certification of Indonesian seafarers

Kongsberg Maritime has completed the delivery and installation of a suite of new bridge simulators for Indonesia's Ministry of Transportation. The new simulators at the Ministry of Transportation's Maritime Training Centre, located at its headquarters in Jakarta, will be used for the assessment of Indonesian seafarers applying for seagoing certification for local and international operations.

Kongsberg simulators will support the Ministry of Transportation to significantly reduce the time taken and the tools required to assess Indonesian seafarers. This is especially important in today's context, as assessments for the certifications have become more stringent. Contemporary seafarer assessment includes customized criteria pre-defined by the assessor and a stronger focus on the human factor in maritime operations.

Kongsberg's K-Sim Polaris simulator was selected as the basis for the Indonesian Certificate of Competency assessment through a competitive tender. The scope of supply includes 1 x DNV GL A Compliant Full Mission Bridge simulator with 240° Field of View and 10 x Part task simulators.

Future migration to Kongsberg's new generation bridge simulator technology platform K-Sim Navigation is accommodated in the contract as part of a 5-year Long Term Simulator Support Program (LTSSP), which features an extensive customized service package. Kongsberg Maritime will also develop new simulator models and exercise areas as part of its delivery.

Damen signs MOU with Pearlson Shiplift Corporation

The Damen Shipyards Group and Pearlson Shiplift Corporation have signed an MOU for close cooperation between the two companies in the design and execution of shiplift projects around the world. The collaboration is set to bring benefits to the clients of both companies in the optimization of the design and realization of shipyard facilities.

Taking account of the expertise of Pearlson Shiplift Corporation as the original inventor and developer of Syncrolift® technology, the Pearlson team will provide the design and engineering knowledge required by Damen during a shipyard construction project. Pearlson Shiplift Corporation will also deliver all the critical shiplift components. "This includes all the vertical lifting equipment–the hoists–and the wire ropes," informs Pearlson Shiplift Corporation Director Bryan Fraind. "As well as the motor controls and load monitoring system, which are the 'brains' of the entire shiplift."

For more information, visit www.damen.com.

VSTEP delivers NAUTIS full mission bridge simulator

The simulator purchased by Helmepa included a NAUTIS DNV Class A FMB simulator with 240° horizontal field of view and an Instructor Station. It is being used to train the navigation and maneuvering skills of Helmepa's member shipping companies' personnel.

Joost van Ree, VSTEP sales director said, "We are proud to announce that a non-profit organization like Helmepa has joined the VSTEP simulator family. Our FMB simulator allows Helmepa members to train effectively ship and boat handling skills in compliance with the latest IMO requirements and model courses."

Helmepa is the pioneering voluntary marine environment protection association and in its capacity as "the maritime training centre for pollution prevention, safety at sea and environmental awareness," Helmepa is offering to its members refresher training on a NAUTIS full mission bridge simulator donated by associate corporate member DNV GL in appreciation of the voluntary training Helmepah as been offering to its members for 33 years.

Autonomous Marine Systems secures $3.5M to fund autonomous ocean monitoring

Autonomous Marine Systems Inc. (AMS), a marine data services company, announced $1.6M in seed funding. This investment will allow AMS to deploy an additional $1.9M in grant funding that the company won in 2015. The capital will go towards advancing existing contracts with customers in the offshore energy industry and Department of Defense and allow the company to pursue interest from other private and public sector customers both domestic and international.

The company has paid pilots scheduled through 2017 in key markets throughout the world. "Long duration, unblinking ocean observation will allow us to be better stewards of our critical maritime resources," says Eamon Carrig, chief executive officer and co-founder of AMS. "Our goal at AMS is to build a global, flexible, and extensible observation system as quickly and efficiently as possible."

To that end, the company has spent 6 years on R&D and pilot programs, recently completing commercial demonstrations for marquee customers in the energy and defense sectors. AMS' core technology is the Datamaran®, a Satellite for the Seas®, an internationally patented, zero emissions sailcraft that serves as a platform for sensors and instrumentation. It can be be operated in the open ocean for long durations without any human intervention or fuel. By deploying these vehicles in large fleets, AMS will drastically lower the cost of ocean data collection, including data that helps manage ocean resources and feeds into climate models. By endowing the Datamaran® with advanced networking technologies, AMS is building the world's first pan-oceanic, intelligent sensor network and data distribution channel.

For more information, visit www.automarinesys.com.

Sea level mapped from space with GPS reflections

The GPS signal used for 'sat-navs' could help improve understanding of ocean currents, according to new research published in Geophysical Research Letters by National Oceanography Centre (NOC) scientists, alongside colleagues from the University of Michigan and Jet Propulsion Laboratory.

As part of this research, sea surface height has been measured from space using GPS signals reflected off the sea surface for the first time. Information from these GPS signal reflections can be potentially used by scientists to monitor ocean currents by measuring the cause of the slopes currents in the ocean's surface.

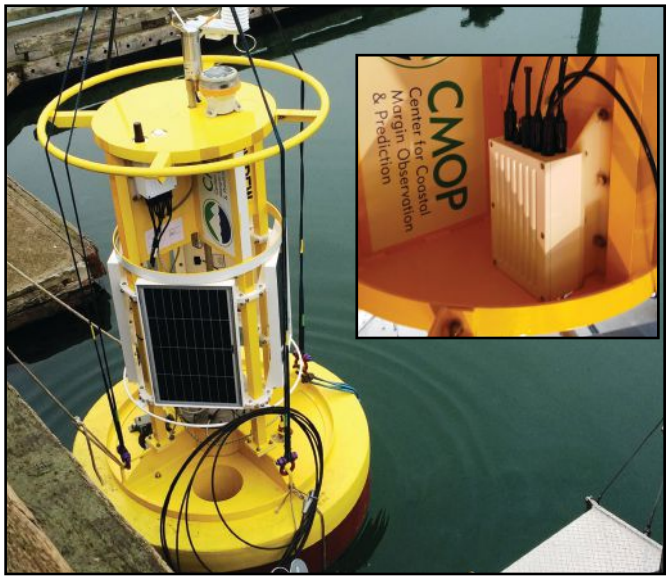
Ocean surface height measurements are routinely made from space by radar altimeters, but this new study is the first that uses the GPS reflections. The data for this research was acquired from the TechDemoSat-1 satellite, launched in 2014 by Surrey Satellite Technology Ltd.

Dr. Paolo Cipollini from NOC, who co-authored this research, said, "The sea surface is not flat at all, especially when looked at over long distances. The largest 'bulges' are due to variations in the Earth's gravity field. On top of those there are smaller, shorter variations due to sea surface currents. We are really encouraged by our results since it demonstrates for the first time that we are able to map the overall sea surface height from space using the GPS-reflections technique. This leads us to think that in the near future we should be able to map currents from space by detecting even smaller variations in sea surface height."

GNSS-Reflectometry (GNSS-R) is the general term for reflectometry using navigation signals, including GPS as well as the European equivalent Galileo. The advantage of using GNSS-R is that it uses the GNSS transmitters already in orbit, and the lightweight, low-power receivers can be launched into space relatively cost effectively. Existing satellite altimeters, although very accurate, are not in enough number to sample the ocean well at scales below 100 km. A constellation of GNSS-Reflectometry receivers would provide a 30-fold improvement on the amount of data that could be gathered. Such a constellation will be launched in late 2016 as part of the NASA CYGNSS mission.

To watch an animation of this, visit https://youtu.be/sbQ0m5lxLD8.

DANTE Buoy Controller System delivers live data to U.S. IOOS®



The University of Washington recently deployed a new oceanographic observing buoy featuring Soundnine Inc.'s DANTE System.

The new buoy was deployed 11 February 2016 in Bellingham Bay (Puget Sound) in collaboration with The Center for Coastal Margin Observation and Prediction, UW, Western Washington University and Northwest Indian College.

The DANTE controller collects data from a suite of meteorological and oceanographic instruments. Two sensors are 60 ft underwater and use S9's Ulti-modem inductive modem to communicate with the controller on the surface. The system forwards data by cellular modem to DANTE server (in the cloud), which delivers data in standardized format to NANOOS, a member of U.S. IOOS®. Data are available to the public in real-time through the NANOOS Visualization System (NVS) web app.

For more information, visit www.soundnine.com.

NOAA and partners bring back first recordings from deepest part of the world's ocean

For what may be the first time, NOAA and partner scientists eavesdropped on the deepest part of the world's ocean and instead of finding a sea of silence discovered a cacophony of sounds both natural and caused by humans.

For 3 weeks, a titanium-encased hydrophone recorded ambient noise from the ocean floor at a depth of more than 36,000 ft, or 7 mi, in the Challenger Deep trough in the Mariana Trench near Micronesia. Researchers from NOAA, Oregon State University, and the U.S. Coast Guard were surprised by how much they heard.

"You would think that the deepest part of the ocean would be one of the quietest places on Earth," said Robert Dziak, a NOAA research oceanographer and chief project scientist. "Yet there is almost constant noise. The ambient sound field is dominated by the sound of earthquakes, both near and far, as well as distinct moans of baleen whales, and the clamor of a category 4 typhoon that just happened to pass overhead."

The hydrophone also picked up sound from ship propellers. Challenger Deep is close to Guam, a regional hub for

container shipping with China and the Philippines.

The project, funded by the NOAA's Office of Ocean Exploration and Research, was designed to establish a baseline for ambient noise in the deepest part of the Pacific Ocean. Human-created noise has increased steadily in recent decades and getting these first recordings allows scientists in the future to determine if the noise levels are growing and how this might affect marine animals that use sound to communicate, navigate and feed, such as whales, dolphins and fish.

For more information, visit www.noaa.gov/seven-miles-deep-ocean-still-noisy-place.

New technology aids the fight against illegal fishing

Illegal, unreported and unregulated (IUU) fishing has a devastating impact on our world and the numbers are eye-opening. IUU fishing depletes fish stocks, damages marine ecosystems, puts legitimate fishermen at an unfair disadvantage and jeopardizes the livelihoods of some of the world's most vulnerable communities.

Effectively curbing and detering vessels from illegal fishing requires a combination of partnership and commitment from the global community to work towards leveling the playing field. Maritime authorities require a combination of data sources to effectively outsmart violators–data sources that include satellite AIS.

exactEarth offers a small vessel tracking service that is rapidly changing the landscape of fisheries protection across the globe.

A large majority of illegal fishing activity is being conducted on smaller boats across our oceans–boats that lack the necessary equipment installed for proper identification and surveillance. The ABSEA solution provides reliable terrestrial and satellite tracking of these small vessels by improving the detection of low powered devices from space.

When ABSEA is embedded within standard low-powered AIS transceivers, it enables their transmissions to be consistently received by the exactEarth satellite constellation. This allows for wide area tracking of these smaller vessels like the millions currently being used in fishing operations. Any boat, regardless of size, can be equipped with the proper tools for efficient long range tracking and monitoring.

For more information, visit www.exactearth.com.

Salt marshes will persist despite rising seas, study predicts

The persistence of salt marshes despite rising seas would be a rare bit of good news for coastal ecosystems, which are under threat from a host of factors including nutrient pollution, invasive species, and development. Healthy marshes buffer coasts from storms, improve water quality, provide habitat for commercial fisheries, and help fight global warming by trapping carbon.

Lead author Matt Kirwan, a professor at the Virginia Institute of Marine Science, says, "Catastrophic predictions of marsh loss appear alarming, but they stem from simple models that don't simulate the dynamic feedbacks that allow marshes to adapt not only to present rates of sea-level rise but the accelerated rates predicted for coming decades. Marsh soils actually build much faster as marshes become more flooded."

More frequent flooding carries more mud into the marsh and also encourages the growth of several common marsh plants. Together, these processes raise the marsh soil in concert with rising waters.

By not accounting for these feedbacks, Kirwan and his co-authors argue, traditional assessments greatly underestimate marsh resilience. Joining Kirwan on the study were Stijn Temmerman of the University of Antwerpen, Emily Skeehan of VIMS, Glenn Guntenspergen of the U.S. Geological Survey, and Sergio Fagherazzi of Boston University.

The team conducted their study by compiling and re-analyzing 179 previously published records of change in marsh elevation from sites in North America and Europe. "Our study shows that soil accretion rates more than double as marshes become more flooded, suggesting a strong ability for marshes to survive accelerations in sea-level rise," says Kirwan.

The most common models greatly overestimate marsh vulnerability to sea-level rise," adds Guntenspergen. "These models assume that marshes rise, but only at a rate equal to recent measurements of marsh accretion. This approach leads inevitably to marsh drowning, and predictions that most tidal wetlands will be inundated by the end of the current century."

The researchers say the few models that do incorporate dynamic feedbacks indicate that marshes can generally survive 10 to 50 mm of sea-level rise per year. That far exceeds current annual rates of about 3 mm of globally averaged sea-level rise, and mostly exceeds even the higher-end rates of 8 to 17 mm rate scientists for 2100.

For more information, visit www.vims.edu.

ORE Catapult, EMEC to collaborate on marine energy

Offshore Renewable Energy (ORE) Catapult and the European Marine Energy Centre (EMEC) have launch the Technology Assessment Process (TAP) to de-risk marine energy technology development

Announced at the International Conference for Ocean Energy (ICOE) in Edinburgh in February, TAP has been designed to support wave and tidal energy technology developers, enabling them to benchmark their technologies and follow a more structured technology development journey. This will result in a less expensive, faster and more certain development pathway.

ORE Catapult and EMEC will guide technology developers through a more structured approach to developing their technologies, from concept development, through to laboratory and analytical testing, prototype proving at a scale test site, single device deployment and preparations for first arrays.

The TAP methodology is designed to assess the development position of technologies and identify key areas of uncertainty. The tool is then used to track progress, and build evidence of performance through a 'Technology Passport' as technological ideas are validated, with greater emphasis on testing and de-risking activities, as technologies move from one stage of development to the next.

TAP will allow developers to improve understanding and validate the competitive prospects for their innovations. Capital investment can be matched to strong, feasible technical ideas and developers will also be able to offer grant awarding bodies visibility of TAP assessment reports to assist in evaluating competing ideas seeking funding.

Investors and sponsors will benefit from early and ongoing independent review, giving a greater level of confidence in the technology being developed, leading to better informed investment decisions, improved confidence and reduced risk.

For more information, visit www.emec.org.uk.

Bilfinger successfully completes €100 million project

The engineering and services group Bilfinger has successfully completed installation of a total of 72 foundations for the new Sandbank offshore wind park. The foundation elements were installed 90 km west of the island of Sylt in the German North Sea with the help of a special installation barge in water depths of more than 30 m. Work on the more than €100 million project began in summer 2015 and was completed on schedule in February 2016. The wind park is being jointly executed by Vattenfall and Stadtwerke München, the municipal utilities department of the city of Munich.

A comprehensive noise protection system developed with a key contribution from Bilfinger, was used to noticeably reduce noise pollution for marine fauna during the construction phase. It was thus possible for the first time to fully meet the strict requirements of the public authorities for the installation of the piles.

Bilfinger Offshore Systems has cutting-edge expertise in the design, manufacture and installation of offshore foundations in the North Sea and Baltic Sea. A total of more than 630 foundations for wind turbines, metering masts and substations have been built to date.

As part of its strategic repositioning, Bilfinger is disposing of a number of non-core activities, which is why this unit was put up for sale in 2015.

For more information, visit www.bilfinger.com.

Gode Wind 2 starts producing power into the grid

The Gode Wind 2 offshore wind farm has begun producing electricity. With 42 wind turbines and a capacity of 252 MW, Gode Wind 2 will produce enough power to supply approximately 260,000 German households yearly.

The construction of the Gode Wind 2 project started with the first installation works at sea in April 2015. To utilize as many synergies as possible and thus saving costs, DONG Energy has constructed Gode Wind 2 together with the Gode Wind 1 offshore wind farm. Gode Wind 1 and Gode Wind 2 have a total capacity of 582 MW. This is enough to supply power to approximately 600,000 households.

For more information, visit www.dongenergy.com.

Shetland Tidal Array's first turbine goes live

Nova Innovation and ELSA announced that the first power has been exported to the grid from the Shetland Tidal Array project. The first Nova M100 turbine of the array delivered power to the Shetland grid following a successful winter of operations and testing.

The Shetland Tidal Array is a joint enterprise between Nova Innovation (Scotland) and ELSA (Belgium). Phase 1 of the array consists of three 100 kW Nova M100 turbines, with more turbines planned in following phases. With the help of Scottish Enterprise, Nova Innovation has delivered a project with over 80% Scottish supply chain content, and over 25% of the spend in Shetland alone.

Energy Minister Fergus Ewing welcomed the announcement, saying, "I would like to congratulate Nova Innovation for installing the first Nova M100 tidal turbine successfully and producing grid connected power. This is a result of a lot of hard work and support from all involved including the Scottish Government's enterprise agency, Scottish Enterprise and the Renewable Energy Investment Fund (REIF)."

Olivier Bontems, Managing Director of ELSA, said, "Our involvement in the project is driven by two key factors: confidence in the Scottish tidal industry and the generation of clean energy to enable economic growth. It is important for the future of Europe to develop strong partnerships able to successfully generate green power, using the skills and resources that exist across Europe."

Simon Forrest, Managing Director of Nova Innovation, said, "Tidal energy has the potential to provide nearly 8% of European electricity demand. This milestone is an important step towards achieving this goal."

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

Project to test Laminaria WEC survivability

Flemish wave energy developer Laminaria has joined forces with the European Marine Energy Centre (EMEC), Innosea, Ghent University, and TTI Testing to support the development of their novel wave energy converter (WEC).

Funded under the OCEANERA-NET First Joint Call 2014, the LAMWEC project seeks to develop and test a 100 kW Laminaria WEC, progressing from stage 5 (technology validated in relevant environment) to stage 7 (sys-

tem prototype demonstration in operational environment).

The main focus of the project is to prove the survivability of the Laminaria WEC, which incorporates an innovative storm protection system, at pre-commercial scale in extreme storm conditions.

The LAMWEC consortium will address specific technology challenges –including the development of a mooring and pulley system to support the innovative storm protection system, power take-off (PTO), frame and new anchor design–enabling the partners to bring together and further develop their technical expertise, with over 30 years of combined practical experience in ocean energy.

The project will culminate in the testing and performance assessment of Laminaria's wave converter at EMEC's grid-connected wave test site at Billia Croo, off the West Coast of Orkney in 2017.

For more information, visit www.laminaria.be.

First power to shore on Gemini offshore wind project

Northland Power Inc. announced that the first turbine of the 600 MW Gemini offshore wind project located in the North Sea is now producing power.

Installation of the turbines will continue throughout 2016, led by the project's EPC contractor and co-owner Van Oord Dredging and Marine Contractors BV and turbine supplier Siemens. The project is expected to be completed in 2017. Energy generated will flow into the Netherlands at Eemshaven where the project connects to TenneT's high voltage grid. Electricity supplied to the grid prior to full commercial operation will generate revenue that will be used to fund a portion of the project's construction costs.

The wind farm encompasses two 34 sq. km areas and is located 85 km off the coast of Groningen in the Netherlands. Invisible from the coast, the project will generate energy in a part of the North Sea where wind speeds are among the best in the world for offshore wind power.

"To have the first turbine up and running represents another critical achievement on our first offshore construction project. This significant milestone follows construction of the electric infrastructure in 2015, and installation of the turbine foundations in only 110 days", said John Brace, CEO of Northland.

The project is owned by Northland Power (60%), Siemens Financial Services (20%), Van Oord (10%) and N.V. HVC (10%). Once fully operational Gemini will generate clean and renewable energy for 1.5 million people in the Netherlands.

For more information, visit www.northlandpower.ca.

Levenmouth turbine offers unrivalled opportunity for renewable energy R&D

The Offshore Renewable Energy (ORE) Catapult officially unveiled its 7-MW demonstration offshore wind turbine in Levenmouth on 29 February, underlining the vital role that Scotland, and the wider UK, can play in research, technology and skills development at the very heart of the global renewable energy industry.

The Levenmouth Demonstration Turbine, acquired by ORE Catapult from Samsung Heavy Industries in December 2015, is the world's most advanced, open access, offshore wind turbine dedicated to research, and offers complementary opportunities for economic growth, training and development of skills vital for the future of the offshore wind industry.

The turbine offers UK industry and academia an unrivalled opportunity to develop a deeper understanding of a wide range of technologies as well as the operations and maintenance aspects of offshore wind turbines, with the ultimate goal of reducing the cost of energy. ORE Catapult is working closely with key academic and industry stakeholders to align the research program of the Levenmouth Demonstration Turbine with industry priorities to drive cost reduction in offshore wind.

For more information, visit https://ore.catapult.org.uk.

Schottel Hydro sells 16 turbines to SME

Over the next two years, Schottel Hydro will deliver 16 Schottel Instream Turbines (SIT) with a capacity of 62 kW each to Sustainable Marine Energy (SME). The British company has signed a long term contract with the European Marine Energy Centre (EMEC) and will build a platform array in Scotland, off the Orkney Islands.

Following successful sea trials in the Solent in summer 2015, the first PLAT-O system, which hosts two SIT, will be installed at EMEC in 2016. The next generation PLAT-O system will be large enough to host four turbines each. Four of these platforms will be deployed in 2016/ 2017 to complete the array. The installed power output of the array will be 1 MW and will be directly fed into the Scottish power grid.

During the sea trials off the Isle of Wight, SIT and PLAT-O have successfully proven to be a perfect match. Both, the turbines and the platform, are designed to be lightweight, robust, stable and simple. Together they provide an extremely efficient integrated solution.

PLAT-O reduces the costs of delivering tidal energy considerably; one of the Earth's most abundant and reliable renewable energy sources. PLAT-O is placed under the surface of the water and can flexibly adjust to the place with the strongest current. Besides a marker buoy, the system is not visible on the surface and vessels can pass safely overhead. The buoyant platform is taut moored to the seabed using a tailor made anchoring solution that has also been developed by SME.

The PLAT-O platform array will host 16 Schottel Instream turbines. The new turbine generation from Schottel Hydro purposely avoids complex subsystems to ensure a lightweight and solid device, which is easy to maintain. The SITs have a rotor diameter of four meters and are designed as downstream turbines which are self-aligning to the flow. The SIT design and features hydrodynamically optimized passive-adaptive composite blades with no need for any active pitch mechanism. Their drive trains are standardized with a two-stage planetary gearbox, an induction generator and a mechanical brake.

For more information, visit www.schottel.de.

Scotrenewables completes deployment of advanced modular anchoring system

Scotrenewables Tidal Power has completed deployment of its advanced modular anchoring system at the European Marine Energy Centre, Orkney in preparation for the installation of its SR2000 2 MW floating tidal turbine.

The anchor deployment formed part of a novel tidal anchors project for floating technologies, which was carried out in partnership with McLaughlin & Harvey, SeaRoc and Scotmarine. The aim of the project was to develop an innovative low cost anchoring system for floating tidal energy converters which could be readily installed and decommissioned utilizing low cost vessels and to demonstrate the anchors on the Scotrenewables SR2000 2MW turbine installation, the largest floating tidal turbine in the world.

The project was supported by the Scottish Government's Marine Renewables Commercialisation Fund administered by the Carbon Trust, which was established to support the development of enabling technology for marine energy arrays and by Invest NI.

For more information, visit www.scotrenewables.com.

COMPANY
SPOTLIGHT

PREVCO Subsea, LLC
www.prevco.com

Manufacturers of subsea pressure vessels

As the subsea community is ever active with new technology and exploration of every kind, it does so against a background of tighter budgets and reduced workforces. The disparity between need and the ability to supply these needs means costs have to be streamlined and efficiency increased.

PREVCO is a subsea engineering company, specializing in the design and production of underwater housings and is able to address some of these needs by supplying their stock and custom products to businesses across the entire subsea industry.

The company was founded by John Head in 1999 who graduated from MIT as an Ocean Engineer and spent many years in the industry working with both subsea vehicles systems and connectors before starting Prevco and has never looked back.

It was his view that there was a place in the market for a company to specialise in designing subsea enclosures, a job that is often performed by in-house engineers. According to John Head "In the current market, with the reduction in manpower (engineers) the ability to outsource for subsea enclosures has never been more important and beneficial for both time and cost reasons, and that's where Prevco can help out!"

Traditionally, PREVCO's main market has been the Defence and Oil & Gas industries, however with the current changing market conditions, more work is being done to support scientific projects and environmental monitoring as well as offshore renewables, arguably one of the fastest growing of the subsea industries.

PREVCO has the ability to provide fully custom housings as required, in many popular subsea materials and they offer a range of stock, off-the-shelf housings in many diameters and lengths that are kept in stock, ready for any customer required modifications (connector penetrations, mounting locations, etc.) before shipping.

PREVCO's unique in-house software called 'New Tube Designs' contains proprietary algorithms and allows the quick and accurate design of both stock and custom housings. This software creates the ability to rapidly develop subsea enclosure designs from scratch, taking only minutes rather than the weeks which are typically spent taking a project from the initial concept, through design and review meetings, to detailed engineering and eventually to approval and fabrication. New Tube Designs has evolved over many years and now not only develops the design but provides all of the essential information to build enclosures.

Additionally, Prevco also offers fast-ship, in stock accessories including Pressure Relief Valves (Dual Poppet and Single Poppet), Dual Seal Vent plugs, Zinc Anodes, an ROV/Diver operated Electric Switch and a portable Vacuum Leak Test and Nitrogen Backfill Kit that is really handy for in the field enclosure assembly.

Over the last few years, the company has grown in size; it opened a UK sales office in 2012 and in 2014 relocated the main office to a 30,000 square foot building on 5 acres in lovely Fountain Hills Arizona.

The new facility, now includes a dedicated pressure test center with three hydrostatic chambers of different sizes and the ability to pressurise up to 15,250 psi, equivalent to over 10,000 meters of water! A typical test cycle for Prevco is for one, one hour hold and two ten minute holds follow by disassembly and inspection. The Pressure Test facility is open for outside customers and the test cycle can be changed to suit customer's needs.

PREVCO anticipates further growth in the coming years as they continue to improve services and expand their product range to meet the needs of an ever evolving industry.

U.S. Navy orders AN/UQN-10s next generation fathometers

Knudsen Systems Inc. (KSI) is pleased to announce delivery orders under it's multi-year contract with the Naval Undersea Warfare Center (NUWC), Division Keyport for supply of 320N COTS fathometers and peripheral equipment. Deliverables include twelve 320N systems, twelve sonar simulators, and thirty-six remote displays. The orders come on the heels of a recent sale of 10 systems to the U.S. Coast Guard, as well as delivery of a unit to the U.S. Foreign Military Sales Office.

The 320N Fathometer–now officially dubbed as the AN/UQN-10 by the U.S. Navy–was selected as the drop-in replacement for obsolete AN/UQN-4 fathometers. KSI in Ogdensburg, N.Y. is the exclusive U.S. distributor for the 320N manufactured in Canada by Knudsen Engineering. Designed to meet critical retrofit requirements, as well as new ship builds, increasing sales for the new AN/UQN-10 fathometer are projected.

For more information, visit www.knudsensystems.com.

Kraken to supply sonar system to major Israeli defence contractor Elbit

Kraken Sonar Inc. announced that its wholly-owned subsidiary, Kraken Sonar Systems Inc. will supply its KATFISH towed sonar system to Elbit Systems Ltd., a major international defence contractor based in Israel.

Elbit recently unveiled a state-of-the-art USV named "Seagull". The Seagull USV is a multi-mission platform boasting high autonomy levels and modular features, allowing it to be rapidly reconfigured for a wide array of missions – including anti-submarine warfare and mine countermeasures.

"Elbit's Seagull USV is one of the most advanced ocean drones in the world – one that will save lives," said Karl Kenny, president of Kraken Sonar. "When our Synthetic Aperture Sonar is integrated on Elbit's Seagull USV, the system can provide remotely operated, unmanned, end-to-end mine hunting operations. These ocean drones can detect very small objects hidden on the seabed and enter confined spaces where underwater explosives are likely to be hidden. Since robotic systems can be remotely operated their use can remove people from very dangerous missions - in essence, taking the sailor out of the minefield."

For more information, visit www.krakensonar.com.

iXBlue to equip the world's most modern submarine program for the Swedish Navy

iXBlue, a global leader in navigation, positioning and imaging solutions, is providing MARINS inertial systems to outfit the Swedish Navy's two future A26 class submarines. Scheduled to be operational in 2024, the A26 is a unique and high-tech submarine with proven modular design. Built by Saab, it is considered today as the world's most modern submarine program. For this new world-class submarine, Saab was looking for the highest performance and reliability in subsea navigation. As the submarine will be specially built to operate submerged for extended periods, with excellent maneuverability in all waters, the inertial equipment inevitably requires proven robustness, reliability and accuracy.

iXBlue was the natural choice for Saab; in fact, the two companies have built a strong partnership over the past years. In 2015, iXBlue delivered 7 MARINS units to equip the Swedish Navy's in-service Gotland-class submarines. Besides the relationship of trust established between the two partners, Saab has been happy with the quality and performance of the product, which perfectly addresses the requirements. The proven expertise and credibility of iXBlue made them confidently select the French high-technology company for this major innovative project.

Selected for its ultimate performance, the iXBlue MARINS inertial navigation system enables stealth autonomous navigation, providing very accurate heading, roll, pitch, speed and position, under severe GNSS-denied environment.

For more information, visit www.ixblue.com.

New Boeing UUV can operate autonomously for months

Boeing introduced Echo Voyager, its latest unmanned, undersea vehicle (UUV), which can operate autonomously for months at a time thanks to a hybrid rechargeable power system and modular payload bay.

The 51-ft-long vehicle is not only autonomous while underway, but it can also be launched and recovered without the support ships that normally assist UUVs. Echo Voyager is the latest innovation in Boeing's UUV family, joining the 32-ft Echo Seeker and the 18-ft Echo Ranger.

"Echo Voyager is a new approach to how unmanned undersea vehicles will operate and be used in the future," said Darryl Davis, president, Boeing Phantom Works. "Our investments in innovative technologies such as autonomous systems are helping our customers affordably meet mission requirements now and in the years to come."

Echo Voyager will begin sea trials off the California coast later this summer. Boeing has designed and operated manned and unmanned deep sea systems since the 1960s.

"Echo Voyager can collect data while at sea, rise to the surface, and provide information back to users in a near real-time environment," said Lance Towers, director, Sea & Land, Boeing Phantom Works. "Existing UUVs require a surface ship and crew for day-to-day operations. Echo Voyager eliminates that need and associated costs."

For more information, visit www.boeing.com.

New RN Submarine prepares for official handover

Artful, the third of the Royal Navy's new Astute-class attack submarines, has been busy conducting her final Contractor Sea Trials ahead of her maiden deployment.

The sophisticated submarine sailed from Barrow-in-Furness in August last year for her new home at HM Naval Base Clyde and since then has been proving her systems and equipment at sea. The highlight of the recent trials was the firing of six Training Variants of the Royal Navy's heavyweight Spearfish torpedo on the British Underwater Testing and Evaluation Centre near the Isle of Skye.

These firings were the most complex of the trials conducted to date as they required a large number of interconnected systems to function together – from loading the torpedoes into their tubes through to the sonar detecting the target and the command system preparing a firing solution.

Artful's Commanding Officer, Commander Stuart Armstrong, said, "These trials are hugely important as they prove the submarine's primary capability as a weapon system and it gives us the confidence that should we need to fire in anger everything has been tried and tested."

Artful will continue Sea Trials until mid-March when she will become a Commissioned Warship at a ceremony at HM Naval Base Clyde.

This will mark the end of her trials in UK waters and formally mark her acceptance into the Royal Navy following the contractual handover which took place in December.

For more information, visit www.royalnavy.mod.uk.

Elbit unveils latest USV

Elbit recently unveiled a state-of-the-art Unmanned Surface Vehicle (USV), named Seagull. The Seagull USV is a multi-mission platform boasting high autonomy levels and modular features, allowing it to be rapidly reconfigured for a wide array of missions -- including anti-submarine warfare and mine countermeasures.

The Seagull is a 40-ft autonomous launch that can be fitted with mission modules for Anti-Submarine Warfare (ASW), Mine Counter Measures (MCM) and force protection/patrol, including a stabilized, remotely operated .50-caliber machine gun and wire-guided torpedoes for stand-off destruction of naval mines and underwater

Improvised Explosive Devices (IEDs).

The new maritime warfare system is the latest product to emerge from Elbit Systems Inc. The company has considerable experience in unmanned surface vessel systems, including the 30-foot Silver Marlin and the 10-foot Stingray USV platforms, plus a 30-year track record with unmanned aerial vehicles.

For more information, visit www.elbitsystems.com.

Newport News Shipbuilding christens USS Washington

Huntington Ingalls Industries' Newport News Shipbuilding division celebrated the christening of the future USS Washington (SSN 787), the 14th Virginia-class submarine. Washington will be the seventh Virginia-class submarine to be delivered by Newport News Shipbuilding.

Washington will be the seventh Virginia-class submarine delivered by Newport News. Construction began in September 2011, marking the beginning of the two-submarines-per-year build plan between Newport News and General Dynamics Electric Boat.

Nearly 4,000 Newport News shipbuilders have worked on Washington. The submarine is on track to be delivered in 2016.

For more information, visit www.huntingtoningalls.com.

R/V Sally Ride completes builder's trials

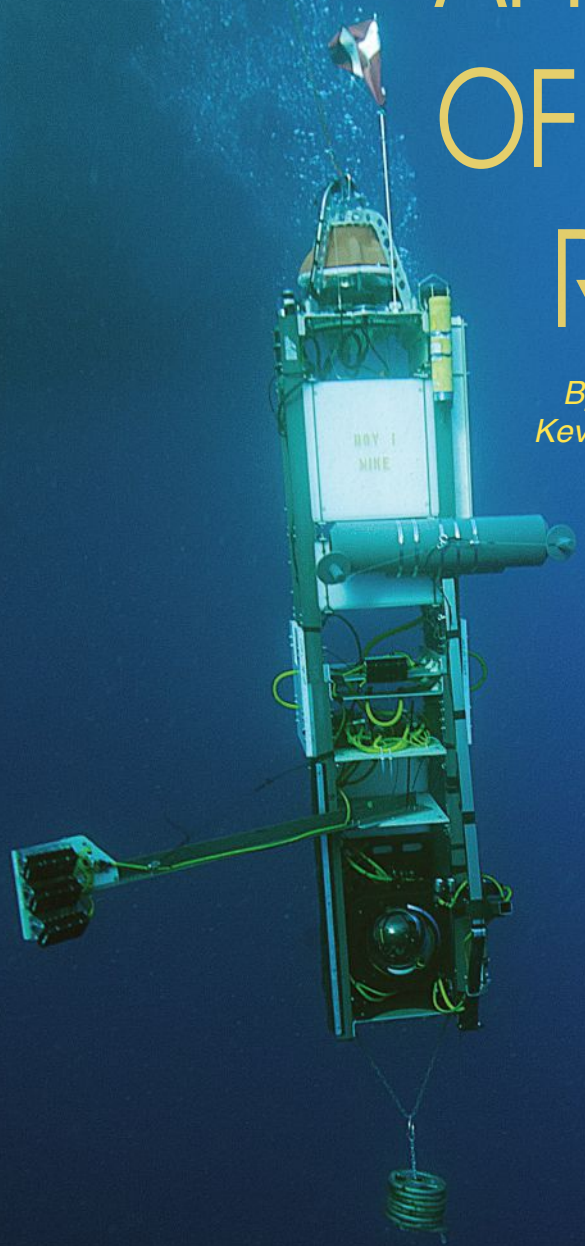
The U.S. Navy's auxiliary general purpose oceanographic research vessel (AGOR), R/V Sally Ride (AGOR 28), successfully completed Builder's Trials off the coast of Anacortes.

Builder's Trials for Sally Ride tested various shipboard systems and ensured readiness prior to conducting Acceptance Trials with the U.S. Navy's Board of Inspection and Survey.

The propulsion system, mission-over-the-side handling equipment, anchor handling system, and work/rescue boat launch system were among the systems successfully demonstrated.

UNIQUE APPLICATIONS OF ACOUSTIC RELEASES

By: Rob Morris, EdgeTech and
Kevin Hardy, Global Ocean Design

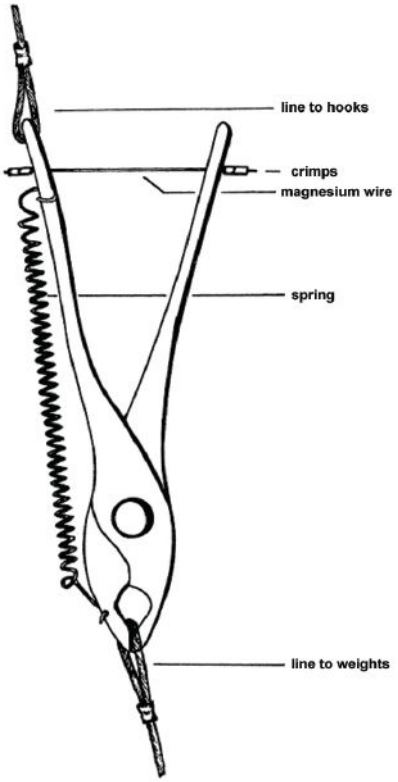


Alpha Lander Mike, from James Cameron's DEEPSEA CHALLENGE Expedition to the Challenger Deep, utilized a dual burnwire-four supplemental acoustic command system (EdgeTech), a second acoustic data modem (Nautronix L3), and assorted countdown timer burnwire releases (custom). (Photo by Charlie Arneson, used with permission, Earthship Productions).

An acoustic release with multiple channels becomes a powerful robotic lander command and control unit. A single EdgeTech BART (Burnwire Acoustic Release Transponder) Board can be the control interface for diverse functions including:

- Acoustically track the benthic lander on descent or ascent,
- Initiating a programmed sequence once the benthic lander has touched down,
- Operate a lander spin release coupling that allows a lander's buoyancy to rotate the lander two full rotations while a side looking camera/light system shoots a panorama of the surrounding seafloor,
- Deploy a drop arm with a baited trap to the seafloor once the panorama is complete,
- Deploy a light arm,
- Close traps,
- Initiate program sequences to cycle sensors and samplers,
- Transpond and range between landers,
- Release a small data recovery buoy leaving the main instrument in situ.
- Deploy a top float array from a benthic lander,
- Operate a cable cutter,
- Open/close valves,
- Operate a solenoid actuator,
- Provide acoustic communications and tracking between a submersible, benthic landers, ROVs, and surface support ship, and, yes,
- Release the anchor weight for ascent.

Ocean scientists once had to rely on clever hacks of everyday items for release mechanisms. These can still be useful, but elegant new options are now available.



A wire-plier release mechanism. The magnesium wire has a diameter of 1.5 mm. When it dissolves in seawater by galvanic action, the spring ensures that the pliers will snap open to release the weights (from Phleger et al., 1970).

An acoustic release above the benthic lander package allows precise placement on the seafloor before release from the ship.

Acoustic releases can be used to lower anchors or other bottom-mounted platforms or systems that require precise placement on the seafloor. Using the acoustic release's transpond feature provides relative range and angle prior to release just above the seafloor.

For increased command-control options, EdgeTech, a company founded by the legendary Doc Edgerton in 1966 and now celebrating its 50th anniversary, created an acoustic release board that acts more like an acoustic command/control unit with the added capacity of two burnwire release circuits. The basic BART board has two release commands, transpond/range, reply enable/disable, and a release abort. A daughter board adds four more commands. A second daughter board provides a subset of 26 ascii characters. That's a lot of distinct commands in a compact unit. The BART board is provided in a rectangular format, as would be appropriate for a cylindrical housing, or a circular board, that fits quite nicely in a 10-in. sphere.

The Nanolander (Global Ocean Design) fits the circular BART Board into a 10-in. polystyrene instrument sphere. Connectors on the sphere are used with command, control, and release functions. The Nanolander carries instruments for deployment off smaller ships of opportunity.

How acoustic releases work

Acoustic releases use unique command codes and multiple frequencies to negate ambient noise fields or ignore commands to other releases within transmission range. The acoustic releases mounted in cylinders have one or (sometimes) two releases, plus the ability to range and transpond. Release mechanisms either rotate a collar that restrains a pelican hook release or apply electrical power to a sacrificial "burnwire." A third release design, a "Push-off" release, uses a rotating threaded shaft to back off a captured nut that supports the load through the threads. The rotating collar or threaded shaft designs may be used anywhere in the sea to their maximum depth rating and are also good for use in freshwater or oxygen depleted zones.

The sacrificial "burnwire" release utilizes an electrolytically sensitive metal link, such as Inconel 625, Nickel-Chromium, or even jacketed multi-strand 316SS. They are alternately called "burnwires," "galvanic links," or "release links." Isolated from dissimilar materials, the Inconel and Ni-Chrome will last years without evidence of corrosion in seawater. They are resistant to biofouling. The 316SS link may be good for up to a year, limited by anaerobic corrosion occurring within the interior of the stranded wire inside the over-molded jacket. Connecting the metallic element of any of these links to the positive terminal of a 9-21vdc battery with a reference ground pin in the seawater provides a fascinating lesson in electrolytic corrosion and mechanical advantage, where a few AA batteries defeat great mechanical strength. When actively corroding, some of these release element metals produce a brown precipitate at a visually stunning rate.

EdgeTech releases, in particular, utilize a Binary Acoustic Command System (BACS) providing 12,000 unique command sets clearly identifiable by the seafloor receiver. This makes the intended transmitted command resistant to environmental noise and false triggering.

An acoustic release, rather than a countdown timer, provides flexibility in recovery time; the experiment test period may demand an extended deployment, such as tides driven by a lunar cycle. It's also possible the ship, personnel schedules, or weather may not be cooperating. Weather prediction is more art than science beyond about 4 days. With an acoustic release, the sensor or sampler package can remain in situ for a very long duration, up to 2 years using alkaline cells and up to 9 years using lithium cells.

A WHOI OBS incorporates a burnwire release mechanism, seen on the vertical white HDPE face, right side.

Multiple releases for single function

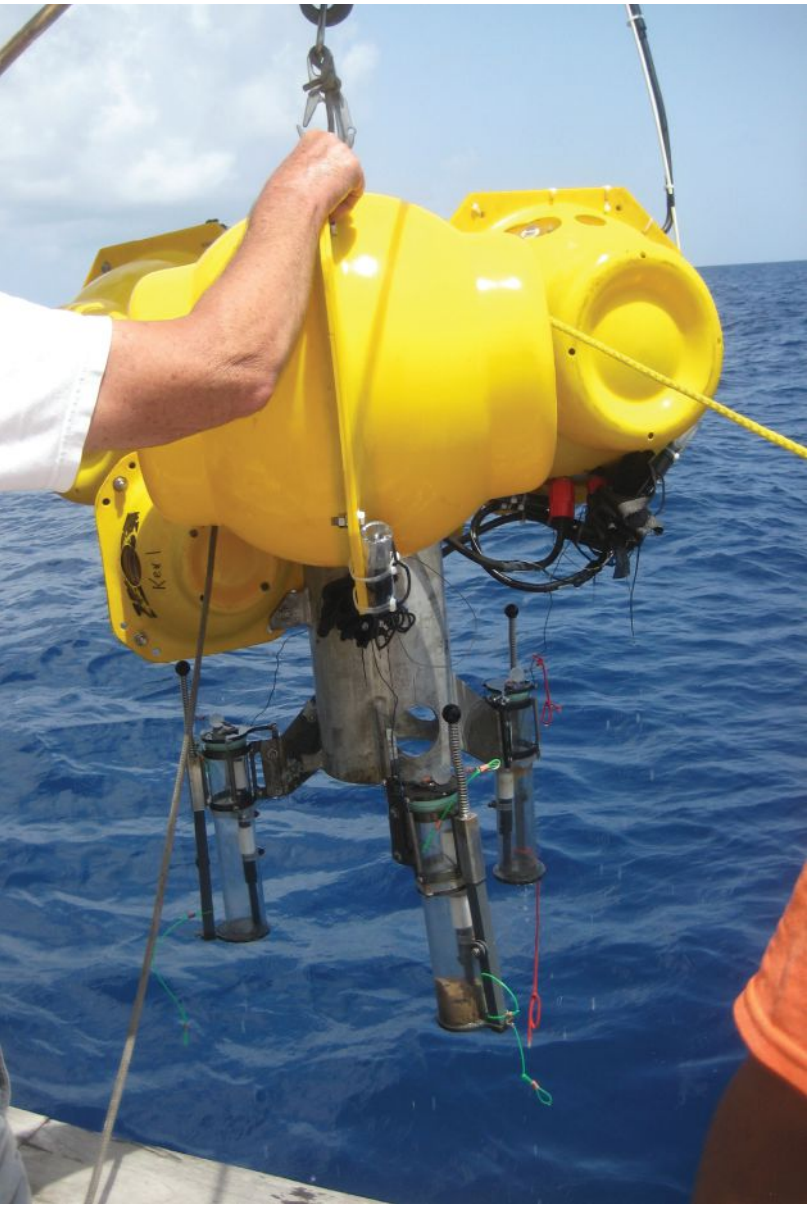
Occasionally, for critical release applications such as instrument moorings, two single function releases are paired side-by-side to provide a redundant release mechanism. A chain connects the two pelican hooks with a link at each end, and the chain passes through a large forged ring. Either release can drop its end of the chain, and the chain will pull through the large forged ring as the mooring rises. An expendable iron anchor is connected directly to the forged ring by a second chain. This dualed or tandem arrangement provides two releases for a single function where the cost of loss is unacceptable.

Unique applications

An electric solenoid plunger, powered on by acoustic command, can be used to pull a plunger to release a pelican hook or drive a ratchet to incrementally turn a disk. An acoustic release can also be used to deploy a recovery line to the surface in order to recover a mooring anchor so that nothing is left on the bottom when the mooring is recovered.

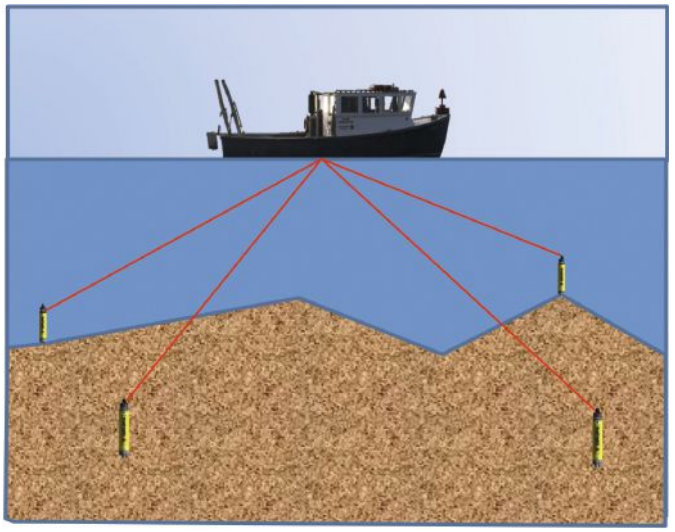
Some benthic landers may use a single release for multiple functions. Dr. Aristides Yayanos, Scripps Institution of Oceanography, captured hadal benthic animals in a trap that closed as the anchor was released. In similar application by Dr. Ken Richter, SPAWAR, sediments are captured in a free vehicle microbial power cell by spring-loaded doors that snap shut with the anchor release and vehicle rise.

In a Data Recovery Pop-Up Buoy from Scripps Institution of Oceanography, the release command simultaneously turned on the surface recovery beacons.



Benthic lander with microbial fuel cell. Doors on sediment traps snap shut with the anchor release and vehicle rise. (Photo by Kevin Hardy, Global Ocean Design).

The transpond function may be used for Long Baseline Navigation (LBL), where a group of four or more transponders are positioned hundreds of meters apart, providing navigational waypoints for AUV ops, mooring motion measurements, and even tracking for fish migration studies.

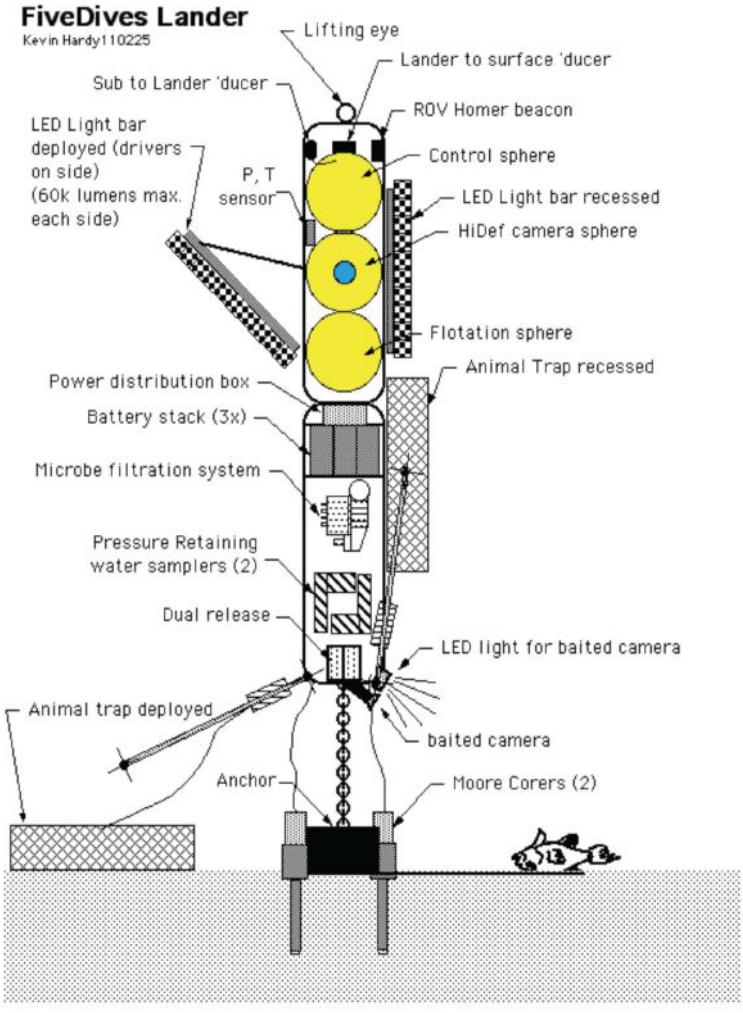


A ship uses the transponder function for precision navigation.

An LBL system has two main components. The first element comprises a number of acoustic transponders moored in fixed locations on the seabed. The transponders are typically mounted in the corners of the operations site. LBL systems yield very high accuracy of generally better than 1 m and sometimes as good as 0.01m. The positions can be converted from relative X, Y, Z position to real world coordinates.

One of the stranger applications is the detonation of unexploded ordnance (UXO), hazardous leftovers from the two Great Wars dumped at sea. These pose an active danger to fisherman, boaters, offshore construction and pipe laying. Once identified by side-scan surveys, an Acoustic Actuator is used with a high explosives charge to remotely detonate the UXO, activated from a safe distance either acoustically or with a timer.

An unexploded mine (above), has an acoustic actuator (center) to trigger an explosives charge (right) using an acoustic release or a timer.

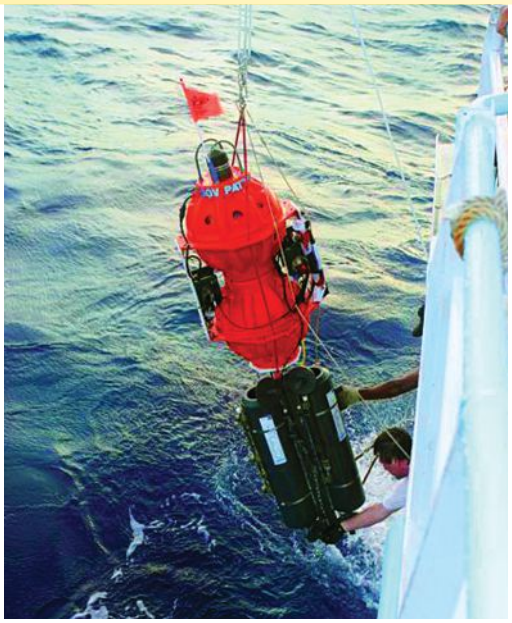


An artist's conception of a proposed complex benthic lander. The right side shows the sub-systems retracted during descent, the left side shows the systems deployed. A BART Board controls filtration systems, camera/light systems, and ROV homing beacons. (Illustration used with permission, Kevin Hardy, Scripps Institution of Oceanography.)

The BART Board is particularly useful with benthic landers. Benthic landers are observational platforms that free fall and land on the seafloor to sense and sample the physical, chemical, and biological activity. Benthic landers are autonomous and have deployment durations from a few days to multiple years. Benthic landers come in a variety of shapes and sizes depending upon the instrumentation they carry and the deployment vessels available. They are capable of working at any ocean depth.

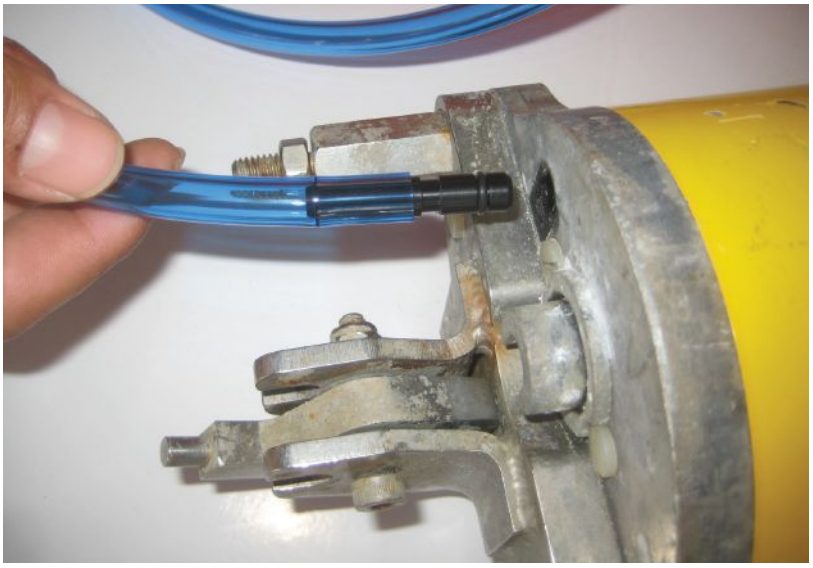
Once on the seafloor, acoustic commands deploy drop arms, rotate the vehicle for an *in situ* panorama photo, and other functions. Through-hull connectors bring the commands where needed: a camera/light system, water pump, acoustic recorders, drop arm, or solenoid valve. Once the mission is complete, additional commands are used to close traps, drop light arms, and other pre-release functions.

The EdgeTech transducer is oil filled and functions at any depth, as demonstrated by the author (Hardy) on DOV PATTY with Scripps Institution in the Sirena Deep of the Mariana Trench. The on-board BART Board received the release command on the first try at 10,700 m depth. The same transducer was qualified for operation on James Cameron's DEEPSEA CHALLENGE Expedition's Alpha Landers.



DOV PATTY is deployed to the second deepest place in Earth's Oceans, 2011, the Sirena Deep of the Mariana Trench. The engineering performance evaluation of the EdgeTech BART Board at these greatest depths was successful. A burn-wire loop held the anchors and the pair of Niskin bottles open.

Deck Purge Box (Global Ocean Design) provides a dynamic means of water vapor removal.



Deck Purge Box (Global Ocean Design) provides a fitting to use on EdgeTech release ports.

Operational tips

1) Transducer placement

It is important to place the release transducer in a location where it has a relatively open view to the surface to provide the clearest acoustic path for the shipboard transducer signals.

2) Corrosion control

Designers must be aware of dissimilar materials that will lead to galvanic corrosion. Isolation of the release housing from a benthic lander frame may be advised. Likewise, pelican hook and drop link should be of the same material.

3) Moisture control

A method to effectively remove moisture from the release electronics housing is needed as condensation may otherwise form on the electronics board when the sealed moist air is chilled below the dew point. Three choices are common: 1) if the release is prepared a day or more ahead of use, a simple desiccant packet of appropriate size maybe inserted into the housing. This will passively dry the air, but relies on dispersion of water vapor, which requires 1 or 2 days lead time; 2) high pressure dry nitrogen bottles and a vacuum pump are used to cycle in dry N2 (the high-pressure bottles have some obvious shipping drawbacks and inherent dangers in the field); or 3) a deck purge box uses a vacuum pump to draw moisture laden air out, then uses the vacuum to draw air back in, forcing it to pass through a desiccant cartridge, dynamically drying the air.

Conclusion

While this story has focused on benthic landers and moorings, acoustic releases can also find application in AUVs and ROVs.

Anyone who has been to sea will tell you "One ping means a lot." It provides the satisfaction of knowing the system is operational on the seafloor, inferring so many things about the status of the entire benthic lander.

Acoustic releases can do more than just drop an anchor. Clever mechanical mechanisms can provide secondary functions without compromising the anchor release. And while not a true acoustic modem, the BART Board provides ocean engineers and marine system designers a powerful command-and-control system in a small, power efficient package at a very affordable cost. New applications will come from expanding mission requirements and the designer's imagination.

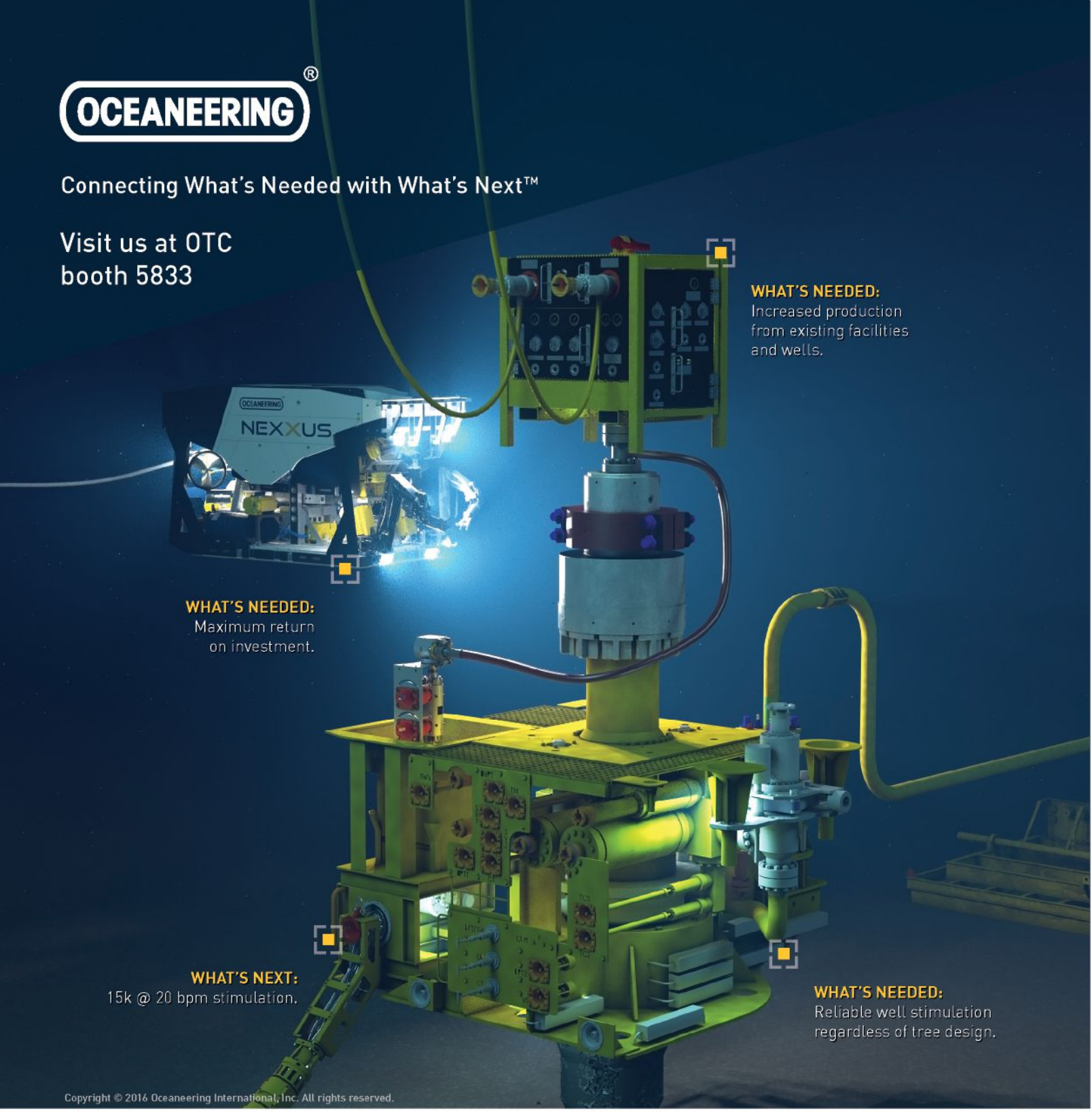
Acknowledgements

The authors thank Greg MacEachern, EdgeTech, for his advice with applications, willingness to try new things, and always sharing from the wealth of his experience and knowledge.

OCEANEERING®

Connecting What's Needed with What's Next™

Visit us at OTC
booth 5833



As the trusted subsea connection specialist, we focus intently on the many challenges that global offshore operators face—from routine to extreme. To solve beyond the status quo, our integrated rigless hydraulic well-intervention solution provides a safe flow path from the well into the reservoir to enable formation damage remediation and ultimately increase production. The result of this cost-effective rigless intervention is a faster production-enhancement solution that maximizes our clients' return on their investments.

Connect with what's next at **Oceaneering.com/WhatsNext**

OFFSHORE INDUSTRY

in this section

iSURVEY Singapore awarded contract with Solstad Offshore

iSURVEY Pte Ltd, Singapore, has been awarded a marine construction support contract by Solstad Offshore Asia Pacific to provide positioning and survey support for its 2016 pipeline and platform installation program in Thailand, on board the DLB Norce Endeavour.

iSURVEY will provide positioning services to support the installation of numerous pipelines and platforms including monitoring during jacket setting, together with final positioning, leveling and survey assistance during pile cut-off. The estimated contract duration is 200 days commenced in mid-January 2016. Subsea positioning will also integrate with IKM Subsea's Merlin work-class ROV during installation operations.

iSURVEY Singapore's managing director Bill Petrie said: "We are extremely pleased that Solstad Offshore have entrusted iSURVEY with survey and positioning works for its forthcoming pipeline and platform campaign. This is recognition of the efficiency and quality of our solutions, and we are pleased they have chosen to extend and renew our contract with them."

iSURVEY Group is a leading provider of survey and positioning services to the global oil and gas, telecommunications and offshore renewable energy sectors. The Group is headquartered in Norway with bases in Singapore and Aberdeen.

Statoil terminating rig contract

Statoil has, on behalf of the Troll license, decided to use its contractual right to terminate the contract with COSL Offshore Management AS for the chartering of the mobile rig COSLInnovator.

"The conditions for terminating the contract signed with COSL Offshore Management AS have in our opinion been met, and we therefore choose to use our contractual right to terminate the contract," says Geir Tungesvik, Statoil's senior vice president for drilling and well.

In addition Statoil has decided to stop drilling operation with the sister rig COSLPromoter when it is safe to discontinue well operations. This is done in order to enable COSL to implement the necessary actions in order to fulfill the requirements of the contract.

The decision may have some short-term consequences for planned drilling activities, but will not have impacts on long-term production on the Troll field. The plans made by the license for gas and fluid production from the oil zone remain firm.

XACT Gulf of Mexico project hits high note

XACT Downhole Telemetry Inc., with offices in Houston and Calgary, ended a landmark year that included six deepwater Gulf of Mexico deployments, delivering an industry first by providing real-time downhole data during a deepwater completion installation with BP.

BP successfully accessed real-time downhole data throughout the well's completion, using XACT's acoustic telemetry network, which was seamlessly integrated into the operation.

Six downhole measurement nodes from XACT spanned the 22,700-ft well, enabling BP to monitor critical parameters including downhole weight on the crossover tool and pressures and temperatures during the well's completion.

"XACT is thankful to BP for once again giving our team the opportunity to demonstrate the value of our network," said Jason Roe, president and CEO of XACT. "The success of this application illustrates the ability of the XACT Acoustic Telemetry Network to provide critical downhole parameters during complex operations."

XACT has worked with BP's upstream technology group to further develop and deploy the acoustic telemetry network. BP has provided investment funding to XACT through BP Ventures.

"BP partners with XACT to help develop technology that enhances well construction and completions," said Issam Dairanieh, managing director at BP Ventures. "We view this as a promising digital technology and are pleased to support its deployment and wider industry acceptance."

XACT achieved multiple industry and application firsts in 2015, including transmitting real-time data during a liner installation, cementing operations and while tripping. XACT delivered these operations in the Gulf of Mexico with major operators and demonstrated the value of real-time applied acoustics to enable decisions for lower cost wells.

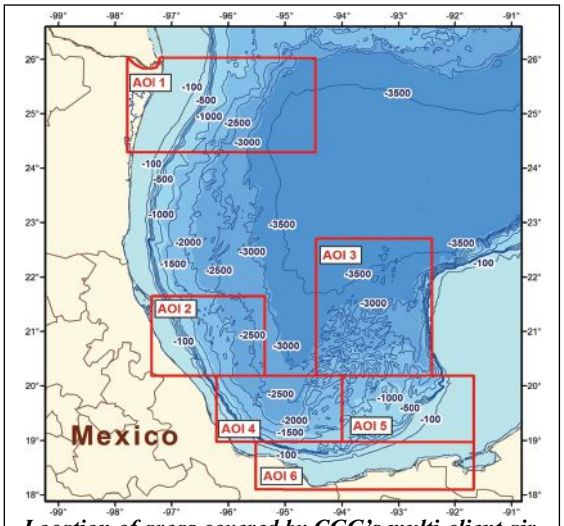
For more information visit:www.xactinc.com.

CGG conducts multi-client airborne gravity and magnetic survey offshore Mexico

CGG has announced that it will commence a multi-client airborne gravity and magnetic survey offshore Mexico. The Comisión Nacional de Hidrocarburos (CNH) has authorized the program, which will include the acquisition of approximately 200,000 line kilometers over six areas across the Mexican Gulf of Mexico.

Data acquisition will commence in March 2016 and is anticipated to take 12 months utilizing specialized geophysical survey aircraft. The project has received significant prefunding from the oil industry.

CGG believes that the Mexican Gulf of Mexico has significant new petroleum potential, both in the shallow and deepwater areas and that CGG's ability to image complex geological environments will help unlock that potential. The survey will provide coverage over the most prospective areas from the prolific Perdido fold belt with AOI 1 to the more mature nearshore heavy oil belt with AOI 6. The data will help explorers map crystalline basement and magnetic and density anomalies within the sedimentary section. The airborne survey will also collect continuous data through the "transition zone" from the marine environment to onshore.



Location of areas covered by CGG's multi-client airborne gravity and magnetic survey offshore Mexico.

A comprehensive interpretation, combining this new data set with available geologic and geophysical data, will also be undertaken by CGG's in-house interpretation team. Deliverables will include a full geophysical interpretation report, including definition of basement lithology and structure, mapping of sediment fairways and depositional-centers and any intrusives or salt which may be present in the sedimentary section. The final results will be presented in ArcGIS® format for assimilation into the clients' own seismic, geological and well control databases. These survey deliverables will provide important insights to exploration and de-risking of prospective areas by oil companies.

Jean-Georges Malcor, CEO, CGG, said: "This airborne gravity and magnetic survey offshore Mexico will be a significant addition to our existing gravity and magnetic database in the Gulf of Mexico where we have over 1,000,000 line kilometers of multi-client data. Combined with our other seismic, geologic and satellite multi-client data in Mexico, this new airborne survey will provide a unique geoscience-rich library to support the successful exploration and economic development of this high-potential area for many years to come."

Harkand wins Apache North Sea subsea installation campaign

Inspection, repair, maintenance (IRM) and light construction company Harkand has been chosen to deliver installation work to support a leading U.S. headquartered operator with its existing drilling campaign in the Nevis South Field in the North Sea.

The project will see Harkand provide project management and engineering services and deploy its personnel and one of its dive support vessels (the Harkand Da Vinci or Harkand Atlantis) to install new subsea equipment for North Sea subsidiary Apache Beryl I Limited (Apache). The scope of work has been called off against the master service agreement (MSA) the IRM firm signed with the operator in 2014.

Harkand previously performed tie-in work in 2015 for the Nevis S67 well at the Beryl field and a Beryl midline disconnect scope under the contract. The company also supported Apache with phase 1 of the Aviat development ,which included preparation work and platform tie-ins of the newly installed Aviat flowline.

Harkand Europe managing director David Kerr said: "In this low barrel price climate, our strong reputation for quality and operational efficiency is proving to be particularly appealing to operators in the region."

"Being selected for Apache's latest campaign builds on the strong relationship we have established with this key operator over several years. We are committed to delivering the same high standards of safety, quality work and performance for them on this project and in the most efficient manner."

Apache's subsea projects manager Patrick Duggan said: "For this latest campaign, Apache have selected Harkand, which aligns with the company's project culture of pace, innovation and excellence. We are committed to build upon the successful previous performances on the Nevis and Aviat work scopes and see Harkand as an ideal partner in this project."

The Harkand Atlantis dive support vessel which has recently completed its 5 year class certification.

Harkand provides offshore vessels, ROVs, diving, survey and inspection services, project management and engineering to the oil and gas and renewables industries. Headquartered in London with operations bases in Aberdeen, Houston, Mexico, Nigeria, Ghana and Angola, Harkand aims to be the leading subsea IRM and light construction contractor globally.

Live QRA view transforms offshore risk metrics into operational improvements

Offshore operators need access to quantitative risk analyses (QRAs) to support daily operational decisions. If the data are not presented clearly and intuitively, the operator may not take important information into account, causing uncertainties and unqualified decisions. With DNV GL's new game-changing Safeti Offshore Viewer, operators can view QRAs live, supporting more efficient, safer and reliable operations.

DNV GL brings QRA to operational phase

"Generating benefits of QRA in the operations phase has long been a challenge," says Mike Johnson, head of product management and strategy, process safety, risk and reliability, DNV GL - Software. "Safeti Offshore Viewer allows you to directly transform risk metrics to operational improvements. Key risk drivers and their impacts can be viewed in 3D. This means better communication, better decisions, safer and more reliable operations," he says.

The Viewer is a dynamic results application for Safeti Offshore, which allows detailed quantitative risk analysis and accurate modeling of hazardous events such as fire, smoke, toxic releases or explosions on fixed or floating platforms. Safeti Offshore provides detailed escalation analysis with the ability to account for the influence of a vast array of safety systems and barriers, for example isolation, blowdown, blast and firewalls.

Event trees, 3D models

The new viewer allows operators to display and examine event trees and view 3D consequence results. The simple and clean interface is designed for consumers of risk information at all levels of the organization. Analysts run the calculations in Safeti Offshore and publish the results, which can then be accessed and reviewed by other users. "The Viewer significantly improves the QRA work flow and adds clear efficiencies," says Johnson.

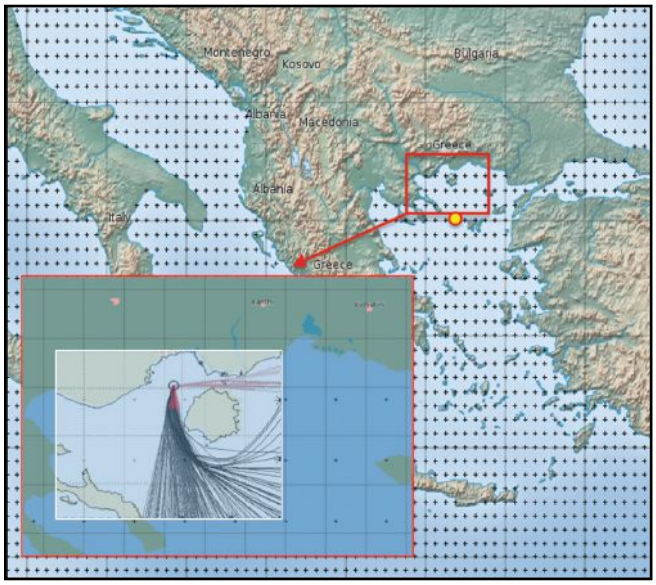
Enhanced operational decisions

"This tool will be used to significantly enhance operational decisions. The visualization capabilities mean that hazards can be readily and directly communicated to all stakeholders," says Are Føllesdal Tjønn, CEO, DNV GL – Software. "This is part of an overall strategy of matching our applications to different organizational requirements. It is a real game-changer in terms of delivering value-driven operational risk management," he says.

About Safeti Offshore

Safeti Offshore allows detailed quantitative risk analysis and accurate modeling of hazardous events, such as fire, smoke, toxic releases or explosions on fixed or floating platforms. It incorporates state-of-the-art dispersion, fire and explosion models, meaning that it provides a direct and cost-efficient way to assess the risks associated with offshore installations without the need to resort to expensive CFD (computational fluid dynamics) based analysis. At the same time, it allows users to incorporate CFD results if required. It provides detailed escalation analysis with the ability to account for the influence of a vast array of safety systems and barriers, for example isolation, blowdown, blast and firewalls.

BMT ARGOSS provides metocean support to Energean



BMT ARGOSS (BMT), a subsidiary of BMT Group, the leading international design, engineering and risk management consultancy, has recently completed an assessment of metocean conditions to support Energean's Prinos and Epsilon oil field developments in the Gulf of Kavala.

Located in the Prinos-Kavala basin, situated northwest of the island of Thassos and some 18 km south of mainland northern Greece, the Prinos oilfield is the main structure with Epsilon a satellite field. BMT was tasked with providing a comprehensive report on the local metocean conditions including wind, waves and current.

Ian Wade, senior metocean advisor at BMT ARGOSS, explains: "The location presented a number of interesting challenges with regard to quantifying the wave climate in particular. In order to provide an accurate representation of the wave conditions at the Kavala study site, we had to carry out several levels of analysis utilizing our Mediterranean wave hindcast, satellite altimetry, as well as wave buoy statistics from a location between the Mount Athos peninsula and the island of Limnos.

This data allowed us to verify the performance of the wave model at that specific location and provide suitable calibrations against satellite altimeter data, without compromising results due to coastal effects. Subsequent wave transforms to the location of interest were then possible, via our spectral wave ray tracing approach."

With extensive experience of developing, maintaining and operating state-of-the-art numerical metocean models covering local, regional and global conditions, BMT ARGOSS recognizes the multiple methods that need to be employed in order to obtain accurate metocean criteria at a given study site.

Ian Wade continues: "Model simulations (hindcasts or forecasts) of metocean conditions have, for many years, been one of the main assets in our arsenal of tools with which to quantify key phenomena. However, all models have their limitations, and it is vitally important that we understand these and correct them or militate against them wherever possible."

For more information, visit www.bmtargoss.com.

Northeast technology solutions firm secures major FPSO contract

A market-leading mobile technology asset management provider has secured a significant six-figure contract with a global vessel construction firm.

Arnlea Systems, which is based in Johnstone House in Aberdeen, was awarded the contract by SBM Offshore, the global leader in FPSO vessel construction and leasing, to rollout its enhanced Intrinsix Ex inspection system across the firm's fleet of FPSO vessels.

Under the 3 year contract, Arnlea, which is currently working with a number of blue chip customers, will rollout the Ex technology across SBM Offshore's FPSO vessels leased out to oil companies around the globe, including Brazil, Southeast Asia and the Gulf of Mexico.

The Ex inspection system, which is part of Arnlea's mobile technology product suite, Intrinsix, will enable SBM Offshore to enhance its inspection and work management operations around hazardous area equipment. Complying with ATEX industry regulations, the system alerts relevant parties to potentially serious issues in a time-critical manner, reducing unplanned shutdowns and loss of revenues.

Currently the largest selling Ex system in the North Sea, the technology provides the operator with increased control of the safety of its personnel as well as effective operation and maintenance of its equipment. Its ability to rule out human error also results in both cost and time savings, while enhancing efficiency and operational safety across the operator's fleet.

Arnlea Systems managing director, Allan Merritt, said: "This is Arnlea's first fleet deal and it is a substantial global contract for us that will help to secure and stabilize jobs across our Aberdeen and Philippines offices. Our team has established a great working relationship with SBM Offshore, having supplied inspection systems to the operator prior to our improved Ex offering, and so the rollout of the system across its fleet will be a smooth and highly beneficial process for the client."

"Intrinsix Ex will enable SBM to follow a set of processes in compliance with ATEX regulations to help provide tangible benefits to the firm, including return on investment within the first year. We recognize that the FPSO market is growing rapidly and we look to expand further into this sector whilst continuing to broaden our product development."

The Intrinsix technology, which was first introduced in 2014, has already been installed on topsides across the globe and is the only product of its kind in the North Sea. It is available as a complete solution or in separate modules, utilizing mobile and AIDC (automatic identification and data capture) technology to support inventory, logistics and operations management and is aimed at transforming the process of capturing data and managing assets.

The integrated software enables Arnlea's clients to manage their supply chain and operations more effectively and safely from warehouse to field operations within a range of industries, including oil and gas, renewables, nuclear, petrochemical, chemical, utilities, pharmaceutical and manufacturing. Since its introduction, Arnlea has invested a further £250,000 on product development during 2015 to enhance the software and rollout improved offerings such as Intrinsix Ex.

To find out more go to www.arnlea.com.

Shell delivers more Brazil Deep-Water production from Parque das Conchas

Shell and its joint venture announce the start of oil production from the third phase of the deep-water Parque das Conchas (BC-10) development in Brazil's Campos Basin. Production for this final phase of the project is expected to add up to 20,000 barrels of oil equivalent per day (boe/d) at peak production, from fields that have already produced more than 100 million barrels since 2009.

"The safe, early delivery of this production is a testament to the efficiency of our deep-water project execution," said Wael Sawan, executive vice-president, deep water, Shell. "With this phased project, we have again demonstrated value from standardization, synergies from contractual relationships, and the strategic deployment of new technologies. These barrels, like other subsea tieback opportunities across our deep-water portfolio, have development cost advantages and will contribute to the strong production growth we expect from offshore Brazil."

Shell is a global leader in deep water with a strong development pipeline following completion of the BG combination, across offshore Brazil, the U.S. Gulf of Mexico, Nigeria, and Malaysia.

Operated by Shell (50%) and owned together with ONGC (27%) and QPI (23%), Parque das Conchas Phase 3 comprises five producing wells in two Campos Basin fields (Massa and O-South) and two water-injection wells. The subsea wells sit in water depths greater than 5,900 ft (1,800 m) and connect to a floating production, storage and offloading (FPSO) vessel, the Espirito Santo, located more than 90 mi (150 km) offshore Brazil.

Image courtesy: Shell.

Parque das Conchas Phase 3 is the latest, major deep-water project for Shell. Shell deep-water sanctioned projects currently in development include the Stones project, whose FPSO vessel is now on location in the Gulf of Mexico, and the Appomattox project, also a Gulf of Mexico project, now under construction. Shell is also part of a consortium exploring and developing the giant, pre-salt Libra field, offshore Brazil, and recently completed the acquisition of BG, which includes significant deep-water Brazil positions.

For more about Parque das Conchas visit: www.shell.com/about-us/major-projects/parque-das-conchas.html.

Heerema awarded Oseberg Vestflanken 2 contract from Statoil

Statoil has awarded Heerema the contract for the Engineering, Procurement & Construction (EPC) of the unmanned wellhead platform at Oseberg Vestflanken 2, as well as the transport and installation of the platform.

Heerema Fabrication Group (HFG) will carry out the engineering, procurement and construction of the unmanned wellhead platform and Heerema Marine Contractors (HMC) will be responsible for the transport and installation of the platform. Fabrication of the platform will start in June this year and the sail away is scheduled for summer 2017, followed by installation with HMC's semi submersible crane vessel.

Koos-Jan van Brouwershaven, CEO of Heerema Fabrication Group, states: "We are very pleased that we have been awarded this contract, for which the lean and innovative concept of our engineers was the basis. Our design of an unmanned wellhead platform with no facilities, helicopter deck or lifeboats represents a new solution in Norway with great possibilities. It meets the challenges of lower investment costs and higher efficiency requirements of Statoil. Our innovative and detailed design capability, knowledge and experience are recognized as critical success factors for the execution of this project. Also important to Statoil is that the engineering, procurement and construction of the platform will be executed on one site, our Zwijndrecht yard."

Jan-Pieter Klaver, CEO of Heerema Marine Contractors, adds: "Both HMC and HFG have a good track record with Statoil. Even though we have two separate contracts we want to show Statoil and the oil & gas industry that we can deliver Unmanned Wellhead Platforms as an integrated EPCI contractor. Statoil can be confident that our combined expertise and experience will ensure a meticulously executed project that will meet all their expectations."

Oseberg Vestflanken 2

The Oseberg Vestflanken 2 platform will be installed in the Norwegian part of the North Sea at a water depth up to 110 m and approximately 8 km northwest of the Oseberg Field Centre. The topside will measure 25 x 23 m, has a height of 20 m and will weigh 900 tonnes. The jacket will have a height of 138 m with a foot print of 36 x 36 m and a weight of approximately 4,400 tonnes. Special to the jacket are suction buckets instead of piles.

Oseberg Vestflanken 2 is the first of three planned phases for developing the remaining reserves in the Oseberg area, about 130 km northwest of Bergen. The Oseberg Vestflanken Development will consist of an unmanned wellhead platform with 10 well slots. Two existing subsea wells will also be reused. All wells will be drilled by a jack up Cat-J drilling rig. The well stream will be routed to the Oseberg Field Centre via a new pipeline, and the wells will be remote-controlled from the Field Centre. The field development will provide 110 million barrels of oil equivalent. Production start is scheduled for the second quarter of 2018.

For more information contact: Heerema Fabrication Group SE email: communications@hfg-heerema.com or Heerema Marine Contractors SE email: info@hmc-heerema.com.

Americans overwhelmingly support offshore energy

With the U.S. Bureau of Ocean Energy Management (BOEM) expected to soon make a final decision on which areas will be included in its proposed 2017-2022 offshore oil and gas leasing plan, Consumer Energy Alliance (CEA) has released a comprehensive analysis that debunks assertions by anti-energy groups suggesting widespread opposition to U.S. offshore energy development.

This is particularly the case in Alaska and in key Atlantic coastal states where BOEM is considering opening up leases for exploration and production, according to the report A Hollow Groundswell: Debunking the Myth of Widespread Opposition to Offshore Energy.

A few vocal anti-energy organizations have highlighted that communities in Virginia, North Carolina, South Carolina, and Georgia at the urging of anti-energy groups using incomplete or inaccurate data have adopted anti-drilling and/or anti-seismic resolutions. Despite claims that these resolutions show widespread opposition to offshore energy, they in truth represent just 3.8% of all four states combined populations, according to CEAs analysis. And, in each instance, the decisions were based on incomplete or inaccurate information.

Business community leaders from chambers of commerce to farm bureaus to manufacturing have repeatedly stressed the economic, job creation, and long-term energy security benefits that offshore energy development could bring to the Atlantic coast states CEA president David Holt said. Despite attempts by anti-energy groups to convey the false appearance of widespread opposition to these much-needed activities, our findings show that significant majorities overwhelmingly support the opportunity associated with the future development of our offshore energy resources.

And in the wake of what Interior Secretary Sally Jewell has called the most aggressive and comprehensive offshore oil and gas regulatory reforms in the nation's history, we can be assured of developing our natural resources in a way that also safeguards our environment, Holt added.

Democratic polling firm Hickman Analytics found last year that voter support for expanded drilling stood at 61% in Virginia and 55% in North Carolina, the CEA report finds. A Harris Poll conducted in 2015 also

found that 77% of registered voters in Georgia support offshore oil and gas drilling.

Earlier this month, a new Harris Poll found that support among registered voters for offshore drilling stood at 65% in Virginia, 64% in North Carolina and 67% in South Carolina.

In Alaska in 2014 and 2015, Hickman Analytics similarly found extremely high levels of support for offshore drilling, with 73% of registered voters voicing support for drilling in the Arctic and 72% in support of expanded offshore drilling in general. Support for Arctic offshore drilling extends to Louisiana 66%, Georgia 59%, Iowa 52%, New Hampshire 54% and South Carolina 63%.

Image courtesy: CEA.

Blackhawk launches new operations facility in Mexico

Blackhawk Specialty Tools LLC has expanded its international operations in Mexico with the opening of a new subsidiary and operating facility in Villahermosa, Mexico, in the heart of the expanding Mexican oil and gas market.

The new facility will be at Cardenas S/N KM 8 R/A. Anacleto Canabal 2da. Seccion, Centro, Villahermosa, Tabasco C.P. 86280 Mexico.

Besides investing in infrastructure within Mexico, Blackhawk will hire and train local employees with a goal to build strong partnerships with both national and independent oil and gas companies. Blackhawk brings the latest technology in well construction, surge reduction and well intervention products and services to the Mexican market.

"As Blackhawk continues to become better known outside the United States and respected throughout the oil and gas industry, the demand for our services continues to grow," said Billy Brown, Blackhawk's president and CEO. "I am extremely excited about our new Mexico facility and believe the rapidly growing international market is a perfect complement to our significant market position in the U.S. onshore and offshore Gulf of Mexico markets."

"As the leading provider of cementing tools and products in the U.S. Gulf of Mexico, expansion into the Mexican Gulf of Mexico is a natural next step for Blackhawk. The recent efforts to allow exploration to leading operators around the world has opened the door for innovation and new technology and will allow both operators and service companies like Blackhawk to share and gain expertise; invest in the local economy and workforce; and improve safety, efficiency and quality to improve oil and gas operations throughout Mexico."

Hydroid introduces the New Generation REMUS 100 AUV

Hydroid, Inc. has announced its release of the New Generation REMUS 100 AUV. The AUV features advanced technology and capabilities that are the first of their kind in the industry, enabling customers to have increased autonomy and creativity during missions.

The New Generation REMUS 100 AUV combines the reliability of the original REMUS 100 AUV that customers know and trust with new features and capabilities, such as advanced core electronics, a flexible navigation suite with an exclusive conformal DVL and an open architecture platform for advanced autonomy. The vehicle was created over a period of 2 years and is designed based on feedback from the world's largest AUV user community.

Design upgrades include:

• Advanced Core Electronics: The New Generation REMUS 100 features cutting-edge core electronics (CE) designed to replace not only the previous REMUS motherboard but also the CPU stack, emergency board and six serial cards. The new CE board is smaller and lighter than the components it replaces, and it uses an ARM +FPGA architecture that makes it both potent and versatile while consuming less than 5 W of power—about 25% of the power required by the earlier version.

• Flexible Navigation Suite: The New Generation REMUS 100 includes an exclusive conformal design, phased array transducer 600 kHz DVL in the rear of the vehicle. This design significantly increases bottom-tracking range to improve overall navigation performance. In addition, the REMUS 100 will now be available with a choice of inertial navigation system (INS) to suit each customer's navigation needs and budget.

• High Capacity Battery Pack: Equipped with two or three (depending on the model) of Hydroid's latest 18650 Li-Ion based packs, the New Generation REMUS 100 AUVs will carry more energy than ever before. The packs use 3.2Ah Li-Ion cells and have the same electrical configuration as the REMUS 600 pack currently in use.

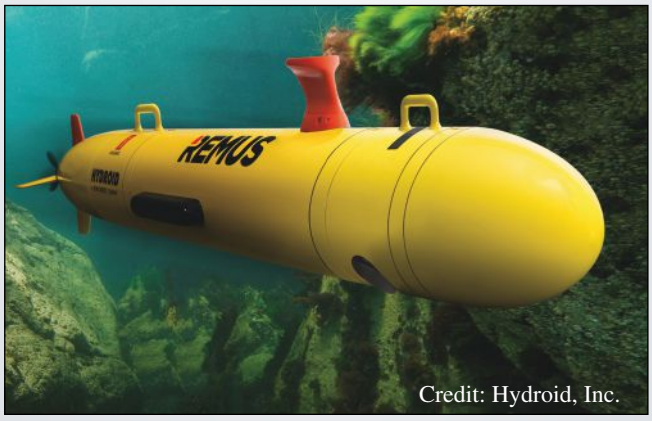
• Modular Elliptical Nose: The redesigned elliptical nose on the New Generation REMUS 100 can reduce drag by 20%. In addition, it's acoustically transparent, so that the acoustic communications transducer can be relocated inside the nose. Because the new nose uses the same modular interface on the existing REMUS 100, it can be easily integrated on both current payload modules and the New Generation REMUS 100.

• Open Architecture: The New Generation REMUS 100 expands on existing REMUS capabilities by adding an open architecture platform for advanced autonomy making the vehicle more versatile. This platform is realized with a publish subscribe database based on a robotic operating system on a second processor. The new REMUS "front seat" performs control functions using well-tested, reliable proprietary control software. The "back seat" performs mission tasks, such as side-scan sonar data logging and extensibility using Hydroid, customer or third-party applications.

The New Generation REMUS 100 is designed so that customers with existing payload modules can have them easily transferred to the new model. Hydroid will continue to support the original REMUS 100 vehicle for customers by request.

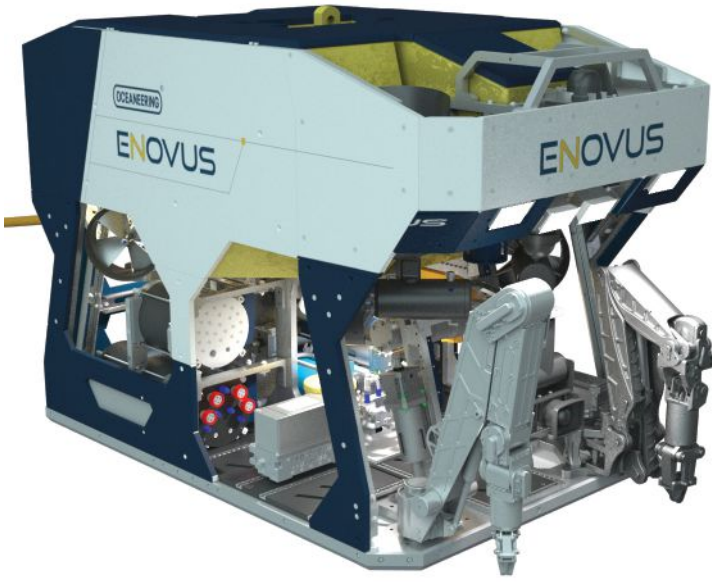
Hydroid's New Generation REMUS 100 AUV is now available to order.

For more information, visit www.hydroid.com/newgenremus.



Credit: Hydroid, Inc.

Oceaneering introduces the new eNovus ROV



Oceaneering International, Inc. has been awarded an 8-year contract by Statoil to provide two work-class electric ROVs for Statoil's CAT-J Platforms in the North Sea.

The new ROVs are currently being built in-house and called the eNovus. With capabilities such as the remote piloting and automated control technology exhibited in the NEXXUS ROV, the eNovus will also incorporate a new automated cartesian manipulator control system that enables the manipulator to be functioned in an XYZ plane as well as automated functionality.

By featuring an environmentally friendly hydraulic system for conventional tooling operations, the eNovus will provide a cleaner and more efficient approach to subsea operations. Additionally, customers will benefit from more available power for tooling and work packages with greater power efficiency. Furthermore, increased reliability will be achieved with more precise automated control and enhanced diagnostics.

"The eNovus is evidence of the emerging trend for cleaner and more efficient work-class ROV systems. The newly advanced ROV will also serve as the basis for a future hybrid between the AUV and ROVs. Currently, the eNovus is under construction at our Morgan City facility and will be completed in the second quarter of 2016," said Kevin Kerins, senior vice president, underwater vehicle technologies.

For more information, visit www.oceaneering.com.

Normand Oceanic WROVs from Subsea 7 successfully integrate SeeByte's CoPilot

SeeByte, a global leader in creating smart software for unmanned maritime systems announces that Subsea 7 has successfully integrated CoPilot with the work-class ROVs on board the Normand Oceanic. The vessel is equipped with two of the latest versions of its work-class Hercules ROV, which are deployed through the vessel's own moonpool and capable to 3,000 m below sea level.

Subsea 7's team on board the Normand Oceanic was able to successfully integrate CoPilot with their Hercules 15 and Hercules 30 ROVs. Feedback has been positive from the ROVs' pilots, particularly with regards to the user interface that summarizes all the data from the vehicle and its sensors onto one screen.

Andrew Foster, ROV fleet and project support manager at Subsea 7 commented: "SeeByte's CoPilot system provides our Hercules ROV pilots with a stable platform to offset the effects of poor visibility and current, allowing them to fully focus on the task at hand. The system flexibility allows us to swiftly install it as and when specific client requirements determine. SeeByte has provided us with a comprehensive and responsive level of support throughout the process. In this latest installation to the Normand Oceanic, the team have also proven their competence in addressing and resolving any issues that have arisen on the vessel remotely."

CoPilot is the world's most advanced, easy-to-use, plug-and-play software that makes piloting any ROV a much simpler task. CoPilot permits pilot controlled auto-transit and stop-and-hover, while providing automated sonar tracking and movement relative to a target. CoPilot is easily retrofitted to any ROV system, but is also available from the factory with VideoRay, Seatronics and SMD.

For more information, visit www.seebyte.com.

Leopard beats the heat

In the Arabian Gulf, Saab Seaeye's pioneering new Leopard electric work ROV has survived its most challenging test yet.

After spending two continuous months working 24 hours a day, seven days a week, often in scorching 40ºC heat, their newly delivered Saab Seaeye Leopard ROV has survived its first real test, report Abu Dhabi-based, CCC Underwater Engineering.

"It was a baptism of fire," admits CCC's ROV manager, Tavis Letherby, having launched the Leopard straight into a 570 km pipeline inspection.

"We wanted to tease out teething problems and in the end we only needed to boost the cooling system to beat the heat. I trusted Saab Seaeye technology and the Leopard proved to be an excellent performing vehicle."

As a rule, electric scores higher than hydraulic when it comes to working in strong currents and at high temperatures –it also produces higher quality survey data. Not least are the considerable savings made in lower operating costs, ownership costs and environmental costs.

Having experienced the collective capability of the ROV's new iCON control architecture and its potent tooling resource, Tavis Letherby concludes with: "The Leopard has a work-class way of thinking."

The inspiration behind the concept, according to Saab Seaeye, was to produce a vehicle able to undertake the widest possible range of work tasks, in the most diverse environments, at the lowest cost of ownership.

With iCON, the Leopard effectively thinks for itself, leaving the operator free to concentrate on the task at hand. This comes from having refined the main electronics pod into an intelligent power distribution and data hub with the brains of the system relocated into sensors and actuators around the vehicle.

The operator also gets greater infor-

mation to make maintenance simpler and quicker, along with remote Internet access for upgrades and support.

Equipment changes are also easier, as distributed intelligence and building-block simplicity avoids the need to partially dismantle the ROV to reach a central electronic heart.

"Although the Leopard can't do everything, an hydraulic work vehicle can, it will take on most missions, including drill support, and with a 3,000-m rating, it can be a valuable option when looking for cost savings."

The combination of its new chassis design together with iCON and its building-block capability means that more interchangeable equipment can be fitted than ever before in a vehicle of this size.

More demanding payloads can also be added, as the Leopard has a 1 tonne through-frame-lift capability and a four-point docking system for tooling skids.

For more information, visit www.seaeye.com.

IMCA workshop: Shared vehicle-borne sensors for ROV and offshore survey applications

The rise of 'ROV DP,' the capability to hold an ROV stationary in the water column, has led to an increase in the sharing of ROV-mounted sensors for ROV positioning, imaging and survey purposes.

A workshop, organized by the International Marine Contractors Association (IMCA) during Oceanology International 2016, discussed the opportunities and challenges arising from this shared use of sensors and consider the future for this developing field of technologies.

Jim Mann, global ROV manager, Fugro (IMCA remote systems & ROV division management committee chairman) led the workshop, supported by Sam Hanton, vice president survey and NASNet at Proserv (Member of IMCA offshore survey division management committee).

"The workshop provided an excellent opportunity to hear about advances within the industry as well as a useful networking forum," explained IMCA's technical director, Richard Benzie. "It was a chance to contribute ideas and views on the future of this field of development within the industry."

Speakers were Tim Rhodes, development manager, Fugro Subsea Technologies, on "Shared vehicle-borne sensors: ROV perspective"; then Robin Longstaff, survey & inspection manager, Bibby Offshore, gave the "Shared vehicle-borne sensors: Survey perspective" view; before Malik Chibah, INS group manager, Sonardyne, turned delegates' attention to "Shared vehicle-borne sensors: A sensor manufacturer's perspective". Following was a 90-min discussion led by Jim Mann and Sam Hanton.

IKM Subsea signs new multi-year frame agreement with Nexans Norway AS

Nexans Norway and IKM Subsea have come to an agreement to extend the current ROV services contracts on board the C/S Nexans Skagerrak.

The contract value including options is 75 million NOK and duration term is firm for 3 years plus 2 yearly options.

IKM Subsea's ROV services will be integrated with iSurvey's positioning and monitoring service during cable lay and trenching operations.

"I am pleased to announce the news of this long-term contract in these challenging times."

"This enables us to further develop our capabilities within the subsea power cable lay market. We have had an excellent working relationship with Nexans Norway over the last 3.5 years and the fact that they are extending the contract by 5 years is a testament to the quality of service we have supplied," says Ben Pollard, managing director of IKM Subsea.

Since 2012, IKM Subsea has supplied a Merlin WR200 work-class ROVs onboard on the C/S Nexans Skagerrak and had in addition supplied the ROV's with personnel and other related services.

For more information, visit www.ikm.com.

AXYS leads the way to commercial acceptance of floating LiDAR

AXYS Technologies Inc. is pleased to announce it has recently completed another two successful validation campaigns for its FLiDAR 6M wind assessment platform. This latest achievement marks the 9th and 10th independently reviewed offshore validations undertaken by AXYS to advance the commercial acceptance of its FLiDAR technology for offshore wind resource assessment in support of project financing.

The latest validation campaigns took place at FINO 1 in the North Sea and West of Duddon Sands in the Irish Sea, adding 11 more months of validation data to AXYS' already impressive body of evidence for commercial acceptance. Both validation campaigns achieved over 98% data availability through harsh winter storm conditions while meeting or exceeding the accuracy standards established by the Carbon Trust Offshore Wind Accelerator (OWA) Roadmap.

Since the initial deployment of its flagship FLiDAR system in 2009, AXYS' FLiDARs have successfully completed 17 offshore wind assessment campaigns and now 10 offshore met mast validations covering a range of operational, site and met ocean conditions in Europe, North America and Asia. This represents a total of nearly 12 years at sea.

AXYS operates a lease pool of eight FLiDARs worldwide with two backup systems available on short notice. AXYS FLiDAR systems have been designed and hardened over the past 7 years to increase survivability and maintain high levels of accuracy and data availability in extreme weather and sea states. Features such as dual-LiDAR, triple-redundant power supply and communications, and redundant data storage were all designed to continually improve system reliability and to ensure the success of our customers' projects.

Watch a video of the FLiDAR buoy effortlessly navigating the rough seas off the coast of Germany from the campaign completed at the FINO 1 met mast as part of the NORCOWE consortium.

Flying high

Falcon - a global success

reliable capable clever

THE WORLD'S LEADING UNDERWATER VEHICLE MANUFACTURER

seaeye.com

SAAB TECHNOLOGIES SAAB

With wave heights exceeding 8 m and wind gusts over 38 kts (20 m/sec), the ruggedized FLiDAR equipped with two LiDARs performed flawlessly, maintaining over 98% data availability through yet another winter storm in the North Sea. https://youtu.be/5V8I0wPCq-M.

OceanGate installs iXBlue inertial navigation system on Cyclops manned submersible

OceanGate, a provider of manned submersible services, and iXBlue, a global leader in navigation, positioning and imaging solutions, have formed a strategic partnership to expand the application and use of advanced marine navigation and sonar equipment to explore the world's deep oceans. As part of the alliance, OceanGate has selected the iXBlue PHINS Inertial Navigation System for use aboard its fleet of Cyclops series manned submersibles.

In a world first, the PHINS system has been installed on a manned submersible to deliver real-time navigational data directly to the pilot. The PHINS system provides accurate position, heading, attitude, speed, and depth data as the submersible explores archaeological sites and other undersea targets. With the use of PHINS, submersible pilots no longer need ship-based tracking and a topside communications link to obtain accurate position data.

"Previously our pilots relied on voice commands from the surface team who tracked the sub's location to help vector us to the target. Now with iXBlue PHINS, the pilot can navigate autonomously throughout the dive and communicate the sub's position back to the surface", said Stockton Rush, CEO of OceanGate.

PHINS has been integrated into Cyclops 1 in preparation for OceanGate's expedition to survey the iconic wreck of Andrea Doria in June 2016. This Italian-flagged passenger liner sank in 1956 about 50 mi from Nantucket. The 697-ft long wreck, often referred to as the 'Mt. Everest of scuba diving' due to its location and 240 ft depth, tests the limits of diving on compressed air.

The 7-day expedition will fully survey the exterior of the wreck with high-definition video and multi-beam 3D sonar. The expedition plan includes 10 dives and 30 hours of diving to create nearly 50 individual sonar scans needed to accurately map the wreck and debris field. After the expedition, the sonar scans will be digitally assembled into a complete virtual 3D model to illustrate the full scope of the wreck and document its current condition.

For more information, visit www.oceangate.com.

Liquid Robotics®' ocean robots surpass 1 million nmi at sea

Liquid Robotics®, the pioneer of wave and solar powered ocean robots, today announced that its fleets of Wave Gliders® have reached 1 million nmi at sea—an important milestone for the unmanned surface vehicle (USV) industry. The Wave Glider is the first USV to complete missions from the Arctic to the Southern Ocean, operate through 17 hurricanes/typhoons, and achieve a Guinness World Record for the "longest journey by an autonomous, unmanned surface vehicle on the planet." One million nmi is the equivalent to 1.29x round trip journey to the moon (at the moon's furthest point) or approximately 46 times around the world.

"A million nautical miles at sea is an important threshold for Liquid Robotics, our customers, and the unmanned surface systems industry," said Gary Gysin, president and CEO of Liquid Robotics. "We're leveraging this expertise to help build an ocean sensor network with Wave Gliders serving as the communications hub and mobile sensor platform. Our vehicles are collecting and transmitting data today that is too costly or difficult to obtain, but is vital to our understanding and protection of the ocean."

Over the past decade, government and commercial organizations have turned to unmanned ocean robots to lower the cost, risks, and improve ocean access, allowing better measurement, monitoring, and understanding of maritime environments. In the defense, oil & gas, and scientific markets, Wave Gliders have been deployed to extend the range and effectiveness of traditional observation and surveillance systems. Missions have been conducted in all five major oceans collecting and communicating environmental, security, weather, and seismic data.

For more information, visit www.liquid-robotics.com.

Advanced Robotic for the sustainable management of offshore oil & gas activities

Clean Sea is a recently developed innovative underwater robotics technology conceived by Eni that allows to conduct automated environmental monitoring and inspection of oil & gas offshore plants.

Eni consolidates its commitment to the development and adoption of the most advanced technologies to support a more environmentally friendly, safe and efficient conduct of its oil & gas activities.

Its key element is an AUV. Because

of their ability to move independently, AUVs open up opportunities for their adoption in situations where traditional techniques, based on ROVs, might prove difficult if not entirely impractical.

A traditional ROV system is intrinsically based on the existence of a physical connection between it and a ship on the surface through which launch, recovery and operations are managed. The connection allows the ROV to receive all the required electrical power, send the collected data, and receive orders by means of one or more cables. The surface ship is positioned above the area in which submarine operations are carried out and hosts one or more specialists who can manipulate the underwater vehicle on the basis of photos and video transmitted in real time by the ROV itself.

Unfortunately, such operations can not be performed in adverse marine conditions, especially if the sea surface is iced. An approach based on an AUV instead, without any need of direct connection with the surface, may act independently of marine conditions or frozen sea surface, albeit with some limitations due to the current technology available. In particular, power is supplied by batteries (which guarantee energy independence in the order of tens of hours), while all the information coming from the sensors and devices installed must be managed directly by the control system of the AUV (and not by the operator) for the correct execution of navigation operations. The artificial intelligence of such AUVs needs to be able to compensate–within acceptable limits–for the absence of the operator; autonomous movement, the avoidance of obstacles and the advanced management of unexpected conditions are examples of characteristics that an AUV should own.

For more information, visit www.eni.com.

OceanServer sees strong demand for Iver3 AUV

OceanServer Technology announced that it has received eight new Iver3 AUV orders for delivery to a variety of survey, research, military and water quality organizations. The Iver3-580 AUV is the third generation AUV produced by OceanServer and builds on the success of the Iver2-580 that has recently been discontinued after 10 years of service and over 200 systems shipped. Research related vehicles will be delivered to Penn State University Applied Research Laboratory and other undisclosed customers. YSI/Xylem has placed two new orders for water quality requirements and Phoenix International has purchased a single system. Three different commands within the US Navy have purchased 4 Iver3 systems for a variety of applications to support the data requirements of the warfighter. OceanServer has started customer shipments and expects to deliver the majority of these vehicles by early in the 2nd quarter of 2016.

All Iver3 AUV models come standard with OceanServer's VectorMap Mission Planning and Data Presentation tool, which provides geo-registered data files that can be easily exported to other software analysis tools. This unique AUV design has enabled OceanServer to carve out a very strong position in the research space for Autonomous Underwater Vehicles, sensors and

behavioral studies. The VectorMap program can input NOAA ENCs or any geo-referenced charts, maps or photo images, allowing the operator to intuitively develop AUV missions using simple point-and-click navigation.
The base vehicle gives university, government and commercial users an affordable base-platform for sensor development or survey applications in water quality, sub-surface security and general research.

For more information, visit www.ocean-server.com.

Researchers develop a swarm of aquatic robots that learn to cooperate by themselves

A team of researchers from the Institute of Telecommunications at University Institute of Lisbon and from University of Lisbon in Portugal are the first to demonstrate a swarm of intelligent aquatic surface robots in a real-world environment. Swarms of robots have the potential to scale to hundreds or thousands of robots and cover large areas, making them ideal for tasks such as environmental monitoring, search and rescue, and maritime surveillance.

"Swarm robotics is a paradigm shift; we rely on many small, simple and inexpensive robots, instead of a single or a few large, complex and expensive robots," said Dr. Anders Christensen, the principal investigator in the project. The team is focused on the challenge of how to control such large groups of robots autonomously. "Controlling a large-scale swarm of robots cannot be done centrally. Each robot must decide for itself how to carry out the mission, and coordinate with its neighbors."

The researchers resorted to nature-inspired approaches for designing their robotic swarm. Instead of manually programming the robots to carry out a mission, evolutionary algorithms are used to synthesize the controller of each robot. Evolutionary algorithms mimic Darwinian evolution to automatically generate the artificial intelligence that controls each robot. "The robots basically learn how to cooperate with each other by themselves." Each robot is controlled by an artificial neural network, an "artificial brain" that allows the robots to carry out the missions autonomously, without a human operator or a central control station. The team demonstrated the capabilities of a swarm with up to 10 robots in various collective tasks, including area monitoring, navigation to waypoint, aggregation, and dispersion.

The robotic platform was built by the team using digital fabrication techniques and widely available components in order for the robots to be inexpensive. Each robot costs only €300 in materials. The hull of the robots is built from CNC-machined polystyrene foam and fitted with 3D-printed components. Each robot is equipped with GPS and compass, it can communicate with neighboring robots using Wi-Fi, and the artificial brain is run on an onboard Raspberry Pi 2 computer. The team is now working on developing the second generation of their aquatic robots, which will be equipped with more advanced sensors and be able to carry out long-term missions at sea. Swarms of aquatic robots have the potential to replace expensive manned vessels and to put the crew out of danger in many maritime missions.

For more information, visit www.biomachineslab.com.

MCP becomes Telenor Maritime

Maritime Communications Partner (MCP) is changing its name to Telenor Maritime. The name change reflects the company's increasingly broad marine connectivity and communications portfolio, with mobile coverage and digital and Internet services. At the same time, MCP is expanding our global position, moving into markets where the Telenor name is well recognized.

Telenor Maritime has continued to grow as a major global mobile operator at sea with a mobile-centric solution, enabling a digital business transformation in the maritime verticals offshore, cruise, ferry, and fisheries. It is building mobile 4G coverage on the Norwegian Continental Shelf and is strengthening its global presence. The new name reflects the changing balance of its business, allowing it to be more relevant to its customers within the markets we operate.

"Telenor Maritime approaches connectivity differently to other maritime communications providers—essentially, we are a mobile operator at sea," said Frode Støldal, CEO of Telenor Maritime. "We use the same skills we've developed in Telenor as one of the largest onshore mobile operators to develop our maritime solutions with mobile devices as the focal point, rather than designing them solely from a satellite, VSAT, or Wi-Fi perspective. Our rebrand from MCP to Telenor Maritime reflects our associations to innovation and connectivity, showing that we enable the best mobile experience at sea."

The new name comes into effect immediately and will be implemented in the company's products, services, and communications throughout 2016.

For more information, visit www.telenormaritime.com.

Orbit receives first order from strategic agreement with European integrator

ORBIT Communication Systems has received an order for OceanTRx™4 and OceanTRx™7 systems, its maritime satellite communication solutions, from a leading European integrator. The contract is valued at $1.5 million. The systems will be installed onboard Navy vessels to allow broadband connectivity at sea. This is the first order of the new contract with the integrator, which the company estimates will order multiple C-, Ku-, and Ka-band Maritime Satellite Communication systems in the next few years.

OceanTRx™4 (1.15 m) and OceanTRx™7 (2.2 m) are ORBIT's flagship maritime SatCom systems supporting C-, X-, Ku-, and Ka-band frequencies in various configurations. The modularity of these systems allows for easy maintenance and upgrade on the ships as well as outstanding RF performance and dynamic response under all sea conditions. The design of the OceanTRx™ systems has set the standard for maritime SatCom solutions around the world for both defense and commercial uses for mission and business critical applications, providing industry-leading performance and significant competitive advantages in every performance aspect. Equally notable is their compatibility with international standards, including performance and regulatory compliance with the demands of the world's largest satellite companies.

For more information, visit www.orbit-cs-usa.com.

HISPASAT, QUANTIS to provide broadband via satellite to North Africa

Spanish satellite communications operator HISPASAT and QUANTIS, together with their Moroccan subsidiary NORTIS, a leading operator in data, voice, and satellite Internet services in Spain and Morocco, have signed a contract to provide satellite broadband services in North Africa. The agreement between the two companies establishes the use of space capacity of the Ku-band capacity of satellites Hispasat 30W-4 and Hispasat 30W-5. The maritime sector—cruise ships, fishing fleets, ocean carriers and ship companies—will be provided with a flexible, innovative solution that is easily adapted to each user's needs. The service offered by QUANTIS through its own platform is supported by HISPASAT's satellite capacity, which will provide the best coverage in the waters of the Maghreb, from the southernmost latitudes of the region to the most central areas of the Mediterranean.

For more information, visit www.hispasat.com.

Companies successfully trial Fleet Xpress in challenging Antarctic conditions

Inmarsat together with Global Marine Networks and Network Innovations, announced the successful trial and subsequent commercial order for Fleet Xpress in Antarctic waters. Fleet Xpress, installed on board the adventure cruise ship Ocean Nova, delivered robust communications in one of the most hostile environments on the planet.

Fleet Xpress, the hybrid Ka and L-band service using Inmarsat's Global Xpress network, delivers the world's first globally available high-speed broadband service from a single network operator. The trial was successfully conducted on board the 1992 built ice class Ocean Nova, owned by Nova Cruising Ltd and operated by Nova Logistics, a polar expedition specialist.

"Our customers rely on us to provide cutting-edge satellite services," said Dr. Luis Soltero, chief technology officer of Global Marine Networks, which offers a range of Internet-based services, hardware and software to commercial clients. "Fleet Xpress delivered on its promise of high-speed seamless mobile broadband service in one of the world's most difficult areas for most satellite systems. Antarctica requires low-horizon satellite views through heavy cloud cover and precipitation. Fleet Xpress successfully overcame these conditions."

In this trial, Network Innovations, one of Inmarsat's first value-added resellers of Fleet Xpress, was able to provide its expertise and support to Global Marine Networks and the crew of the Ocean Nova, which used a Cobham SAILOR 100GX antenna.

Noting the first-rate performance of the Fleet Xpress service throughout the trial, Eric Verheylewegen, vice president and general manager of Network Innovations commented on the successful outcome of tests aboard the Ocean Nova. "Throughout this test, the Fleet Xpress service allowed passengers and crew to conduct daily communication activities beyond our expectations in this extreme location. Now they have decided to install Fleet Xpress, we could not be more satisfied with the results."

"This trial marks another important milestone for the launch of Fleet Xpress. By testing Fleet Xpress in such harsh conditions we are pushing the boundaries of what we can offer," said Ronald Spithout, president of Inmarsat Maritime. "Fleet Xpress is set to redefine maritime communications and will transform the way vessels are managed and optimized throughout the globe. We are thrilled that Nova Cruising Ltd have chosen to rely on and invest in Fleet Xpress with a commercial order for the rest of their fleet."

For more information, visit www.inmarsat.com.

Harris CapRock launches cyber security solution for oil & gas customers

Harris CapRock Communications launched SafePass™ Pro, an advanced cyber security solution for proactive defense against cyberattacks targeting oil and gas IT infrastructures. The solution also is available for cruise, maritime, and other commercial customers.

Industry experts estimate cyberattacks against the global energy industry will cost businesses up to $1.9 billion by 2018. SafePass™ Pro improves network resources, minimizes malware and spyware, enables centralized control across all sites, enforces acceptable use and security policies (AUP), and provides an opportunity to assess and eliminate network vulnerabilities. SafePass Pro customers also will receive Harris CapRock's 24/7 monitoring and support, network threat detection, and vulnerability scanning.

The new cyber security solution includes Alert Logic threat monitoring services. Alert Logic Threat Manager provides network intrusion monitoring and detection, as well as a vulnerability scanner, while the firewall protection supports URL filtering, application filtering, and security.

Customers also will have access to Harris Corporation's industry-leading cyber security experts to pinpoint system vulnerabilities, monitor insider threats, proactively defend the network and respond to incidents. Harris experts protect networks that move 2 million air passengers a day and manage 150 Department of Defense satellites as well as numerous government installations.

"Security breaches and emerging threats to corporate networks are impacting the oil and gas market with greater cost and frequency as offshore operations rely more heavily on always-on communications networks," said Tracey Haslam, president, Harris CapRock. "SafePass™ Pro offers an unparalleled approach to cyber protection with the added ability of working with Harris cyber security experts committed to securing critical government networks."

For more information, visit www.harriscaprock.com.

SES deploys maritime VSATs on floating hospitals

SES S.A. and FRIENDSHIP, a non-government organization, along with the technical assistance of Square Informatix (Bangladesh) Ltd, launched the first state-of-the-art maritime VSATs on three of FRIENDSHIP's floating hospital ships—Lifebuoy Friendship Hospital, Emirates Friendship Hospital and Rongdhonu Friendship (formerly the Rainbow Warrior II) Hospital.

SATMED, the newly deployed satellite-based e-health platform, will enable FRIENDSHIP to establish communications with national and international doctors from remote areas, provide medical counselling to marginalized communities through telemedicine, and exchange medical knowledge with local doctors. SATMED is an IT-enabled cloud infrastructure accessible around the globe that facilitates data exchanges between professionals and medical frameworks such as electronic medical records and teleradiology systems. The platform is an open, flexible, and afford-

able solution that perfectly fits SES's range of satellite based e-activities.

The project is funded by the Luxembourg Government and implemented in cooperation with SES Techcom Services and e-Medical Communication (eMC).

For more information, visit www.ses.com.

Byzantine Maritime Gas selects KVH mini-VSAT broadband service

KVH Industries, Inc. has been chosen by Singapore-based Byzantine Maritime Gas Pte. Ltd. as the VSAT provider for its new fleet of liquefied petroleum gas (LPG) carriers. The company, which specializes in marine transportation of petroleum products, is deploying KVH's TracPhone V11-IP antenna systems with mini-VSAT Broadband service.

The TracPhone V11-IP chosen by Byzantine Maritime Gas is a dual-mode C/Ku-band antenna system designed by KVH to provide global connectivity, redundancy, and rain-fade resistance while delivering data speeds up to 4 Mbps downlink and 1 Mbps uplink. Byzantine will utilize KVH's network management services via the CommBox Network Manager, which is built into the TracPhone V11-IP's belowdecks unit. The CommBox services provide least cost routing and connection-specific firewall rules as well as web caching and compression—important management tools for optimizing the data being used onboard the vessel.

The myKVH web portal that Byzantine Maritime Gas is using as part of the mini-VSAT Broadband service offers a single, secure site with the tools to configure the onboard network, monitor vessel positioning, obtain vessel data usage status, and allocate data usage to individual users or tasks onboard. This portal was developed by KVH to meet the maritime industry's need for a critical tool for bandwidth management and is a key component in enabling Byzantine Maritime Gas to manage its usage-based monthly airtime plans.

These services are part of KVH's unique approach to the big data needs of the maritime industry. KVH's complete end-to-end solution includes rugged antenna hardware, affordable airtime plans, global connectivity, comprehensive network management tools, global customer support, and compelling content for operations and entertainment at sea—a concept the company terms the Power of One.

For more information, visit www.kvh.com.

Globecomm unveils advanced VSAT service for maritime, other customers

Globecomm has announced full commercial availability of Globecomm VSAT, powered by iDirect, a new, high-capacity satellite service designed to deliver "industrial strength" connectivity to fixed and mobile assets on a global basis.

The service provides a broad range of narrowband and high-throughput applications over a robust, flexible and scalable network designed specifically to serve government and enterprise sectors. The platform is built to offer a full range of shared services as well as fully private networks for land, maritime and aeronautical customers. Coverage includes the major ocean regions most relevant to merchant shipping as well as land masses on five continents.

Globecomm VSAT, powered by iDirect has been developed to support the growing requirements of enterprise users for asset management and information logistics, including M2M and Industrial IoT applications, as well as solutions for data and video.

The state-of-the-art global VSAT network is based on the iDirect Evolution IP-based platform technology. It communicates with a wide range of iDirect modems including the X7, which supports automatic beam switching as well as access to new HTS services. Globecomm customers will have access to Ku-, Ka-, and C-Band services on the new Globecomm VSAT platform.

The service combines Globecomm's global teleport presence and extensive terrestrial fiber connectivity and iDirect's advanced coding and network management techniques. The result is in an end-to-end managed service supported by the company that built it.

In September 2015, Briese Schiffahrts, a major German ship operator and one of Globecomm's most loyal maritime customers, became one of the first companies to install the latest gen-

eration of Globecomm's iDirect Evolution-based VSAT service for their global maritime business. Briese was so impressed with the service that the company has decided to roll it out to additional ships.

For more information, visit www.globecomm.com.

MOL launches trial use of big data

Mitsui O.S.K. Lines, Ltd. (MOL) announced that it will launch a trial of onboard data transmission and accumulation for its operated vessels in cooperation with Ship Data Center Co., Ltd, which is a wholly owned subsidiary of Nippon Kaiji Kyokai (ClassNK).

MOL has worked steadily to create an environment that allows the collection of big data from onboard its operated vessels and sharing the information between ship and shore in real time using marine broadband service. Based on the analysis of onboard big data, MOL also aims to build a comprehensive vessel operation support network, which will improve operating safety, reduce vessels' environmental impact, make vessel operation more economical, enhance ship management, and promote high-quality training and education for seafarers.

In the initial trials, MOL will transport onboard big data acquired from MOL-operated vessels to Ship Data Center, where it will be accumulated for the benefit of the entire maritime cluster. MOL believes supporting this trial effort will promote innovation throughout the entire maritime cluster, including producers of ship supplies, shipyards, ship's classes, societies, universities and research institutes.

With the goal of becoming the world leader in safe operation, the entire MOL Group, on land and sea, is united to proactively develop and introduce technologies that will contribute to safe, reliable operation and build and maintain the trust of valuable customers. In addition, as the world's leading shipping company, MOL takes a proactive stance in efforts to promote the continued growth of the maritime industry.

For more information, visit www.mol.co.jp.

ITC Global awarded contracts for offshore communications in Western Africa

ITC Global has been awarded two multi-million dollar contracts, each spanning 3 years, to provide remote offshore communications to five floating production storage and offloading (FPSO) vessels based in Western Africa. Service is being delivered to several major European-based oil and gas companies, including Saipem and Eni S.p.A.

The FPSOs, operating in the Congo, Angola, and Equatorial Guinea, are each outfitted with two C-band stabilized antennas, delivering between 4 and 10 Mbps high data rate service to the vessels. The custom-engineered solution was designed to enable increased automation at the remote site, reducing the number of remote workers required on each FPSO at one time.

With certified field technicians based in strategic locations throughout Western Africa, ITC Global utilized its local presence to ensure fast installation and commissioning of each FPSO for the customer's African operations.

New European organization for subsea cables

The European Subsea Cables Association (ESCA) has announced their formation as "the" European trade association for all telecommunication and power subsea cables.

The new association has emerged from what was formally Subsea Cables UK. It is a forum of European companies that own, operate, and maintain subsea cables or provide services for the subsea cable industry within Europe and surrounding waters.

The principal goal of ESCA is the promotion of marine safety, safeguarding of subsea cables from man-made and natural hazards, and protecting the rights of operators to install and maintain cables.

Peter Jamieson of Virgin Media and chairman of ESCA, said, "The requirement to form this new association has come from our membership and it was the logical evolution of the organization. Close to 50% of the old UK association members were non-UK. Therefore, we can better serve our members by becoming a more regional association."

Colin Rayman of Red Penguin Associates and ESCA executive committee member, added, "The formation of a European Subsea Cable Association will mean we can now reach out further to enhance our European Maritime and Fishing liaison with Government departments and associations with similar interests and to move closer to attaining mutual understanding of our industries, sharing the seabed safely and maintaining the integrity of assets."

ESCA provides guidance and technical papers freely to members for the benefit of the sector. The membership of the organization contains expertise from all areas of the industry and convenes bi-annually to share ideas and information.

For more information, visit www.escaeu.org.

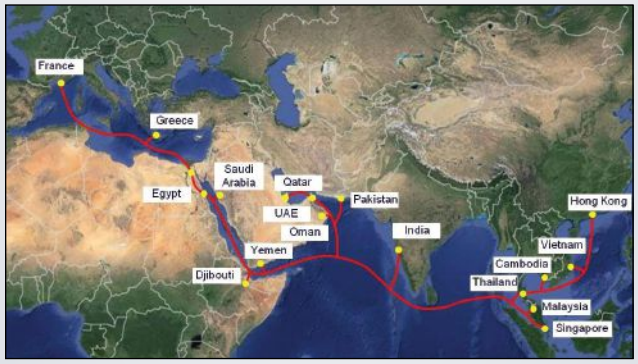
TE SubCom to deploy upgrade to AAE-1

TE SubCom, a TE Connectivity Ltd. company, and the consortium behind the Asia-Africa-Europe-1 (AAE-1) cable system announced that the deployment of a large-scale wavelength equipage to the system is currently underway. The equipage will utilize TE SubCom's most advanced 100 Gbps optical transmission equipment available, representing a major leap forward in undersea capacity.

AAE-1 is a 25,000-km system owned by a consortium of 19 global service providers that will connect Southeast Asia to Europe across Egypt, connecting Hong Kong, Vietnam, Cambodia, Malaysia, Singapore, Thailand, Myanmar, India, Pakistan, Oman, UAE, Qatar, Yemen, Djibouti, Saudi Arabia, Egypt, Greece, Italy, and France. Project implementation is progressing at full speed with the wet system manufacture complete, initial dry plant equipment installation and site acceptance testing complete at over half of the landings, and the commencement of marine installation with four main lay cable ships and numerous support vessels presently working, for a scheduled Ready for Service by end of 2016.

This additional equipage of AAE-1 will utilize TE SubCom's C100U+ technology, which has the potential of improving the spectral efficiency in the fibers. This is the first capacity upgrade of the system and it is expected to be delivered when the system achieves ready for provisional acceptance (RFPA).

For more information, visit www.subcom.com.



Global Marine awarded NAZ extension

Global Marine Systems Limited has been awarded an extension of the North America Maintenance Zone (NAZ) submarine cable maintenance contract up to 31 December 2024. This long-term extension demonstrates the consortium owners' confidence in Global Marine's capabilities to deliver highly responsive and well-executed maintenance provision to all members.

NAZ covers a cable maintenance footprint, which stretches from the Eastern North Pacific to the Equator. Global Marine has been providing cable maintenance services from its base port in Victoria, British Columbia, Canada since January 2012, providing dedicated year-round cover to the region. Global Marine's track record in the North Pacific extends back further, when in 1991 it installed and maintained the first repeatered system linking the U.S. mainland with Japan.

This new contract will see Global Marine expand the cable storage capacity at the Victoria depot in British Columbia. Additionally, the purpose-built cable ship Cable Innovator will replace CS Wave Venture from 1 February 2017, bringing improved DPS-2 functionality. The repair vessel stores strategic spares in its cable tanks to support rapid mobilization in the event of a fault and is equipped with COTDR and deepwater ROV capability to support the detection of faults on ultra-long haul systems.

For more information, visit www.globalmarinesystems.com.

Tekmar wins DONG Energy contract

Tekmar Energy has bolstered its industry track record after being awarded a major contract with DONG Energy to supply 189 cable protection systems (CPSs) on its Race Bank offshore windfarm in North Norfolk.

Tekmar will provide its seventh generation TekLink mechanical latch system, which includes a specially developed quick connect design that significantly accelerates CPS assembly time, complete with the array and export cables and bellmouths.

The contract represents the ninth DONG Energy project that Tekmar has worked on and is the fourth successive contract following the recent announcement that Tekmar is providing DONG Energy with its innovative cable protection systems on the Burbo Bank Extension project on the northwest coast of England.

For Race Bank, Tekmar has worked with DONG Energy

to engineer a standardized CPS design for the project that offers maximum flexibility during the installation activities offshore. These systems will be delivered from its manufacturing facility and headquarters in Newton Aycliffe, County Durham.

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

Lab upgrade increases 66 kV deployment potential

The Offshore Renewable Energy (ORE) Catapult has upgraded its UKAS accredited high voltage (HV) electrical laboratory, providing enhanced testing capability unique in the UK and paving the way for an industry shift from 33 to 66 kV for future offshore wind inter-array electrical systems.

The upgrade to the adjustable HV reactor involved introducing an automated control system and increasing the power rating of the 600 kV resonant transformer, in collaboration with Doble PowerTest, to 150 kW of power. This now means that the reactor has both the required high voltage and power capacity to carry out automated step-breakdown testing of 66 kV cable systems using water terminations.

ORE Catapult's HV electrical test laboratory is capable of exerting up to 20 times the operating stresses on the cable. This type of Highly Accelerated Lifetime Test (HALT) is used to instigate breakdown across the cable insulation, enabling the qualification of new wet-type cable systems and the assessment of the degradation of cable insulation systems.

Stepping up array systems in offshore wind farms to 66 kV will have a dramatic impact on the sector, enabling increased offshore power density, lower operational losses, fewer offshore collector substations, and the resulting reduction in the leveled cost of energy. Ultimately, this move is essential for the development of larger offshore wind power parks that will use larger capacity offshore wind turbines.

For more information, visit https://ore.catapult.org.uk.

Telefónica to link Brazil and the USA with new cable

Telefónica announced the deployment of BRUSA, a new submarine cable nearly 11,000 km in length linking Rio de Janeiro and Fortaleza (Brazil) with San Juan (Puerto Rico) and Virginia Beach (USA). The cable is expected to begin operations in early 2018, reinforcing Telefónica's infrastructure leadership in the Americas.

Leading edge technology will allow BRUSA to support ultrafast transmission capacity and increase end-to-end connectivity and the availability of ultrahigh-speed broadband services. With this new infrastructure, Telefónica strengthens its leadership in the wholesale market and addresses the exponential growth of data transmission generated by its B2B customers, telecom operators, OTT players, and end-consumers.

This new infrastructure will improve communication reliability and deliver enhanced resilience by increasing the number of USA landing points, overall network performance, and end-to-end security. BRUSA will also provide one of the lowest latency communication links between the two largest economies in the region, Brazil and USA, and offer

a greater flexibility and scalability than previously deployed systems.

Telefónica has recently strengthened its infrastructure in the Americas with the deployment of the Pacific Caribbean Cable System (PCCS), a consortium submarine cable with a transmission capacity of up to 80 Tbps, which links Jacksonville (Florida, USA) with the British Virgin Islands, Puerto Rico, Aruba, Curacao, Colombia, Panama, and Ecuador. In addition, Telefónica also manages the Unisur cable connecting Uruguay and Argentina and the SAM-1, a submarine cable system deployed in 2000 that forms a 25,000-km ring linking the USA, Caribbean, and Central and South America.

The new submarine cable reinforces Telefónica's ambition to provide a more cost-effective and reliable service to Telefónica companies as well as other telecom operators and content providers, allowing Telefonica to seize the growth opportunities of the global wholesale market.

BRUSA will become part of Telxius, the global company recently created by Telefónica to best optimize its infrastructure asset portfolio and that will gradually integrate certain assets, including part of its tower and submarine fiber optic cable networks.

Telefónica's global fiber optic network consists of more than 65,000 km (of which 31,000 km is proprietary submarine fiber optic cable) connecting the USA, the Americas, and Europe.

For more information, visit www.telefonica.com.

SEA-ME-WE 5 lands in France

SEA-ME-WE 5 (South East Asia - Middle East - Western Europe 5), to be operational in the second half of 2016, landed at the submarine cable station of La Seyne-sur-Mer in the South of France.

This new 20,000 km-long fiber optic cable will strengthen the Europe-Asia route by providing additional capacity and also ensuring the protection of voice and data traffic passing through the other cables in the area.

SEA-ME-WE 5 will connect France to Singapore, serving 17 countries: Saudi Arabia, Bangladesh, Egypt, United Arab Emirates, France, Indonesia, Italy, Malaysia, Myanmar, Oman, Pakistan, Qatar, Republic of Djibouti, Singapore, Sri Lanka, Turkey, and Yemen. Orange Marine, a 100% subsidiary of Orange Group manages the installation of SEA-ME-WE 5 in the Mediterranean, with four shore ends: France, Egypt, Italy, and Turkey.

The cable design is based on the latest 100 Gbps very high-speed technology combined with wavelength division multiplexing offering 24 Tbps design capacity of 3 pairs of fibers. This high capacity intercontinental highway provides route diversity and resilience to the existing submarine cables between Europe and Asia, which are heavily loaded.

SEA-ME-WE 5 introduces the innovative concept of end-to- end connection to open and neutral Points of Presence (POPs) in Europe and Asia. In France, the SEA-ME-WE 5 will be connected to Interxion Data Center in Marseille (MRS1) by terrestrial cable established from the Toulon station. Interxion is a truly neutral European data center provider, completely independent of any network, hardware, software operator or provider. This will enable the SEA-ME-WE 5 to provide

access to a wider range of connectivity providers and IT services at extremely competitive costs.

The arrival at Toulon and the extension by terrestrial cable to the Interxion data center (MRS1) in Marseille strengthens the role of the region for international trade to the Middle East, Asia and Africa/Indian Ocean.

With a participation in more than 40 submarine cables and international consortium but also major investments, Orange is working to develop the quality of its global network service to contribute to its ambition: offering an enriched connectivity to its customers and connect them to their essentials.

For more information, visit www.orange.com.

Level 3 cable enhances Colombia's connectivity

Level 3 Communications, Inc. announced the activation of a new subsea cable landing station giving Colombia a Pacific Ocean route to connect to its international network. The new landing station enhances Colombia's options for redundancy and removes sole reliance on traditional connectivity via the Caribbean Coast. The fiber optic undersea cable runs 300 km to the seaport city of Buenaventura on Colombia's Pacific coast, then 154 km over land to the city of Cali, where it connects with Level 3's national fiber optic system that provides access to the main Colombian markets.

Demand for connectivity and network services in Colombia and Latin America is rising. Frost & Sullivan estimates the Latin American fixed broadband services market will grow at a rate of 12.4%, to reach 90.8 million connections in 2018. At launch, Level 3's undersea system has a total installed capacity of 8 TB, of which 400 GB are already available, responding to market needs. Now, enterprises have greater access to connectivity, route diversity, and redundancy both domestically and internationally.

Colombia will be able to transmit data and mobile communications more quickly to many key cities throughout the Americas, such as Los Angeles, Miami and New York, U.S.; Mexico City, Mexico; Santiago, Chile; Buenos Aires, Argentina; and São Paulo, Brazil. In turn, these cities will have greater connectivity to seven of the main cities in Colombia: Bogotá, Medellin, Cali, Ibague, Manizales, Pereira, Armenia and Popayan. The new route also provides enhanced connectivity and route diversity to cities in Asia and Europe.

Level 3 builds, operates, and maintains a global communications network with extensive fiber miles in more than 60 countries on three continents. The company owns more than 180,000 km (110,000 mi) of intercity routes, 103,000 km (64,000 miles) of metro routes and 53,000 km (33,000 miles) of undersea routes.

For more information, visit www.level3.com.

TI Sparkle adds to SICILY HUB

Telecom Italia (TI) Sparkle, the International Services arm of Telecom Italia Group, announced that its latest Next Generation Data Center in Palermo has expanded its reach by including MENA Cable's landing station in Mazara, Sicily.

Located closer than any other European peering point to North Africa, the Mediterranean and the Middle East, TI Sparkle's SICILY HUB is served by Seabone, TI Sparkle's Tier 1-grade Global IP Transit service, while its open and resilient configuration supports carriers and ISPs that want to enhance the redundancy of their networks.

In addition, through DE-CIX's IX platform, SICILY HUB allows carriers that land their IP backbones in Sicily to directly interconnect with each other and to other providers that have a presence in the facility. These other providers include some of the world's most well-known and largest content players.

MENA Cable is the 9,500-km infrastructure with multi fiber pairs utilizing most advanced optical technologies to satisfy capacity needs to connect the markets of Oman, KSA, India, and beyond to Europe passing by Egypt. The cable also includes branching units in the Mediterranean and Red Seas for potential expansions of cable reach to more markets in South Europe and East Africa.

As a result, MENA Cable is now closer to Europe through three diversified routes and is able to provide a relevant improvement of performance and Internet experience to its customers who, at the same time, can enjoy a rich ecosystem and market place of multi-breed interconnected players available at SICILY HUB.

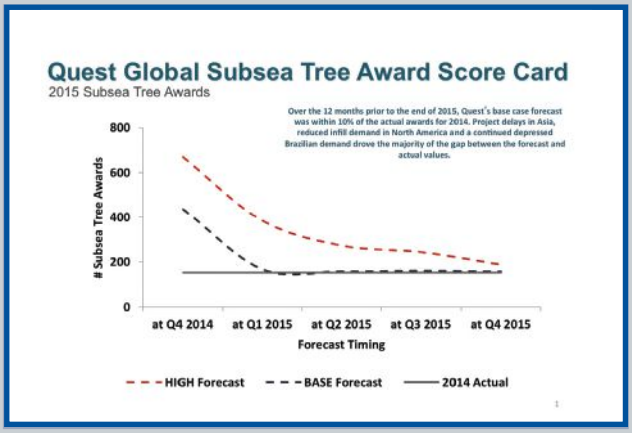
TI Sparkle' Sicily Hub has been designed with the most advanced technologies and follows the most restrictive technical parameters typical of Telecom Italia Group's Next Generation Data Centers.

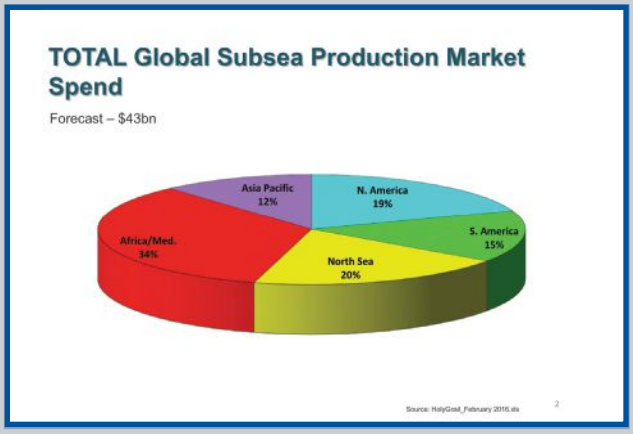
Seabone is TI Sparkle's global Tier 1 IP Transit service providing ISPs, content providers, and accelerators with top quality, best performing, and most secure access to the Global Internet. Ranking among Top 10 global IP backbones, Seabone has a consolidated leading position in the Americas and in Europe, leveraging a unique presence in Mediterranean, Africa, Middle East, and Southeast Asia.

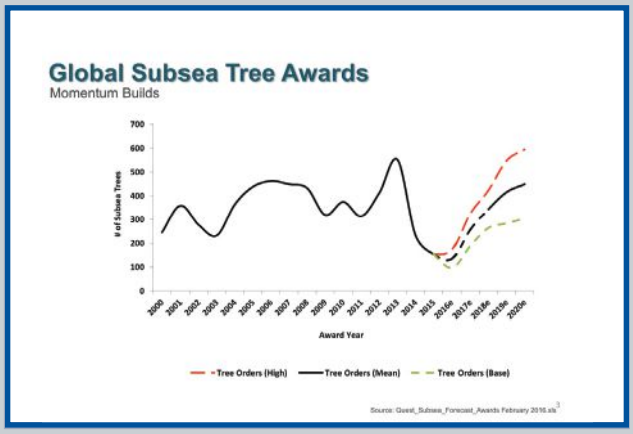
For more information, visit www.tisparkle.com.

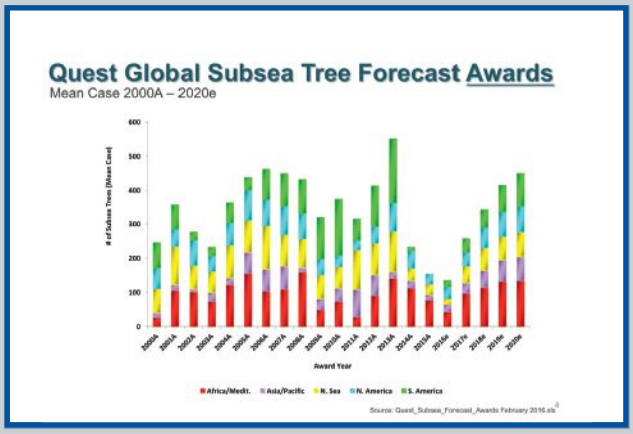
OFFSHORE STATS & DATA

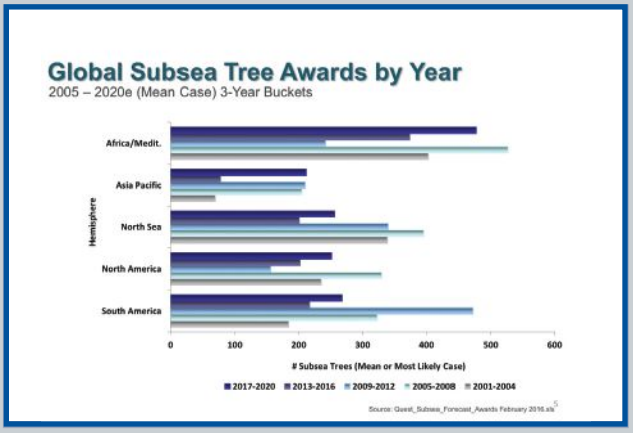
Quest Offshore Activity Report

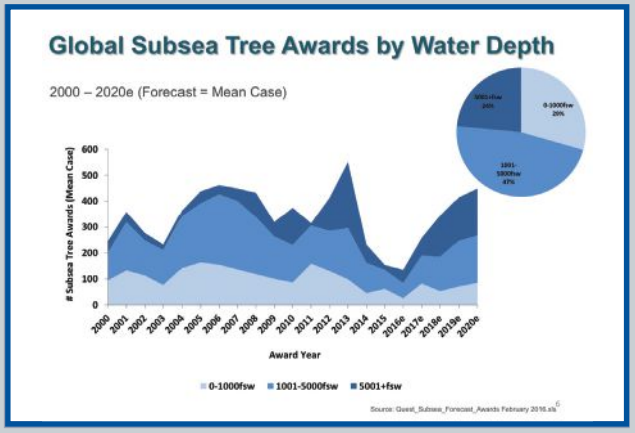












FOR MORE DETAILED INFORMATION
(281) 491-5900 - USA • 44 (0) 1737 371704 - London • e mail: corp@questoffshore.com
www.QuestOffshore.com • www.SubseaZone.com • www.FloatingProductionZone.com

Gulf of Mexico Data
Current Deepwater Activity

Operator	Area	Block	OCS Lease	Rig Name	Prospect Name	Water Depth (ft)
SHELL OFFSHORE INC.	WR	508	G17001	NOBLE JIM DAY	STONES	9,591
SHELL OFFSHORE INC.	AC	815	G19409	NOBLE DON TAYLOR	Silvertip	9,340
MARUBENI OIL & GAS USA INC	MC	305	G19935	ENSCO 8505	Aconcagua	7,096
UNION OIL COMPANY OF CALIFORNIA	WR	677	G21245	T.O. DISCOVERER CLEAR LEADER	Saint Malo	7,038
ANADARKO PETROLEUM CORPORATI	KC	875	G21447	NOBLE BOB DOUGLAS	LUCIUS	6,820
ANADARKO PETROLEUM CORPORATI	KC	875	G21447	* WIRELINE UNIT (LAF DIST)	LUCIUS	6,820
BP EXPLORATION & PRODUCTION INC	GC	743	G15607	SEADRILL WEST AURIGA	ATLANTIS(GC)	6,820
APACHE DEEPWATER LLC	AT	426	G18603	ENSCO 8503	BASS LITE	6,617
SHELL OFFSHORE INC.	MC	475	G35335	NOBLE GLOBETROTTER		6,590
BP EXPLORATION & PRODUCTION INC	MC	822	G14658	T.O. DEVELOPMENT DRILLER III	THUNDER HORSE SOUTH	6,263
BP EXPLORATION & PRODUCTION INC	MC	778	G14658	THUNDER HORSE PDQ	THUNDER HORSE NORT	6,036
ANADARKO PETROLEUM CORPORATI	WR	51	G31938	DIAMOND OCEAN BLACKHAWK	SHENANDOAH	5,847
BP EXPLORATION & PRODUCTION INC	MC	776	G09867	SEADRILL WEST VELA	THUNDER HORSE NORTH	5,636
COBALT INTERNATIONAL ENERGY LP	KC	129	G30924	ROWAN RELIANCE		5,519
FREEPORT MCMORAN OIL & GAS LLC	MC	127	G19925	NOBLE TOM MADDEN	KOQV	5,471
CONOCOPHILLIPS COMPANY	AC	475	G35137	MAERSK VALIANT		5,143
BP EXPLORATION & PRODUCTION INC	GC	825	G28100	ENSCO DS-3	MAD DOG PHASE	2 4,979
CHEVRON USA INC	KC	96	G33531	PACIFIC SANTA ANA	LUDLOW	4,838
NOBLE ENERGY INC	MC	338	G32316	ATWOOD ADVANTAGE		4,824
CHEVRON USA INC	GC	806	G31751	PACIFIC SHARAV		4,720
ANADARKO PETROLEUM CORPORATION	GC	726	G24179	* WIRELINE UNIT (HOUMA DIST)	TONGA	4,655
ANADARKO PETROLEUM CORPORATION	GC	726	G24179	ROWAN RESOLUTE	TONGA	4,655
BP EXPLORATION & PRODUCTION INC	GC	782	G15610	MAD DOG SPAR RIG	MAD DOG PHASE 2	4,428
HESS CORPORATION	MC	725	G22898	STENA FORTH	TUBULAR BELLS	4,311
BHP BILLITON PETROLEUM (GOM) INC	GC	654	G20084	T.O. DEEPWATER INVICTUS	SHENZI DEVELOPMENT P	4,300
CHEVRON USA INC	KC	102	G25782	T.O. DEEPWATER ASGARD	TIBER	4,262
ANADARKO PETROLEUM CORPORATION	GC	561	G16753	DIAMOND OCEAN BLACKHORNET	K2 (ENI)	4,144ON
ANADARKO PETROLEUM CORPORATION	GC	561	G16753	* WIRELINE UNIT (HOUMA DIST)	K2 (ENI)	4,144
CHEVRON USA INC	GC	596	G16759	T.O. DISCOVERER INSPIRATION	TAHITI NORTH	4,023
SHELL OFFSHORE INC.	MC	809	G09873	CAL-DIVE Q-4000	URSA	3,853
LLOG EXPLORATION OFFSHORE LLC	MC	895	G33764	SEADRILL WEST NEPTUNE		3,682
HESS CORPORATION	GC	512	G26315	DIAMOND OCEAN BLACKLION	STAMPEDE	3,577
SHELL OFFSHORE INC.	MC	807	G07963	OLYMPUS N88	MARS	3,040
SHELL OFFSHORE INC.	MC	807	G07963	H&P 201	MARS	2,945
SHELL OFFSHORE INC.	MC	807	G07957	ATWOOD CONDOR	MARS	2,901
SHELL OFFSHORE INC.	GB	426	G07498	* COIL TUBING UNIT (LAF DIST)	AUGER	2,862
SHELL OFFSHORE INC.	GB	426	G07498	* WIRELINE UNIT (LAF DIST)	AUGER	2,862
W & T ENERGY VI LLC	MC	243	G19931	* WIRELINE UNIT (N.O.DIST)	MATTERHORN	2,816
CHEVRON USA INC	VK	786	G10944	NABORS 87	PETRONIUS COMPLIANT	1,754
HESS CORPORATION	GB	215	G09216	NOBLE PAUL ROMANO	CONGER	1,453
HESS CORPORATION	GB	215	G09216	* COIL TUBING UNIT (LAF DIST)	CONGER	1,450
STONE ENERGY CORPORATION	VK	989	G09771	H&P 100	POMPANO I	1,290
WALTER OIL & GAS CORPORATION	EW	834	G27982	H&P 203	HUMMINGBIRD	1,183
ENVEN ENERGY VENTURES LLC	MC	194	G02643	* LIFT BOAT (NEW ORLEANS DIST)	COGNAC	1,024
ENVEN ENERGY VENTURES LLC	MC	194	G02638	NABORS S.D. XIV	COGNAC	1,024
FIELDWOOD SD OFFSHORE LLC	EB	160	G02648	* WIRELINE UNIT (L.J.DIST)	CERVEZA	940
EXXON MOBIL CORPORATION	SM	6636	P00188	* WIRELINE (GENERIC)		842
WHISTLER ENERGY II LLC	GC	18	G05809	NABORS MODS 201	BOXER	760
FIELDWOOD SD OFFSHORE LLC	EB	110	G02650	* NONE RIG PA OPERATION (LJ)	TEQUILA	660
FIELDWOOD SD OFFSHORE LLC	EB	110	G02650	* WIRELINE UNIT (L.J.DIST)	TEQUILA	660

Deepwater prospects with drilling and workover activity: 50

Current Deepwater Activity as of Tuesday, March 29, 2016

Activity by Water Depth

Water Depth (m)	Active Leases	Approved Applications	Active
0 to 200	1,224	36,299	2,223
201 to 400	83	1,129	21
401 to 800	177	902	10
801 to 1,000	246	579	9
1,000 & above	2,584	2,132	30

Rig Activity Report 24 March 2016

Location	Week of 02/19	+/-	Week Ago	+/-	Year Ago
Land	432	-14	446	-578	1010
Inland Waters	4	1	3	0	4
Offshore	28	1	27	-6	34
U.S. Total	464	-12	476	-584	1048
Gulf of Mexico	27	1	26	-6	33
Canada	55	-14	69	-65	120
N. America	519	-26	545	-649	1168

Activity by Water Depth Information current as of Tuesday, March 28, 2016.
Maximum number of rigs operating in the deepwater Gulf of Mexico. The rig unit includes platform rigs operating on deepwater production facilities in addition to the MODU's. The numbers do not distinguish between rigs drilling and those in service for completion and workover operations.

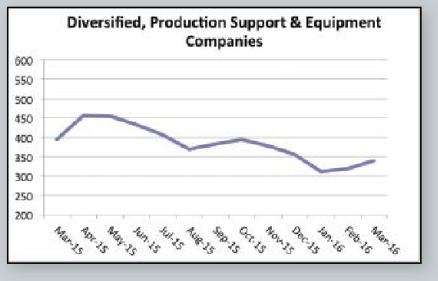
Information provided courtesy of the U.S. Bureau of Ocean Energy Management and Baker Hughes

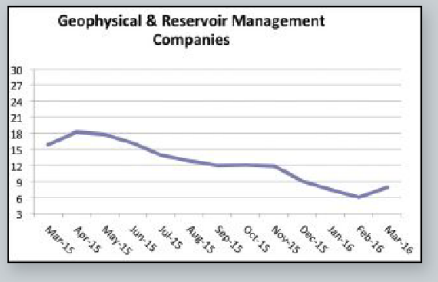
Monthly Stock Figures & Composite Index

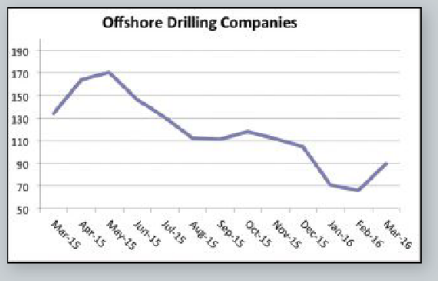
Industry Company Name	Symbol	Close(*Mid*) *March*	Close(*Mid*) *February*	Change	Change %	High	Low 52 week
Diversified, Production Support and Equipment Companies							
Baker Hughes, Inc.	BHI	43.34	39.78	3.56	8.9%	70.45	37.58
Cameron Intl. Corp.	CAM	65.57	64.36	1.21	1.9%	71.22	40.50
Drill-Quip, Inc.	DRQ	50.81	50.81	0.00	0.0%	81.78	48.88
Halliburton Company	HAL	34.64	29.11	5.53	19.0%	50.20	27.64
Tenaris SA	TS	23.44	20.85	2.59	12.4%	32.77	18.53
Newpark Resources, Inc.	NR	4.06	3.62	0.44	12.2%	10.85	3.35
Schlumberger Ltd.	SLB	71.94	70.31	1.63	2.3%	95.13	59.60
Superior Energy Services, Inc.	SPN	12.02	8.87	3.15	35.5%	26.95	8.25
Weatherford International, Inc.	WFT	6.78	6.47	0.31	4.8%	14.91	4.95
Deep Down, Inc.	DPDW	0.72	0.61	0.11	18.0%	0.88	0.37
FMC Technologies	FTI	26.27	23.12	3.15	13.6%	44.43	22.30
Total Diversified, Production, Support and Equipment.....		**339.59**	**317.91**	**21.68**	**6.8%**	**499.57**	**271.95**
Geophysical / Reservoir Management							
Dawson Geophysical Company	DWSN	4.07	2.95	1.12	38.0%	6.11	2.90
Mitcham Industries, Inc.	MIND	2.99	2.38	0.61	25.6%	5.46	2.24
Compagnie Gnrale de Gophysique-Veritas	CGV	0.83	0.68	0.15	22.1%	7.98	0.59
Total Geophysical / Reservoir Management..…….....		**7.89**	**6.01**	**1.88**	**31.3%**	**19.55**	**5.73**
Offshore Drilling Companies							
Atwood Oceanics, Inc.	ATW	9.07	5.63	3.44	61.1%	35.66	4.82
Diamond Offshore Drilling, Inc.	DO	21.54	16.92	4.62	27.3%	35.95	14.18
ENSCO International, Inc.	ESV	10.61	8.38	2.23	26.6%	28.40	7.25
Nabors Industries, Inc.	NBR	8.63	5.97	2.66	44.6%	16.99	4.93
Noble Drilling Corp.	NE	10.72	7.36	3.36	45.7%	18.58	6.66
Parker Drilling Company	PKD	1.95	1.11	0.84	75.7%	4.55	0.98
Rowan Companies, Inc.	RDC	16.17	11.65	4.52	38.8%	24.13	10.67
Transocean Offshore, Inc.	RIG	10.79	8.86	1.93	21.8%	21.90	7.67
Total Offshore Drilling..…….....		**89.48**	**65.88**	**23.60**	**35.8%**	**186.16**	**57.16**
Offshore Contractors, Services, and Support Companies							
Helix Energy Solutions Group, Inc.	HLX	4.58	2.63	1.95	74.1%	17.73	2.60
Gulf Island Fabrication	GIFI	8.15	8.87	-0.72	-8.1%	16.52	7.78
McDermott International, Inc.	MDR	3.79	2.38	1.41	59.2%	6.00	2.20
Oceaneering International	OII	30.86	27.12	3.74	13.8%	59.65	25.33
Subsea 7 SA	SUBCY.PK	7.07	5.8	1.27	21.9%	12.15	4.86
Technip ADS	TKPPY.PK	13.61	11.16	2.45	22.0%	18.15	9.69
Tetra Technologies, Inc.	TTI	6.25	4.90	1.35	27.6%	9.44	4.62
Total Offshore Contractors, Service, and Support..…….....		**74.31**	**62.86**	**11.45**	**18.2%**	**139.64**	**57.08**
Offshore Transportation and Boat Companies							
Seacor Holdings, Inc.	CKH	50.02	42.45	7.57	17.8%	78.95	41.24
Gulfmark Offshore, Inc.	GLF	6.22	3.07	3.15	102.6%	17.68	2.50
Bristow Group	BRS	17.25	12.76	4.49	35.2%	64.64	11.02
PHI, Inc.	PHII	18.01	15.53	2.48	16.0%	35.74	15.01
Tidewater, Inc.	TDW	7.00	4.67	2.33	49.9%	31.80	4.24
Trico Marine Services, Inc.	TRMAQ.PK	10.32	9.30	1.02	11.0%	14.35	9.06
Hornbeck Offshore	HOS	9.25	5.81	3.44	59.2%	25.22	5.58
Total Offshore Transportation and Boat ……..…….....		**118.07**	**93.59**	**24.48**	**26.2%**	**268.38**	**88.65**

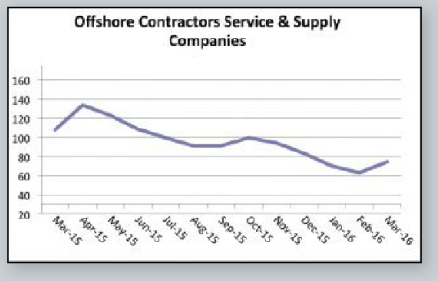
Monthly Stock Figures & Composite Index

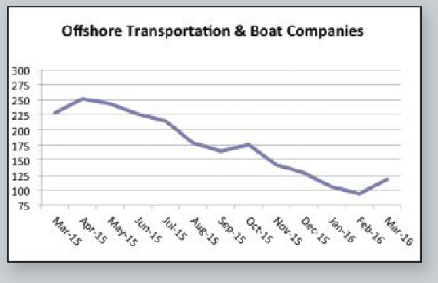
Industry	Close(*Mid*) *March*	Close(*Mid*) *February*	Change	Change %	High 52 week	Low
Total Diversified, Production, Support and Equipment	**339.59**	**317.91**	**21.68**	**6.8%**	**499.57**	**271.95**
Total Geophysical / Reservoir Management	**7.89**	**6.01**	**1.88**	**31.3%**	**19.55**	**5.73**
Total Offshore Drilling	**89.48**	**65.88**	**23.60**	**35.8%**	**186.16**	**57.16**
Total Offshore Contractors, Service and Support	**74.31**	**62.86**	**11.45**	**18.2%**	**139.64**	**57.08**
Total Offshore Transportation and Boat	**118.07**	**93.59**	**24.48**	**26.2%**	**268.38**	**88.65**
Total Offshore Source Index	**629.34**	**546.25**	**83.09**	**15.2%**	**1,113.30**	**480.57**

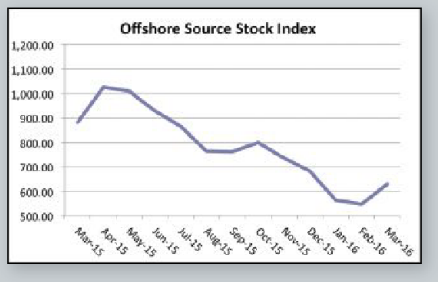










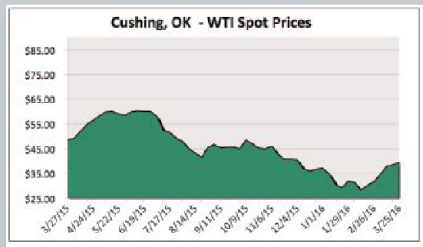


DISCLAIMER

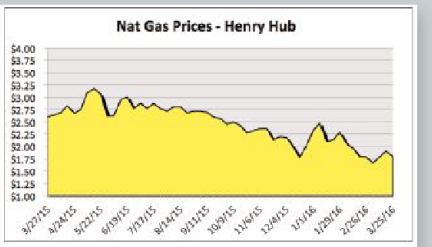
The information on this page is provided for information and comparison purposes only and should not be used to make financial and business decisions and is accurate to the best of our knowledge for the period indicated.

Oil & Gas Industry Trends

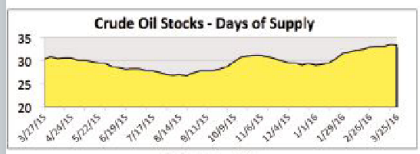
Monitoring the Pulse of the U.S. Offshore Oil & Gas Industry



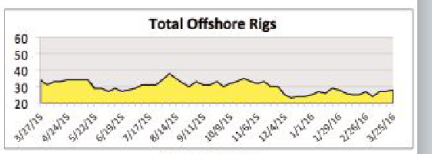
*Source - EIA



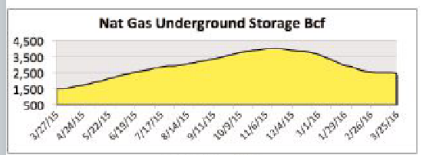
* NYMEX Close



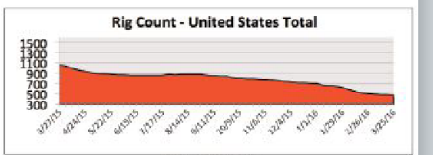
*Source - EIA



*Baker Hughes



*Source - EIA



*Baker Hughes

Positive trend, at least 3 weeks

Changing trend, less than 3 weeks

Negative trend, at least 3 weeks

SBG Systems completes the Apogee product line with two new inertial sensors in subsea enclosure

SBG Systems releases the Apogee-M and the Apogee-U, two new inertial sensors to complete the Apogee product line. The Apogee-M is a Motion Reference Unit (MRU), and the Apogee-U is an Inertial Navigation System. Both are made of titanium with a depth rating of 200 m.

Apogee Series is the most accurate inertial navigation systems (INS) based on the robust and cost-effective MEMS technology. One year after the successful release of the Apogee surface sensors (IP68 enclosure), SBG Systems completes the product line with a Motion Reference Unit (MRU) and an Inertial Navigation System (INS) with a titanium subsea enclosure (200-m depth rating).

Apogee integrates the very latest generation of MEMS sensors to reach a high degree of precision -0.008° in roll and pitch in real-time–while delivering a robust and accurate heading thanks to the continuous fusion of GNSS and IMU data. Made of titanium, Apogee-M and Apogee-U are ideal to mount close to the sonar head for hydrographic tasks from shallow to deep water.

The Apogee provides a real-time heave accurate to 5 cm, which automatically detects the wave frequency and constantly adjusts to it. When wave frequency is erratic or in case of long period swell, the delayed heave feature can save the day by allowing survey in rough conditions. This algorithm allows a more extensive calculation, resulting in a heave accurate to 2 cm displayed in real-time with a little delay.

Apogee sensors can be paired with any type of survey-grade GNSS receiver or by the one offered by SBG Systems. The SplitBox GNSS integrates the latest tri-frequency GNSS receiver to offer several positioning features such as RTK, Marinestar, OmniSTAR, Veripos, and TerraStar corrections.

Configuration is made easy throughout the intuitive embedded web interface where all parameters can be quickly displayed and adjusted. The new 3D View helps the user to check the mechanical installation, especially sensor and antennas position, alignments, and lever arms. The user can then connect the Apogee to the main hydrographic software such as Hypack, QINSy or Teledyne PDS2000 thanks to available drivers.

The MEMS technology is renowned for being highly robust and low-maintenance while the subsea enclosure is made in titanium. SBG Systems continuously make its systems evolve with new firmware upgrades that are available during the whole life of the product without extra cost.

Apogee-M and Apogee-U are ITAR free. All models are available for order. Ordering information and delivery time are available from SBG Systems representatives and authorized SBG Systems dealers.

For more information, visit www.sbg-systems.com.

EdgeTech releases the new 2300 combined tri-frequency side-sonar, sub-bottom profiling & bathymetry system

EdgeTech, the leader in high-resolution sonar imaging systems and underwater technology, has just announced the release of a new towed sonar system providing tri-frequency side-scan sonar, enhanced sub-bottom profiling and MPES bathymetry. Celebrating 50 years in underwater technology, the company is excited to announce the new 2300 system. The unit combines EdgeTech's highly successful line of side-scan sonars, sub-bottom profilers and MPES bathymetry into one fully integrated system.

The new 2300 system is ideal for deep water combined sonar operations and provides many enhancements to traditional systems. Utilizing EdgeTech's proven Full Spectrum® CHIRP technology to provide crisp, high-resolution imagery, surveyors can choose to operate any two frequencies simultaneously from the versatile tri-frequency system. Sub-bottom profiler capabilities have been expanded on the new 2300 and includes the ability to incorporate up to four low-frequency transducers as part of EdgeTech's DW-106 (1-10kHz) deep penetration system. Coupled with that is the ability to utilize a large PVDF hydrophone array providing better sub-bottom receive sensitivity and directivity. EdgeTech's MPES bathymetry is also available on the platform. The Multi Phase Echo Sounder (MPES) produces real-time, high-resolution, three-dimensional (3D) maps of the seafloor while providing co-registered simultaneous dual frequency side-scan imagery. Additional features include a remote head USBL beacon, optional Nexus Multiplexer, a rear magnetometer shackle mount, and adjustable trim panels.

For more information, visit www.edgetech.com.

New optical modem for subsea communication

Aquatec Group has announced the launch of the AQUAmodem Op1L, a new lightweight version of their standard optical modem, designed for use by divers and on small ROVs. Using established technology, the optical modem allows short range interrogation, commanding and data download from underwater equipment. The new instrument is three times lighter than the original optical modem, making it ideal for applications in oceanographic, environmental, and coastal research, as well as offshore energy industries.

The AQUAmodem Op1L is compatible with any instrument with an RS232 serial interface, including Aquatec's AQUAlogger and HYDROlog ranges, and can replace costly ROV mateable connectors or cables, resulting in economical operations and greater flexibility. The latest version is also interchangeable with Aquatec's original optical modem, and can reduce expenditure costs when combined with existing systems.

There is a growing demand for smaller ROVs for shallow water applications, which can be easily deployed from a small boat or dockside. The compact, lightweight design makes the AQUAmodem Op1L ideal for deployment on these ROVs to depths of 500 m.

For more information, visit www.aquatecgroup.com.

New Kongsberg position reference system integrates all available GNSS services

Kongsberg Maritime has expanded its established satellite position reference system portfolio with the introduction of a new system that integrates all available Global Navigation Satellite Systems (GNSS) and all possible correction services. The new DPS 432 combines full decimetre accuracy with high integrity and availability of GNSS data, supporting the safety and efficiency of offshore operations that rely on advanced dynamic positioning (DP) systems.

DPS 432 integrates signals from GPS, GLONASS, BeiDou and Galileo, and regional correction signals including SBAS (e.g., WAAS, EGNOS, MSAS, GAGAN), in addition to the new G4 services from Fugro, to ensure high flexibility for DP operations globally. Because DPS 432 exploits available combinations of GNSS signals, it is ideally suited to complex operations in challenging environments. The system increases satellite availability, improves integrity monitoring and enables more precision under challenging signal tracking conditions.

The new DPS 432 will be a part of the well-established Kongsberg DPS range of solutions, a portfolio of products that meets all requirements for operations in any geographical region.

The DPS 432 features the sophisticated DPS NAV Engine® used in all DPS solutions, which runs critical computations independent from the DPS HMI (operator interface) to ensure continuous and reliable operation. The DPS NAV Engine® runs in a safe mode, protected from unintended user operations, while several DPS HMIs can be connected to the same DPS NAV Engine® in a networked architecture.

The system can integrate multiple layers of information, giving the DP operator unmatched opportunities for a customised visual presentation, including electronic chart, seabed maps, well head positions, static targets and AIS target information.

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

TE Connectivity gains DNV GL approval for pressure sensors

TE Connectivity announces that several models of its pressure sensors have received DNV GL-type approval to complement its established ABS certification in addressing marine and offshore applications. Proof of high quality and safety standards, DNV GL approval confirms that TE Connectivity pressure sensors are compliant to their manufacturing rules with suitable facilities for product manufacturing, testing and inspection; methods for constant monitoring of product quality; and qualified manufacturing personnel.

ABS and DNV GL-approved pressure sensors offer distinct advantages and applications for ships, barges, offshore oil platforms and desalination. Pressure transducers are approved for gauge,

absolute and differential pressure measurement applications in hazardous and non-hazardous environments. Sensors can be constructed with materials including 316L stainless steel and nickel alloys; flush diaphragms are available.

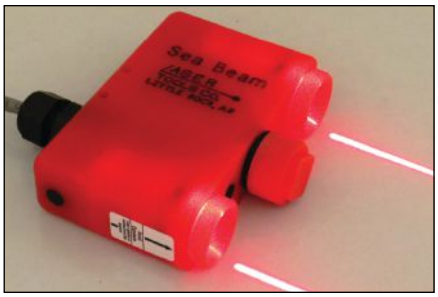
For more information, visit www.astsensors.com.

New underwater laser

Laser Tools Co., Inc. has developed a new laser system called the SB10 Sea Beam™ that assists in size measurements at a distance that's certified water proof to over 1,000 ft. This system is used to scale unusual objects, fish, reefs, artificial structures and mechanical fixtures at depths where divers can't explore or the cost is too great. The SB10 Sea Beam™ Laser Scaler shoots two laser beams 75 mm apart that the ROV views by camera. The laser dots or lines are measured using video capture techniques and the range and size of the target is analyzed.

The SB10 Sea Beam™ is only 2.5 in. long and 4 in. wide, mounts directly to an ROV, and weighs less than 90 mg when immersed. It includes a water proof battery compartment that allows it to be completely portable so that it can be used with all ROVs, drones and submersible vehicles with or without external power. The power consumption is less than a ½ watt and the front lens caps glow when the lasers are on.

For more information, visit www.lasertoolsco.com.



Sonardyne debuts expanded line-up of subsea vehicle navigation technologies

Subsea technology company Sonardyne International Ltd. debuted its expanded line-up of ROV and AUV navigation solutions during the Oceanology International exhibition and conference in London.

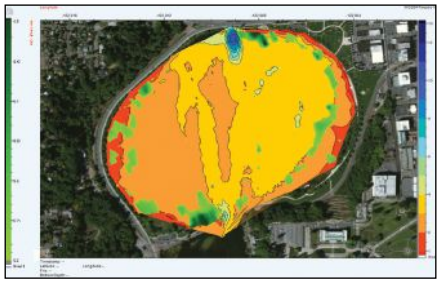
New additions to the company's Lodestar AHRS and SPRINT INS product lines mean that there is now a model to suit all underwater vehicle applications and budgets. As all versions utilize the same small, lightweight subsea housing; users can now switch capability without the need to fit different hardware–saving both vehicle payload space and operational expenditure. The company also launched one of the smallest combined INS and DVL instruments on the market. Being manufactured in the UK, in one facility, export procedures are considerably simplified.

Saving time, lowering costs and reducing users' risk was a recurring theme of Sonardyne's participation at this year's event. The 6G family of multi-functional transponders continues to grow with the long-life Mega, ultra-small Nano and intelligent SMART, all making their Oceanology debut.

For more information, visit www.sonardyne.com.

BioSonics major software release for aquatic habitat mapping

BioSonics recently announced the release of Visual Habitat 2.0 (VH2), specialized software for the assessment and mapping of aquatic habitat features including seagrass, bathymetry, and various substrate types. This new upgraded version includes tools to generate full-color, interpolated maps with bathymetric contours. VH2 allows



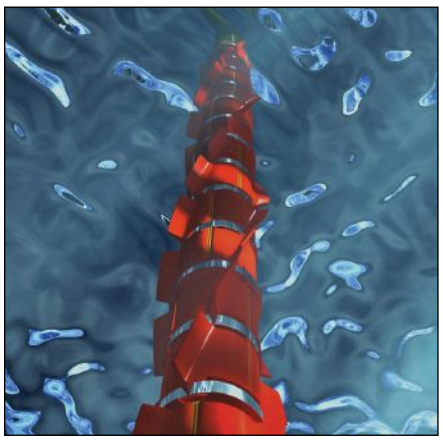
users to interpolate and form gridded data using three different methods; triangulated linear interpolation, inverse distance weighting, and ordinary kriging. Users can print maps directly or export their results as KML, shapefile, or image files for use in Google Earth or ArcGIS. VH2 also automatically computes grid statistics including the area, water volume, and plant and volume. Existing users can download VH2 at no cost and a demo version is available for new users.

With the release of VH2, BioSonics is once again pioneering creative solutions using their quality scientific echosounders and advanced software. BioSonics president Tim Acker explained, "The release of VH2 software provides the missing link to the complete solution for visualizing aquatic ecosystems and easily monitoring changes over time. The mapping imagery instantly generated with VH2 is quite compelling."

For more information, visit www.biosonicsinc.com.

Trelleborg launches innovative subsea vibration suppression system

Trelleborg's offshore operation has launched an innovative new vortex induced vibration (VIV) suppression system. The Tri-Strake™ Combi, developed to complement the high performance S-Lay capable Tri-Strake™ Stinger system and the cost-effective Tri-Strake™ Lite system, not only eases



installation but provides added resilience and load-bearing capacity, including stinger installation loads.

Jonathan Fox, senior product development engineer for Trelleborg's offshore operation, says: "Pipelines unsupported over free spans, such as steel catenary risers and rigid steel flowlines, are prone to VIV fatigue, which can lead to serious issues such as pipe girth weld failure or premature pipe malfunction. To combat this, the Tri-Strake™ Combi comprises interlocking moldings, with three-start helical strakes."

Trelleborg utilized its vast offshore and VIV knowledge in the design of the Tri-Strake™ Combi and carried out extensive computational analysis and physical testing. The system's lightweight construction provides operators with a simple and rapid assembly method. While the customized high endurance material selected for the system not only provides added resilience and load bearing capacity, it also eases installation.

Each section of the system has been designed as a lightweight hinged component, ensuring it is quick and easy to pre-install onshore or install offshore. The unique, modular design enables the system to be stacked during shipping, ensuring more efficient and cost-effective transportation.

For more information, visit www.trelleborg.com/offshore.

Tritech AquaTrak™ CVL supplied into Asia-Pacific

Sea and Land Technologies (SALT) has purchased the Tritech AquaTrak™ Correlation Velocity Log (CVL) to enhance their rental pool.

The AquaTrak™ CVL offers the benefits of a 300-kHz and the accuracy of a 1,200 kHz and is available with the same connector and flange interface as found on most 600 kHz DVLs, therefore, it is a complete drop-in replacement for industry-standard DVLs. The single vertical beam permits installation of the AquaTrak™ CVL safely above the bottom of the ROV for protection to provide the same high level of performance, irrespective of altitude and with a range of 0.5 to 300 m.

AquaTrak™ uses an acoustic cross-correlation technique to calculate the distance moved between two very closely spaced pulses which transmit from a single transmitter. This innovative technique enables AquaTrak™ to run effectively at low speeds, a common operation when performing subsea operations with a Work Class ROV.

New generation multibeam trawl sonar delivers real-time refresh rate

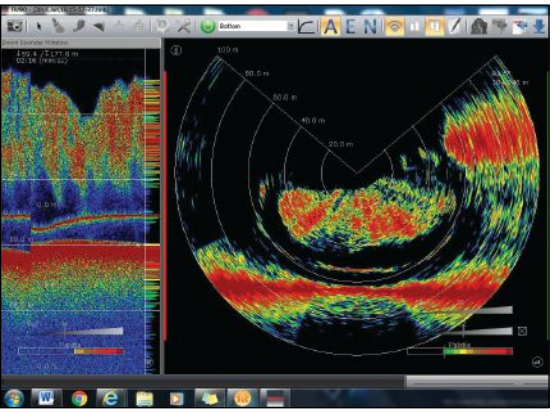
The new Simrad FM90 Multibeam Trawl Sonar System is now available. With a class-leading near real-time image refresh rate, the FM90 provides a detailed live representation of the trawl, enabling the skipper and crew to maximize catch and reduce the potential for expensive damage by better trawl positioning.

The Simrad FM90 is a "third wire" system, which builds on the already established market-leading trawl sonar system, the Simrad FS70. In addition to the increased one image per second refresh rate, it features a completely redesigned sonar unit. The FM90 Deployment Pack has a yellow top and black bottom to confirm correct orientation prior to launching and to assist in visual sighting during recovery. It also has improved hand holds to assist handling even with gloves on. The strain relief can be accessed using standard tools without opening the entire Deployment Pack, and the unit is quick filling and draining.

Based on Kongsberg Maritime subsidiary Kongsberg Mesotech's highly regarded multibeam sonar technology, the FM90 delivers a far superior net outline image compared to one generated by a scanning sonar. Also, unlike, scanning sonar, the FM90 is a solid-state sonar system with no moving parts, which eliminates potential failure points and increases reliability and availability during trawl operations.

Significantly expanding the data generated by the system, the FM90 deployment pack also communicates with Simrad PI/PX 40 kHz sensors (up to a maximum of six measurements) by means of hydroacoustic links. Supported sensors include catch, depth, temp, bottom contact, rip, door spread, door depth, net geometry, pitch/roll, and height. Existing 70 kHz sensors can be converted to 40 kHz sensors, ensuring a cost-effective upgrade path to the latest generation system. The FM90 Trawl Multibeam System also includes downwards and upwards looking 200 kHz echo sounders.

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



Okeanus introduces the FlexSEA modular flotation system

Okeanus Science and Technology has introduced the FlexSEA Modular Flotation System (FlexSEA) as part of its portfolio of flotation equipment available for rent. Okeanus will be the exclusive provider of FlexSEA, engineered by SeaRobotics Corporation.

FlexSEA modules are configurable to supply different amounts of buoyancy for a variety of payload sizes and weight conditions. The mounting arrangements are designed so that standard ROV manipulators can be used to remove, untether or detach some or all of the temporary flotation modules after use; this allows for recovery and re-use. The modules can be of equal size, or modules of different sizes can be configured to be attachable and detachable to form arrays. The arrays provide buoyancy to a wide variety of subsea modules, tools, instrumentation packages, vehicles and submersibles. Depth ratings of 2,000 to 4,000 m of seawater are available.

For more information, visit www.okeanus.com.

WASSP S3 multibeam sounder for survey and mapping

Multibeam sounder manufacturer WASSP Ltd of Auckland, New Zealand is pleased to introduce the first WASSP S3.

S3 is purpose built for the survey and mapping market. The product is shipped with WASSP software for

2D/3D mapping and Polar view and features the following:

- New DRX digital/wideband hardware platform;
- Functionality additions via licensing;
- Touch screen compatible software;
- Simplified installation and commissioning;
- New flexible transducer cable for portability, making it easier to install in a pelican case; and
- Turnkey packages available that include position/heading and motion sensors.

The DRX uses wide-band technology and is rated to IP53 running on 9-32 volts, making it ideal for the harsh marine environment that many WASSP customers operate in.

The starting price for the S3 is US$14,995 which includes WASSP software, transducer and DRX, which handles the signal processing and sensor interface and can be licensed to interface with third-party software suites including HYPACK with others to follow.

The S3 was officially launched at the Oceanology International exhibition in London.

For more information, visit www.wassp.com.

FarSounder launches major software update for navigation sonars: SonaSoft 3.2

FarSounder is pleased to announce the release of SonaSoft™ version 3.2, a major upgrade to the software that powers the FarSounder-500, FarSounder-1000, and FS-3DT sonars. This upgrade includes significant processing, user interface, and display improvements. Major upgrade features include:

- True Target Motion™;
- Chart viewer improvements;
- Sonar status indicator; and
- Improved color scale display.

"Our development team continues to set the standard for 3D Forward-Looking Sonars," says Matthew Zimmerman, FarSounder's vice president of engineering. "Our focus on improving navigational safety is evident to our customers. Our commitment to vessel safety continues with our latest SonaSoft 3.2 release, making it even easier for vessel operators to understand what is underwater, ahead of their vessels in polar regions, tropical locals and everywhere in between." Videos and screenshots of the new software are available on the company's website.

The software update is compatible with FarSounder's existing products and integrates directly with select ECDIS and integrated bridge systems including the Wärtsilä SAM Electronics NACOS Platinum and Transas Navisailor 4000. The upgrade is available to all current and new navigation sonar customers.

For more information, visit www.farsounder.com.

Survey Engine V5.1 released

Coda Octopus is pleased to announce the release of Survey Engine Version 5.1.

This version allows faster side-scan TVG editing by introducing a new feature to preview results in the Survey Engine mosaic window. It also includes general maintenance and bug fixes.

Version 5.1 is available to clients with active TEAM subscriptions covering the Survey Engine V5 release.

Enquiries for purchase or upgrade to this latest version of the Survey Engine suite can be made to our sales team at sales@codaoctopus.com

We welcome user feedback on our products and our Technical Support team are available 24x7x365 to assist and respond to client requirements.

For more information, visit www.codaoctopus.com.

Teledyne Marine new product highlights at OI 2016

Teledyne Marine launched a substantial number of new products within its five core technology segments: imaging, instruments, interconnect, seismic and vehicles at Oceanology International 2016. Many of the products were shown live at the show during dock-side and on-water demos and/or highlighted at the technology presentations.

The Bowtech Explorer-Extreme compact ultra-low light camera was one product highlighted. The Explorer-Extreme camera has been redesigned to be much smaller and lighter. The camera is ultra low light sensitive 1 x 10-5 lux and 6,000 m rated Titanium housing.

The new SeaBat T50-P multibeam echosounder from Teledyne RESON has been very well received by the market due to its clean and ultra-high resolution data, its portability and its wider swath coverage. The SeaBat T50-P Full Rate Dual Head configuration will be shown for the first time at OI 2016.

Teledyne Benthos is upgrading its

family of acoustic releases with the launch of its new UTS-9400 Universal Topside Unit, which offers user-friendly touch-screen operation, universal command capability, and advanced ambient acoustic noise analysis as well as its new R2K Midwater Acoustic Release, which delivers a new advanced electronics architecture with battery voltage indication, tilt measurement in 1% increments, and more.

The Oceanscience rapidCASTTM underway profiling system provides near real-time SV data to surveyors, while eliminating survey downtime and minimizing bathymetry data uncertainty. The automated profiler deliver sound velocity casts to 500 m at 8 kts speed through water while underway, without the requirement of an operator on deck.

Teledyne TSS Saturn-DVL. Showcasing the capabilities of Teledyne Marine, Saturn-DVL is TsSS' new fibre optic gyro device provides an integrated navigation solution for subsea vehicles. It can provide a wealth of navigation and inertial measurements from its durable yet compact housing. Soon to be available in 0.1°, 0.3°, and 0.5° heading accuracies and with a 600 kHz or 300 kHz DVL, the unit will be depth rated to 4,000 m as standard.

The Oceanscience Z-Boat/Z-boat 1800 RP delivers unmatched value and convenience for hydrographic surveyors conducting shallow water inshore bathymetric surveys by removing the expense of mobilizing manned boats and the danger of placing technicians in hazardous locations. Simply launch the two-man portable Z-Boat and start surveying immediately. The Z-Boats echosounder, GPS and radio modem allow the operator to track the boat in real time from a shore laptop. The new Z-Boat 1800 RP has a ruggedized IP67 rated hull design and offers an interchangable sensor well, which allows for the easy integration of an array of surveying sensors.

For more information, visit www.teledynemarine.com/oi16.

Portable, wire-free rear-view vision system for marine applications

Hyndsight Vision Systems has recently announced a transformative new rear-view camera and monitor system specifically designed for the boating industry. Hyndsight's

Journey is a totally portable, wire-free rear-view system that can be mounted within seconds on any type of power or sail boat, providing real-time video as a way to maintain safety on the water. Journey is designed for the harsh boating environment and is rugged, weather resistant and provides a video stream through a direct connection (camera to monitor), offering the boat owner a clear image that can transmit up to one-third of a mile with direct line of sight. With a sun light readable screen, both the camera and monitor are submersible and buoyant and fit neatly, along with custom mountable accessories, into a rugged carrying case.

For more information, visit www.hyndsightvision.com.

Novacavi reports engagement in pilot project for ENI

Novacavi is pleased to announce its engagement in a pilot project for ENI platforms subsidence monitoring in Adriatic Sea.

Novacavi has been called in to provide a specially designed custom pressure resistant cable for a new submarine hydraulic digital profile meter to be laid on the seabed close to a gas extracting platform. Installation of this monitoring system may reach a depth of 100 m in order to survey and take permanent readings of the subsidence cone caused by gas extraction.

Novacavi has conceived and supplied a special cable for pressure transducer power and signal transmission with high reliability and roughness considering hostile environmental conditions as well as stress due to transport and installation.

For more information, visit www.novacavi.it.

Miniature high resolution camera from Teledyne

Teledyne Bowtech is delighted to release the Divecam-720. This camera is smaller, lighter and more robust than it's predecessor the Divecam-650C.

The Teledyne Bowtech Divecam-720 miniature high resolution underwater CCD camera, provides a low cost solution to shallow underwater viewing and observation to either 100 or 300 m.

The camera has a high quality hard anodised Aluminium housing fitted with a fixed focus wide angle lens giving a diagonal field of view of 65° in water.

With an acrylic window, the camera is rated to 100 m operating depth, the deeper 300 m version has a Sapphire glass window.

The miniature, high quality Sony 1/3" CCD sensor offers high resolution and low light level sensitivity, achieved by using 10 bit digital processing. It is the ideal camera for underwater viewing tasks.

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

Egil Haugsdal follows Geir Håøy as president of Kongsberg Maritime. Haugsdal holds extensive leadership experience from Kongsberg, and currently heads Kongsberg oil & gas technologies. He has previous experience from Kongsberg as executive vice president of business development and as president of Kongsberg protech systems.


Haugsdal

Mr. Leif Kristian Weum has been appointed to the position of Managing Director of the Kongsberg Maritime Sales and Service office in Athens, Greece. Kongsberg Maritime Hellas SA is a key Sales & Customer Support office established to serve the significant number of Greek shipping companies, located in the Athens area.

Phoenix International Holdings, Inc. is pleased to announce the hiring of **Jack Herbert** as commercial operations sales manager in the Largo, Maryland office. His responsibilities include executing Phoenix commercial (AUV, ROV, and engineering) sales objectives, increasing market share, and leading an aggressive commercial marketing and sales program.

HTL Australasia, part of the HTL Group, have recently appointed **Frank Windley** and **Steven Hughes** as territory sales managers to serve the geographical areas of Queensland, New South Wales, Western Australia and the Northern Territory with their extensive product and service portfolio.

Chelsea strengthens their sales team with the appointment of **Stephanie Lavelle** as maritime sales manager and **Loren Hiller** as marine sales manager. Stephanie joins the team with over 6 years' experience as a marine biologist and Loren has a BSc (Hons) in marine biology from the University of Portsmouth.

Seatronics Ltd, an Acteon company, has announced the recruitment of **Janelle Pence** as vice president for the USA region. She will be responsible for managing and developing Seatronics' business with a particular focus on developing long-term partnerships with the ROV and survey community in the Gulf of Mexico. Pence has more than 14 years of experience in the offshore oil and gas industry, with a substantial focus on subsea development.


Pence

UTEC Survey, an Acteon company, announce a key appointment to head up its new branch office in Abu Dhabi as it seeks to broaden support to its growing client base in the Middle East region. **Noel Cowley**, with the UTEC group since 2007 in various operational and senior management positions, will head up the Abu Dhabi office as general manager. UTEC is currently supporting several high-profile projects in the Middle East region.

Aquatic Engineering & Construction Ltd, an Acteon company, has expanded its team based in Houston. **Bob Terrell** joined Aquatic as regional manager, while **Andrew Blaquiere** has moved permanently from the Acteon group to Aquatic as proposals and project engineer. Both will focus on growing Aquatic's business in the Americas.

ABS has centralized its global marine strategic planning, client development, and product and service offerings to deliver enhanced classification services and joint technical projects. Effective 15 February 2016, **Dr. Kirsi Tikka** is promoted to the new role of executive vice president – global marine. She will continue to be based in London.

MacArtney continues to expand its business portfolio through a new partnership with **dotOcean** for North American markets. The agreement consolidates MacArtney's strong position in key markets and provides customer access to the extensive range of dotOcean sediment and soil measurement products.

Hydrographic survey single beam echo sounder manufacturer **CEE HydroSystems**, with offices in Sydney, Australia and San Diego, USA has entered into a new 2016 distributor agreement with marine and land survey specialist **Geometius b.v.** As a Trimble dealer, Geometius is now able to offer CEE HydroSystems' survey-grade echo sounders along with their positioning solutions.

James Fisher Offshore, part of James Fisher and Sons plc, announces the signing of a cooperation agreement with **Aquatic Engineering & Construction Ltd.**, an Acteon company. Their combined capabilities and expertise allows them to deliver fully integrated back-deck solutions to offshore operators globally.

RINA, a world leader in marine services such as classification and certification, recently opened a new office in the heart of HafenCity, in Hamburg. Led by Massimo Volta, general manager Europe, RINA Services, the new office will continue to service foreign clients and use the expansion to support its ever-growing portfolio of German and North European clients.

SeaTrepid International LLC announced that it is forming a new division, **SeaTrepid DeepSea** thus expanding its service offerings to include AUV mapping operations. **Jake Klara** was appointed as commercial manager of SeaTrepid DeepSea and **Jennifer White** as marketing manager.

Kongsberg Maritime has established a new country office in the Republic of Panama. Opened in January 2016 and situated in the 'Canal Zone' close to Panama City, Kongsberg Maritime Panama will service merchant fleet customers transiting the Canal and the extensive tug sector in the region, in addition to providing support for ongoing or planned land reclamation dredging and new port and terminal construction projects.

The new Hydrex office in Rotterdam has officially opened as of 1 March. Its purpose is to improve the delivery of services and underwater expertise to the maritime industry of Rotterdam. To enable a fast mobilization throughout the entire Rotterdam port without delaying a ship's commercials operations, Hydrex dive support vessels will be stationed in Rotterdam. These workboats are fully equipped with hydraulic cranes, winches, a dive spread and control room.

Western Advance Pty. Ltd., the exclusive distributor for Applied Acoustic Engineering (AAE) in Australia, has recently completed a contract for the supply of one of AAE's Nexus USBL systems to Neptune Marine Services headquartered in Perth, WA. The provision of this system is notable as it marks the 450th USBL system that AAE has supplied to the subsea industry, further demonstrating the company's strong position in this field.

Subsea technology company **Sonardyne International Ltd.**, has announced that it is making available to hire its new deep water hydrostatic pressure testing chamber located in Yateley, 40 mi southwest of London. Third party companies and organizations can test to water depths up to 6,300 m (20,670 ft).

DeepSea Power & Light has redesigned its website at www.deepsea.com.

CALENDAR & EVENTS

April 11-13, 2016
SPE HSSE-SR
Stavanger, Norway
www.spe.org/events/hse/2016

April 18-21, 2016
ONR/MTS Buoy Workshop 2016
Woods Hole, MA
www.whoi.edu/buoyworkshop/2016

April 18-21, 2016
SubOptic
Dubai, UAE
www.suboptic2016.com

April 25-27, 2016
Waterpower Week in Washington
Washington, D.C
www.nationalhydroconference.com.

April 26-28, 2016
Next Gen Marine Power & Propulsion
Southampton, UK
www.hybridmarine-power.com

May 2-5, 2016
AUVSI - XPonential
New Orleans, LA
www.xponential.org

May 2-5, 2016
OTC
Houston, TX
www.otcnet.org

May 16-19, 2016
Canadian Hydrographic Conference
Halifax, Nova Scotia
www.chc2016.ca

May 25-26, 2016
Deepwater Decommissioning Workshop
Houston, TX
decommissioninggom.offsnetevents.com

June 1-3, 2016
UDT
Oslo, Norway
www.udt-global.com

June 7-9, 2016
Capitol Hill Ocean Week
Washington, D.C.
nmsfocean.org/capitol-hill-ocean-week

June 12-15, 2016
PORTS 2016
New Orleans, LA
www.portsconference.org

June 14-16, 2016
SeaWork International
Southampton, UK
www.seawork.com

June 21-23, 2016
Clean Pacific
Seattle, WA
www.cleanpacific.org

June 21-23, 2016
MAST
Amsterdam, The Netherlands
www.mastconfex.com

July 30 - Agust 3, 2016
IMCC
St. Johns, Newfoundland
conbio.org/mini-sites/imcc-2016

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

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

OCEAN NEWS & TECHNOLOGY

www.oceannews.com 35 YEARS

JANUARY
Editorial: Underwater Navigation; Manned Submersibles
Distribution: Underwater Intervention; GOM Oil Spill & Ecosystem
Product & Services Focus: Multibeam & Side Scan Sonars; Research & Development Services

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

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

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

MAY
Editorial: UW Imaging & Processing; Marine Salvage/UW Archeology
Special Focus Section: *Executive Profiles*
Distribution: UDT (Norway) Seawork International
Product & Services Focus: Magnetometers; Water Dredges & Airlifts; Diving Services

JUNE
Editorial: Autonomous Unmanned Vehicles; Defense & Naval Systems;
Special Focus Section: *New Product Profiles*
Distribution: Clean Pacific; MAST
Product & Services Focus: Tracking & Positioning Systems; Seismic Monitoring; Equipment Leasing/Rental Services

JULY
Editorial: Ocean Engineering; Marine Construction
Special Focus Section: *Company History Profiles - Then and Now*
Distribution: OMICS
Product & Services Focus: Navigation, Mapping & Signal Processing; Data Processing Services

AUGUST
Editorial: Workclass ROVs; Deepwater Pipeline/Repair/Maintenance
Distribution:
Product & Services Focus: Cameras, Lights & Imaging Sonars; Oil Spill Clean-Up Services

SEPTEMBER
Editorial: Ocean Observing Systems; Subsea Telecom; Offshore Wind Installation & Maintenance
Distribution: AWEA Offshore Windpower; Oceans '16 MTS/IEEE Monterey; Teledyne Marine Technology Workshop: EWEA Annual
Product & Services Focus: Water Sampling Equipment; Cable Installation Services

OCTOBER
Editorial: Offshore Communications; Subsea Inspection, Monitoring, Repair and Maintenance
Distribution: OilComm; Offshore Energy; Clean Gulf
Product & Services Focus: Acoustic Modems, Releases & Transponders; Marine Communications; Survey & Exploration Services

NOVEMBER
Editorial: Offshore Support, Supply & Emergency Vessels; Deep Sea Mining
Distribution: International Workboat
Product & Services Focus: Ship Protection Systems; Cranes, Winches & Control Systems; Vessel Charter/Leasing Services

DECEMBER
Editorial: Light Workclass ROVs; Commercial Diving; Year in Review; UI Pre-show issue
Distribution: Offshore & Deep Sea Mining
Product & Services Focus: Diving Equipment & Services; Buoyancy Materials; Construction & Repair Services

Serving the Ocean and Offshore industry, Ocean News & Technology has a long, rich history as the primary information resource executives around the world rely on.

For more than 30 years ON&T has provided news, forecasts, and authoritative feature articles designed to keep industry leaders informed and focused on the future of the industry.

Industry's Choice creates Advertiser's Advantage

ONT's unique comprehensive format and cutting-edge distribution methods demonstrate the publication's standing as the #1 choice for industry news, making it the best ROI choice for advertisers!

Print – Still the preferred format in the industry, ON&T print copies are distributed worldwide.

Digital – No matter where they are in the world, subscribers also have the benefit of the digital edition, complete with linked websites in ads, articles and releases.

APP – ON&T's free APP is utilized thousands of times each month, creating an instant path from ads to websites 24/7.

VIDEO-IN-PRINT – Embed video in your ad! Viewed by digital and APP readers, your VIP can be informational, inspirational, and/or entertaining.

Ocean Industry Directory – Each issue features a directory providing your product, services and contact information to buyers around the world. Listings are available in print and digital editions and can be updated throughout the year.

Archives – Available through digital and APP, readers can research historical data, articles, and references with the aid of Keyword Search.

TSC

ADVERTISING

North America
Lisa Chilik
574-261-4215
Lchilik@tscpublishing.com

International
Mimi Shipman
+44 (0) 777 601 7564
mshipman@tscpublishing.com

Editorial
Ladd Borne
772-285-8308
lborne@tscpublishing.com

OCEAN NEWS & TECHNOLOGY
www.oceannews.com
35 YEARS

OCEAN INDUSTRY *MONTHLY* DIRECTORY

CURENT LISTINGS IN EVERY ISSUE

Ocean Industry Directory is featured in every issue of Ocean News, and the industry knows this is the one source they can count on to provide them with up to date listing information for the products and companies they're looking for.

Don't miss the opportunity to provide your next prospect with the information he needs to contact *you*. Place your listing in the Ocean News & Technology Ocean Industry Directory today! Listing can be changed at any time. Add your QR code to direct print readers to your website.

ANNOUNCING PRODUCT & SERVICE DIRECTORY:

Produced annually in digital format, this new comprehensive directory distinguishes between manufacturers, sellers, and rental agents. Published in early 2016, be sure to include your company by sending listing information today. www.oceannews.com/product-service-directory

SPECIAL OFFER

Companies listed in our Monthly Ocean Industry Directory will receive a free logo in the company listing section of the Product & Service Directory. Contact your representative for details.

Directory Sales:

North America:
Lisa Chilik: +1 574-261-4215
Lchilik@tscpublishing.com

International:
Mimi Shipman: +44 (0) 777 601 7564
mshipman@tscpublishing.com

ACOUSTIC SYSTEMS

Applied Acoustic Engineering Ltd
Marine House, Gapton Hall Road, Great Yarmouth. NR31 0NB, UK
Tel: + 44 (0) 1493 440355
Fax: +44 (0) 1493 440720
E-mail: gavinwilloughby@appliedacoustics.com
Website: www.appliedacoustics.com
Contact: Gavin Willoughby

Manufacturer of fully integrated USBL acoustic tracking systems, both portable and vessel based, high quality multi-system compatible beacons for acoustic positioning and release, and seismic sub-bottom profiling systems for coastal, offshore or geohazard surveys. All products are supported by a network of overseas representatives providing a first class service on a global scale.

iXBlue
Tel: +33 (0) 1 30 08 88 88
Fax: +33 (0) 1 30 08 88 00
Website: www.ixblue.com

- **GAPS USBL** acoustic positioning system
- **RAMSES** long baseline MF and LF positioning systems
- **POSIDONIA** very long range USBL system
- **ComMet** subsea metrology system
- **OCEANO** acoustic release range

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

Ocean Sonics Ltd.
11 Lornevale Road
Great Village, NS, B0M 1L0
Tel: +1 902 655 3000
E-mail: info@oceansonics.com
Website: www.oceansonics.com

*Ocean Sonics designs and manufactures the **icListen Smart Hydrophone**, a compact self-contained easy to deploy digital instrument. As the world leader in gathering ocean sound, Ocean Sonics combines very high signal performance with innovative ease of use to give customers the best digital hydrophone technology available. This enables users to collect, record, measure, process and interpret calibrated sound data from the ocean.*

icListen HF *10 Hz to 200 kHz*
icListen LF *1 Hz to 1600 Hz*
icListen AF *1 Hz to 12 kHz*
icTalk Calibrated Smart Projector: *10 kHz to 200 kHz*
LUCY PC software *for instrument control and data presentation*
Radio Buoy, Battery Packs and Cable solutions

RTsys
25 rue Michel Marion
56850 Caudan, France
Tel: +33 297 898 580
E-mail: info@rtsys.eu
Website: www.rtsys.eu

- *Acoustic Monitoring: EASDA14, Embedded Multichannel Passive Acoustic Recorders*
- *WiFi remote Buoy: BASDA14, Multi-sensor & Rechargeable Acoustic Buoy accessible in Real-time*
- *Sediment Characterization: INSEA, Acoustic Velocimeter for Sediment Characterization*

We provide advanced embedded acoustic products in the environmental research, surveying and monitoring areas. With Synchronized Multichannel Acquisition and accepting a broad range of Acoustic Transducers and Hydrophones from 3Hz to more than 1MHz, our solutions allow the user a new range of applications.

ADCP/DVL

Rowe Technologies, Inc.
12655 Danielson Ct.
Suite 306
Poway, CA 92064
Tel: 858 842 3020
E-mail: sales@rowetechinc.com
Website: www.rowetechinc.com
Contact: Ray Mahr

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

BUOYS

MetOcean
21 Thornhill Drive
Dartmouth, Nova Scotia
B3B 1R9 Canada
Tel: +1 902 468 2505
Fax: +1 902 468 4442
E-mail: emily@metocean.com
Website: www.metocean.com
Contact: Emily MacPherson

MetOcean designs and manufactures drifting buoys, environmental platforms, and the world renowned NOVATECH locator beacon product line. MetOcean's drifting buoy family consists of environmental and weather monitoring, oil spill response, and search and rescue drifters: NOVA profiling float, Iridium SVP (iSVP), iSPHERE, Argosphere, SLDMB, and iSLDMB.

BUOYANCY PRODUCTS

DeepWater Buoyancy, Inc.
394 Hill Street
Biddeford, ME 04005
Tel: +1 207 502 1400
Fax: +1 207 221 5718
E-mail: sales@deepwb.com
Website: www.DeepWaterBuoyancy.com
Contact: Dan Cote, Sales Manager

DeepWater Buoyancy creates subsea buoyancy products for leading companies in the oceanographic, seismic, survey, military and offshore oil & gas markets. Thousands of customers have relied on our products for over thirty years, from the ocean surface to depths exceeding six thousand meters.

Subsalve USA
P.O. Box 2030
North Kingstown, RI 02852
Phone: 401-884-8801
Fax: 401-884-8868
E-mail: richard@subsalve.com
Website: www.subsalve.com
Contact: Richard Fryburg

Since 1977 Subsalve USA has been America's #1 manufacturer of standard and custom flotation devices and we are the innovators in buoyancy and engineered inflatables. Our products include: Professional, Commercial, Standard, Shallow Water, Enclosed Flotation Bags, Cable & Pipeline Floats, Water Load Test Bags, Rapid Recovery & Mark V/ORCA EOD Systems.

Nautilus Marine Service GmbH
Alter Postweg 24
Buxtehude
21614
Germany
+49 (0) 41618 66250
info@nautilus-gmbh.com
www.vitrovex.com
Contact name: Steffen Pausch

Nautilus Marine Service provides the finest VITROVEX® glass housings that are capable of operating in the most extreme regions of the Earth. VITROVEX® glass enclosures offer the dual advantage of buoyancy and pressure proof housings - a perfect combination for small and autonomous underwater instrumentation packages. Simple, reliable and affordable.

CABLES

Falmat Cable
1873 Diamond Street
San Marcos, CA 92078
Toll Free: 800 848 4257
Tel: +1 760 471 5400
Fax: +1 760 471 4970
E-mail: sales@falmat.com
Website: www.falmat.com
Contact: Shawn Amirehsani

*Falmat Custom Cable Technologies is a global leader in providing innovative and high performance designs for use in harsh and demanding environments. Our proven and hardworking **"XTREME"** cables are known worldwide for superior reliability and durability in commercial and military projects.*

High quality engineered cables for ROV, side scan sonar, video, communication, towed array, geophysical, instrumentation, deep-water Ethernet and many other specialized applications. We offer installing braided haired fairing, single and multilayered steel armored cables in short lengths. Falmat is a Certified ISO9001/AS9100 organization. Visit our web site: www.falmat.com.

South Bay Cable Corp
54125 Maranatha Drive
P.O. Box 67
Idyllwild, CA 92549
Phone: (951) 659-2183
Fax: (951) 659-3958
E-mail: Sales@southbaycable.com
Website: www.southbaycable.com
Contact: Gary Brown, Sales Manager

Since 1957, South Bay Cable Corp has designed and manufactured specialized electrical, electro-mechanical and electro-optical-mechanical cables for use in demanding marine environments. Cables are designed to meet customer requirements and include tether and umbilical cables for ROVs, tow cables, video inspection, faired cables and a host of other customer specific applications.

CONNECTORS

AK Industries
3115 East Las Hermanas Street
Rancho Dominguez, CA 90221
Tel: +1 310 762 1600
Fax: +1 310 762 1616
E-mail: sales@ak-ind.com
Website: www.ak-ind.com
Contact: Allan Kidd

AK Industries is an agile high tech manufacturer of rugged low cost underwater electrical connectors. The HydroVolt line of connectors is the most rugged and reliable low cost connector available. AK Industries is also ideally suited to provide unique solutions engineered to customer requirements.

BIRNS, Inc.
1720 Fiske Place
Oxnard CA 93033-1863 USA
Int'l: +1 805 487 5393
Fax: +1 805 487 0427
USA: +1 888 BIRNS 88 (+1 888 247 6788)
E-mail: service@birns.com
Website: www.birns.com
Contact: Eric Birns

BIRNS, Inc. has been serving the subsea industry since 1954, and is an ISO 9001:2008 certified global leader in the design and manufacturing of high performance connectors, custom cable assemblies and lighting systems. With a NAVSEA PRO-020 certified molding facility, the company leads the industry with sophisticated connector lines, including exceptional electrical, electromechanical, coaxial, electro-coax, optical, electro-optical and electro-opto-mechanical hybrid options. BIRNS provides the industry's highest volume of cost-effective hydrostatic and helium pressure testing, and has a wide range of ABS Product Design Assessment (PDA) certified fiber optic and electrical penetrators. BIRNS also delivers brilliant LED and tungsten-halogen marine, chamber, security and commercial diving lights trusted in the world's most extreme environments.

BIRNS Aquamate LLC
122 Waltham St.
Pawtucket, RI 02860 USA
Tel: +1 401 723 4242
Fax: +1 401 753 6342
E-mail: sales@birnsaquamate.com
Website: www.birnsaquamate.com
Contact: Eli Bar-Hai

Birns Aquamate design and manufacture underwater electrical connectors, cable assemblies, and cable terminations. The company produces a wide range of standard industry connectors such as the 5500 Series, SC, MC, LP, FAWL/FAWM, Rubber Molded, etc. BIRNS Aquamate is the only underwater connector producer that guarantees compatibility with other manufacturers. Birns also specializes in fast turn-around for custom design of special connector solutions. Stocking dealers in the UK, South Africa and Holland as well as dealers in Canada, Germany, Belgium, Norway, China, and Brazil.

SEACON
1700 Gillespie Way
El Cajon, CA 92020 USA
Tel: +1 619 562 7071
Fax: +1 619 562 9706
E-mail: seacon@seaconworldwide.com
Website: www.seaconworldwide.com

The SEACON Group are world leaders in underwater connector technology and provide an extensive and diverse range of electrical, optical and hybrid connector assemblies, submersible switches and cable system solutions for many applications within the Oceanographic, Defense, Oil and Gas and Environmental markets. With locations in California and Texas, USA, Mexico, Brazil, the United Kingdom and Norway and a worldwide network of agencies and representatives, SEACON is able to supply very quick solutions to any requirements across the globe.

Teledyne Impulse
9855 Carroll Canyon Road
San Diego, CA 92131 USA
Tel: 1-800-327-0971 or
+1-858-842-3100
Fax:+1-858-565-1649
E-mail: impulse@teledyne.com
Website: www.teledyneimpulse.com

Teledyne Impulse designs and manufactures highly reliable electrical and optical interconnection systems for a range of harsh environments. From underwater sensor connectors, to ROV connectors, to the largest vehicle systems, Impulse products are proven performers in demanding applications, which include oceanographic exploration, defense, oil and gas production, and wastewater management.

Teledyne ODI - A Teledyne Technologies Company
1026 North Williamson Blvd.
Daytona Beach, FL 32114
Tel: +1 386 236 0780
Fax: +1 386 236 0906
Toll Free: (888) 506 2326
E-mail: ODI_marketing@teledyne.com
Website: www.odi.com

A leader in subsea electrical & fiber optic interconnect systems. Wet-mateable connectors include signal & high-power electrical, optical, and hybrid products. All based on patented PBOF technology. These rugged components are designed for use at any ocean depth, in the harshest environments. ODI also provides top quality custom engineered solutions for any subsea networking challenge.

DESIGN AND ENGINEERING

Hydro Leduc NA, Inc.
19416 Park Row, Ste. 170
Houston, TX 77084
Tel: 281-679-9654
E-mail bogden@hydroleduc.com
Website: www.hydroleduc.com

Hydro Leduc is a specialist in the design and manufacture of hydraulic piston pumps, hydraulic motors, hydro pneumatic accumulators, and customized hydraulic components satisfying customer needs with reliable products from a reliable source. As the leader in micro hydraulics, it is feasible to obtain several tons of force from a minimal power source within a restricted space envelope. The techniques of micro hydraulics allow simple solutions to problems that are often beyond the limits of traditional mechanical options. Hydro Leduc's expertise is at your service in varied applications such as oil service tools, oceanographic instrumentation, aeronautics, and any extreme working condition of temperature, pressure, medium, and environment.

DIVING & MEDICAL TRAINING COURSES

Interdive Services Ltd & InterMedic Services UK
3 Stoke Damerel Business Centre
5 Church Street, Stoke Plymouth
Devon, PL3 4DT, Great Britain
Tel: +44 1752 55 80 80
Fax: +44 1752 56 90 90
E-mail: vanessa@interdive.co.uk or diving@interdive.co.uk
Website: www.interdive.co.uk
Contact: Ms. Vanessa Yardley

High quality marine related training courses approved by HSE, IMCA,IDSA, NPD, MCA and RYA. Training from basic to advanced levels (including hospital based) by friendly & experienced instructors. Training providers to UK Ministry of defense. Training on your site, at our facilities, inhouse or overseas. Also, experienced diver assessments and Offshore Medic course.

EQUIPMENT RENTAL

Okeanus Science & Technology, LLC
2261 Denley Road
Houma, LA 70363
Tel: 985-346-4666
Fax: 985-346-8444
E-mail: Bleblanc@okeanus.com
Website: www.okeanus.com
Contact: Benton LeBlanc

Okeanus is the premier rental provider for oceanographic and marine scientific research equipment utilized in nearshore and offshore projects around the world. Focused on providing industry-leading customer service, Okeanus offers advanced, high-quality technology coupled with knowledgeable and experienced staff that can deliver dedicated support regardless of a project's location.

FIBER OPTIC PRODUCT/SERVICES

Focal Technologies Corporation, Moog Inc.
77 Frazee Avenue
Dartmouth, Nova Scotia
Canada B3B 1Z4
Tel: +1 902 468 2263
Fax: +1 902 468 2249
E-mail: focal@moog.com
Website: www.moog.com/marine
Contact: Shawn Taylor

Focal, A Moog Inc. Company, specializes in providing electrical slip rings, fiber optic rotary joints, hydraulic utility swivels and fiber optic multiplexer solutions for the worldwide marine industry including ROV, seismic, FPSO turret and oceanographic applications. Product features include hybrid packages that combine fiber, electrical and fluid rotary joints for harsh environments.

Ocean Specialists Inc.
8502 SW Kansas Ave
Stuart, FL 34997
Tel: +1 772 219 3033
Fax: +1 772 219 3010
Email: jbyous@oceanspecialists.com
Website: www.oceanspecialists.com
Contact: Jim Byous

Ocean Specialists, Inc (OSI) is a submarine fiber optic network development company with global project capabilities. OSI works with clients during all project phases of subsea network development, from planning and design to procurement and implementation. Our customers, primarily representing Oil and Gas, Telecommunications and Ocean Observing, recognize the value of fiber optic networks to their field and services solutions, and look to OSI to deliver the skills and experience that developing these networks require.

GYRO COMPASSES

iXBlue
Tel: +33 (0) 1 30 08 88 88
Fax: +33 (0) 1 30 08 88 00
Website: www.ixblue.com

- **QUADRANS** compact surface gyrocompass
- **OCTANS** surface gyrocompass and motion sensor
- **OCTANS NANO** compact subsea gyrocompass and motion sensor
- **OCTANS** 3000 subsea gyrocompass and motion sensor

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

HYDROPHONES

High Tech, Inc
21120 Johnson Road
Long Beach, MS 39560, United States
Tel: 228 868 6632
Email: high_techinc@bellsouth.net
Website: www.hightechincusa.com
Contact: Glenn Pollock

Experts in rugged marine sensor systems utilized in geophysical surveys, anti-submarine warfare, marine mammal monitoring and downhole applications. Products include data acquisition systems, hydrophones, array cables, pressure vessels and peripherals related to marine systems.

INSURANCE

John W. Fisk Company
4833 Conti Street, Suite 200
New Orleans, LA 70119
Toll Free: +1 888 486 5411
E-mail: insure@jwfisk.com
Website: www.jwfisk.com

Fisk Marine Insurance provides all types of insurance to any limit required for commercial diving, marine contractors, offshore oilfield and platforms, plug and abandonment (P&A) contractors, land based energy, ocean marine cargo and oceanographic research worldwide. Our coverages include Workers Compensation (USL&H & Jones Act, General Liability, Professional Liability, Hull P&I, Equipment, Bonds and International Packages for clients working outside of the USA. Contact us for more information: 1-888-486-5411 or insure@jwfisk.com. Visit our website: www.jwfisk.com

LIQUID STORAGE

Aero Tec Laboratories, Inc. (ATL)
45 Spear Road Industrial Park,
Ramsey, NJ 07446 USA
Tel: +1 201 825 1400
Fax: +1 201 825 1962
E-mail: atl@atlinc.com
Website: www.atlinc.com
Contact: David Dack

ATL specializes in the design/manufacture of custom bladder-type fluid containment systems, including tanks, inflatables, pillows and bellows for surface and subsea. ATL's flexible fluid containers boast unparalleled chemical tolerance, abrasion resistance, and remarkable durability - used with methanol, diesel fuel, gases, ethyleneglycol, hydraulic fluids and chemical cleaning cocktails. Expedited deliveries are also available.

MAGNETOMETERS

Bartington Instruments Ltd
Unit 5, Thorney Leys Business Park
Witney, Oxon OX28 4GE
United Kingdom
Tel: +44 (0)1993 706565
E-mail: sales@bartington.com
Website: www.bartington.com

Bartington Instruments' products include high precision, low noise fluxgate magnetometers, gradiometers and data acquisition units for marine applications. With a reputation for performance, reliability and durability, our instruments are used for detection of magnetic anomalies such as underwater UXO, pipe and cable location, magnetic signature analysis, and oil and mineral exploration.

Geometrics, Inc.
2190 Fortune Drive
San Jose, CA 95131
Tel: +1 408 954 0522
Fax: +1 408 954 0902
E-mail: sales@geometrics.com
Website: www.geometrics.com
Contact: Bart Hoekstra

Geometrics, a member of OYO Corporation, manufactures, sells, and services portable geophysical instruments for land, marine, and air investigations of the subsurface. Geometrics' product line includes proton precession and cesium magnetometers, high-resolution seismographs, and electrical conductivity imaging and resistivity systems. Geometrics' instruments are used around the world for natural resource exploration, geotechnical and environmental assessments, ordnance detection, locating archeological and treasure sites, teaching and research.

MARINE ENVIRONMENTAL CONSULTING SERVICES

CSA Ocean Sciences Inc.
8502 SW Kansas Avenue
Stuart, FL 34997
Tel: +1 772 219 3000
Fax: +1 772 219 3010
E-mail: gstevens@conshelf.com
Website: www.csaocean.com
Contact: Gordon Stevens

CSA Ocean Sciences Inc. (CSA) is a marine environmental consulting firm specializing in multidisciplinary projects concerning potential environmental impacts of activities throughout the world. With extensive experience in environmental sciences and technical field operations, CSA is staffed and equipped to offer a complete range of services for projects in offshore, nearshore, estuarine, wetland, and freshwater environments.

MOTION SENSING EQUIPMENT

Kongsberg Seatex AS
Pirsenteret
N-7462 Trondheim, Norway
Tel: +47 73 54 55 00
Fax: +47 73 51 50 20
E-mail: km.seatex@kongsberg.com
Website: www.km.kongsberg.com/seatex
Contact: Finn Otto Sanne at finn.otto.sanne@kongsberg.com

Kongsberg Seatex is a leading international marine electronics manufacturer specializing in the development and production of precision positioning and motion sensing systems. Our commitment is to provide quality products and solutions for safe navigation and operations at sea in the commercial offshore, maritime, hydrographics and defence industries.

Watson Industries, Inc.
3035 Melby Street
Eau Claire, WI 54703
Tel: +1 715 839 0628
Fax: +1 715 839 8248
E-mail: info1@watson-gyro.com
Website: www.watson-gyro.com
Contact: Tom Henke

Specializing in precision positioning and motion sensing systems for use in undersea cable laying, buoy and current monitoring, magnetic field measurement, yacht and ferry stabilization, remotely operated vehicles, sonar, camera and antenna stabilization, heading reference and surface ship navigation. We can customize our products to meet your specifications.

NAVIGATION & POSITIONING SYSTEMS

EvoLogics GmbH
Ackerstrasse 76
13355 Berlin, Germany
Tel: +49 (0) 30 4679 862-0
Fax: +49 (0) 30 4679 862-01
E-mail: sales@evologics.de
Website: www.evologics.de

EvoLogics provides the world's most advanced spread-spectrum underwater communication systems (S2C) with multi-channel data management, networking capability, built-in tracking and positioning functions with USBL. Data loggers, acoustic wake-up module and releasers optionally included. Deployments in offshore platforms (FPSO, ABS), environmental monitoring, defense systems, ROV and AUV operations and more. Applications include simple positioning and sensor information to transmission of underwater photos.

iXBlue
Tel: +33 (0) 1 30 08 88 88
Fax: +33 (0) 1 30 08 88 00
Website: www.ixblue.com

- **PHINS** surface and AUV INS
- **PHINS 6000** deep water subsea INS
- **HYDRINS** hydrographic survey INS
- **MARINS M-Series** first rank and submersible ships INS
- **ROVINS** subsea INS

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

OCEANOGRAPHIC INSTRUMENTS/SERVICES

Falmouth Scientific, Inc.
1400 Route 28A, PO Box 315
Cataumet, MA 02534-0315 USA
Tel: +1 508 564 7640
E-mail: fsi@falmouth.com
Website: www.falmouth.com

Sensors – Systems – Service
Falmouth Scientific, Inc. designs and manufactures precision oceanographic instrumentation and systems. Product areas include:
• Ultra-Portable Seismic Systems • Current, Wave, and Tide meters • Structural Stress Monitoring Systems • Sidescan Sonar Imaging Systems • Acoustic Transducers, Systems, and Support • Acoustic Positioning and Relocation Beacons

nke Instrumentation
rue Gutenberg
56700 Hennebont, France
Tel: +33 2 97 36 41 31
Fax: +33 2 97 36 10 12
E-mail: info.instrumentation@nke.fr
Website: www.nke-instrumentation.com

• Fresh and marine waters multiparameter probes: CTD, dissolved oxygen, turbidity, fluorescence, pH • Monitoring data loggers for atmospheric and marine corrosion, and cathodic protection • Dedicated and customized measurement and monitoring equipment for: sediment transport, underwater systems behaviour, fishing efforts and environmental parameters, intelligent networks...

Contact : Valérie Le Pen - vlepen@nke.fr or Goulven Prud'homme - gprudhomme@nke.fr
• Provor and Arvor profiling subsurface floats (ARGO project), CTD, dissolved oxygen and optical sensors; Argos and Iridium transmission. • Drifting surface buoys with temperature and GPS receiver for Surface velocity project. • Carioca drifting buoy: sea water dissolved pCO2, chlorophyll, wind speed and salinity.
Contact: Patrice Brault - pbrault@nke.fr

Nortek AS
Vangkroken 2
1351 Rud, Norway
Tel: +47 67 17 45 00
E-mail: inquiry@nortek.no
Website: www.nortek.no

Nortek excels in the development and manufacture of acoustic Doppler instrumentation. Doppler Velocity Logs (DVL) are used for subsea navigation. Acoustic Doppler Current Profilers (ADCP) are used to understand physical processes in the ocean, rivers, lakes and laboratories. We pride ourselves on being innovative in product development and production processes. Nortek provides solutions to engineers and scientists by offering real-time data collection and support from our responsive technical team.

RBR
95 Hines Road, Ottawa
Ontario Canada K2K 2M5
Tel: +1 613 599 8900
Fax: +1 613 599 8929
E-mail: info@rbr-global.com
Website: www.rbr-global.com

Based in Ottawa, Canada and established in 1976. The company is an industry leader in the design, development and manufacture of high precision instruments for oceanographic, freshwater, groundwater and cryospheric research. Products include CTDs, small temperature or depth loggers, tide gauges, wave loggers and multi-parameter sondes.

ROMOR Ocean Solutions
41 Martha Avenue
Mount Uniacke, NS Canada
B0N 1Z0
Tel. +1 (902) 466-7000
Fax. +1 (902) 466-4880
E-mail: Sales@romor.ca
Website: www.romor.ca
Contact: Darrin Verge, President & CEO

ROMOR Ocean Solutions provides instrumentation solutions for the geophysical, oceanographic, defense, security, oil & gas, and renewable energy industries. By partnering with world renowned manufacturers, ROMOR is able to offer technical knowledge, value added services, logistics expertise, and the most reliable instrumentation on the market.

Sea and Land Technologies Pte Ltd
65 Tuas Avenue 1
Singapore 639508
Tel: +65 65180777
Fax:+65 65630366
E-mail: enquiry@sea-landtech.com
website: www.sea-landtech.com

A leading solutions provider in Asia Pacific countries for Oceanography, Meteorology, Hydrography, Hi Resolution Marine Seismic studies, Coastal Monitoring, Hydrology and Environmental Surveys. With over 20 years of experience partnering leading worldwide manufacturers, SALT provides advanced technology hardware and software solutions, combined with Calibration, Training, Repairs, Cable Moulding services & RENTAL Equipment to the users in the region. In addition to our 60,000 square foot HQ in Singapore, SALT has offices in Malaysia, Indonesia, Thailand, Philippines and Australia.

Sea-Bird Scientific
13431 NE 20th St.
Bellevue, WA 98005
Tel: +1 425 643 9866
Fax: +1 425 643 9954
E-mail: info@sea-birdscientific.com
Website: www.sea-birdscientific.com
Contact: Calvin Lwin, Sales

Sea-Bird Scientific, comprised of Sea-Bird Electronics, WET Labs, and Satlantic, provides integrated solutions to customers' measurement needs. Sea-Bird Scientific is the leader in accurate, stable ocean instruments for measuring conductivity (salinity), temperature, pressure, oxygen, pH, chlorophyll, CDOM, turbidity, beam attenuation, irradiance, radiance, PAR, nitrate, and phosphate. Our CTD profilers, water samplers, moored CT recorders, wave/tide recorders, DO sensors, and optical sensors are used by research institutes, ocean observing programs, government agencies, and navies globally.

Star-Oddi
Skeidaras 12, 210
Gardabaer, Iceland
Tel: +354 533 6060
Fax: +354 533 6069
E-mail: baldur@star-oddi.com
Website: www.star-oddi.com
Contact: Baldur Sigurgeirsson

A manufacturer of miniature data loggers with sensors as temperature, depth/pressure, salinity, tilt/acceleration, compass direction/magnetometer, light levels, acoustic receiving/transmitting. The loggers are used for various researches, including oceanography, fishing gear studies, equipment behavioral monitoring and fish tagging. Data is presented in the application software with a time-stamp for each measurement.

Turner Designs
845 W Maude Avenue
Sunnyvale, CA 94085
Phone: +1 408 749 0994 x146
Toll Free: +1 877 316 8049 x146
Fax: +1 408 749 0998
Contact: Tom Brumett, Sales Engineer
E-mail: sales@turnerdesigns.com
Website: www.turnerdesigns.com

Providing fluorescence-based solutions for research, water quality, and pollution control for over 40 years. Known for reliable and stable submersible, field, handheld, laboratory, and online fluorometers and turbidimeters. Customers rate us an average of 9.4, on a scale of 1-10, when asked how likely they would be to recommend us.

SMART TELEMETRY

OceanWise Ltd
Dovedale House, 16 Butts Road
Alton, Hants, GU341NB, UK
Tel : +44 (0)1420 768262
Fax : +44 (0)8713 140910
Email : info@oceanwise.eu
Website: www.oceanwise.eu
Contact : john.pepper@oceanwise.eu

Monitoring and measuring environmental data is not enough. You need to manage it so you get the right data in the right place at the right time. Our Environmental Data Sharing and Publishing solutions gets the most out of your investment in data monitoring.

- ***Easy and inexpensive viewing and sharing of real-time data***
- ***Secure and straightforward archiving and storage of all types of marine data***
- ***Data accuracy, integrity and reliability***

Enjoy the confidence of working with marine data experts!

SONAR SYSTEMS

iXBlue
Tel: +33 (0) 1 30 08 88 88
Fax: +33 (0) 1 30 08 88 00
Website: www.ixblue.com

- **JH 200, JH 250, JH 500** very low frequency transducers
- **SAMS-DT-6000** deep tow synthetic aperture sonar
- **SEAPIX 3D** multibeam sonar

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

Klein Marine Systems, Inc.
11 Klein Drive
Salem, NH 03079
Tel: +1 603 893 6131
Fax: +1 603 893 8807
E-mail: Klein.Mail@KleinMarineSystems.com
Web: www.KleinMarineSystems.com
Contact: Deborah Durgin, Supervisor, Marketing & Sales

Klein Marine Systems, Inc. is the world's leading sensor technology provider that manufactures and designs high-resolution side scan and multi-beam sonar equipment, and radar-based security and surveillance systems. Klein has developed a worldwide reputation of excellence in the industry by providing quality products and excellent customer service. Please feel free to check out our product offerings at www.KleinMarineSystems.com.

Marine Sonic Technology
120 Newsome Dr. Suite H, PO Box 1309
Yorktown VA 23692-1309
Toll Free: +1 800 447 4804
E-mail: Regan.Lipinski@na-atlas.com
Website: www.marinesonic.com

Marine Sonic Technology builds high quality, high resolution side scan sonar systems. Located in Yorktown, Virginia, Marine Sonic has been in business for more than 25 years. Our towed systems are rugged, easy to deploy and simple to operate. We also offer highly efficient AUV/ROV embedded systems, which occupy minimal space and low power consumption.

SOUND VELOCITY PROBES/CTDS

SAIV A/S
Nygardsviken 1, 5164
Laksevag, Norway
Tel: +47 56 11 30 66,
Fax: +47 56 11 30 69
E-mail: info@saivas.no
Website: www.saivas.no
Contact: Gunnar Sagstad

• STD/CTD, Sound Velocity probes/recorder with optional multi-parameter facilities; Turbidity, Fluorescence, Oxygen etc. The new CTD/STD model SD208 with wireless communication and high accuracy: 0.002 mS/cm, 0.002 °C

• Precision pressure /depth (0.01% accuracy) and temperature sensors/recorders. Applications: hydrographic profilings, installation on ROVs and towed systems, etc. Robust and compact designs are combined with accuracy and "plugand play" compatibility. Output format for sonar equipment, e.g. EM1002, EM3000, SSP, HiPAP and Reson 8125.

SUB-BOTTOM PROFILES

iXBlue
Tel: +33 (0) 1 30 08 88 88
Fax: +33 (0) 1 30 08 88 00
Website: www.ixblue.com

- **ECHOES 3500 T3 and T7** high penetration sub-bottom profilers
- **ECHOES 5000** full ocean depth sub-bottom profiler
- **ECHOES 10000** shallow water sub-bottom profiler

iXBlue is a leading global provider of innovative solutions and services for navigation, positioning, and imaging.

SUBSEA FABRICATION

New Industries
6032 Railroad Avenue
Morgan City, LA 70380
Tel: +1 985 385 6789
E-mail: bill.new@newindustries.com
Website: www.newindustries.com
Contact: Bill New

New Industries provides quality fabrication services to the offshore oil & gas and marine industries focusing on large diameter pressure vessels, suction piles, DNV buildings and deepwater subsea production equipment such as jumpers, PLETs, PLEMs and manifolds.

SUBSEA TOOLING

Subsea Americas
3447 Hwy 182
P.O. Box 185
Berwick, LA 70342
Tel: +1 985 714 1767 or 985 518-0055
E-mail: charles@subseaamerica.com
Website: www.subseaamericas.com
Contact: Charles Mayea

Subsea Americas (SSA) is a leading provider of rental ROV tooling equipment on a worldwide basis. SSA is a 24 hr. / 7 days a week service provider of a comprehensive range of standard subsea tooling equipment. From torque tools and flying lead orientation tools to 15k isolated hydraulic intensifiers and wire rope cable cutters - SSA can fully support the client's needs with quality service, and reliable equipment at a most competitive cost.

UNDERWATER VEHICLES/AUVS

Hydroid, Inc.
a subsidiary of Kongsberg Maritime
6 Benjamin Nye Circle
Pocasset, MA 02559-4900 USA
Tel: +1 508 563 6565
Fax: +1 508 563 3445
E-mail: glester@hydroid.com
Website: www.hydroid.com
Contact: Graham Lester

Hydroid, a subsidiary of Kongsberg Maritime, is the world leader in manufacturing advanced Autonomous Underwater Vehicles (AUVs). REMUS AUVs provide innovative and reliable systems for the marine research, defense, hydrographic and offshore/energy markets. Hydroid vehicles represent the most advanced, diversified and field-proven family of AUVs and support systems in the world.

OceanServer Technology, Inc.
151 Martine Street
Fall River, MA 02723 USA
Tel: +1 508 678 0550
Fax: +1 508 678 0552
E-mail: sales@ocean-server.com
Website: www.iver-auv.com
Contact: Jim Kirk

OceanServer Technology, Inc. is a leading provider of man-portable Autonomous Underwater Vehicles (AUVs) with over 250 AUVs deployed worldwide. The Iver AUV is an affordable, commercial vehicle used for general survey and sub-surface security work, and serves as a research platform for autonomy, behavioral and sensor development studies at universities and navy research facilities.

UNDERWATER VEHICLES/ROVS

Deep Ocean Engineering Inc.
2528 Qume Drive, Suite 11
San Jose, CA 95131 USA
Tel: +1 408 436 1102
Fax: +1 408 436 1108
E-mail: sales@deepocean.com
Website: www.deepocean.com
Contact: Bill Charbonneau

Deep Ocean Engineering, Inc. provides remotely operated and unmanned surface vehicle (ROV / USV) solutions which are used by a broad range of industry applications - security, military, nuclear and hydroelectric power plants, inshore dams and lakes, oil and gas, scientific research, fisheries, salvage, search / recovery, and pipeline inspections.

i-Tech
22330 Merchants Way
Katy, TX 77449
Tel: +1 281 693 9403
E-mail: Katarina.Tehlirian@Subsea7.com
Website: www.interventiontechnology.com
Contact: Katarina Tehlirian

i-Tech is a global division of Subsea 7 delivering world class remotely operated vehicle (ROV) and intervention tooling support services to the offshore energy industry, operating from four regional centers: Europe & Africa, Asia-Pacific the Americas and Brazil.

Oceaneering International, Inc.
11911 FM 529
Houston, TX 77041
Tel: 713.329.4500
E-mail: info@oceaneering.com
Website: www.oceaneering.com
Contact: Bill Mallin

Oceaneering is the subsea connection specialist. We are connecting what's needed with what's next as the world's largest ROV operator and the leading ROV provider to the oil and gas industry with over 300 systems operating worldwide. We push the limits of ROV intervention and meet new, demanding tooling intervention.

QSTAR ROV Training & Subsea Services
C/ Sucre 26, 35008 - C/Medas 4-6, 08023
Canary Islands & Barcelona, Spain
Tel: + 34 616 604 778 / + 34 928 91 48 13
Fax: +34 928 91 48 13
E-mail: info@qstar.es
Websites: www.qstar.es & www.rovs.eu

QSTAR was established to offer services for industries that require effective solutions for Subsea projects through the use of our ROV fleet and high Qualified personnel. Our World leading ROV Training Division offers High Quality Training for ROV PILOT TECHNICIANS as a World-Wide ROV Training Establishment Member of the IMCA.

Outland Technology
38190 Commercial Ct.
Slidell, LA 70458 USA
Tel: 985-847-1104
Fax: 985-847-1106
E-mail: jeff@outlandtech.com
Website: www.outlandtech.com
Contact: Jeff Mayfield

Offering the most rugged equipment and unsurpassed customer service, Outland Technology has been the world's leading manufacturer of underwater video, lighting and ROV equipment for over 30 years. We recognize that no two jobs are the same and specialize in products that are customizable for your specific applications.

Teledyne SeaBotix
2877 Historic Decatur Road, Suite 100
San Diego, CA 92106 USA
Tel: +1 619 450 4000
Fax: +1 619 450 4001
E-mail: SeaBotixInfo@Teledyne.com
Website: www.SeaBotix.com
Contact: Alasdair Murrie

Teledyne SeaBotix is a world leading manufacturer of capable underwater MiniROVs that perform a multitude of tasks including maritime security, search and recovery, hull and pipeline inspection, hazardous environment intervention, aquaculture, sensor deployment and oceanographic research. The Little Benthic Vehicle systems have become the benchmark in compact ROVs around the world.

and ROV equipment for over 30 years. We recognize that no two jobs are the same and specialize in products that are customizable for your specific applications.

VideoRay
212 East High Street
Pottstown, PA 19464
Tel: +1 610 458 3000
Fax: +1 610 458 3010
E-mail: sales@videoray.com
Website: www.videoray.com
Contact: Brian Luzzi

With more than 3,500 ROV's in service around the world, VideoRay has clearly become the global leader in Observation ROV technology. VideoRay is an extremely versatile, portable, affordable, and reliable solution for underwater operations including surveys, offshore inspections, search & recovery, homeland & port security, science & research, fish farming, and other unique applications in underwater environments. VideoRay is available on the General Services Administration.

UNDERWATER VIDEO EQUIPMENT

ROVSCO, Inc.
5263 Barker Cypress Road, Suite 600
Houston, TX 77084
Tel: +1 281 858 6333
Fax: +1 281 858 6363
E-mail: sales@rovsco.com
Website: www.rovsco.com
Contact: Jessica McKenney

Rovsco provides support and solutions to the offshore subsea and marine industries; work-class ROV and Commercial Diving operations. We manufacture a number of tools/equipment and subsea video items. We have an excellent reputation worldwide based on our product knowledge, dependability, commitment to customer service and speed of response.

WINCHES, HANDLING & CONTROL SYSTEMS

Hawboldt Industries
220 Windsor Road
Chester, Nova Scotia
Canada B0J 1J0
Tel: 902 275 3591
Fax: 902 275 5014
E-mail: paul.phillips@hawboldt.ca
Website: www.hawboldt.ca
Contact: Paul Phillips

Hawboldt Industries has built robust commercial and scientific deck machinery for over a century, focusing on custom winch solutions and satisfying project requirements from engineering to commissioning. ROV winches, A-frames, and electro-hydraulic power packs are available to satisfy the offshore and subsea markets. Our scientific winches, preferred by universities and governments worldwide, are renowned for their durability and performance particularly in harsh environments.

Markey Machinery Company
7266 8th Ave. South
Seattle, WA 98108 USA
Tel: +1 800 637 3430
Fax: +1 206 623 9839
E-mail: info@markeymachinery.com
Website: www.markeymachinery.com

Preferred by the US fleet, Markey's advanced oceanographic winch systems provide ultimate dependability, reliability and precise performance when and where you want it. Operating within critical windows of opportunity you can count on our custom winches, capstans, windlasses and auxiliary machinery for the successful execution and completion of your research.

WINCHES - UNDERWATER

ALL OCEANS Engineering Ltd.
Tyrebagger Works, Clinterty, Kinellar
Aberdeen AB21 0TT, UK
Tel: +44 (0) 1224 791001
Fax: +44 (0) 1224 791002
E-mail: admin@alloceans.co.uk
Website: www.alloceans.co.uk
Contact: Brian Abel

MECHANICAL HANDLING UNDERWATER
Launch and Recovery Systems - 6,000m plus Underwater Winches - ROV and Diver operated Tether Management Systems - 6,000m plus Torque Tools - Electric and Hydraulic systems - ROV and Diver operated General Products - Compensators, latches, swivels, metrology sets, cable reels, pressure housings, junction boxes Workshop Services - Fabrication, assembly and testing Engineering - prototyping, product development, solutions engineering AC-ROV - The mini ROV that broke the mold.

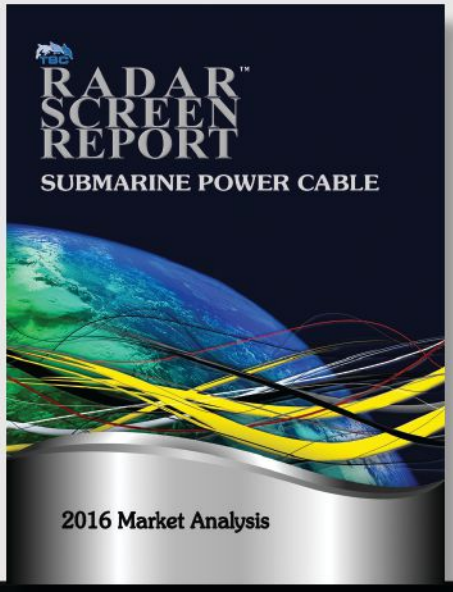
Submarine Cable World™

Daily Newsfeed • Industry Analysis • Consulting Services

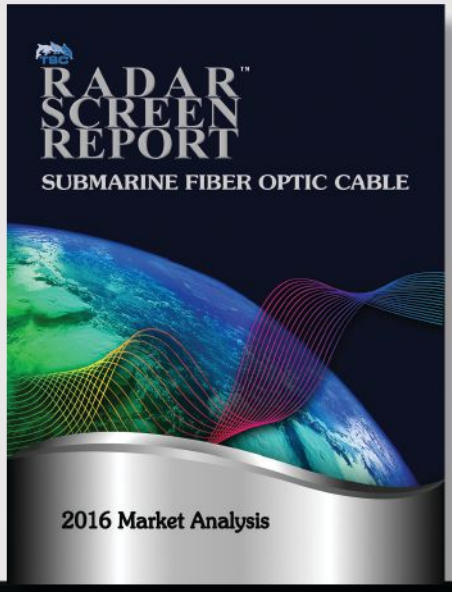
The highly specialized 2016 Radar Screen Report is available this year in three volumes

- Review of 2015 Contracts
- Forecast Demand 2016-2021
- Major Factors Impacting the Market
- List of 2015 Projects Under Contract
- List of Future Planned Projects

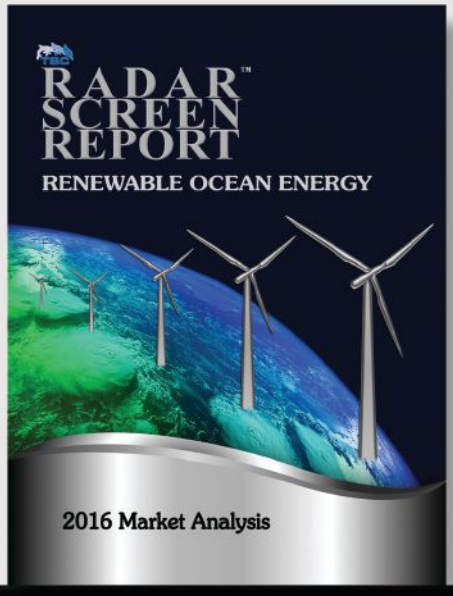
SUBMARINE POWER CABLE



SUBMARINE FIBER OPTIC CABLE



RENEWABLE OCEAN ENERGY



Order Today!

The 2016 Radar Screen Report™ is available in January and includes a mid-year update.
Place your order at www.subcableworld.com

Subscribe to the Submarine Cable World Daily NewsFeed™

Delivered electronically every weekday, the Submarine Cable NewsFeed™ includes the latest developments in:

- Submarine Fiber Optic Communications
- Power Cables
- Renewable Ocean Energy
- Marine Cable Installation & Maintenance Services
- Regulation of Cables
- International Telecom Carrier Activities
- International Internet Markets

Subscribe at www.subcableworld.com

TSC **Published and distributed by TSC • www.subcableworld.com • 772-617-6787**

ADVERTISER INDEX

Ametek SCP Inc.	69	www.amtekscp.com
Balmoral Comtec Ltd	39	www.balmoral-group.com
Caldwell Marine International, LLC	48	www.caldwellmarine.com
Canadian Hydrographic Conference	70	http://tinyurl.com/Canadian-Hydrographic-Conf
CSA Ocean Sciences Inc.	4	www.csaocean.com
DeepSea Power & Light	16	www.deepsea.com
ECA Robotics	19	www.eca-robotics.com
ECO Magazine	55	www.ecomagazine.com
EdgeTech	24	www.egdetech.com
Euromaritime	67	www.euromaritime.fr/en
EvoLogics GmbH	83	www.evologics.de
FORUM Energy Technologies, Inc. (F.E.T.)	9	www.f-e-t.com
GJ Land & Marine Distribution, Inc.	42	www.gjfood.com
Global Ocean Design	54	www.globaloceandesign.com
Horizon Marine	84	www.horizonmarine.com
InterOcean Systems, Inc.	43	www.interoceansystems.com
iXBlue SAS	27	www.ixblue.com
JW Fishers Manufacturing, Inc.	40	www.jwfishers.com
Klein Marine Systems, Inc.	36	www.KleinMarineSystems.com
LinkQuest, Inc.	5	www.link-quest.com
Lockheed Martin MS2	3	www.lmco.com
New Industries	41	www.newindustries.com
Nortek AS	7	www.nortek-as.com
Ocean Aero	59	www.oceanaero.us
Ocean News	72, 73, 74, 81	www.oceannews.com
Ocean Specialists, Inc.	57	www.oceanspecialists.com
Oceaneering International	34	www.oceaneering.com
OceanServer Technology	21	www.ocean-server.com
Oceans '16	71	www.oceans16mtsieeemonterey.org
Okeanus Science & Technology	17	www.okeanus.com
Quest Offshore Resources, Inc.	58	www.questoffshore.com
Radar Screen Report	81	www.subcableworld.com/radar-screen-report
Remote Ocean Systems (ROS)	42	www.rosys.com
ROVSCO, Inc.	53	www.rovsco.com
Rowe Technologies, Inc.	51	www.rowetechinc.com
Saab Seaeye Ltd	47	www.seaeye.com
SeaRobotics	49	www.searobotics.com
Shark Marine Technologies, Inc.	45	www.sharkmarine.com
SonarTech Co., LTD	49	www.SonarBeam.co.kr / www.sonartech.com
Subcable World	81	www.subcableworld.com
SubCtech GmbH	69	www.subCtech.com
Teledyne Marine	14	www.teledynemarine.com
The Business Network for Offshore Wind	23	www.bizmdosw.org
US Underwater Services, LLC	37	www.usunderwatersercives.com
Valeport Limited	50	www.valeport.co.uk
VideoRay	2	www.videoray.com

UNDERWATER COMMUNICATION AND POSITIONING SOLUTIONS

S2C TECHNOLOGY: COMMUNICATION AND TRACKING COMBINED

- time, space and cost-saving solutions
- low power consumption for autonomous operations
- advanced data delivery algorithms, addressing and networking, remotely configurable settings
- extendable platform with multiple configuration options: power-saving Wake Up module, acoustic releaser, additional sensors, custom solutions, OEM versions availableh

USBL POSITIONING SYSTEMS

simultaneous positioning and communication - no need to switch between positioning mode and modem mode

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: up to 0.04 degrees

LBL POSITIONING SYSTEMS

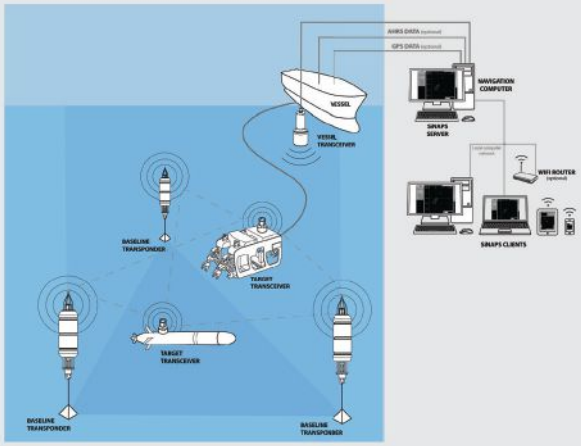
highly accurate, precise and stable performance, simultaneous positioning and data transmissions

- flexible SiNAPS positioning software
- reliable data transmissions
- range: up to 8000 m
- accuracy: better than 0.01m

UNDERWATER ACOUSTIC MODEMS

reliable data transmissions even in adverse conditions, customizable R-series modems, light and compact M-series "mini" modems, **new S2CM-HS high-speed modem**, special editions for developers, S2C communication and positioning emulator - remote access or standalone device

- range: up to 8000 m
- depth: up to 6000 m
- data rate: up to 62.5 kbps



EvoLogics GmbH
Ackerstrasse 76,
13355 Berlin, Germany

tel.: +49 30 4679 862-0
fax: +49 30 4679 862-01

sales@evologics.de
evologics.de

Horizon Marine

A **CLS Group** Company

Integrated Metocean Solutions

Observe | Measure | Validate | Integrate | Forecast | Report

EddyWatch® | FAST Eddy℠ | SurveyWatch℠ | RouteWatch® | Asset Tracking | Oil Spill Response

tel: +1 (508) 748-1860 www.horizonmarine.com horizon@horizonmarine.com