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ESSENTIAL INTELLIGENCE

Do the Right Thing: BIRNS Talks Integrity pg. 10

Clearing the Strait of Hormuz: UUVS as Mine Countermeasures pg. 28



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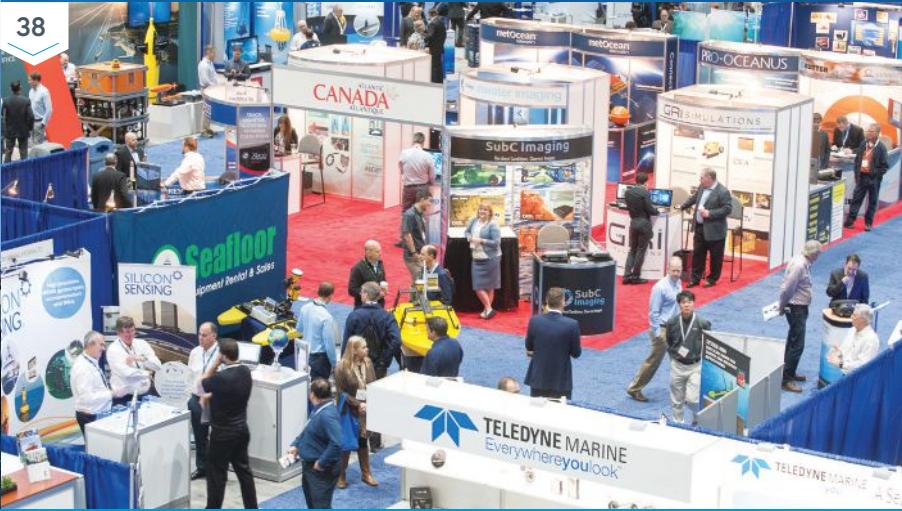
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FEATURES

- 10 Committed To Integrity In Business**
- 18 SeaCam® Product Line Expansion**
Includes IP Camera Options
- 28 Clearing the Strait of Hormuz**
Using UUVs to Detect and Dispose of Maritime Mines in a Volatile Region
- 38 50 Not Out: Oceanology International Hits its Half-Century**

DEPARTMENTS

- 14 OCEAN SCIENCE & TECHNOLOGY**
- 22 OFFSHORE ENERGY**
- 32 SUBSEA INTERVENTION & SURVEY**
- 40 COMMUNICATION & SUBSEA CABLES**
- 46 DEFENSE**

IN EVERY ISSUE

- 08 EDITORIAL**
- 20 PRODUCT FOCUS**
- 50 STATS & DATA**
- 54 EVENTS**
- 56 MILESTONES**
- 59 OCEAN INDUSTRY DIRECTORY**



ON THE COVER:

The Phoenix International Holdings Inc. REMORA ROV outfitted with xBot and 2x Hydro-Lek manipulators prior to a 5,000 msw shipwreck penetration dive.

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Editor's Notes: On 10 December 2018, the Offshore Wind for Territories Act was passed by the U.S. House of Representatives.

According to the U.S. Department of Interior's Royalty Policy Committee, a substantially increased federal commitment to growing the offshore wind sector would spur major investment from States, industries, and researchers nationwide. The committee also states that, "In order to ensure the benefits of offshore energy and mineral development to all Americans it is necessary to expand the reach of the Outer Continental Shelf Lands Act (OCSLA) to the United States Territories."

The recently passed House bill would accomplish this. It amends OCSLA to authorize offshore wind development in the U.S. Exclusive Economic Zone (EEZ) adjacent to U.S. territories. Bills expanding OCSLA to the territories have passed one body or the other in Congress several times over the last decade but have not yet become law. At the time of this writing, it remained unclear whether the act would receive a senatorial vote in 2018, but it is likely to in 2019.

ON&T asked Randall Luthi, President of NOIA, to share his opinion on this bill. His organization penned a letter

U.S. TERRITORIES NEED THE OFFSHORE WIND FOR TERRITORIES ACT

BY RANDALL LUTHI,
President, National Ocean Industries Association (NOIA)

in support of the Act to key members of Congress in early December.

Randall Luthi: The House passage of H.R. 6665, the Offshore Wind for Territories Act, is welcome news for many Americans this holiday season. Too often, Americans in the U.S. territories are our forgotten citizens. The Offshore Wind for Territories Act empowers U.S. territories such as Guam and Puerto Rico to tap their offshore resources and strengthen their energy security, all while providing jobs and economic growth for hardworking Americans.

For too long, the territories have been neglected because no federal agency actually has the authority for overseeing energy, including renewable energy, and mineral development in the EEZ offshore. In addition, the Federal government is unable to evaluate potential resources until OCSLA is extended to these areas. Clarifying the Secretary of the Interior's authority and responsibility under OCSLA will provide the support and opportunity for a comprehensive process for planning and developing offshore energy in coordination with the territories.

NOIA supports the inclusion of U.S. territories in OCSLA by this bill and by the recent recommendations by the Royalty Policy Committee. It is

imperative that Senate Majority Leader Mitch McConnell (R-KY), Minority Leader Chuck Schumer (D-NY) and the Senate Committee on Energy and Natural Resources follow the leadership of Representative Madeleine Bordallo (D-GU) and pass this bill in a timely manner.

For more information, visit www.noia.org.

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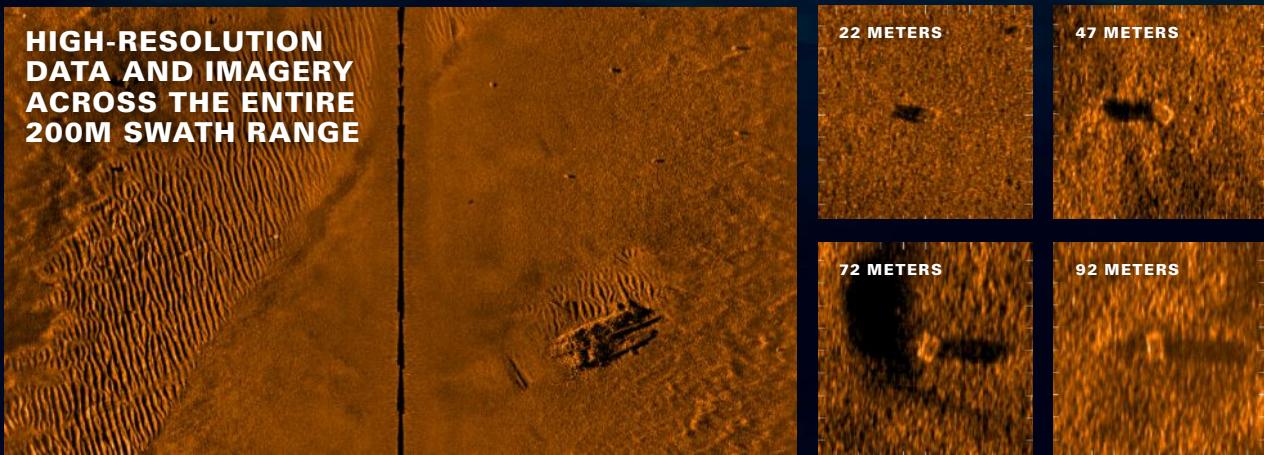
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» Eric Birns, President & CEO, BIRNS, Inc.



COMMITTED TO INTEGRITY IN BUSINESS

AN INTERVIEW WITH ERIC BIRNS,
PRESIDENT & CEO, BIRNS, INC.

Our readers know BIRNS designs and manufacturing of high-performance lighting and connector systems, and it's true that they provide exceptional products. You can read about all of them on their website, and you should, because that commitment to quality is what built BIRNS into a global leader.

What you may not know, is that they are led by a man whose core values have become the driving force behind that renowned high-performance. Eric Birns is committed to understanding the requirements of every potential client that he meets, whether it's a leading ROV manufacturer or a small diving company, the U.S. Navy or a university laboratory. Our editor asked Eric Birns to summarize how he implements his core values in a cutting-edge, technology driven company:

BIRNS was founded in 1954. How was the industry different then?

Back then, the industry was young and unsophisticated, and the technology was in its infancy, so every product introduction required new development. My father, Jack Birns, started a small business in Hollywood, selling photographic equipment to the Navy and other customers. It was a bit of a detour from his successful career as a photographer for LIFE Magazine, but every day, he worked hard to satisfy customers' needs.

As BIRNS grew, our product line expanded to include underwater

lights and other equipment, including specialty lights for the US Man-In-The-Sea program and Sea Lab, supplying what was considered deep submergence lighting at that time, even though those early incarnations only went down to about 92 meters.

We also began serving the Navy, the early oil and gas industry and the commercial diving market. Not long after, we started making subsea connector systems, for our own lights like the BIRNS Snooper and our lines of helmet lights, and then began supplying the industry with complex connector systems as demand rapidly increased.

Of course, even now, ours is a small industry, so to stay in business BIRNS had to develop on-going long-term customer relationships. These relations depend on customers recognizing that we are always striving to do the right thing.

What does do the right thing mean to BIRNS?

It means we must act ethically. Over time, we developed our business structure and codified our practices. In 1994 we wrote our ethical code of conduct: the BIRNS Guiding Principles. We achieved third-party ISO 9001:2008 certification of our Quality Management System



(QMS) in 2009, and developed our BIRNS Cultural Statement (incorporating seven main ethical tenets) in 2014. Although BIRNS is a for-profit enterprise, we have always tried to operate the business in a way that makes the world a better place. For example, we run a vibrant internship program, make charitable contributions, and have an on-going annual college scholarship program.

Recently we upgraded our QMS structure and transitioned certification to ISO 9001:2015, which emphasizes leadership commitment to understanding the needs of all interested parties, in order to increase customer focus and satisfaction. The process required our management team to thoroughly consider *all* of the stakeholder groups with which we interact—in any way—and to work out how to improve that interaction.

During this period I happened to encounter three concurrent (and convergent) elements of ethical education: a Lockheed Martin webinar on implementing a formal Ethics Program; another on ISO 10018 and Quality People Management, leading to study of Employee Engagement; and my deepening interest in philosophy, which led me to ponder our company's purpose.

Therefore, we refined and upgraded our core values: *Focus on the Customer; Do the Right Thing; Treat People Right; and Continually Improve*. These core values are integrated into our business efforts, our internal projects and all communications.

Are your employees buying into these core values?

Yes, and they are an integral part of the process. We've implemented an ongoing Employee Engagement Program, giving every team member a voice so we can take appropriate action. Similar programs for other stakeholders are being developed. We actively consider how we affect the world during every major business decision, so we discontinued product lines for which we don't have a clear competitive advantage; actively recycle various materials; and are instigating sustainable business practices such as earth-friendly packing materials and eschewing certain plastics. We invest heavily in employee training and development as well as steadily improving tooling, equipment, and employee benefits.





» BIRNS has introduced new lamps for an array of lights for applications from helmet and vehicle use to Pressure Vessel for Human Occupancy (PVHO), including the BIRNS Doubly-Safe Chamber Light-LED™. The new 450 lumen lamps for this rugged chamber light have 35,000-hour lamp lives and come in a wide selection of voltage ranges, all with a mere 6.5W power draw.



» The BIRNS Primum™ series is a heavy-duty connector line that's open face pressure rated to 6km, and stands up to the harshest physical abuse that the marine environment can dish out. It provides incredible power, signal and voltage performance capabilities, including requirements above 3kV, and its wide array of pin configurations includes options up to 40 electrical contacts from 2 to 20 AWG.

We strive to have those discussions with clients early, so we can make suggestions about future capability and cost-savings across the system lifecycle. If adding future capability is easy/inexpensive, do it, but also keep in mind that assessments must include the impact on other systems. Before purchasing products, identify your critical needs. Consider whether the system must be easily reconfigurable, either in the future or the near term. The answers to such questions will determine things like whether purpose-built solutions are preferred to a "one size fits most" product.

BIRNS offers high-quality equipment for each of your critical needs, and our long history means we also have experience to talk about everything from future capabilities to wild-card variables. We understand the consequences of such differences, including how to make cable sets compatible across all of your instrument configurations. Getting it right the first time means that in order to make the most of our high-quality products, clients should talk with our experts as early as possible.

ABOUT BIRNS:

BIRNS provides solutions trusted in the planet's most demanding environments—from deep ocean and marine applications to military programs and nuclear power facilities. They deliver a wide range of unparalleled, technologically advanced products, proven to perform in incredibly rigorous applications. From design to development to meticulous testing—BIRNS exceeds industry standards and customer expectations—constantly evolving to meet the changing needs of the marketplace. BIRNS will host Stand C21 at OI Americas, February 25-27 in San Diego, CA. For more information, visit

WWW.BIRNS.COM

SURVEY REVEALS THAT MOST MARITIME COMPANIES ARE UNPREPARED FOR CYBERSECURITY THREATS



By Hansford ("Ford") P. Wogan
Jones Walker LLP



On 24 October 2018, Jones Walker LLP publicly released the findings from its inaugural Maritime Cybersecurity Survey. The survey—which reflects the responses of 126 senior executives, chief information and technology officers, non-executive security and compliance leaders, and key managers from U.S. maritime companies—confirms that the evolving technologies deployed by the industry to increase efficiencies and competitiveness present significant cybersecurity risks.

The survey's respondents represent key sectors of the U.S. maritime industry, from small, mid-size and large companies and include vessel owners and operators, port operators and support providers, and cargo shippers.

The survey asked for input on the following: attitudes and perceptions toward cyber threats; threat management and readiness; operations, training, budgeting, and staff committed to cybersecurity; strategic planning; history of data breaches;

response plans and security frameworks; and on-vessel security.

The most significant takeaway from the survey: the industry is operating with a false sense of security and is largely unprepared to address these looming risks.

While 69% of respondents believed that the industry as a whole was prepared to address cybersecurity and the associated threats, only 36% of respondents believed that their own company was prepared. Put differently, 64% of respondents believed that their own company was unprepared to prevent a data breach.

The survey's findings indicate that preparedness is tied directly to company size. 100% of respondents from larger companies (400+ employees) felt prepared to address a potential data breach. However, 94% of respondents from small companies (1-49 employees) and 81% of respondents from mid-size companies (50-399 employees) felt unprepared.

In this respect, the survey responses correlate with actual and potential data breaches. 78% of large companies reported a successful or attempted breach within the past year. Among small and mid-size companies, there were significantly fewer successful or attempted breaches, with 83% of small companies and 60% of mid-size companies reporting no breach. This disparity raises questions: Were there no breaches? Or are these companies simply unaware of breaches?

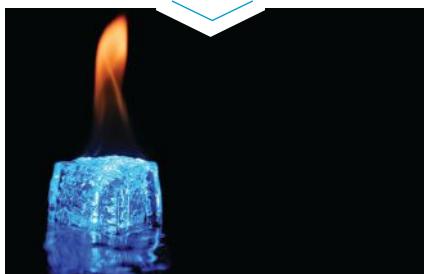
Preparedness also varied based on the type of company. 31% of vessel owners and operators believed their company was prepared. Among port operators, that number climbs slightly, to 33%, while 57% of cargo shippers surveyed believed their company was prepared. As computerization and autonomy have become more prevalent in the industry, it is no shock that cargo shippers stand in the best position to prevent a data breach.

Where does the industry go from here? Before answering, one must acknowledge that the risk of a cybersecurity threat does not appear to be on the radar for many, particularly the small and mid-size companies. The risks and impacts, though, are well-known. Given the interconnectedness of the industry, with vessel operators working hand in hand with ports and cargo owners, the potential trickle-down effect of an attack on one company can have widespread ramifications on other companies. For proof, look no further than the June 2017 attack on Maersk and the consequences of that breach.

As technology advances, industries must adapt and change. Before that can be done, the threats must be acknowledged and understood. The survey suggests that industry awareness is growing but is not yet at a point where the industry as a whole is prepared to tackle the challenges.

Companies should proactively put into place the strategic plans, policies, and procedures necessary to recognize and address cybersecurity threats. Employee training, threat assessments, and insurance will undoubtedly play a significant role in making companies cyber-secure. As each stakeholder takes steps to embrace and address cyber-security, so too will the industry as a whole.

INTERNATIONAL TEAM SET TO DRILL GAS HYDRATE TEST WELL ON ALASKA'S NORTH SLOPE



An international partnership formed to investigate the resource potential of natural gas hydrates has announced plans to drill an initial test well within the Prudhoe Bay Unit (PBU), on the Alaska

North Slope. The US Department of Energy's National Energy Technology Laboratory (NETL), the Japan Oil, Gas and Metals National Corporation (JOGMEC), and the U.S. Geological Survey (USGS) play roles in the partnership.

Gas hydrates are naturally occurring combinations of natural gas and water that form in specific conditions of relatively cold temperatures and relatively high pressures. They are known to occur in abundance in northern Alaska, as well as in the shallow sediments of deepwater continental margins around the world, most notably in the Gulf of Mexico and off the southeastern coast

of Japan. Gas hydrates have been researched in the U.S. and Japan since the mid-1990s.

The international partnership team has arranged with the Prudhoe Bay unit owners to drill, log, and gather samples to confirm the occurrence of gas hydrate at a location within the Prudhoe Bay unit. The initial well will feature temperature and acoustic monitoring devices that allow it to serve as a monitoring well for potential further production testing field experiments. The effort builds upon prior gas hydrate field research conducted by both the U.S. and Japan, including successful short-duration tests in Canada in 2002, 2007, and 2008; in Alaska in 2007 and 2012; and offshore Japan in 2013 and 2017.

The next critical step is for the international partnership team to conduct field experiments of sufficient duration to reveal how gas hydrates release natural gas in response to reservoir depressurization. The site in Alaska provides a unique opportunity to conduct experiments over many months because the partnership with industry will allow access to sites on a year-round basis.

A photograph of a yellow underwater vehicle performing navigation tasks in the ocean. The vehicle is equipped with various sensors and a camera. The text "Total Navigation" is overlaid on the image. In the top right corner, there is a logo for Sonardyne Subsea Technology.

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OCEAN CLEANUP DEVICE CATCHES, BUT DOES NOT RETAIN PLASTIC

» In early December 2018, team opened the U-shape of Ocean Cleanup System 001 wider in an attempt to solve the problem.



Since deploying Ocean Cleanup System 001 in the Great Pacific Garbage Patch (GPGP), the project team observed that plastic is exiting the system once it is collected.

In a statement from the project, they said that they were working on causes and solutions to remedy the issue. Because this is a beta system, and this is the first deployment of any ocean cleanup system, they say that they have been preparing for surprises. Although the deployed device is not harvesting plastic yet, based on the current results, the Ocean Cleanup team says, "We are positive we are close to making it work."

They were not the only ones to expect problems. An ECO Magazine article published in 2015 shared both criticisms of the plan and the Ocean Cleanup team's response. Based on their observations from this beta deployment, the team now says that they plan to "tune the system . . . and not just collect, but also retain the plastic caught."

Initial Observations from the Ocean Cleanup Team

On October 6th, the Ocean Cleanup team completed the Pacific Trials 350 nautical miles from land, through which they

confirmed the system's general behavior and seaworthiness.

After giving the go-ahead to continue the remaining 850 nautical miles to the GPGP, the team deployed System 001, or Wilson, in its operational configuration. There has been one crew change since the launch, which brought in a new set of team members with different objectives. The main goal of Crew 1 was to deploy and install Wilson in its U-shape, and, now, Crew 2 is focused on observation, data analysis and, soon, plastic collection. These have been their main, initial observations:

- ➊ For the most part, the system is behaving as predicted
- ➋ Plastic density in the GPGP is in line with our expectations; but, due to our short time in the GPGP, this is a limited data set, so we cannot fully verify this yet
- ➌ No interactions with marine life have been observed
- ➍ Small particles float within the system, though quantitative measurements are still required
- ➎ Plastic remains in the system for a relatively short time

Cause and Effects

Although the technology is built on simple principles, the dynamics are complex. There could be various reasons why plastic is not staying inside the system. We have concluded that the system does appear to be moving too slow at times (remember, to catch the plastic, we need a speed difference where the system is faster than the plastic) or, occasionally, the speed difference appears to be reversed, where the plastic is then faster than the system. At the very minimum, the system needs to be continuously traveling faster than the plastic.

One hypothesis is that the force of the wind against the system might be making both extreme ends of the floater pipe oscillate (like the fin of a fish), which may lead to a motion force against the wind direction. This motion counteracts the force of the wind, and, therefore, slows down the system.

It is also possible that the vibrations in the ends of the U-shape could be creating a type of ripple-force field that repels the plastic as it nears the mouth of the system. The team says that they believe the first solution they will attempt could potentially remediate both of these causes.

Solution

The Ocean Cleanup team has conducted scale model tests and created computer models, and, yet, this phenomenon was never observed, so they have not had a solution ready to deploy. However, they felt that the first logical solution could be easily-enacted because they had the materials available on board the vessel.

The team addressed the speed difference by opening the U-shape about 60-70 meters wider. Doing this, they thought, would have two effects on the speed of the system; firstly, it would increase the surface area of the system exposed to the wind and waves, which are the driving forces of the system. Secondly, by widening the span, the team thought this could also reduce the propulsive force caused by the undulating ends, simply because it would not be directed straight into the motion direction of the system anymore.

To perform the extension, the team lengthened the closing lines which keep the cleanup system in its U-shape. They performed the extension in several stages. As an increased span was expected to have a negative effect on the system's ability to rapidly pivot when a change in wind direction occurs, the team had to be careful to not increase the span too much.

Results of the First Solution

On 4 December, the Ocean Cleanup team reported that the closing line extension did not effectively increase the span of the system and, therefore, the speed did not improve. Further approaches to widen the u-shape are being evaluated and tested by the team.

What's Next

System 001 must work before the Ocean Cleanup team can look to scaling up, so there is no time to waste. They continue to analyze more data and test alternative solutions until the system is fully operational. To follow the team's efforts to implement a solution to this snag, visit www.theoceancleanup.com/system001.

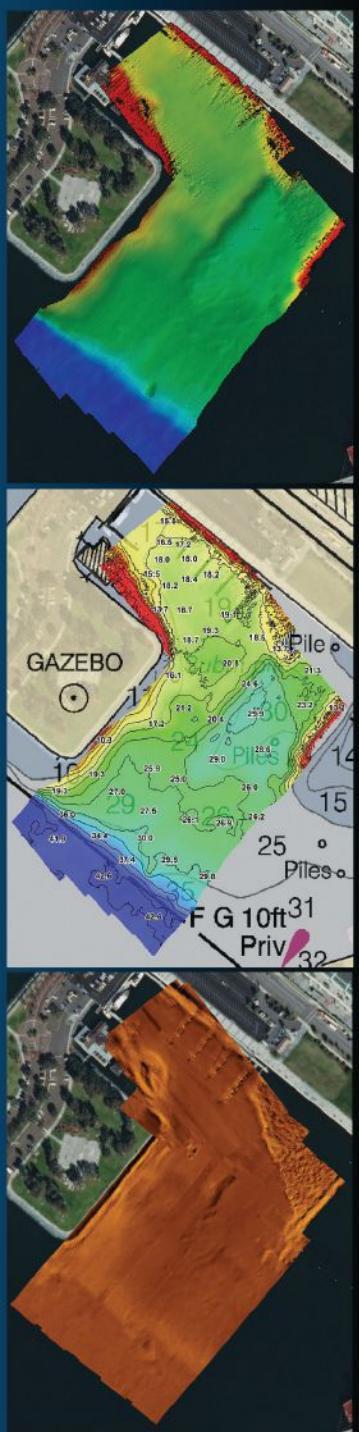


» Observation and analysis of the system will play a large role in efforts to make it fully functional.

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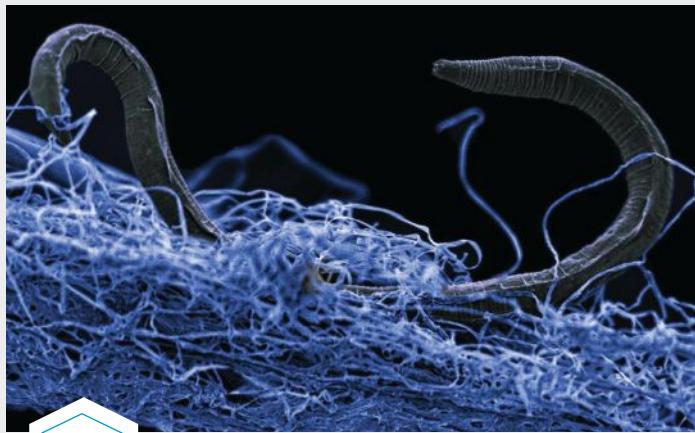
The IP Apex SeaCam® leverages the same proprietary corrector optics as the Apex SeaCam® to provide superior imaging performance with a low-distortion 70° HFOV and 12x optical zoom. The h.265 and h.264 compression engine minimizes streaming bandwidth, and standard 256 GB onboard solid-state memory enables up to four days of continuous high quality 4K recording.

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About DeepSea Power & Light

DeepSea Power & Light is a U.S. Company with over 30 years of experience manufacturing underwater lights, cameras, batteries, and lasers for deep diving submersibles, ROVs, AUVs, offshore oil, and commercial divers.

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SEAFLOOR DRILLING REVEALS SECRETS OF THE DEEP EARTH

Drilling 2.5 kilometers into the seafloor, and sampling microbes from continental mines and boreholes more than 5 km deep, scientists with the Deep Carbon Observatory team have used the results to construct models of the ecosystem deep within the planet. Barely living "zombie" bacteria and other forms of life constitute an immense amount of carbon deep within Earth's subsurface—245 to 385 times greater than the carbon mass of all humans on the surface, according to scientists nearing the end of a 10-year international collaboration. With insights from now hundreds of sites under the continents and seas, they have approximated the size of the deep biosphere—2 to 2.3 billion cubic km (almost twice the volume of all oceans)—as well as the carbon mass of deep life: 15 to 23 billion tonnes (an average of at least 7.5 tonnes of carbon per cu km subsurface). The work also helps determine types of extraterrestrial environments that could support life.

Among many key discoveries and insights:

- ➲ The deep biosphere constitutes a world that can be viewed as a sort of "subterranean Galapagos" and includes members of all three domains of life: bacteria, archaea, and eukarya
- ➲ Two types of microbes—bacteria and archaea—dominate Deep Earth. Among them are millions of distinct types, most yet to be discovered or characterized. This so-called microbial "dark matter" dramatically expands our perspective on the tree of life. Deep Life scientists say about 70% of Earth's bacteria and archaea live in the subsurface
- ➲ Deep microbes are often very different from their surface cousins, with life cycles on near-geologic timescales, dining in some cases on nothing more than energy from rocks
- ➲ The genetic diversity of life below the surface is comparable to or exceeds that above the surface
- ➲ While subsurface microbial communities differ greatly between environments, certain genera and higher taxonomic groups are ubiquitous - they appear planet-wide

➲ Microbial community richness relates to the age of marine sediments where cells are found—suggesting that in older sediments, food energy has declined over time, reducing the microbial community

➲ The absolute limits of life on Earth in terms of temperature, pressure, and energy availability have yet to be found. Microbial life can survive up to 122°C, the record achieved in a lab culture

➲ The record depth at which life has been found in the continental subsurface is approximately 5 km; the record in marine waters is 10.5 km from the ocean surface, a depth of extreme pressure; at 4000 meters depth the pressure is approximately 400 times greater than at sea level

➲ Scientists have a better understanding of the impact on life in subsurface locations manipulated by humans (e.g., fracked shales, carbon capture and storage)

Ever-increasing accuracy and the declining cost of DNA sequencing, coupled with breakthroughs in deep ocean drilling technologies (pioneered on the Japanese scientific vessel Chikyu) made it possible for researchers to take their first detailed look at the composition of the deep biosphere. There are comparable efforts to drill ever deeper beneath continental environments, using sampling devices that maintain pressure to preserve microbial life (none thought to pose any threat or benefit to human health).

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CHECK THE TECH!

Each issue, Ocean News & Technology highlights a few of the latest products from our friends in the ocean industry. Some are from big companies with storied histories, some come from new inventors with big ideas, but no matter the pedigree of these emerging technologies, they all share one thing in common:

This is where cutting-edge concepts become real-world tools.



Comparison of OceanSonics' current hydrophone and the new smaller P4 platform.

OCEAN SONICS' NEXT GENERATION SMART HYDROPHONE

New tools from Oceans Sonics simplify array design and deployment while guaranteeing the high-quality data that icListen Smart Hydrophones are known for. In 2019 the company is introducing the newest icListen Smart Hydrophone, Platform 4. Designed for creating arrays, from the simple to the complex; towed or static, Platform 4 is only 23mm diameter, making it the smallest Ocean Sonics hydrophone offering to date. Its small size makes it simple to mount on AUVs, ROVs, and other autonomous vehicles.

With its exceptionally low power drawing, Platform 4 is perfect for long term deployments, drawing only small amounts of power from its external power source. Platform 4 has a range of depth and maintains the 200khz frequency range of previous icListen's. It does not have internal memory, but external data storage is easy to add or remove.

For a full product unveiling and demonstration, visit Ocean Sonics at Ocean Business in Southampton in April.

WWW.OCEANSONICS.COM

NEMO UNDERWATER DRONE

Nemo is the first-generation product from Aquarobotman Science & Technology Co of Shenzhen, China. Perfectly balanced, Nemo can dive to 100 m at a speed of 3.9 knots, remote controlled by phone, tablet, or VR headset with controller, which shows realistic footage in sync with head movements. Shoots high-def snapshot and video. Includes LED lighting modules. Batteries work three hours.

WWW.AQUAROBOTMAN.COM



The small self-calibrating class 1-4 torque tool.

SUBSEA OPERATORS REPORT SAVINGS WITH SMART TORQUE TOOL

Considerable savings in major torque intervention projects are reported by subsea operators who have adopted the new smart electric torque tool from TMT and Saab Seaeye. At half the weight of its hydraulic equivalent, it can be operated from an electric robotic vehicle of a much smaller size than is normally required for hydraulic systems, allowing smaller support vessels to be used.

As a software-managed system, it is possible to achieve far more accurate and finer control and feedback than with a hydraulic system. The early success of the electric torque tool concept comes from being a self-calibrating, highly accurate torque control system set in a small, fast to set-up package.

A key benefit for subsea operators is the tool's ability to adapt automatically to Class 1 to 4 fittings and torques whilst performing the integrity-critical task of opening and closing seabed valves and other torque tensioning tasks.

WWW.SaabSeaeye.com

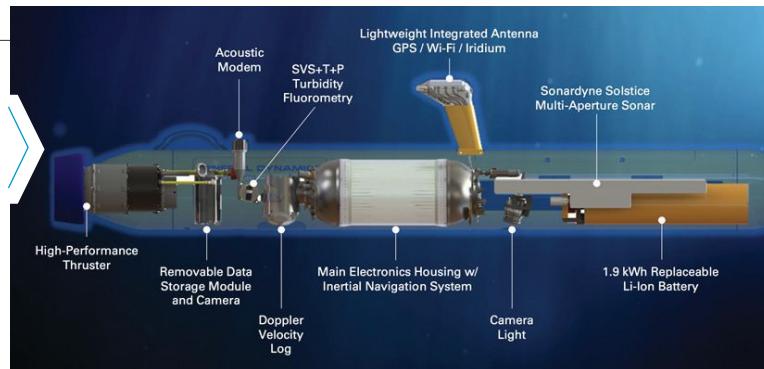


INSIDE THE NEW BLUEFIN-9 UUV

The General Dynamics Mission Systems Bluefin-9 unmanned underwater vehicle provides unmatched high-resolution data, leading navigation, data processing and mission turnaround time in a two-man portable UUV. Featuring a full carbon fiber body, integrated sensors, latest generation communications and navigational components, and new onboard processing capabilities, the Bluefin-9 is the professional's tool to Know What's Below.

Expeditionary & Simple Logistics for The Most Dynamic Missions

Tightly integrated commercial off-the-shelf sensors deliver best-in-class imagery and collect bathymetric and environmental data, including data on water currents, temperature, salinity and turbidity. Designed for detailed hydrographic surveys, the Bluefin-9 is outfitted with Sonardyne Solstice Multi-Aperture Sonar (MAS) that provides high-resolution imagery even in littoral waters. Solstice delivers undistorted, high contrast imagery in shallow water, where other sensors fail, by using dynamic focusing while allowing for wide swath coverage. The Bluefin-9 is also equipped with Nortek Doppler Velocity Logs (DVLs) that collect information on water currents up to 30 meters.



The Bluefin 9 provides unmatched high-resolution data and imagery.

Unmatched Data Quality: Integrated Sonardyne Solstice multi-aperture side scan sonar delivers a 200-meter swath range and ultra-high along-track resolution of 0.15°.

Precise & Reliable Navigation: Provides precise navigation (0.3% D.T. CEP 50) and accurate, geo-referenced data by incorporating a high-performance Doppler Velocity Log (DVL) and Inertial Navigation System (INS).

Expeditionary Operation: Allows swapping of the 1.9 kWh battery and 1TB Removable Data Storage Module (RDSM) in 30 minutes or less. The modular, free-flooded architecture eases in-field maintenance and minimizes operational down-time.

Data When You Need It: Advanced on-board data processing that offers operators access to processed sonar and camera data that is ready for post-mission analysis.

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MASSACHUSETTS OFFSHORE WIND AUCTIONS BREAK U.S. RECORD FOR HIGHEST LEASE PRICES

In a confirmation of the growing strength of the U.S. offshore wind market, three offshore wind energy leases offered at auction by the U.S. Department of Interior Bureau of Offshore Energy Management (BOEM) in Massachusetts were won at prices of \$135 million, \$135 million and \$140 million, a huge new record for U.S. offshore wind leases.

"These lease prices and the fact that we had 19 companies eligible to bid on these leases is great news for the overall U.S. offshore wind marketplace," said Liz Burdock, President & CEO, Business Network for Offshore Wind.

"Remember that just three years ago, these lease areas had no bidders at all. This strong interest from the offshore wind marketplace demonstrates the economic potential of the offshore wind industry."

The auction consisted of 32 rounds before determining the provisional winners of Lease Area OCS-A 0520 (128,811 acres), OCS-A 0521 (127,388 acres), and OCS-A 0522 (132,370 acres). Winning bids totaled \$410 million in high bids.

"BOEM should partner with the states where offshore wind development is underway and put some of the auction proceeds towards developing grants and programs that invest in port infrastructure upgrades and support U.S. companies seeking capital investments to become part of the supply chain," Burdock added. "Cost efficiency, environmental responsibility and the creation of local jobs showcase offshore wind's advantages as an alternative energy. Payments by developers to lease ocean waters should benefit all parties involved, including state ratepayers, high-skilled workers and supply chain businesses in the industry."

Burdock noted that the success of the

Massachusetts auctions should encourage BOEM to expedite the next series of auctions on both coasts, and to expand offshore wind activities to the Gulf and U.S. territories in the Caribbean.

The previous three BOEM offshore wind energy auctions took place in New Jersey (2015--\$1.9M), New York (2016--\$42.5M) and North Carolina (2017--\$9M) and have reflected a growing market for offshore wind energy as more European developers and manufacturers invest in the U.S. East Coast potential for generating clean, renewable and sustainable electricity.

The three Massachusetts areas were previously known as Lease OCS-A 0502 (248,015 acres) and Lease OCS-A 0503 (140,554 acres) and did not receive bids in the first Massachusetts auction in 2015.

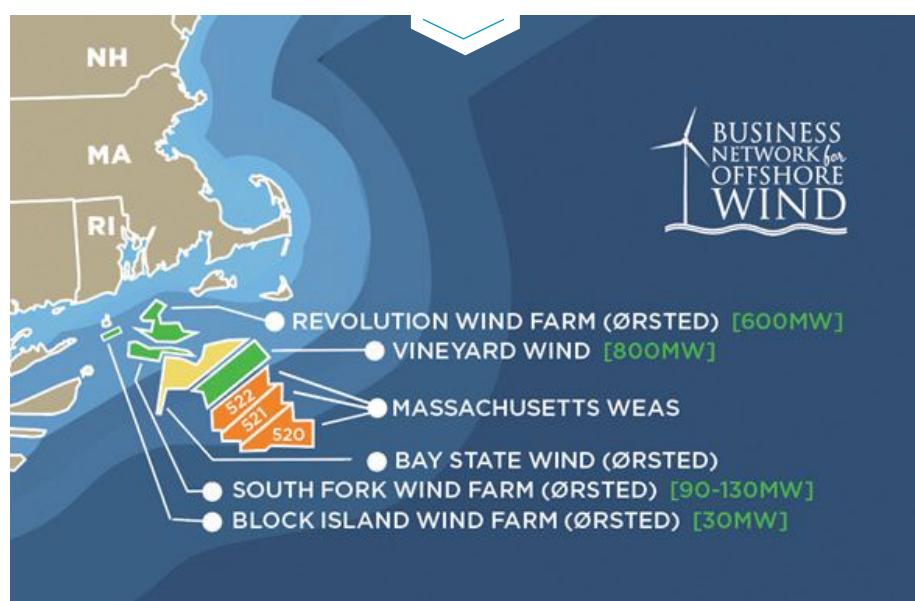
According to an analysis prepared by BOEM, if fully developed, the 390,000-acre area leased could support approximately 4.1 gigawatts of commercial wind generation, enough electricity to power over 1.5 million homes.

Regarding next steps for the winners, each lease will have a preliminary term of one year, during which the lessee will submit a Site Assessment Plan (SAP) to BOEM for approval. A Site Assessment Plan describes the activities (installation of meteorological towers and buoys) a lessee plans to perform for the assessment of the wind resources and ocean conditions of its commercial lease area.

If a Site Assessment Plan is approved, the lessee will then have up to five years in which to submit a Construction and Operations Plan (COP) to BOEM for approval. This plan provides detailed information for the construction and operation of a wind energy project on the lease.

BOEM's next set of auctions is expected to include four Wind Energy Areas in the New York Bight area under the state of New York, which is scheduled for early 2020.

WWW.OFFSHOREWINDUS.ORG



VÅR ENERGI ESTABLISHED AS NEW E&P COMPANY IN NORWAY



Vår Energi was officially established on 10 December 2018, as Norway's largest independent E&P company with a net daily production of more than 170,000 barrels of oil equivalent (boe) in 2018. Vår Energi is dedicated to exploring, developing and producing solely on the Norwegian continental shelf (NCS), with planned investments of 65 billion NOK over the next years. A key project is extending the life of Norway's oldest license area – the Balder field – towards 2045, giving the first license on the NCS, PL 001, a life span of 80 years.

After receiving appropriate approvals, the merger between Point Resources AS and Eni Norge AS has concluded. The two companies have joined forces to create Vår Energi AS, with a new organization of about 800 employees. Vår Energi is the largest independent exploration and production (E&P) company on the Norwegian continental shelf, with a net production rate of more than 170 000 barrels of oil equivalent per day (boepd) in 2018. Vår Energi is dedicated to exploring, developing and producing oil and gas resources offshore Norway.

Kristin F. Kragseth stepped into the role as Chief Executive Officer (CEO) of Vår Energi, heading a new management of 13 professionals with extensive experience from Point Resources, ExxonMobil and Eni. Philip D. Hemmens has become Chairman of Vår Energi's Board of Directors.

Currently the company holds ownership in 17 producing oil and gas fields in Norway. Vår Energi plans to significantly increase its oil and gas production by investing approximately 65 billion NOK in more than ten development projects over the next years, raising production levels to net 250,000 boepd in the early 2020s.

A major project contributing to achieve this is the redevelopment of the first NCS license area, PL 001 from 1965.

The redevelopment has been named the Balder X Project.

The redevelopment of the Balder and Ringhorne fields entails major, future project activities such as extending the lifetime of the Jotun floating production storage and offloading vessel (FPSO) towards 2045; extending the life of the Balder FPSO towards 2030; and drilling of 15 new production wells in the Balder field area and 11 new production wells in the Ringhorne field area. Key contracts for the redevelopment project will be awarded and tenders will be submitted in the near future.

Vår Energi has reserves and resources of more than 1,250 million boe, targeting development of about 500 million boe.

The company is committed to continued exploration expenditure across all parts of the NCS in the years to come. It holds a strategic position in the Barents Sea. The partly electrified Goliat field, with one of the lowest CO₂-emitting installations on the NCS, represents the first infrastructure for oil production in the region. Vår Energi aims to further develop this potential through near field exploration activities and increased oil recovery. Furthermore, through the partnership in Johan Castberg, Vår Energi is investing heavily in the future development of Norway's northernmost oil province.

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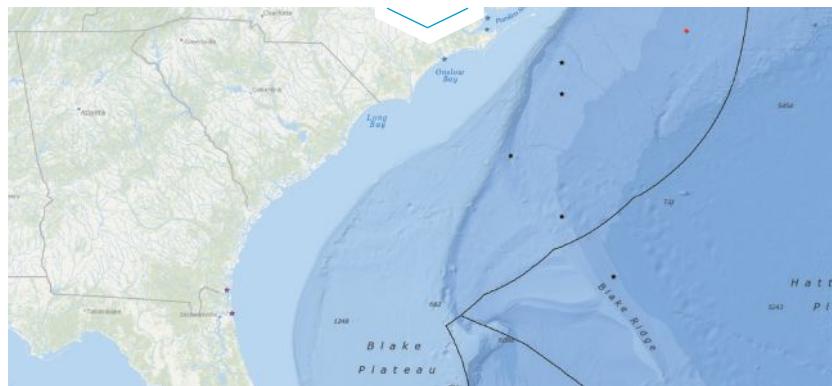
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FEDERAL LAWSUIT FILED OVER ATLANTIC COAST GEOPHYSICAL SURVEY PERMITS



National Marine Fisheries Services map showing active and in process incidental take authorizations for the region shown. The five black stars indicate authorizations specifically for active oil and gas authorizations. A fully interactive map for the entire U.S. is available at the NOAA fisheries website.

On 11 December 2018, several environmental advocacy groups filed a lawsuit in the U.S. District Court of South Carolina to halt authorizations granted by NOAA Fisheries in November for companies that propose conducting geophysical surveys in the Atlantic Ocean to "incidentally, but not intentionally, harass marine mammals."

The Bureau of Ocean Energy Management (BOEM) has responsibility for permitting geophysical surveys, while NOAA has responsibility for managing the marine mammal population.

At the time of the November announcement, NOAA Fisheries stated that they had reviewed five separate applications from companies involved in geophysical surveys using airgun arrays in the Atlantic Ocean.

The lawsuit claims that airgun arrays can disrupt marine mammal behavior and harm their ability to communicate. They further claim that drilling off the Atlantic coast poses a long-term risk to the region's environment. The group filing the lawsuit is comprised of the South Carolina Conservation League, the Center for Biological Diversity, Defenders of Wildlife, NRDC, North Carolina Coastal Federation, Oceana, One Hundred Miles, the Sierra Club, and the Surfrider Foundation.

The International Association of Geophysical Contractors has countered claims about harm to marine mammals by stating that, "More than five decades of extensive worldwide seismic survey activities and scientific research indicate that the risk of direct physical injury from sound to marine mammals is extremely low."

The new lawsuit follows public opposition by numerous Atlantic coast state, local, and federal elected officials—including the governors of every Atlantic state—who have expressed concern over the impacts expanded oil and gas exploration, development, and production could have on the commercial fishing and tourism industries.

Sources: www.fisheries.noaa.gov/action/incidental-take-authorization-oil-and-gas-industry-geophysical-survey-activity-atlantic and www.iagc.org/iagc-positions.html.

WWW.FISHERIES.NOAA.GOV



Iranian President Hassan Rouhani has reportedly said that his nation would block oil exports passing through the Persian Gulf if the United States tries to prevent Iranian oil shipments.

IRAN THREATENS TO BLOCK PERSIAN GULF OVER U.S. SANCTIONS

According to multiple reports out of Iran and Pakistan, Iranian President Hassan Rouhani has renewed a threat to cut off international oil sales from the Persian Gulf. He is quoted as saying, "if someday, the United States decides to block Iran's oil (exports), no oil will be exported from the Persian Gulf."

Rouhani also reportedly pledged that the US wouldn't be able to prevent Iran from exporting its crude oil.

"America should know... it is not capable of preventing the export of Iran's oil... If it ever tries to do so... no oil will be exported from the Persian Gulf."

Rouhani also reportedly said that Iran will continue to sell its oil and the United States will not succeed in cutting Iran's economic ties with the region and the world.

Rouhani has previously stated that he does not want a war with the United States, but insists that, "America must think again about her presence in the region, in the Persian Gulf, in the Sea of Oman, in Afghanistan, in Iraq and other places."

A U.S. carrier strike group led by USS John C. Stennis arrived in the Persian Gulf on 8 December and took part in joint naval exercises with the Essex Amphibious Ready Group (ARG) on 12 December in the Arabian Sea. According to The Wall Street Journal, while U.S. aircraft carriers have long maintained a continuous presence in the Persian Gulf region, the latest dispatch ended the longest period in two decades that such a military presence has been absent from the region.



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LEADING INVESTORS BACK SHELL'S CLIMATE TARGETS

Royal Dutch Shell plc (Shell) has announced plans to set short-term targets as part of a long-term ambition to reduce the Net Carbon Footprint of its energy products. The company plans to link these targets to executive remuneration, subject to shareholder approval. Shell announced the plans in a joint statement developed with institutional investors on behalf of Climate Action 100+, an initiative led by investors with more than \$32 trillion in assets under management.

"Meeting the challenge of tackling climate change requires unprecedented collaboration and this is demonstrated by our engagements with investors," said Shell Chief Executive Officer Ben van Beurden. "We are taking important steps towards turning our Net Carbon Footprint ambition into reality by setting shorter-term targets. This ambition positions the company well for the future and seeks to ensure we thrive as the world works to meet the goals of the Paris Agreement on climate change."

In 2017, Shell was the first international oil and gas company to set the ambition to reduce the Net Carbon Footprint of the energy products it sells, expressed as a measure of carbon intensity, taking into account their full life-cycle emissions. Shell aims to reduce the Net Carbon Footprint of its energy products by around half by

2050, and by around 20% by 2035, in step with society's drive to meet the goals of the Paris Agreement.

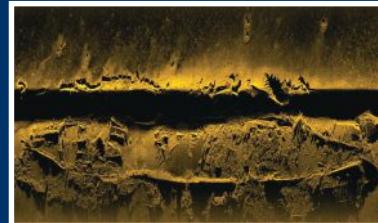
Shell is building on that long-term ambition with the commitment to setting specific Net Carbon Footprint targets for shorter periods, of three or five years. Shell will set the target each year, for the following three- or five-year period. The target setting process will start from 2020 and will run to 2050. Shell plans to link these targets and other measures to its executive remuneration policy. The revised remuneration policy will be put to shareholders for approval at the company's Annual General Meeting in 2020. The announcement is part of a drive to increase transparency around the topic of climate change, and to create clear benchmarks for performance.

Shell will publish its progress towards lowering the Net Carbon Footprint of its energy products initially in the Sustainability Report. In line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), Shell intends to integrate this disclosure into the Annual Report and Form 20-F as appropriate. The company will seek third-party assurance of the reported Net Carbon Footprint. The full text of the joint statement is available on Shell's website.

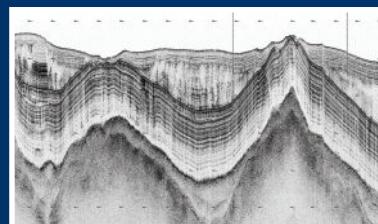
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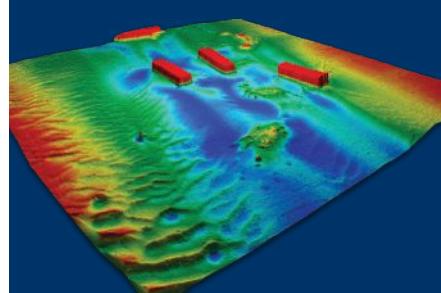
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CLEARING THE STRAIT OF HORMUZ

USING UUVS TO DETECT AND DISPOSE OF MARITIME MINES IN A VOLATILE REGION

By: Greg Leatherman, ON&T Editor

The U.S. State Department is on the record saying that they are committed to imposing "unprecedented financial pressure on Iran," specifically through comprehensive sanctions levied against that nation's ruling regime. Among the threats Iran has made in response to these sanctions, is the placement of maritime mines in the Strait of Hormuz, a vital passageway that provides the only sea passage out of the Persian Gulf to the Indian Ocean. With over one fifth of global oil exports passing through the strait, Iran's threats are a startling proposition. U.S. officials estimate that Iran could position 1,000 mines in the Strait of Hormuz in less than a week. Is the world prepared to defend against such an assault?

THE MATTIS PLAN

While in command of the U.S. Military's Central Command (CENTCOM), Secretary of Defense James Mattis anticipated this scenario. As a result, Mattis oversaw the development of a plan to keep the Strait of Hormuz open, including safe passages for oil tankers. The plan supports a rapid multinational effort to prevent Iranian mine-laying and systematically clear any mines already deployed. Because of this plan, most observers believe that even if Iran acts on such threats, coalition forces could reopen the Strait within a week, though the operation to ensure it remains open could last for months. Of course, Iran also has armed submarines, cruise missiles, and at least 1,000 small attack

boats, which could further threaten international shipping in the strait, but these are also considered in Mattis' plan, and for this article, we are focusing on maritime mines.

To ensure preparation for multiple scenarios, the U.S. leads frequent mine identification and exploitation exercises in the U.S. 5th Fleet's area of operation, which includes the Arabian Gulf, Gulf of Oman, Red Sea and parts of the Indian Ocean. For the largest of these exercises, the International Mine Countermeasures Exercise (IMCMEX), navies and government agencies from more than 40 nations spanning four continents participate in a defensive mine countermeasures exercise in the Middle East's international



» The Strait of Hormuz provides the only sea passage out of the Persian Gulf to the Indian Ocean. Iran has threatened to place mines in its waters.

waterways. Beyond this, the U.S. 5th Fleet conducts quarterly mine countermeasure exercises with the U.K.'s Royal Navy. According to the participants, these exercises

enhance cooperation, mutual mine countermeasure capabilities and interoperability, which demonstrates the shared commitment of ensuring unfettered operations of naval,



» The Avenger class mine countermeasure (MCM) ships USS Dextrous (MCM 13), USS Gladiator (MCM 11), USS Devastator (MCM 6), and USS Sentry (MCM 3), part of Commander, Task Force 52, sail in formation as part of a photo exercise in the Arabian Gulf, Dec. 6, 2016. The combined MCM force enhances mine-hunting capabilities in searching, identifying and neutralizing mines threatening the freedom of navigation and the free flow of commerce. Photo credit: Petty Officer 2nd Class Christina Brewer, U.S. Navy.

support and commercial vessels throughout the maritime domain.

Two Task Forces (TF) under the U.S. Forces specialize in mine countermeasures. TF-56, Expeditionary Combat Forces: deploys highly trained, skilled technicians who are experts in explosives, diving, and parachuting. They also use rigid inflatable boats and riverine command boats, as well mobile construction equipment via the Seabees. TF-52, Mine Warfare: provides command and control of all mine warfare assets in the region. The technology TF-52 deploys includes specialized helicopters, minesweeper ships, and unmanned underwater vehicles (UUV).

OPEN SYSTEMS ARCHITECTURE

A critical requirement of the Navy's Mine Countermeasure (MCM) technology package, including for UUVs, is its common open systems architecture design. Modularity of the mission package allows for platform flexibility and quick reconfiguration of the whole mission package in response to evolving and dynamic mission requirements the fleet will encounter day-to-day. In plain terms, that means that these UUVs can be seamlessly integrated into multiple ship systems and mission modules.

This has become more important as the Navy trends towards a mix-and-match set of people, platforms and sensors to detect and destroy mines, a departure from the simpler legacy mine

countermeasures setup with a single helicopter type and a single wooden-hull ship class, set for replacement by the new Littoral Combat Ship and its neatly defined mission package. In fact, the Navy says that when it comes to deploying UUVs, they're not limiting deployment to U.S. ships, they're working with the ships of coalition partners as well. For example, in 2017, the Navy conducted tests with USS Independence (LCS-2) to test their ability to deploy personnel and UUVs off the Australian built LCS, after doing similar tests on the Lockheed Martin-variant USS Freedom (LCS-1) last summer.

Speaking last year at the National Defense Industrial Association's annual Expeditionary Warfare Conference, Capt. Michael Egan, Commander of Task Force 52, said "We've taken our ExMCM company with their Mk 18 family of UUV systems, we've put them aboard cruisers and destroyers and had them do extensive rehearsals of the actual operations – and in some cases, in exercises and operations we've actually used those platforms."

Why do this? According to Capt. Hans Lynch, head of the mine warfare branch within OPNAV N95, speaking at the same conference, if an adversary were to deploy mines in a busy shipping area,

"I can't imagine a scenario in which we would actually have enough LCSs to mass that capability as quickly as we need it."

In such a scenario, Capt. Lynch says, every deployment option would be used, "Shore-basing makes a lot of sense. ESB (Expeditionary Sea Base) makes a lot of sense. EPF (expeditionary fast transport) makes a lot of sense. Coalition platforms. And really I think there are opportunities for even DDG-1000s, they have enough room that we can put a USV or UUVs onboard. Aircraft carriers even or some of our big-deck amphibs could support some of our mission platforms that we have."

Clearly, the Navy is considering every possible scenario. So, let's take a closer look at some of the key mine counter measure technologies used by the Navy's 5th Fleet. This is by no means an exhaustive list, but it should give you an understanding of how coalition forces would defend against the types of threats Iran is making in the Strait of Hormuz.

AVENGER CLASS MINE COUNTERMEASURES (MCM) SHIPS

Avenger Class MCM ships are designed to clear mines from vital waterways. Using variable depth sonar scans, UUVs, and other methods, Avenger-class MCM ships employ high-resolution sonar and video systems, cable cutters and a mine detonating device that can be released and detonated by remote control. They are capable of detecting, classifying, and neutralizing both moored and bottom mines as well as conventional sweeping measures. The ships are of fiberglass sheathed, wooden hull construction. There remain 11 MCMs in current service to the fleet, including four that are based out of Manama, Bahrain.



An MH-53E Sea Dragon, from Helicopter Mine Countermeasures Squadron (HM) 15, prepares to land on expeditionary mobile base platform ship USS Lewis B. Puller (ESB 3).

MH-53E SEA DRAGON HELICOPTER

The MH-53E is used primarily for Airborne Mine Countermeasures (AMCM), with secondary missions of vertical shipboard delivery and assault support. It can operate from carriers and other warships and is capable of towing a variety of mine hunting/sweeping countermeasures systems, including the Mk 105 magnetic minesweeping sled, the AQS-14A side-scan sonar, and the Mk 103 mechanical minesweeping system. When performing the assault support mission, the MH-53E can be fitted with the GAU-21 .50-cal. machine gun ramp-mounted weapon system. It can also be used to deploy lightweight UUVs.

TELEDYNE SEABOTIX vLBV

SeaBotix vectored Little Benthic Vehicles (vLBV) are portable ROVs ideal for mine detection. The vLBV300 is only 18 kg (40 lbs) in air with various payload packages available, meaning that it can be easily deployed via helicopter. It's also versatile, with uses in a wide range of applications including underwater inspection. The system features dual vertical thrusters and is capable of carrying



Explosive Ordnance Technician 3rd Class Nicholas Hursky launches a SeaBotix vLBV300 during the International Mine Countermeasures Exercise (IMCMEX). Photo credit: Mass Communication Specialist 1st Class Blake Midnight, U.S. Navy.

a wide variety of sensors and tooling including imaging sonars and multi-function manipulators. Standard features include LED lighting that tracks the high-resolution camera, auto-depth, heading and trim (speed), depth and temperature sensors, low-drag, neutrally buoyant tether on a reel with slip ring, and a choice of control consoles.

SEAFOX MINE DISPOSAL UUV

The SeaFox UUV manufactured by Atlas Elektronik was developed based on the expendable mine disposal vehicle (EMDV) principle. The semi-automatic UUV is primarily used for the disposal of mines and other identified ordnance in sea. It can detect and classify the mines and sea objects. It is guided by a fiber-optic cable. The SeaFox can also be used in damage estimation, intelligence, route survey, maritime boundary control and harbor surveillance missions. The complete SeaFox system includes a console, a launcher, and the SeaFox vehicles. It can be launched from a range of naval platforms such as dedicated mine counter measures vessels (MCM), surface combatants, rubber boats and helicopters.



A Seafox UUV sits on the deck of HMS Middleton (M34), Oct. 14, 2016 in the Arabian Gulf. Photo credit: Petty Officer 2nd Class Tyler Thompson, U.S. Navy.

HYDROID MK 18 SWORDFISH AND KINGFISH UUVS

The Mk 18 Mod 1 Swordfish UUV is capable of performing mine countermeasures operations such as search, classification, mapping, reacquire, and identification. The UUV can navigate via acoustic transponders in long-baseline or ultra-short-baseline mode or via P-coded GPS. Its upward- and downward-looking acoustic digital velocity log improves dead-reckoning accuracy. Follow-on block upgrades combine two separate UUV programs into the MK 18 family of systems to deliver improved detection capability against buried mines in high clutter environments.

This year, at the direction of the Navy, the Mk 18 was upgraded to a Mod 2 version. Resembling a conventional torpedo, they are launched from ships or mid-sized rigid-hull boats for mine countermeasure work. The Kingfish mounts a Small Synthetic Aperture Sonar Module that provides high resolution underwater scan imagery and is capable of detecting buried targets.

The Kingfish Mod 2 is nearly 4 meters long and weighs over 600 pounds. It is deployed and recovered using a small crane. It features better sonar, endurance and coverage abilities than the smaller Mk18 Swordfish model it serves alongside. The Kingfish is capable of being deployed off of the Littoral Combat Ship (LCS) as part of the LCS's countermine mission for coastal waters alongside the larger General Dynamics Knifefish UUV.

GENERAL DYNAMICS KNIFEFISH UUV

Knifefish is a heavyweight class MCM UUV designed for deployment off LCS. The Knifefish provides the mine warfare commander with enhanced mine-hunting capability



Brian Dinkel, assigned to Commander, Task Group (CTG) 56.1, recovers a MK-18 Mod 2 Kingfish UUV after testing its autonomous topographic large area survey, forward looking sonar. Photo credit: Mass Communication Specialist 1st Class Blake Midnight, U.S. Navy.

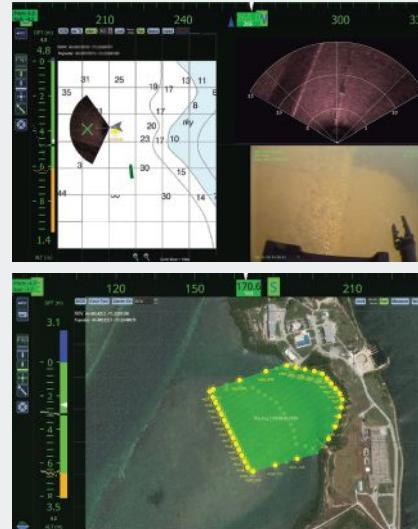
by detecting, classifying and identifying both buried mines and mines in high clutter environments. Knifefish's job is to detect, avoid and identify mine threats by operating in the minefield as an off-board sensor while the host ship stays outside the minefield boundaries. Knifefish also gathers environmental data to provide intelligence support for other mine warfare systems.

In late 2018, General Dynamics released a two-man-portable MCM-capable UUV, the Bluefin-9, which provides high-resolution data and rapid navigation, data processing and mission turnaround time in a two-man portable UUV. Featuring a full carbon fiber body, an integrated suite of sensors, latest generation communications and navigational components, and new onboard processing capabilities, it will be interesting to watch whether a UUV based of this design will be deployed to the Navy's 5th Fleet.

STAYING PREPARED

As this article was being written, the U.S. and U.K. were joining together in their fourth mine countermeasures exercise of 2018. Given the advanced skills and technology with which these forces are armed, there can be no doubt that they are prepared for the dangers posed by maritime mines.

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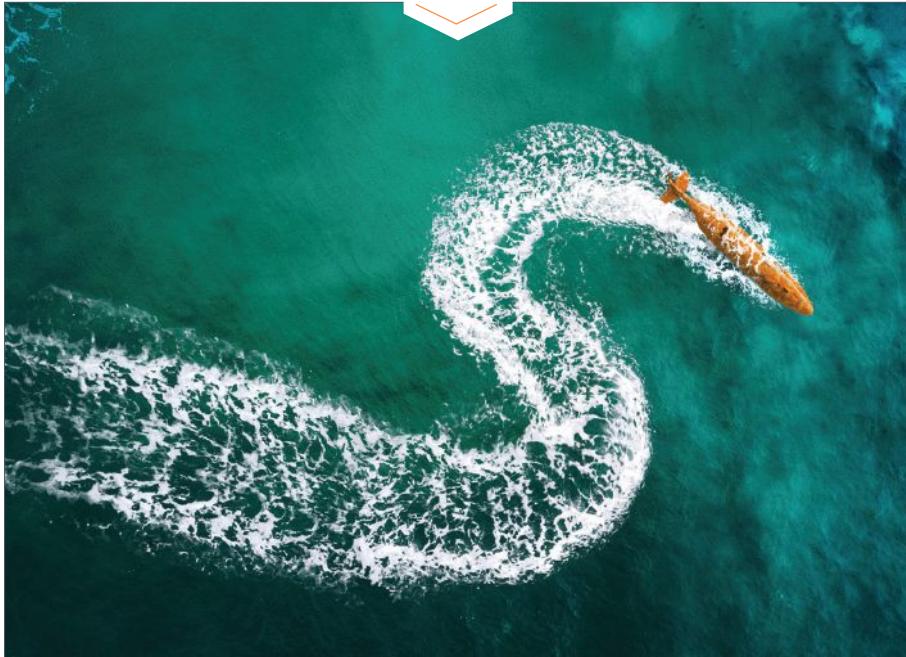
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KONGSBERG INTRODUCES THE HUGIN SUPERIOR AUV SYSTEM



» The HUGIN SUPERIOR platform packages the very latest technologies into one system

Kongsberg Maritime's has unveiled the new HUGIN SUPERIOR AUV (Autonomous Underwater Vehicle) System introducing significantly enhanced data, positioning and endurance capabilities that together will stimulate a positive step-change in subsea survey operations for commercial, government, and naval users.

Leveraging and improving on the power of the already de facto industry standard HUGIN technology platform, and its experience as a trailblazer in maritime autonomy since it pioneered Dynamic Positioning in the seventies, Kongsberg Maritime has created a game-changing new AUV generation that places data quality and its reliable and cost-effective collection front and center.

The HUGIN SUPERIOR platform packages the very latest technologies into one system delivering twice the area. It is equipped with the new HISAS 1032 Dual Receiver Synthetic Aperture Sonar (SAS) which generates approx. 1000 meters

swath at 2.5 knots for SAS imagery, real aperture and SAS bathymetry, with consistent resolution over the entire swath (typically 5x5 cm in mission imagery). The system also features the de facto industry standard EM2040 mk II multibeam.

Configurable for diverse applications, a class-leading data suite with upgraded SAS processing, sidescan sonar imagery, bathymetry, subbottom profiler, camera, laser, magnetometer, turbidity and diverse environmental sensors for methane and CO₂ measurement, ensure that the new HUGIN is as ready for field development surveys and pipeline inspection as it is for environmental monitoring or wreck searches.

Contributing to improved data confidence for users at sea and ashore, the HUGIN SUPERIOR utilizes sophisticated positioning technology, with in mission standard navigation rated twice as effective as other AUV platforms, including current HUGIN models. Operating HUGIN SUPERI-

OR now costs less with fewer external updates needed, and with new potential for concurrent revenue generation, further economic efficiencies can be achieved.

The new HUGIN SUPERIOR also comes with a 30% increase in energy capacity on board, without changing form factor or size. While raising the bar in terms of extending mission endurance, the extra power available can also be used to maintain current levels of endurance while adding more sensors, increasing productive survey time and contributing even more to reduced OPEX.

WWW.KONGSBERG.COM

JAMES FISHER OCEAN TEAM COMPLETES SOUTH CHINA PROJECT

James Fisher Ocean Team (JFOT) has completed its first excavation for COOEC Subsea in the South China Sea and the team is gearing up for additional projects in 2019.

JFOT was established to provide an enhanced service to clients in China by experts from global controlled flow excavation (CFE) James Fisher Subsea Excavation (JFSE) who have worked in the region since 2009 and a specialist Chinese offshore project, vessel and marine equipment provider.

The project, for COOEC Subsea in Zhujiangkou Basin, 170km southwest of Hong Kong in the South China Sea, was for post-lay trenching of 7km of subsea cable as part of the oil field's joint development. It was delivered by JFSE's international experts alongside local specialists, technicians and logistics support.

Fu Wenzhi, technical manager of COOEC Subsea, said, "We have established the trust in the technology and personnel from JFSE over the years who have once again executed the project within time and budget. Now that the equipment as well as operational and logistical support are based locally in Shenzhen, we are looking



forward to further opportunities to work together."

JFOT has two excavation spreads – the Twin R2000 and T8000 - positioned permanently in China to more efficiently and effectively support clients in the country's growing oil & gas and offshore wind sectors. The joint venture brings together the global expertise, technologies and industry knowhow of JFSE with local knowledge and delivery teams based in Shenzhen. The subsea excavation equipment services a number of sectors and applications include pipeline and cable trenching, deburial, rock dump dispersal and seabed clearance and preparations.

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FINALISTS ANNOUNCED FOR NEXT YEAR'S UK SUBSEA AWARDS

The finalists have been announced for next year's Subsea UK awards, which recognize the companies and individuals who are leading the way in the UK's £7.5 billion subsea sector.

The prestigious awards ceremony will take place on Wednesday, 6th February 2019 at the Aberdeen Exhibition and Conference Centre.

Seatecronics Ltd, Enpro Subsea and Motive Offshore Group have been announced as the finalists for the Subsea Company of the year award, which is sponsored by the Oil & Gas Authority (OGA).

Infinity Oilfield Engineering Limited, Crondall Energy and The Brimmond Group have been shortlisted for the Best Small Company award and the Innovation for Safety award will see Canyon Offshore Ltd, JFD Ltd and Ecosse IP Ltd compete to take home the accolade.

In the Global Exports award, which is sponsored by the Department for International Trade (DIT), UTEC Survey Asia Pte Ltd, Enpro Subsea and Royal IHC Limited have all been shortlisted.

Emerging talent within the industry will be recognised on the night with Lee Martin of Crondall Energy, Graceann Robertson of EC-OG and Ryan Fernando of Aker Solutions being shortlisted for the Emerging Young Talent award, which is sponsored by SMD.

C-Kore Systems Ltd, Rovco and Viewport3 Ltd have been recognised for their developments in new technology and have been shortlisted for the Innovation & Technology award, which is sponsored by Simmons & Company International.

An individual who has made a lasting impact on the subsea sector throughout their career will also be recognized on the night with the Outstanding Contribution award.

The awards will take place during Subsea Expo, which runs from 5-7th February 2019 at the Aberdeen Exhibition and Conference Centre. This year's event will have the theme 'Innovating the Future' and will look to stimulate high-level discussions on subsea technology and the rise of digitalization. Looking at how they are accelerating the ability to deliver sustainable energy and achieve operational efficiency.



WWW.SUBSEAUK.COM/9796/SUBSEA-UK-AWARDS-2019



NEXANS TO FOCUS ON CABLE IMR SERVICES WITH NEW TEAM

The world relies increasingly on high voltage offshore cable connections to ensure the continuous and reliable flow of power. As these critical connections grow longer and with higher capacity, there is an increasing statistical risk of them being damaged by external factors, such as fishing activities. To address these challenges Nexans has now combined its wealth of experience and resources - including fault location technology, specialized offshore repair equipment and the special assets for the repair itself - into a dedicated Inspection, Maintenance and Repair (IMR) team.

The new IMR team comprises highly experienced Nexans experts who can support customers worldwide with emergency response, a 24/7 hotline and fast-track mobilization.

"Nexans has an impressive toolbox when it comes to IMR. We can offer a full scope of IMR services covering every need from preventive works to assisting when faults occur. We also carry out fault location with innovative technology as well as on and offshore repairs even under the most complex and harsh conditions," said Tom Skattum IMR Department Manager – Nexans Subsea & Land Systems

A Nexans IMR agreement not only reduces the failure risk for cable systems through proactive inspection and maintenance, but also enables Transmission Service Operators (TSOs) to manage unexpected incidents more efficiently with the help of the expert team. Thanks to a Nexans IMR agreement, a TSO could potentially cut the response time to an incident by up to 70 percent, leveraging on the Group's 40-year track record.

WWW.NEXANS.COM

SEATOOLS INTRODUCES SUBSEA EXCAVATION TOOL

Following an extensive R&D trajectory, subsea technology company Seatools has introduced the revolutionary Carrera E 3D motion-controlled precision flow excavation spread. The 630+ kW, all-electric deep-water excavator features Seatools' advanced ROV DP technology and sets the stage for unprecedented levels of accuracy, production, and workability in the mass flow excavation (MFE) market.

Seatoools developed the Carrera E mass flow excavation spread leveraging its proven capabilities in heave compensation and ROV control technologies. The patent-pending spread features 3D motion control, which enables precision excavation operations at a minimum of seabed disturbance. Thanks to the Carrera E's incorporated dynamic positioning (DP) capabilities, the tool may follow a pre-programmed track (e.g., a cable route) with high precision and in a highly automated manner.

Seatoools arrived at the game-changing design by performing a holistic analysis on subsea excavation operations. Johan Sol, responsible for business development, explains: "Early on in the development process we analyzed excavation operations as well as the direct and indirect cost drivers from a client point of view. Especially in terms of indirect cost drivers – vessel day rates, environmental downtime, survey costs, and crew costs – we found significant room for improvement: in some cases, total project costs could be cut by 50% while realizing reduced environmental impact and safety improvements."

The Carrera E is launched by means of a dedicated, actively heave-compensated LARS. The LARS minimizes trench depth variation, and, under all circumstances, prevents physical contact between the product and the excavator. The motion control technologies – AHC and DP – maximize the spread's workability

and extensively boost both production rates and dredging tolerances. Even under adverse environmental conditions, such as strong currents and high-sea conditions.

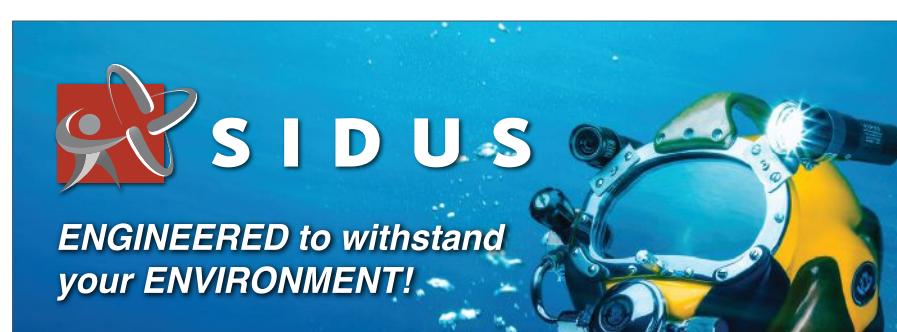
Above and beyond its superior positioning capabilities, the Carrera E's boosted production rates can be attributed to a highly powerful and efficient all-electric drive configuration. With over 500 kW of installed power dedicated to dredging, the spread takes on a wide range of soil conditions. Despite its hefty power rating, the MFE spread is compact in size. The LARS, including tool, only requires a 20-foot container footprint and a minimum of vessel interfaces. Combined with the fact that no tugger wires are required, all this means the Carrera E can be deployed from a wide



range of vessels, including smaller, low day rate vessels.

A final and gainful cost saver results from the high level of automation, as is common for Seatoools' fall pipe ROVs: in case of 24-hour operations, the spread can be operated by just four operators. Value creation also results from its integrated survey capabilities. The Carrera E enables pre-process, intermediate, and post-process surveys without requiring a separate WC-ROV spread. In turn, creating a far more cost efficient workflow.

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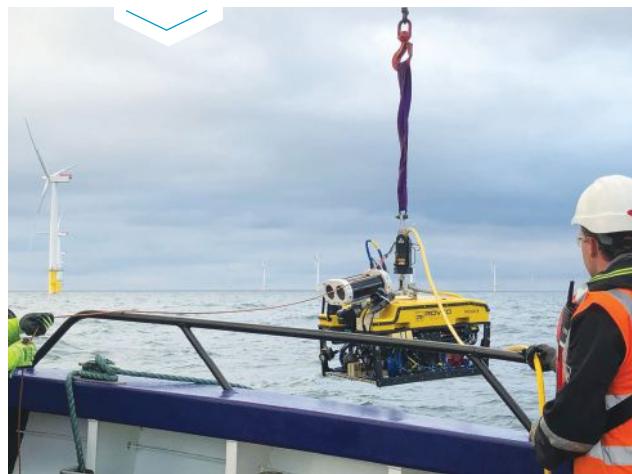
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ROVCO LIVE 3D VISUALISATION PROJECT AWARDED SECOND PHASE OF FUNDING



Leading ROV and hydrographic survey company, Rovco, has been awarded further funding to develop the next stage of its integrated live 3D vision and artificial intelligence (AI) survey technology. This brings the combined total in technology grants for the UK subsea services company to £1.46 million.

The funding has been awarded by Innovate UK, the UK's innovation agency. The next stage, AUV3D Phase 2 continues from the successful Phase 1 project and trials proving the technology at the Offshore Renewable Energy (ORE) Catapult's test centre.

In collaboration with ORE Catapult and ScottishPower Renewables, the funding will support additional research into the cutting-edge 3D vision technology by applying machine learning and AI based analysis to 3D survey and cable burial data.

During the 18-month project, Rovco aims to achieve live transmission of 3D subsea models to shore. As the project progresses Rovco will also commercialise its proven technology, bringing pioneering subsea survey technology to market in live 3D computer vision.

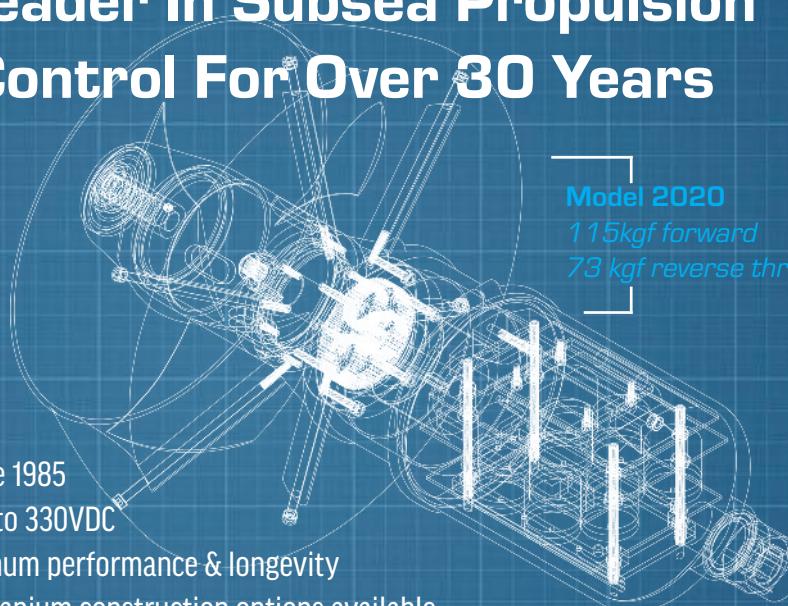
Rovco predicts the integrated technology, which utilises advanced computer vision and AI systems with ROV platforms, could transform the way offshore inspections are carried out and reduce costs by millions each year.

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» Photo credit: Fugro

FUGRO'S IRM EFFICIENCIES REDUCE COSTS AND ATTRACT NEW NORTH SEA CLIENTS

Recent work includes significant pipeline and structure inspections for Centrica Storage, Chrysaor, Dana, Petrofac, Premier, Repsol and Spirit Energy. Workscopes also include light repair and maintenance and decommissioning, utilizing Fugro's multirole vessels and broad in-house environmental, geotechnical and geophysical expertise.

Karl Daly, Fugro's European IRM Service Line Director, commented, "In this competitive market, we are extremely pleased that our experienced IRM team, efficient vessels, in-house ROVs and AUVs and bespoke tooling have helped Fugro to secure these contracts. These all enable us to optimize schedules and reporting to clients, and to reduce project time, costs and risks."

He added that Fugro's commercial and technical proposals are underpinned by the company's ability to demonstrate outstanding IRM service efficiencies and highlighted a notable 30-day inspection campaign. "This recent inspection project was not only completed within schedule and under budget, but it also achieved 100% vessel up-time and delivered huge cost savings on repairs," he explained. "By rapidly designing, simulating and integrating a unique ROV-deployable caisson centralizer repair tool, we avoided the need for an expensive dive support vessel, saving our client over £1 million."

2018's additional contracts join the long-standing ROVSV framework agreements and regular inspection work Fugro carries out for four other UK North Sea operators. The company also performs annual platform asset-based ROV inspections for six clients in the UK and regular North Sea ROVSV pipeline inspections for operators in the Irish, Danish, Dutch and Norwegian continental shelves. Elsewhere in Europe in 2018, Fugro completed several major trunk line pipeline inspection projects.

WWW.FUGRO.COM

EQUINOR STUDIES SUBSEA DRONES FOR IRM

i-Tech Services (a Subsea 7 company) has developed the Autonomous Inspection Vehicle (AlV), which can stop, carry out its inspection task, and then travel to and autonomously dock into a recovery basket. Equinor engaged the company in a pilot study to investigate its use for inspection, repair, and maintenance (IRM) in the Tampen area of the North Sea. While the study concluded that this technology could be ready for deployment within by 2019, it recommended accelerating development for some elements. Equinor is utilizing findings from the study with the aim of sanctioning the vehicle as a permanently available subsea inspection and light intervention capability.

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FEATURE

50 NOT OUT: OCEANOLOGY INTERNATIONAL HITS ITS HALF-CENTURY

SAN DIEGO CONVENTION CENTER
TO HOST 50TH ANNIVERSARY
Oi EVENT IN FEBRUARY 2019

To the understandable pride of all concerned, February 2019 marks the 50th anniversary of Oceanology International, the seminal and widely respected ocean science and technology conference and exhibition. This landmark occasion will be celebrated over three days at the San Diego Convention Centre, which is hosting the second Oceanology International Americas event (OiA '19) between 25-27 February 2019. More than 200 exhibitors are being lined up for the show, and attendee numbers are expected to exceed 2,750.

How different this all seems from 50 years ago: a world away, yet oddly familiar. The comparatively modest inaugural Oceanology International event took place in

» All photos courtesy of Oceanology International

Brighton, England over four days, 18-21 February 1969. The Beatles were at number 1 in the album chart with *Abbey Road*; and any delegates who quietly returned home or to their hotels instead of hitting the town to celebrate the show's end on the Friday would have been watching some of the first ever colour broadcasts from the BBC!

At the event itself, the signs were extremely encouraging. A total of 600 visitors and exhibitors attended: enough to establish viability, cementing the notion that Oi could become a going concern as a biennial undertaking. The success of the first Oi proved that this was a timely and appropriate initiative, reflecting a major upswing in oceanology interest related to simultaneous developments within the offshore oil & gas industry and environmental bodies.

Over the years, Oceanology International has continued to grow in prestige and influence as a forum for innovation and commerce, keeping pace with – and often driving – significant advances in ocean science and technology. By the time Oi celebrated its 25th anniversary in 1994, its international conference program was presenting more than 135 papers within an extensive technological portfolio. Eleven of the companies which exhibited at the first event in 1969 were still on board: literally hundreds of others had come along in the interim, attracted by Oi's status as a uniquely galvanic symposium for commerce and ideas.

Eventually, inevitably, Oi expanded to the point where a change of venue was required, to which end the event was transplanted to ExCel London in 2000. However, Oi's exponential rise didn't stop there. The year 2013 saw the launch of Oi China in Shanghai, establishing a trading and solutions dialogue with a booming new marketplace. Immediately successful, Oi China relocated to the port city of Qingdao for 2017 and 2018, but is heading back to Shanghai in 2019. Of course, Oi's global stature has been further enhanced with the inception of Oi Americas, launched in San Diego in 2017.

OiA '19, arranged in association with The Maritime Alliance, is the second Oceanology International Americas event and the second to be held in San Diego, a burgeoning Blue Economy hub. The exhibition floor will be packed with companies promoting products and services in a broad variety of categories, running the gamut from marine science, ports and maritime security to marine environmental protection, offshore oil & gas, ocean mining, fisheries & aquaculture and offshore construction – and all points in between.

ANNIVERSARY DISCOUNT

One of the most direct links between the initial event and OiA '19 is the Society for Underwater Technology (SUT), which sponsored the 1969 Oi and is still enthusiastically committed as one of OiA '19's supporting partners. To mark the 50th anniversary, SUT is offering a special deal: for the price of a normal one-year SUT subscription, you can apply for membership now and gain access to all member benefits until 30 June 2020. (Go to sut.org/sut-membership and enter the special offer code, Oceanology50.)



ON TO THE FUTURE

"The underlying impetus behind OiA '19 is the desire to forge mutually constructive working relationships and train a spotlight upon game-changing incentives from international ocean professionals of every stripe," says Jonathan Heastie, Senior Event Director from organizers, Reed Exhibitions. "The event's third day will represent a thorough celebration of Oi's fruitful 50-year history, but our unwavering focus is always on the new. This is why we have introduced our Future Tech hub to direct delegates towards the latest technologies."

The Future Tech hub provides exhibitors with advantageously located booths at the front of the OiA '19 floor plan, plus the

opportunity to stage two 20-minute presentations in an open-plan theatre adjacent to their booth. Companies already confirmed for the hub include Think Sensor Research, engineering design solutions specialists Igloo Innovations, Apium Swarm Robotics and maritime security firm ThayerMahan. In addition, OiA '19 organizers have extended an invitation to companies with fewer than 10 employees – and a product or innovation to launch or promote, if it has emerged since the 2017 event – to showcase their new innovations within the Future Tech hub. Visit the Oi website at www.oceanologyinternationalamericas.com for more details.

KEY TOPICS AND NETWORKING

The breadth of the OiA '19 exhibition program is reflected in the expansive conference schedule. Key topics to be examined in detail, under the conference's technical tracks umbrella, will include Unmanned Vehicles, Vessels and Robotics; Ocean Observation and Sensing; Hydrography, Geophysics and Geotechnics; Marine Pollution and Environmental Stressors; Navigation and Positioning; and Ocean ICT.

The conference calendar is reinforced by two noteworthy one-day content and networking events, both designed to demonstrate the way converging streams of thought and developing technologies are working towards the furtherance of a sustainable Blue Economy. On OiA '19's opening day, Monday 25 February, the Ocean Futures Forum will match heads of business with senior strategists for in-depth discussions relating to market opportunities and evolving technological needs across ocean sustainability, aquaculture, offshore renewables and defense.

CATCH THE NEXT WAVE

Meanwhile, on Tuesday 26 February, Catch the Next Wave 2019: Frontiers of Exploration (presented in association with The Explorers Club) will bring together scientists, technicians and explorers to demonstrate the interdependent roles of science and exploration. By its very nature, ocean and space research pushes boundaries by literally delving into the unknown: breakthroughs occur when new technology is needed to address new demands. In turn, advanced and innovative

tech enables exploration to achieve new levels of sophistication, in a reciprocal cycle of inquiry and discovery. Catch the Next Wave will examine these bilateral benefits via inspired speaker pairings, prefaced by a welcome video from storied filmmaker and deep-sea explorer James Cameron. Other Catch the Next Wave speakers include Dr. Michael Gernhardt – NASA Astronaut; Margaret Leinen – Director of Scripps Institution of Oceanography; and Erden Eruç – Adventurer, Ocean Rower.

"With so many exhibitors and visitors embodying the growing markets for marine renewables and aquaculture in the US and across the globe, OiA '19 will demonstrate that there is every reason to feel optimistic for the future of ocean science and technology," adds Jonathan Heastie. "Here is where you'll be able to witness how industry professionals meet ocean sustainability challenges, devise solutions and create networks to literally keep maritime businesses buoyant—and all under a single roof."

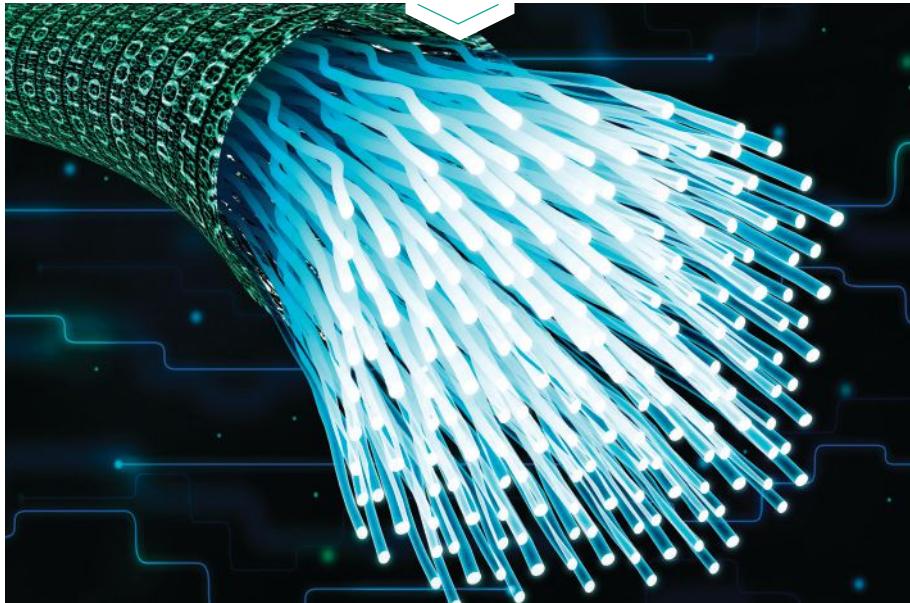


REGISTER NOW

For more information and to register for the conference, visit www.oceanologyinternationalamericas.com and click on 'register'. Registration can be completed via LinkedIn or email, and early-bird rates end on 21 December 2018. Registration for the OiA '19 exhibition is free.

SUBMARINE NETWORKS Q&A

WITH BRIAN LAVALLÉE, SENIOR DIRECTOR AT CIENA



What methods is the submarine network industry using to manage and control their networks to-day?

Submarine networks carry more than 95 percent of the world's intercontinental electronic communications traffic and are responsible for over \$10 trillion worth of transactions every day. They are the backbone of the internet, but simply have not received the same media attention as counterparts on land or in space.

Traditionally, submarine networks have been managed manually with offline tools such as ledgers and spreadsheets. Most operators today use some type of network management system software, with a growing adoption and integration of automation and analytics. Automation allows operators to select service path endpoints and the network automatically provisions the service – something that

in the past would have taken days to months now takes only minutes, maybe even seconds. Plus, because this involves machine-to-machine communications, the chances of an error are significantly reduced, making the process quicker and more secure. Analytics allows for understanding the health of the network on an ongoing basis and proactively and reactively choosing the best path for a service across the network.



Where do you see subsea fiber technology headed in the next few years? What trends or developments are the most important?

Data traffic is expected to grow significantly in the coming years, with bandwidth increasing around the world. There is no sign that this growth will slow down anytime soon. The increase in traffic is in part due to some of the more obvious

offenders – just look around and you can't help but notice the number of people glued to their phones consuming videos and playing games. Also, as developing countries continue to have access to and embrace technology, the amount of traffic will grow by leaps and bounds. And not so obvious, but right now one of the biggest culprits is machine-to-machine traffic between data centers where accessed content is hosted and shared. Some of these bits will travel between data centers over land, but others will make the long jump across the ocean, moving through fiber optic cables on the seafloor.

No matter where the traffic is coming from, the enormous growth in bandwidth demand is pushing the technology that enables submarine networks to the limit, requiring innovations in all parts of the end-to-end network, from data center to data center.



How much more can capacity be increased without having to lay new cable?

We're approaching Shannon's Limit in the submarine cable industry, getting close to how much information we can send down an individual optical fiber. Shannon's Limit effects every type of communications, whether you're a wireless carrier or submarine cable operator – there's a limit to the amount of information you can share through a particular communications medium.

About ten years ago, coherent technology came into the submarine cable market and it's now the standard to upgrade any subsea cable. As the bandwidth continues to grow, coherent modems are the technology of choice and the industry keeps developing technologies, such as improved forward error correction, linear and non-linear mitigation techniques, and so on. Once we hit that maximum limit on the fiber, we'll have to deploy more submarine cables, which may likely be based on Spatial Division Multiplexing (SDM) offering significantly more fiber pairs than existing subsea cables.



How does the rapid adoption of coherent detection modems enable submarine networks to maintain pace with bandwidth demands?

Adopting coherent technology allows submarine network operators to significantly increase bandwidth capacity far higher than initial total design capacities. One of the key attributes of coherent optical technology is the high coding gain, soft-decision Forward Error Correction (FEC), which enables signals to travel longer distances, while requiring fewer regenerator points. This provides a wider margin, allowing higher bit rate signals to traverse greater distances – increasing bandwidth significantly while simplifying photonic lines, requiring less equipment and lowering costs. A variety of impairment mitigation techniques incorporated into DSP technology has also enabled massive capacity increased on both old and new submarine cables.



What role does proactive analytics play?

Analytics can uncover trends in a network and help address failures before they occur by determining what is "normal" and what is "not normal" through the ongoing analysis of streaming network sensor data. Analytics provides actionable insights so that operators can address potential issues proactively rather than reactively. Having this insight is the first step in creating a network that is capable of identifying its own weaknesses, and automatically adjusting without human involvement.

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PRYSMIAN FINALIZES €125M CONTRACT WITH IPTO



» Right to left: Gianni Boulaxis (CEO RAE), Georgios Stathakis (Greek Minister of Environment and Energy), Manos Manousakis (CEO IPTO), Hakan Ozmen (CEO Prysmian Powerlink), Giannis Margaris (VP IPTO), Christos De Meis (CEO Powertec)

Prysmian Group, a world leader in the energy and telecom cable systems industry, announces the finalization of the contract agreement, worth €125 million, with Independent Power Transmission Operator (IPTO), who are responsible for the transmission power grid in Greece, for a submarine power cable connection between the island of Crete and the Peloponnese region of the Greek mainland.

The award of the project to Prysmian by IPTO, as announced on 2 October 2018, has been finalized with the signing of the contract in a ceremony in Chania attended by the Greek Minister of Environment and Energy, Mr. Georgios Stathakis, and IPTO CEO, Mr. Manos Manousakis.

Hakan Ozmen, EVP Project BU, Prysmian Group stated: "With the trust IPTO again places in us with this contract, we can proudly reaffirm Prysmian leadership in submarine cable interconnectors, as this project stands alongside many others we have secured in recent times," continued Ozmen, "including connections in Greece between the island of Syros and Lavrion, the Cyclades project, two links between the islands of Evia, Andros and Tinos and the Italy-Greece interconnector, all awarded to Prysmian by IPTO, which complement a range of projects across the Mediterranean region with the Sardinia-Italian Peninsula (SA.PE.I) project, the Capri-Torre Annunziata and Capri-Sorrento connections in Italy, two interconnectors between Spain and Morocco, and both projects linking the Balearic Islands, the Iberian Peninsula-Mallorca and Ibiza-Mallorca, as well as the 400kV Dardanelles link in Turkey."

The Crete-Peloponnese contract involves the design, supply, installation and commissioning of an HVAC cable system composed of 150 kV three-core cables with XLPE insulation and double-wire armouring. The route extends to a length of 135 km and shall reach the challenging depths of installation of up to 950 metres, that shall be performed with Prysmian own vessel, Giulio Verne.

The submarine cables will be produced at the Prysmian's center of excellence in Arco Felice (Naples) with delivery and commissioning scheduled for 2020.

DEDICATED HIGH-SPEED, LOW-LATENCY 4G CONNECTIVITY IN THE NORTH SEA

Marlink is now providing its customers operating in the North Sea with dedicated high-speed, low-latency 4G connectivity as part of its hybrid communications services, following the implementation of a private Access Point Name (APN) on the Tampnet North Sea LTE network.

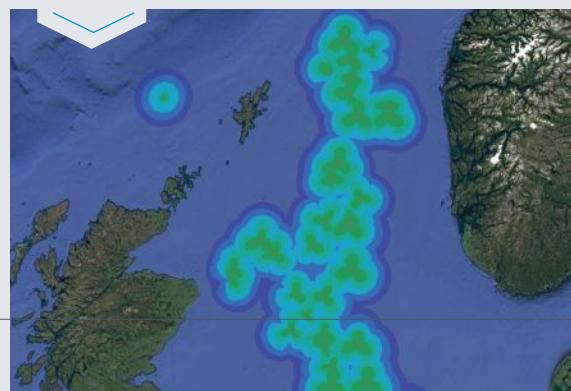
As the only satellite service provider providing multi-band hybrid services with integrated Tampnet North Sea LTE capacity, Marlink offers even more utility and value to customers. Because the 4G bandwidth available via the APN is dedicated to Marlink customers and not shared with any other vessels or users in the North Sea, Marlink guarantees access to Tampnet LTE services at all times. The result is a more streamlined, simpler hybrid service with high resilience and low-latency connectivity, as well as reduced operational overheads.

Importantly, Marlink's strengthened North Sea hybrid services can contribute to reducing drillship non-productive time (NPA), by enabling reliable access to connected decision support tools. With guaranteed Tampnet bandwidth now available, crews and operations will have more opportunity to enjoy connectivity on board, opening the potential for more low-latency applications and less delay on video calls.

Marlink manages the end-to-end configuration and delivery of the Tampnet service with seamless switching between VSAT and LTE. The leading maritime communication provider's multi-band hybrid approach allows traffic to be seamlessly routed through different available carriers depending on the unique requirements of applications used on board and network conditions at any given time, ensuring optimal use of all available channels depending on location and availability.

Tampnet's state-of-the-art, low latency, high-bandwidth North Sea LTE services are enabled by an extensive 3000 Km subsea fibre network. Marlink customers have been able to extend their operational, business and welfare communications capabilities since May 2015, when Tampnet and Marlink formed an operational partnership.

WWW.MARLINK.COM





PRYSMIAN SECURES NEW SUBMARINE CABLE PROJECT IN THE USA

Prysmian Group, world leader in the energy and telecom cable systems industry, has been awarded a new contract by Caldwell Marine International LLC, a US construction contractor specializing in submarine utility operations.

"This contract represents a very strategic opportunity for Prysmian Group as we move, following the acquisition of General Cable, to consolidate our presence in the US interconnection market," stated Hakan Ozmen, EVP Projects, Prysmian Group.

Prysmian Group will be responsible for the design, manufacture, supply and testing of a 6 km 3x630 mm² 115kV submarine cable system with XLPE insulation, plus all related cable accessories to connect Deer Island to mainland Massachusetts (USA). The Group will also be responsible for the project's land section, for which it will supply and install 8 km of 115kV land cabling, along with all related accessories. All submarine cables will be produced at Prysmian's center of excellence, located in Arco Felice (Italy). The land cables will be manufactured at Prysmian's state-of-the-art

factory in Abbeville (South Carolina, USA), thus offering local expertise to the US market through high-quality products and cable solutions. Delivery of the project is scheduled for early 2019.

Over the years, the Group has made major investments in newly upgraded assets, with a view of expanding the range of products and innovative technologies, enhancing the services offered and strengthening production, execution and installation capabilities. The Group aims to better serve the market's needs and position itself as a turnkey

solution provider able to offer the widest range of high-voltage and medium-voltage cable solutions, both AC and DC.

The recent acquisition of General Cable has further strengthened Prysmian Group's position in the submarine US cable industry, as the Group can now leverage on the additional production facilities in Nordenham (Germany), a center of technological and manufacturing excellence, and on a highly complementary geographical presence.

WWW.PRYSMIANGROUP.COM



BARRACUDA

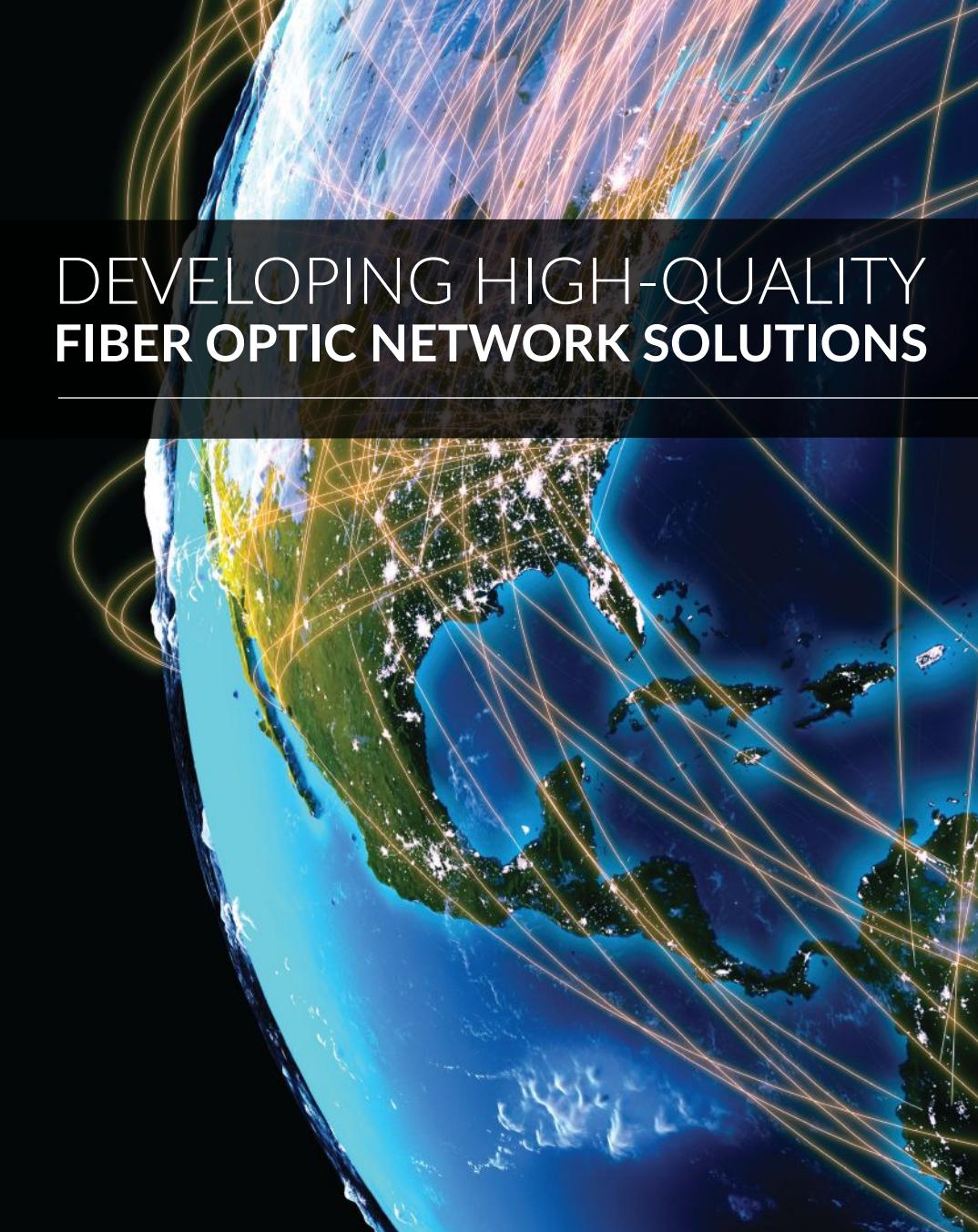
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COMTECH EF DATA RECEIVES \$9.8 MILLION DELIVERY ORDER FROM US NAVY



Comtech Telecommunications Corp. has announced that its Tempe, Arizona-based subsidiary, Comtech EF Data Corp. received an additional \$9.8 million delivery order against the \$59.0 million indefinite delivery/indefinite quantity (IDIQ) contract previously

awarded by the U.S. Naval Warfare Systems Command.

The delivery order specified Comtech EF Data's SLM-5650B Satellite Modems and NetVue™ Integrated Management System. The SLM-5650B Satellite Modem is Comtech's latest generation satellite modem targeted for government and military applications. The SLM-5650B leverages the heritage and feature set of the SLM-5650A modem. The SLM-5650B supports backwards compatibility/interoperability for existing SLM-5650A networks while providing enhanced performance and an expanded feature set. The commercially available modems will support satellite communications and interoperability across the Navy's platforms and shore sites.

The NetVue™ Integrated Management System is a powerful network management system with advanced monitoring and diagnostic capabilities and an easy-to-use graphical user interface. NetVue™ features a robust, comprehensive network management and analytics engine that allows users to intelligently maximize resources and to ensure that Key Quality Indicators meet and exceed Service Level Agreements.

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NEW PROJECTS REPORTED IN SOUTHEAST ASIA, CARIBBEAN

According to our friend John Manock at SubCableWorld, various reports are coming in about new submarine fiber optic cable projects.

Malaysian mobile phone operator Kiddig Cellular Communications Sdn Bhd has announced the Malaysia International Internet Gateway (EM-IIG), linking Hong Kong with Peninsula Malaysia and the Malaysian provinces of Sarawak and Sabah on the island of Borneo. The project was reported in several Malaysian news sources, including the New Straits Times.

In the Caribbean, there are two reports of proposals, one from Google and one from Telefonica, for cables to Cuba. Few details are available, but the Telefonica proposal reportedly is a branch from a planned Caribbean cable system. These projects join ARCos-1, which earlier this year filed with the FCC for a licence to extend its cable system to Cuba and Deep Blue Cable, which mentions Cuba as a possible landing point.

If you haven't checked out SubCableWorld, visit them today. Among the latest news items available is a look at all of the recent subsea cable contract awards, along with insightful, real-time market analysis, technology trends, financial results, and company news.

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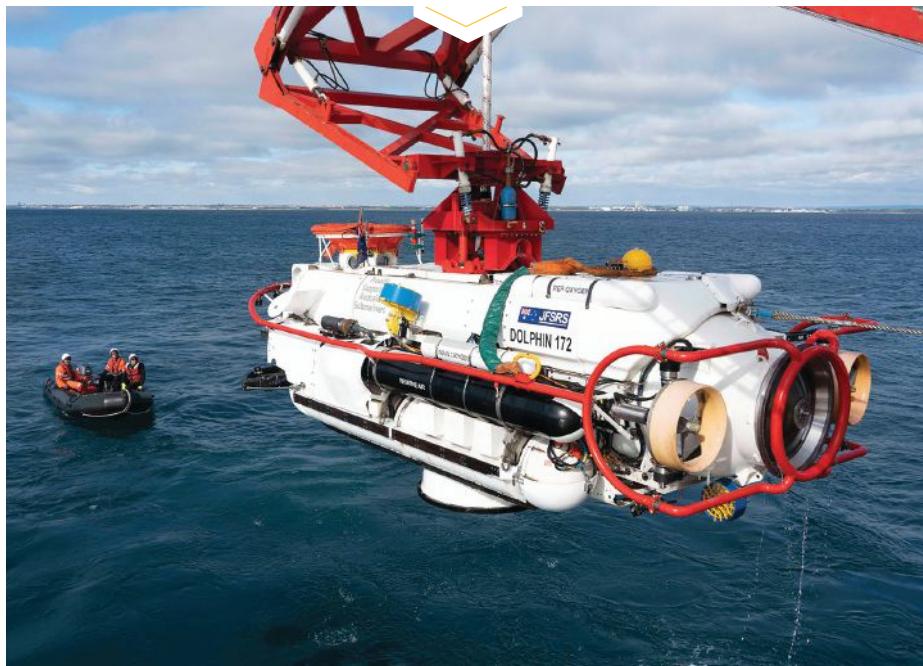
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JFD AND ROYAL AUSTRALIAN NAVY COMPLETE SUBMARINE RESCUE EXERCISE



» The Launch and Recovery System is capable of handling the rescue vehicle in conditions up to and including sea state 6.

JFD, a world leading underwater capability provider serving the commercial and defense diving markets and part of James Fisher and Sons plc, has successfully completed the "Black Carillon" 2018 submarine rescue exercise with the Royal Australian Navy (RAN), further demonstrating its commitment to driving the highest standards in submarine rescue safety.

Black Carillon 2018 successfully tested every aspect of the RAN's submarine rescue system, including the new hyperbaric escape and rescue capability, demonstrating a step-change in advanced submarine rescue operations.

It was also the first exercise to incorporate the RAN's new hyperbaric equipment suite (HES) which entered into service in July 2018, testing the fully integrated submarine rescue capability. This means for

the first time, the entire crew of a Collins Class submarine – up to 88 submariners – can be treated simultaneously.

The exercise was unequivocally successful in demonstrating an industry-leading step-change in advanced submarine rescue operations, further safeguarding the lives of submariners. It encompassed the entire rescue operation which included mobilization and preparations, the deep dive mating exercise, aeromedical evacuation, transfer under pressure (TUP) and decompression, as well as the demobilization of the entire system.

The RAN has commended JFD on a safe and highly successful Black Carillon:

"I was exceptionally impressed with what you achieved in the exercise and it was clearly evident that a strong sense of teamwork had been developed," said

Captain Geoff Wadley, RAN, Commander Submarine Force.

"Speaking to international observers, they were unanimous in their praise for the exercise and the value they all got out of it, a job exceptionally well done."

A major element in testing the rescue suite this year was a continuously run 'Rescue Exercise', which aimed to test the complete system from the submersible through the hydraulics bellows into the transfer under pressure (TUP) chamber where any initial triage of patients could be undertaken. They then move to the new recompression chambers for simulated treatment depending on the symptoms being exhibited. The exercise, which commenced at early light at 0530 on 19 November and finalized at 1508 on 20 November, involved the launch and recovery of the submersible as in a real DISSUB scenario



» JFD's Third Generation submarine rescue systems bring about a renewed focus on efficient design and optimizing Time to First Rescue.



» The key to getting the 3rd generation system to location on time is its transportability.

and necessitated the split manning of all control points of the suite to cover 24 hour operations. JFD worked seamlessly with the RAN medics and doctors to achieve all exercise objectives.

Toff Idrus, JFD Australia managing director, commented:

"Throughout our long and well-established partnership with the RAN, the James Fisher Submarine Rescue Service (JFSRS) team has pioneered and driven continual innovation to ensure the submarine rescue capability is as safe and comprehensive as possible. The annual Black Carillon exercises allow us to test the full capabilities of the JFSRS service, and we were particularly pleased to receive full operational verification from the RAN on the new HES system and advanced TUP capability during this most recent exercise."

"During 2018 the JFD and RAN teams have completed a record three operational deployments to sea in a single calendar year, a testament to the long-standing partnership in providing the most advanced submarine rescue capability that will ultimately drive the highest standards in protecting lives at sea."

Black Carillon 2018 was conducted over a period of more than three weeks in November 2018. As a comprehensive operation, the exercise included all assets that would be required in the event of a real rescue operation, including RAN Rescue Gear Ship MV Stoker, Collins-class submarine HMAS SHEEAN and RAN Escape Gear Ship MV Besant.

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STRONGER PARTNERSHIPS ON HORIZON FOR US MARITIME DEFENSE SUPPLIERS

U.S. companies competing for military and commercial maritime business in Australia and across the Indo-Asia-Pacific region are planning to ride a wave of acquisition and modernization spending into the Pacific International Maritime Exposition 2019 next October in Sydney.

Buoyed by growing naval defense and coastal infrastructure budgets, the biennial showcase, Australia's largest and most diversified maritime business event, is expected to outperform its 2017 edition, when it hosted nearly 550 exhibitors and 16,500 trade visitors, including 79 official delegations representing 53 nations, at the International Convention Centre in Sydney.

Chief among exhibiting countries, the United States will present a wide range of innovative technologies, equipment and services from a cross-section of leading manufacturers and suppliers that is likely to include Boeing Defence Australia [NYSE: BA], General Atomics, Lockheed Martin [NYSE: LM], Northrop Grumman [NYSE:NOC] and Raytheon [NYSE: RTN].

The centerpiece of the American national presence at Pacific 2019 will be the USA Partnership Pavilion, organized by Kallman Worldwide, Inc., in coordination with numerous government agencies, including the departments of Commerce, Defense and State. Next year's show will be Kallman's sixth consecutive edition organizing Americans at Pacific, one of four biennial events including Avalon (Geelong), CivSec (Melbourne) and Land Forces the firm represents in the U.S. for Aerospace Maritime Defence and Security Foundation of Australia Limited (AMDSFA).

"With significant operations in country and technology, equipment, components and services supporting military and private operators across Australia and the Indo-Asia-Pacific region, the United States is a vital 'anchor tenant' at Pacific 2019 and all of our events," said AMDSFA CEO Ian Honnery. "Our long-standing partnership with Kallman Worldwide consistently adds value for buyers and sellers on-site, ensuring increased U.S. participation in our shows and corresponding interest in U.S. suppliers among our attendees."



Located prominently at ICC, the USA Partnership Pavilion will be a full-service business destination: an efficient location for buyers to meet more U.S. suppliers, an on-site operations center for American exhibitors to maximize their exposure and impact at the show, and a forum for all to share ideas and insights.

Tom Kallman, President & CEO of Kallman Worldwide

"Now more than ever, success in international trade is driven by partnership and teamwork," said Kallman Worldwide President and CEO Tom Kallman. "The United States' year-round presence in Australia, amplified by the USA Partnership Pavilion next at Pacific 2019, reflects our nation's commitment to build sustainable, mutually beneficial business relationships in maritime sectors around the world."



In addition to Pacific, Kallman Worldwide's maritime events calendar currently includes the just-completed Exponaval in Valparaiso, Chile; NAVDEX in Abu Dhabi and DIMDEX in Doha, Qatar.

"The sheer size of the Australia and Indo-Asia-Pacific region presents unique challenges for naval forces and commercial shipping, but the nations that make up this expansive region are not alone in their efforts to upgrade equipment and operational capabilities," said Kallman. "Around the world, in response to security threats and trade opportunities, that tide is rising."

About Kallman Worldwide, Inc.

Established in 1963, Kallman Worldwide creates unique opportunities for U.S. companies to strengthen business relationships around the world by maximizing their impact at international trade shows. With its flagship USA Partnership Pavilion, end-to-end exhibitor services, custom stand-building and corporate hospitality programs, Kallman has helped more than 10,000 companies, associations and government agencies "export with purpose and exhibit with confidence" at over 1,500 industry and professional events in 46 countries. The company is a strategic partner of the U.S. Department of Commerce, and a proud recipient of the President's "E" Award for its role in helping to increase U.S. exports. Kallman Worldwide is headquartered in Waldwick, N.J., and staffs a Latin America office in Santiago, Chile.

WWW.KALLMAN.COM

US CHALLENGES RUSSIAN CLAIMS IN SEA OF JAPAN

On 6 December 2018, a U.S. Navy destroyer sailed into waters claimed by Russia in the Sea of Japan in a direct challenge to Moscow.

The guided-missile destroyer USS McCampbell "sailed in the vicinity of Peter the Great Bay to challenge Russia's excessive maritime claims and uphold the rights, freedoms and lawful uses of the sea enjoyed by the United States and other nations," U.S. Navy Lt. Rachel McMarr, a spokesperson for the U.S. Pacific Fleet, said in a statement.

The move is part of what the Navy calls "freedom of navigation operation," which challenges nations that claim sovereignty over waters beyond the 12 nautical miles allowed by international maritime law.

Russia claims all of Peter the Great Bay, which is home to its Pacific fleet.

'Wherever international law allows'

"U.S. forces operate in the Indo-Pacific region on a daily basis," McMarr said. "These operations demonstrate the United States will fly, sail and operate wherever international law allows. That is true in the Sea of Japan, as in other places around the globe."

The U.S. Navy has conducted several such operations in the South China Sea, sailing past islands claimed by China near Gaven and Johnson reefs in the Spratly Islands.

The McCampbell's operation comes at a time of heightened tensions between Moscow and Washington.

Black Sea voyage planned

CNN reported Wednesday that the Navy is also preparing to sail a ship into the Black Sea in response to Russia's actions against Ukraine.

Last month, Russia seized three Ukrainian navy ships in the Kerch Strait, which links the Black Sea and the Sea of Azov.

CNN reported that the Pentagon had asked the State Department to inform Turkey that it planned to send a warship to the Black Sea.

The U.S. is required to notify Turkey under a treaty that governs the passage of military vessels from the Mediterranean to the Black Sea.

Source: <https://www.voanews.com/a/us-challenges-russian-claims-in-sea-of-japan/4688498.html>



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WHAT THE RETURN OF VOLATILITY MEANS FOR NEAR TERM OIL AND GAS MARKETS

BY G. ALLEN BROOKS | Author, *Musings From the Oil Patch* | www.energymusings.com

CRUDE OIL

Last month, we commented on how commodity market expectations (for \$100 a barrel oil) have been shattered by the realization that the world is producing more oil than needed. The downward pressure on oil prices from growing oil inventories was exacerbated by the realization that the Trump administration was granting a number of waivers to oil importing countries that allowed them to continue purchasing crude oil from Iran, meaning global supplies would not contract as much as expected. That realization upset OPEC's (especially Saudi Arabia's) planning for adjusting production levels to ensure the world was adequately, but not over-supplied with oil. OPEC's goal is to keep global oil supply and demand balanced, a condition that helped drive the recent oil price recovery.

Saudi Arabia continues to respond to international pressures over the death of former Saudi journalist and opinion writer Jamal Khashoggi. At the same time, the country is being pressured by President Donald J. Trump to boost production in order to drive down global oil prices. As strange as that pressure appears, since it would be hurtful to the U.S. domestic oil industry (contradicting a key tenet of Trump's economic policy), it would help the average citizen who benefits from lower gasoline and heating oil prices. Trump's pressure caused Saudi Arabia to boost its production, adding to the growing glut that now requires the country to cut its output. At least that is what is expected by the market from the OPEC and OPEC+ meetings scheduled for December 6.

With oil prices recently falling below \$50, concern has emerged that we are about to repeat 2014-2016, which was devastating for the oil industry. A graph that overlays October and November daily oil prices against the daily oil prices starting in November 2014 shows a terrifying similarity,

at least for oil executives and commodity traders. Consumers gained from the dramatic oil price fall that started in June 2014 at over \$100 a barrel and bottomed in February 2016 at \$28. Although oil prices have more than doubled since then, memories of the devastation wrought on the oil industry from the price drop remain vivid for those in the industry who lived through those years.

One arena where current oil price volatility has manifested itself is in the debt market. A chart comparing the yields for energy high-yield debt versus other high-yield debt shows how credit markets are now demanding higher returns due to the increased risk to the financial health of those energy companies that issued the debt in response to the drop in oil prices. While the current uptick in energy high-yield debt interest rates has not pushed yields to the levels seen in 2016, the upward move is disconcerting. The rise signals further pain for the industry as it transitions from the glory years of \$100 a barrel oil to an uncertain future. That uncertainty reflects questions about oil's future use and the changing economics for the industry. Oil price volatility may be welcomed by commodity traders, but it forces industry executives to remain cautious in spending, hurting other market segments and those communities where the oil industry operates.

NATURAL GAS

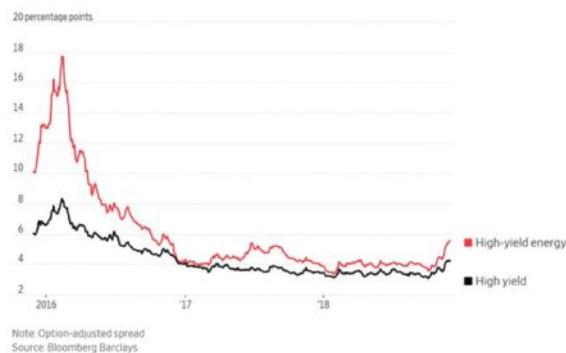
As the early arrival of winter forced people to reach into their closets for heavy coats, hats and gloves, it also sent shock waves through the natural gas trading pit. The low level of gas in storage, ready to meet the seasonal spikes in gas consumption that comes from winter cold weather, was suddenly perceived as a risk rather than a vote of confidence about the strength of domestic output growth.

To appreciate how this view of gas markets suddenly shifted, one only needs to review a chart of the price history for the January 2019 natural gas futures through its life so far. Other futures contracts maturing during the balance of winter suggest gas prices will continue to stay above \$4 per thousand cubic feet, but not in the \$4.60 range. As the chart shows, the January 2019 contract, starting in late July 2018, traded between \$3 and \$3.20 until October. As the first seasonal cold weather arrived, the contract traded up into the \$3.20-\$3.40 range, but when Arctic cold temperatures and early snows arrived, the gas market woke up to the possibility there wouldn't be sufficient storage volumes if we experienced a longer and colder winter than forecast.

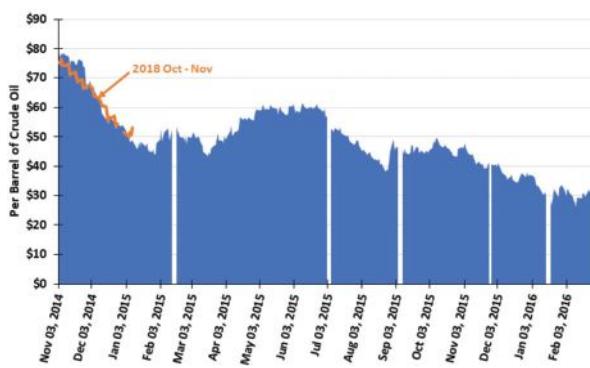
As meteorologists began revising their forecasts along those lines for the upcoming winter, the need to secure more gas for storage, but equally as important to squeeze down consumption, became obvious. The easiest and traditional way to achieve those goals was to boost gas prices. The history of the January 2019 contract shows how rapidly prices and price expectations changed in response to dramatic demand increases.

Natural gas production volumes continue to set records, but demand also remains strong, especially as LNG export shipments rise. Future natural gas price volatility will reflect variability in winter weather. What we know about the future of the gas market is signaled by the futures price curve. It shows that by next summer prices will be back below \$3 and by the summer of 2020, lower still. This price curve reflects the belief that shale gas production growth will continue unabated so that we will remain in a surplus situation. If that production assumption proves wrong, or our consumption and exports grow more than anticipated despite \$4-plus gas prices, watch for natural gas price volatility to remain a constant.

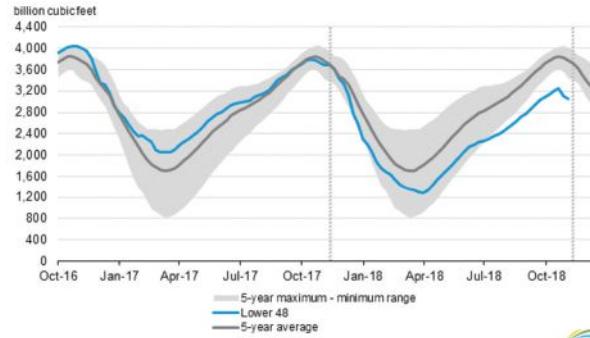
Oil price volatility has manifested in the debt market.



Is 2018 going to be a repeat of 2014-2016?



Working gas in underground storage compared with the 5-year maximum and minimum.



Source: U.S. Energy Information Administration



Natural gas futures anticipate cold weather demand.



CRUDE & NATURAL GAS Spot Prices

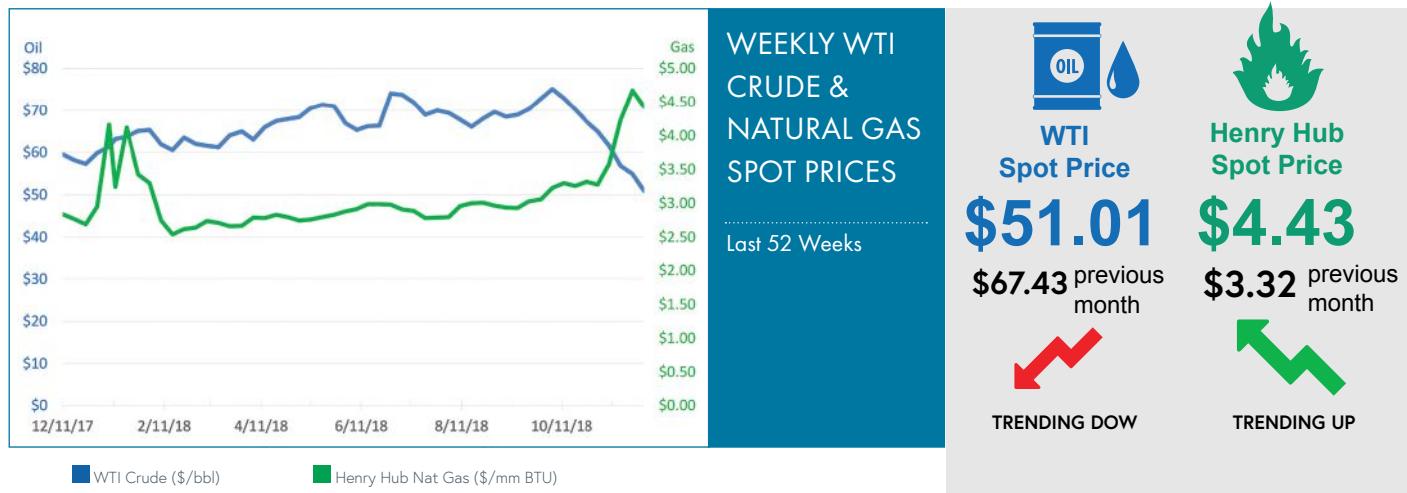
PRICES IN US DOLLARS AS OF NOVEMBER 30, 2018

After an extended upward trend during most of 2018, oil prices declined in November, finishing the month at just over \$50.00 per barrel on the EIA's WTI Spot Prices report. This was after an extended period that saw prices holding at over \$70 per barrel. The drop was attributed by the Wall Street Journal and other news sources to higher inventories and signs of a slowing global economy.

In response to the drop, OPEC and other oil producing countries

agreed to cut production in early December. This is forecasted to lead to higher prices in 2019, according to the WSJ.

Unlike oil prices, natural gas prices climbed throughout November. Henry Hub Spot Prices crossed the \$4.00 per million BTU mark, closing at \$4.43 in late November. The three-week stretch of prices over the \$4.00 mark in November was the longest such stretch of the year in which prices began \$2.95 per million BTU mark.



KEY EQUITY Indexes

PRICES IN US DOLLARS AS OF DECEMBER 10, 2018

THE DOW JONES INDUSTRIAL AVERAGE AND S&P 500 have fallen significantly in the past month

The Dow Jones and S&P 500 indexes experienced a sharp sell-off in late November and early December that effectively eliminated the significant gains throughout 2018. The sell-off was attributed to a necessary correction as well as concerns over a trade war between the US and China and some data that suggested the possibility of a recession in 2019 or 2020.

The Dow Jones Industrial Average (DJIA) closed on December 10 at 24,423.26. That is nearly 500 points below where it began the year in spite of setting numerous record highs and nearing the 27,000 point market as recently as October. Similarly, the S&P 500 closed at 2,637.72 or about 75 points below where it started the year. The S&P 500 also flirted with the record-breaking 3,000-point mark in October.

While the Dow and S&P found themselves more or less back where they began the year, the PHXL Oil Services Index (OSX) was not so lucky. In spite of a couple of rallies that saw it surpass the 160-point mark, a sharp decline in November pushed the OSX down below 100 points, closing at 95.05 on December 10. This is down from 154.21 on January 1, 2018.

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Int'l Deepwater Drilling

Rio de Janeiro, Brazil » March 19-20
www.iadc.org/event/2019-iadc-international-deepwater-drilling-conference-exhibition/

US Hydro

Biloxi, MS » March 19-21
www.thsoa.org/US-Hydro-2019

Decommissioning & Abandonment Summit

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Mari-Tech

Ottawa, Canada » April 23-25
www.mari-techconference.ca

AUVSI XPONENTIAL

Chicago, IL » April 30 – May 2
www.xponential.org/xponential2019/public/Enter.aspx

EUROPE

EERA DeepWind

Trondheim, Norway » January 16-18
www.sintef.no/projectweb/eera-deepwind

Subsea Expo

Aberdeen, U » February 5-7
www.subseaexpo.com

Submarine Networks EMEA

London, UK » February 12-13,
www.terrapiinn.com/conference/submarine-networks-world-europe/index.stm

Ocean Business

Southampton, UK » April 9-11
www.oceanbusiness.com

DEVEX

Aberdeen, UK » May 7-8
www.devex-conference.org

UDT

Stockholmsmassan, Sweden »
 May 13-15
www.udt-global.com

AUSTRALASIA

ADECS

Singapore » January 29-30
asia-decs.com/

Oil & Gas Tech Asia

Ho Chi Minh, Vietnam » March 5-7
www.oilgastechasia.com

Singapore AUV Challenge

Singapore » March 8-11
www.sauvc.org/

Australasian Oil & Gas

Perth, Australia » March 13-15
www.aogexpo.com.au/about

China Cable Connectivity

Symposium » March 25-27
 Shanghai
www.ulandiwcchina.org

Telecoms World Asia

Bangkok, Thailand » March 25-27
www.terrapiinn.com/conference/telecoms-world-asia/index.stm

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www.unmannedsystems-asia.com

Underwater Technology

Kaohsiung, Taiwan » April 16-19
www.ut19.tori.org.tw/webpage/index.aspx

ICCOE

Bangkok, Thailand » April 25-28
www.iccoe.org

EDITORIAL FOCUS	PRODUCTS & SERVICES FOCUS	SHOW DISTRIBUTION
JANUARY		
» Deepwater Inspection, Repair & Maintenance » ROV Tooling	Manipulator Arms & Tools; Pumps, Hoses and Hose Connectors; Cameras, Lights	Underwater Intervention » February 5-7 Subsea Expo » February 5-7 Oceanology Americas » February 25-27
FEBRUARY		
» Subsea Cables » Offshore Communication	Cable Installation Services and Equipment; Telecommunication Technologies	Int'l Wind Partnering Forum » April 9-10
MARCH		
» Mapping & Survey » Oceanology » MetOcean	Bathymetric Mapping/Charting; Data Acquisition & Processing	US Hydro » March 18-21 Ocean Business » April 9-11
APRIL		
» Offshore Technology » Maritime Security & Ocean Intelligence	Testing Facilities; Military Tech and Contractors	OTC » May 6-9
MAY		
» Surface Vehicles » Tracking & Positioning	Transponders / AIS; S/P Power Systems; Dredging	TBD
JUNE		
» Offshore Energy Exploration » Ocean Sound	Sonar Systems and Vessels; Imaging & GIS; Magnetometers	TBD
JULY		
» Unmanned Vehicles Buyers' Guide	ROV, AUV, USV, Glider, Towed Vehicles	TBD
AUGUST		
» Submersibles (AUV, ROV, UUV)	Cranes, Winches, LARS & Control Systems; Sensor, Profilers, Measurement; Thrusters; Umbilical, Tether, Cables, and Connectors	TBD
SEPTEMBER		
» Renewables » Offshore Energy Installation & Maintenance	Energy Storage Devices; Inspection Drones; Current Meters	TBD
OCTOBER		
» Ocean Science & Technology	Acoustic Modems; Acoustic Releases, Transponders, Command & Control Systems; Technical Schools, Training Programs	TBD
NOVEMBER		
» Oil Spill Prevention & Response » Ocean Archaeology & Salvage » Executive Profile	Buoyancy Materials; Pressure/Watertight Housing; Well Control Equipment	TBD
DECEMBER		
» Upper Deck Equipment Guide	LARS, Winches, Cranes, A-Frames, and Buoys	TBD





JOHN BRIGHT, MA, RPA, JOINS CSA OCEANS SCIENCES

CSA Ocean Sciences Inc. (CSA), a leader in marine environmental consulting and provider of multidisciplinary services, has announced the addition of John Bright to their team as an Operations Supervisor. Mr. Bright is a Maritime Archaeologist with over 10 years of experience in archaeological research and scientific field operations, over 12 years of experience as a scientific diver, and has an extensive background in both academic and government research programs. He will assist the CSA Ocean Sciences Operations team by supporting field projects worldwide.

Mr. Bright brings a diverse and interdisciplinary skill set to the team at CSA Ocean Sciences. He holds a Master of Arts in Maritime Studies and a Bachelor's of Science in Biology from East Carolina University. He spent 5 years working for the US National Park Service's Submerged Resources Center, based in Lakewood, CO, before taking a contractor position with the National Oceanic and Atmospheric Administration (NOAA). There, he served as Research Coordinator and Unit Diving Supervisor at Thunder Bay National Marine Sanctuary in Alpena, MI.

Throughout his career, Mr. Bright's work has focused on field operations supporting an array of scientific research areas. He has in depth experience with marine remote sensing and seafloor mapping, applied GIS, and technical science diving. In particular, Mr. Bright is an expert in the mathematical theory and application of marine magnetics as a remote sensing tool. Of note, he was the Co-Principal Investigator for the NOAA-led discovery of shipwrecks Bluefields and U-576 off the North Carolina coast, and was the Chief Scientist for another NOAA-led expedition to locate two historic shipwrecks—Choctaw and Ohio—on the bottom of Lake Huron. Mr. Bright has also used his background in biology to support multi-year freshwater ecological studies while working with NOAA.

DECOM NORTH SEA SECURES GRANT

Decom North Sea, the membership organization for the oil and gas late life and decommissioning sector, has successfully secured a Decommissioning Challenge Fund (DCF) grant award from The Scottish Government.

The £5million fund aims to provide opportunities for the supply chain in Scotland supporting the acceleration of projects to develop investment grade business cases, and to fund new structures and infrastructure, allowing recipients to compete within the decommissioning market.

Decom North Sea's Chief Executive, John Warrender said: "This is part of our overall strategy to facilitate a step change in the decommissioning sector's ability to share knowledge, collaborate and communicate. Knowledge hubs are not new and have been successfully implemented in other sectors. Our aim is to replicate this success within the decommissioning sector, providing a knowledge resource that has the potential to offer a range of tools and services to help the sector share and analyse its information and engage much more effectively."

www.decomnorthsea.com



*John Warrender, Chief Executive,
Decom North Sea*

KOGNIFAI PARTNER PROGRAM AVAILABLE TO ALL

The Kognifai Partner Program is now open to all, enabling third party developers and users to share the secure Kognifai infrastructure and leverage the digitalization expertise at Kongsberg Digital. By providing the digital ecosystem needed to deliver new technologies and services, the open Kognifai Partner Program ensures that the best transformative solutions are available to KONGSBERG customers at all times. Kongsberg Digital created Kognifai, an industrial digital platform and ecosystem, to help companies realize their digital transformation ambitions. Kognifai is tailor-made to gather, structure, store, and analyze industrial data for reuse in value-adding solutions and applications delivered by KONGSBERG and partners. To clients, the ecosystem will be a one-stop-shop that offers a broad range of solutions and applications relevant to diverse industry sectors, including maritime and energy. Software developers and providers in the Kognifai Partner Program can use Kognifai's infrastructure to quickly scale apps and services, and offer and distribute them to high-quality customers who are looking for digital solutions to optimize their shipping operations. Whether the solutions on Kognifai are developed by KONGSBERG or other experts, the Kognifai Partner Program guarantees that they are safe, secure, and easily accessible.

The Kognifai Partner Program opens an ocean of opportunity for customers and providers. Companies already in the partner program include KPMG, VesselMan, NSG Digital, and KNL. Learn more about the Kognifai Partner Program here www.kognifai.com/kognifai-partner-program.



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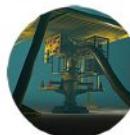
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Contact: Glenn Pollock



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.

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Ocean Sonics designs and manufactures the icListen, a compact self-contained easy to deploy digital hydrophone. 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. It's a compact, all-in-one instrument capable of processing data while collecting in real-time.

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RTSYS designs and manufactures Real-Time Acoustic Systems (Underwater Recorders and Buoys), Sonar Systems (analog sonar retrofit, portable sonars for divers) and Autonomous Underwater Vehicles.

Our Synchronized Multichannel Acquisition Core System (SDA) can handle various Acoustic Transducers and Hydrophones from 3Hz to more than 1MHz and allows a broad range of applications such as noise impact studies, sediment characterization, or cetacean research.

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Teledyne RESON together with Teledyne BlueView and Teledyne Odom provides a range of high quality underwater acoustic hardware and software solutions for underwater imaging within Teledyne Marine. These solutions are delivered through recognized brands such as SeaBat, BlueView, Odom, HydroSweep and ParaSound Multibeam Echosounder and Teledyne PDS software suite.

Teledyne Marine is a group of leading-edge subsea technology companies that are part of Teledyne Technologies Incorporated. Through acquisitions and collaboration over the past ten years, Teledyne Marine has evolved into an industry powerhouse, bringing Imaging, Instruments, Interconnect, Seismic, and Vehicle technology together to provide total solutions to our customers.

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Nortek excels in the development and manufacture of acoustic Doppler instrumentation. Doppler Velocity Logs (DVLs) are used for subsea navigation. Acoustic Doppler Current Profilers (ADCPs) 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.

ROWE TECHNOLOGIES, INC.

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Website: www.rowetechinc.com

Contact: Rico Castelo, Sales Manager



Rowe Technologies designs and manufactures state-of-the-art Acoustic Doppler Current Profilers (ADCPs) and Doppler Velocity Logs (DVLs), applicable to an array of current measuring and navigational deployments for world-wide use, in oceans, lakes, and rivers. Rowe Technologies 7,100 ft² facility is headquartered in San Diego California and was founded in 2009 by Dan and Steve Rowe, the sons of Fran Rowe who is the originator of the Acoustic Doppler Current Profiler (ADCP) and co-founder of Teledyne RDI. Rowe Technologies highly experienced, innovative staff has over 250+ years of Doppler system development experience and is on the preponderance of ADCP patents.

BUOYS

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MetOcean Telematics designs and manufactures drifting buoys, environmental platforms, and the world renowned NOVATECH locator beacon product line. In addition to providing complete end-to-end telematics services, and one of the few manufacturers in the world to achieve ISO 9001 certification. MetOcean Telematics' 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.

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DeepWater Buoyancy Inc. is the world's largest producer of subsea buoyancy products for the oceanographic community and has a vast product line of buoyancy solutions for offshore oil & gas, energy and technology companies. This product portfolio has been built over the course of 35 years serving these industries. Though products are offered for shallow water applications, the company specializes in deepwater, providing solutions to depths of 6000 meters and beyond.

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Cathx Ocean design and manufacture advanced subsea imaging and precision measurement systems for subsea operations.

Designed to meet stringent technical, operational and integration requirements associated with various subsea applications and vehicle types, Cathx Ocean's systems offer precision, reliability and peace of mind. Products include advanced still imaging, colour laser point cloud and video systems, designed to deliver precision subsea data in a way that allows automation for subsea vehicle operations.

The range includes the Hunter system (AUV Imaging and Laser), the Scout system (Observation Class ROV Imaging and Laser Profiling), the Pathfinder system (Work Class ROV Imaging and Laser Profiling) and the Prowler I & II systems (Towed Vehicle Imaging Range and Scale Measurement).

DEEPSEA POWER & LIGHT

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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.

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Ocean Specialists, Inc. (OSI) is a system development and advisory firm for undersea cable projects and technology with global 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.

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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.

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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.

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www.evologics.de		www.seaeye.com	
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www.gdmissionsystems.com/bluefin-9		www.sharkmarine.com	
Greensea	31, 68	Sidus.....	35
www.greensea.com		www.sidus-solutions.com	
iXBlue	07	Sonardyne	15
www.ixblue.com		www.sonardyne.com	
J.W. Fishers Manufacturing, Inc.	49	SubCtech GmbH.....	19
www.jwfishers.com		www.subCtech.com	
L3 OceanServer	47	Subsalve.....	41
www.ocean-server.com		www.subsalve.com	
Moog Focal	37	Southwest Electronic Energy Group.....	57
www.moog.com/focal/914-x		www.swe.com	
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www.oceanbusiness.com		www.tecnadyne.com	
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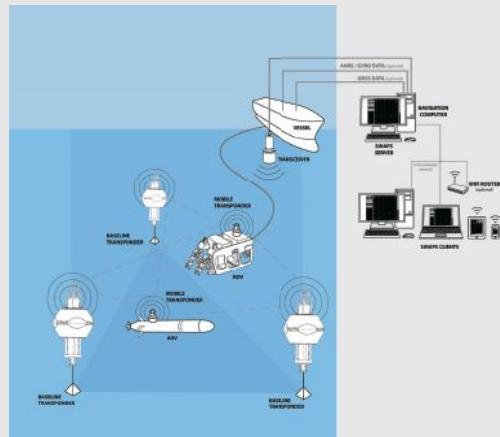
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- flexible SiNAPS positioning software
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- accuracy: better than 0.01 m



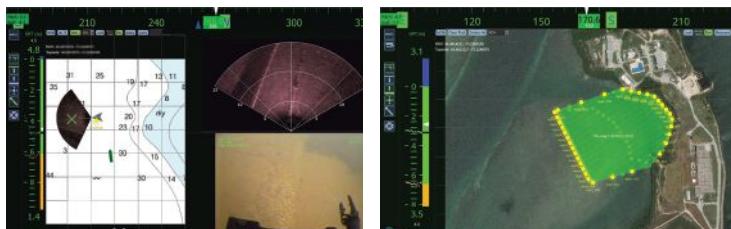


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