

PLANET



7.
Saipem
Innovator 2.0®



13.
New Underwater Mobile
Mapping Technology



27.
ROV Pilot
Training



30.
Making the Right
Underwater Connections

10

The magazine of choice for Subsea
Construction and ROV Professionals

ISSUE
Q1 / 2017

ABOUT

With approximately 9,000 email distributions and 2,000 printed copies delivered to the offices of ROV & subsea construction related companies, oil majors and also distributed at trade shows – ROV Planet aims to become the leading publication, online news portal, and forum of the ROV & subsea construction industries.

ISSUE NO.11: **APRIL 2017**

ISSUE NO.12: **JULY 2017**

BUYER'S GUIDE – COMING SOON!

If you would like to be listed or would like to advertise in our ROV/AUV Equipment & Parts Supplier, Operator, and Distributor Directory 2017 please send enquiries to: **DIRECTORY@ROVPlanet.com**

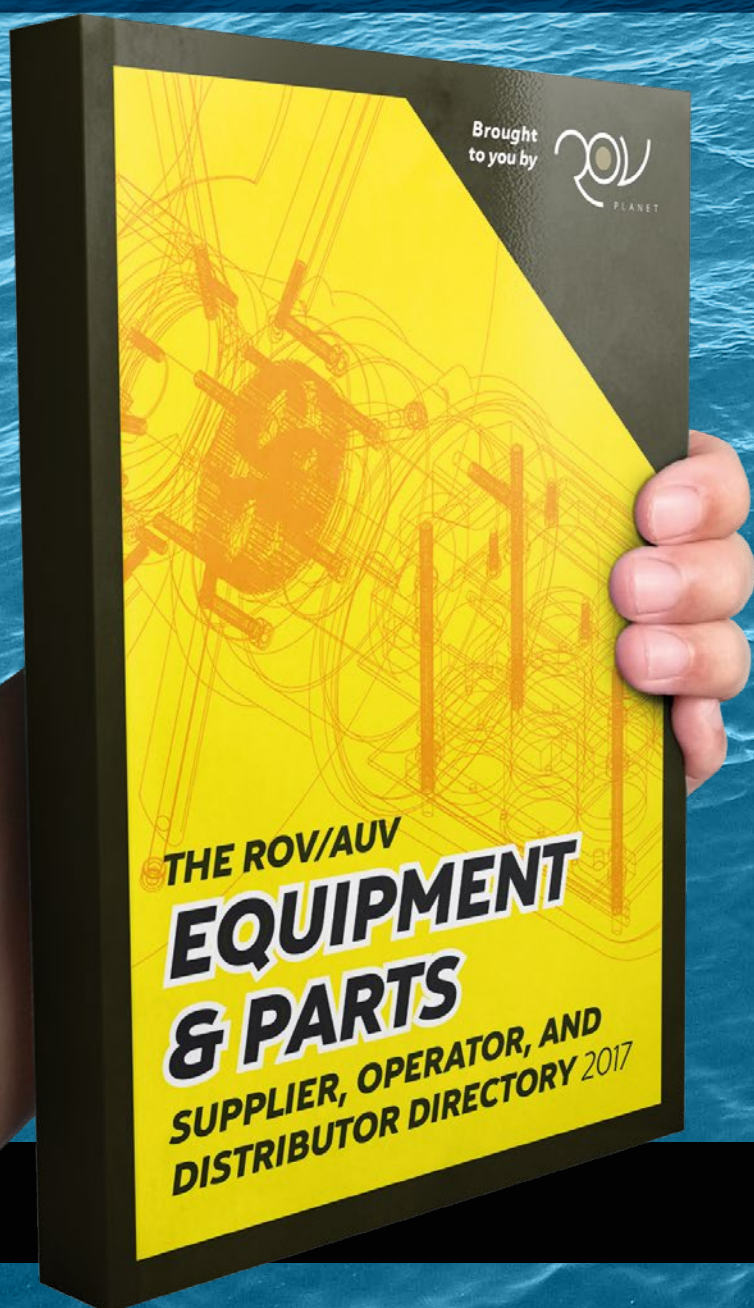


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WELCOME TO



PLANET



My name is Richie Enzmann, and allow me to welcome you all to the latest issue of ROV Planet!

Dear Reader,

ROV Planet is celebrating its "jubilee" issue no.10! It has been a great journey for us and we would like to take the opportunity to thank the help and support of everybody, including our readers and advertisers. It is very much appreciated!

You will see several changes being implemented within the new magazine structure in the forthcoming issues to reflect the diverse applications of ROVs across the range of different sectors including offshore renewables, decommissioning, submarine cables, and defence.

The poster is slightly different this time. Although not as entertaining as in issue 01, but we used it to reflect on our previous issues and to display the testimonials of some of the high profile readers within the ROV industry.

After 2 years of writing about ROVs and the ROV industry I have finally decided to undertake the Premium ROV Pilot training course offered by QSTAR in Las Palmas de Gran Canaria. You will be able to read about this training and my experiences as I work myself through each module to become an ROV Pilot Tech! This will be an interesting and exciting read for all that are interested in ROVs and especially for a lot of people that were thinking of giving this course a go.

Additionally, we have started working on the ROV Planet ROV/AUV Equipment Supplier, Operator & Distributor Directory 2017 (aka The Little Yellow). Please get in touch if you would like your company to be listed and I still haven't gotten in touch with you within the next few months. We are planning to launch this comprehensive and useful directory later on this year.

And as always, please sit back and enjoy our 10th jubilee issue!

Best regards,
Richie Enzmann

UPCOMING EVENTS

17-18 January, 2017 – Undersea Defence Technology – Singapore

The must attend conference for the undersea defence sector in Asia.

01-03 February, 2017 – Subsea Expo – Aberdeen, UK

Europe's largest annual subsea exhibition and conference.

21-23 February, 2017 – Underwater Intervention – New Orleans, LA, USA

A not-for-profit industry conference and exhibition, jointly owned by the Association of Diving Contractors International and the ROV Committee of the Marine Technology Society.

03-05 April, 2017 – MCE Deepwater Development – Amsterdam, Netherlands

World-class technical discussions focusing on the offshore technology, innovation and experience.

04-06 April, 2017 – Ocean Business – Southampton, UK

The hands-on ocean technology exhibition and training forum.

01-04 May, 2017 – OTC – Houston, TX, USA

The World's largest annual offshore exhibition and conference.

Please check out our website on:

www.ROVPlanet.com



Underwater Intervention 2017

February 21 - 23, 2017
Morial Convention Center Hall B1
New Orleans, LA

www.underwaterintervention.com



The world's premier event for Commercial Diving Contractors, Remotely Operated Vehicles, Manned Submersibles, and all other aspects of the Underwater Operations Industry!

Now in its 25th year, Underwater Intervention is jointly owned by the Association of Diving Contractors International (ADCI) and the ROV Committee of the Marine Technology Society. The show attracts thousands of commercial divers, contractors, engineers and safety professionals who converge on New Orleans for a few days of exchanging ideas, demonstrating new technology and supplies, and generating attention for a highly precise and sought-after line of work that is integral to many different industries.

ATTEND UNDERWATER INTERVENTION 2017

Join your peers at THE industry event of the year.

- Network with leaders in the underwater industry from around the world.
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- See the latest and greatest products and services for the underwater industry.

You don't want to miss this!

Registration information is on our website at www.underwaterintervention.com/attendees

EXHIBIT AT UNDERWATER INTERVENTION 2017

Showcase your products and services to top decision-makers in the underwater industry!

Exhibit space is quickly running out, so don't delay!

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NH Grand Hotel Krasnapolsky
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Courtesy of Saipem



INNOVATOR 2.0[®]

SAIPEM PRESENTS ITS NEW RANGE OF ROVS

SAIPEM HAS SUCCESSFULLY COMPLETED SEA TRIALS OF ITS NEW ROV, THE INNOVATOR 2.0[®].

These vehicles are of vital importance to Saipem's subsea operations. In fact, the company uses its proprietary ROVs to perform installation and maintenance of subsea fields and pipelines ranging from shallow to ultra-deep waters, in the harshest environmental conditions and most demanding operational scenarios.

The new Heavy Work Class ROV, Innovator 2.0®, is the result of three years of design and testing. It is a benchmark of excellence in terms of subsea robotics; it has drawn upon Saipem's experience in the construction of underwater facilities, as well as constant collaborative projects with the best Italian and European research centres. It has also utilised the production of components by specialist Italian companies.

While these certifications are not strictly necessary, they represent an additional benefit compared to competitor ROVs available on the market. Neither performance nor the characteristics of other subsea robots are guaranteed by an external certification body.

Since 1999, the year in which the first Innovator (Mark 1) was built by Saipem, the Company has been committed to the development of robots that can face new offshore operational challenges by implementing latest technologies. As a result, it has transformed Sonsub, Saipem's product line specialising in the development of remote subsea technologies, into a point of excellence in the sector.

By consolidating its ROV fleet over the years, Saipem has become one of the few operators in the market capable of designing, building, and operating its own subsea robots. Saipem has deployed these in almost all of its subsea projects under extreme operating conditions: shallow waters, ultra-deep waters, and the most hostile seas with strong currents and very low levels of visibility. The Company will also use them in the future, especially given the tendency of the oil and gas market to promote increasingly challenging subsea projects to exploit reserves in remote areas.

TECHNICAL CHARACTERISTICS OF THE INNOVATOR 2.0®

The new Heavy Work Class ROVs, Innovator 2.0®, are a benchmark of excellence in terms of subsea robotics: they are the result of 20 years of constant technical improvement and of continuous research into the performance of robots in terms of operational effectiveness and RAM (Reliability, Availability, and Maintainability).

Designed for an average life expectancy of over 15 years and to establish a new state of the art, they are on the cutting edge of ROV technology from a variety of perspectives. The innovations brought by Saipem incorporate the entire ROV system. On the sea surface, the ergonomics of the console and the Human Machine Interface (HMI) have been redesigned to make the work of pilots less demanding and as efficient as possible. Surface equipment has been designed for installation in a dedicated control room or a container. This allows for the entire Innovator system to be transportable by land, sea, or air.

The umbilical cable and tether have been redesigned with an innovative 6,600V power supply which allows the ROV to operate effectively even with extremely high cable lengths: up to 7,000m. At the same time, the Tether Man-



Courtesy of Saipem





Courtesy of Saipem

agement System (TMS), which in its base configuration can handle 1,100 m of tether, has been optimised to find the best compromise between robustness and weight, and to simplify maintenance work.

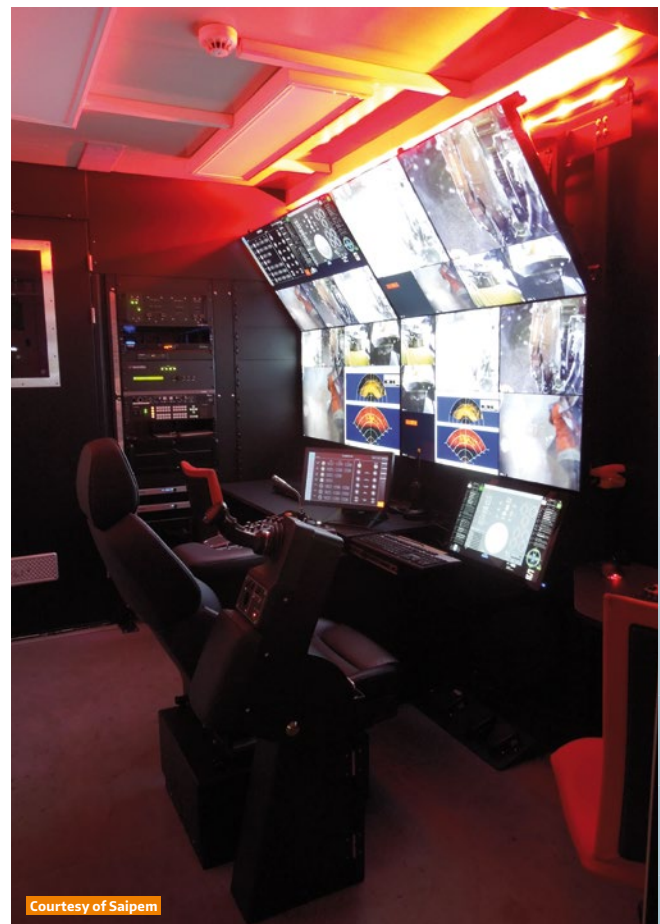
Finally, the ROV has been designed to ensure that size and weight are contained whilst guaranteeing all the power needed to perform even the most demanding jobs. The new electrical motor can in fact provide 210Hp which, combined with the extremely high efficiency of the propulsion system, ensures a bollard pull of 1,100kg in each direction, a maximum speed of 3.5 knots and the ability to lift loads of over 600 kg hooked to the front part of the frame (values certified by DNV-GL). These performances make it suitable for operations in extreme conditions – including very strong sea currents – and to execute jobs which in the past would have been considered practically impossible.

The electronic control unit, designed and built by Saipem especially for the Innovator 2.0® is extremely compact and robust, and is capable of resisting both high pressure levels and extreme temperatures. A high degree of flexibility is guaranteed by a wide array of auxiliary instruments that can be attached to the ROV, enabling a further extension of the vehicle's capacities and uses. The control system – which was completely developed by Saipem – runs the ROV's propulsion plant in a remarkably efficient way. This makes it particularly easy for the pilot to operate in every type of work situation.

These innovations – combined with the way they have been individually engineered and integrated into a broader system – have allowed Saipem to build the finest ROV in the oil and gas sector in terms of both technology and operational effectiveness. Saipem will continue the phase of research and development to ensure that the Innovator 2.0 remains the best ROV on the market, and that each new robot produced can implement all the improvements which come to light from the company's experience in the field.



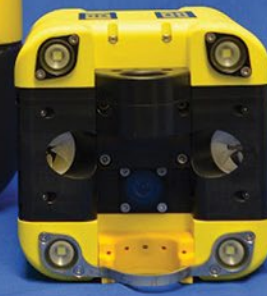
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Ramses

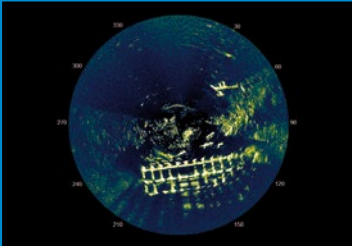
Sparse-LBL MF and LF
positioning systems



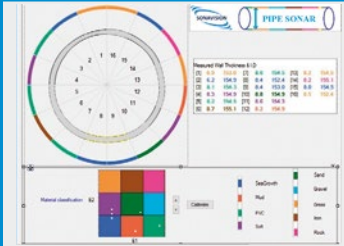


World Class Underwater Technology

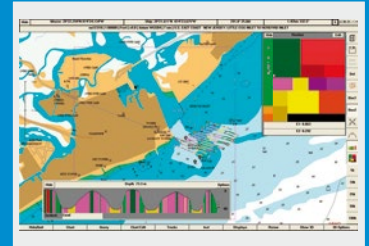
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NEW UNDERWATER MOBILE MAPPING TECHNOLOGY

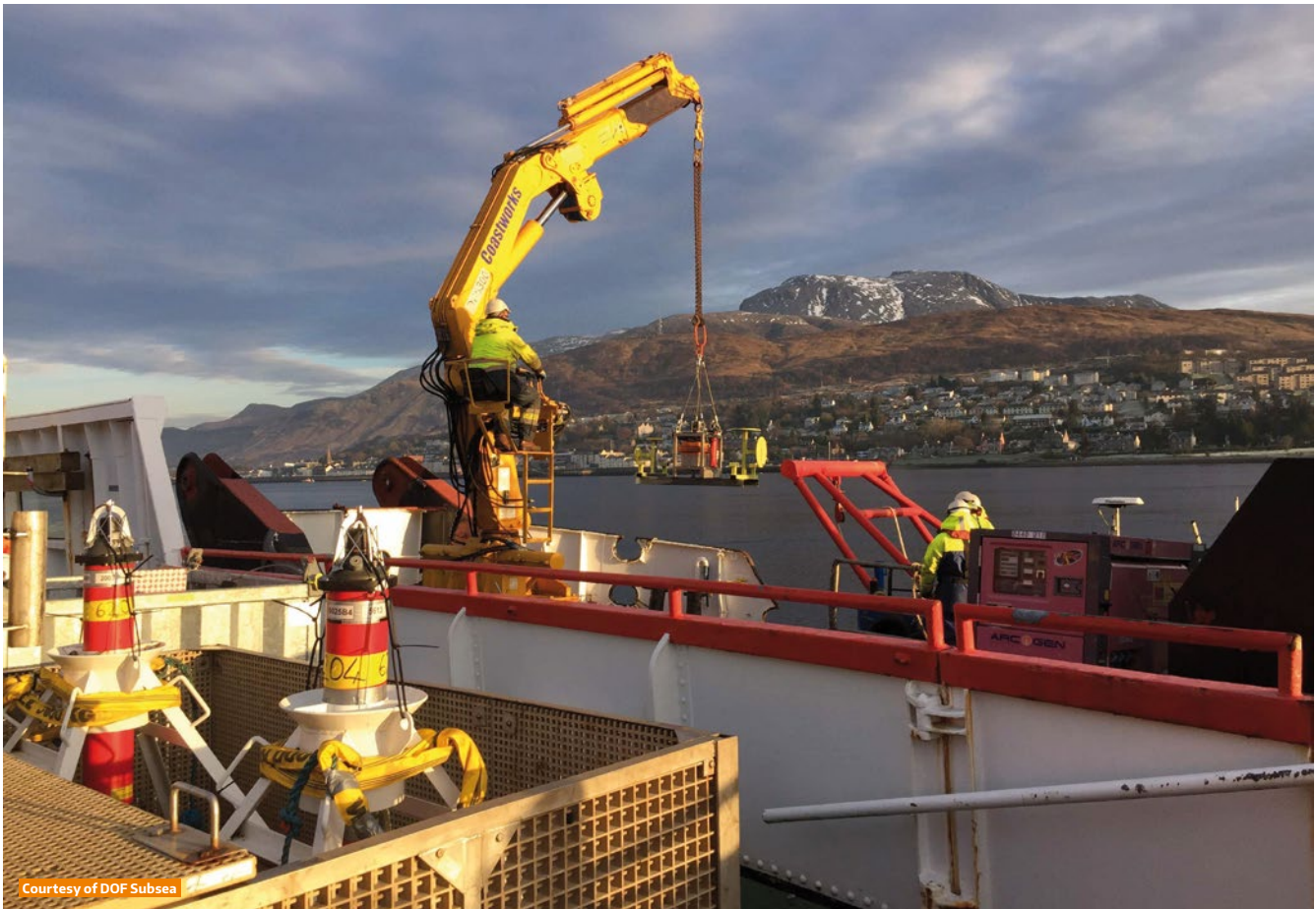
DOF Subsea, together with subsea technology companies Sonardyne, 2G Robotics, and Seatronics (an Acteon company), successfully demonstrated a new underwater surveying technique last week that could significantly shorten the time needed to map underwater structures and offshore sites.

Representatives from across the North Sea energy sector, including senior figures from oil majors, contracting companies and service providers, attended the demonstrations which were held over three days at The Underwater Centre in Fort William.

The event was organised by DOF Subsea to showcase the capabilities of dynamic mobile mapping. The new technique uses a 3D laser scanner fitted to an ROV to create highly detailed, point cloud images of subsea assets and environments. By combining the 3D laser data with precise underwater acoustic and inertial navigation information, it is now possible to generate centimetre resolution engineering models from which accurate measurements can be instantaneously and repeatably captured.

Within the offshore sector, one of the primary applications for the new technology is underwater metrology, a process that requires accurate, precise and robust measurements. These are critical for successful fabrication and installation of spools and jumpers. Not only does the new method save time and money, it also reduces the risk of spool pieces being fabricated incorrectly.

The new laser-acoustic-inertial metrology solution brings together three independent systems, each of which is proven within its respective field.



Courtesy of DOF Subsea

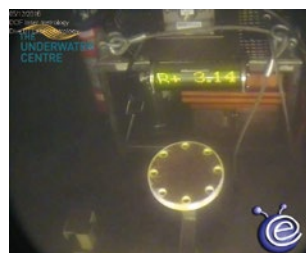
The 2G Robotics ULS 500 Pro Laser, provided by exclusive distributor Seatronics, is a laser triangulation measurement system that is ideal for capturing high-detail measurements from dynamic platforms such as an ROV or AUV. Sonardyne's SPRINT inertial navigation sensor makes optimal use of aiding data from transponders deployed on the seabed and from other acoustic sensors to provide dynamic, centimetric-level navigation for the ULS 500 laser, which is post-processed using Sonardyne's Janus software. DOF Subsea's Metro software is configured to use the Sonardyne SPRINT-positioned ULS 500 to undertake standardised metrology calculations offshore, reducing risk in metrology calculations and ensuring approved algorithms are used to generate client deliverables.

The new metrology solution is ROV-mounted and mapping operations are conducted in Dynamic Mode (i.e. with the ROV flying the spool route) in order to simultaneously survey multiple horizontal or vertical flanges. Key operational benefits of the technique include;

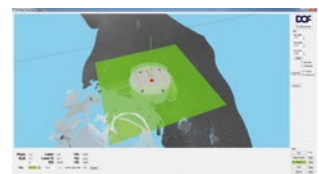
- | **NON-INTRUSIVE** – no prior subsea intervention is required in advance of metrology, and no subsea bracketry, control spheres or metrology aids are required
- | **FLEXIBLE DEPLOYMENT** – modular system which can be easily fitted to an ROV (for Dynamic data acquisition), or mounted onto a tripod (for static data acquisition)
- | **TIME TO SURVEY** – significant reduction in the time (and therefore vessel cost) needed to gather the survey data in comparison to traditional techniques such as pure acoustic LBL; typically less than three hours for a laser metrology.
- | **TIME TO DATA** – quick delivery of results offshore; typically within six hours of data acquisition
- | **INFERRED METROLOGY** – with prior dimensional control information, hub position and orientation can be inferred using laser scan data



Courtesy of DOF Subsea



Courtesy of DOF Subsea



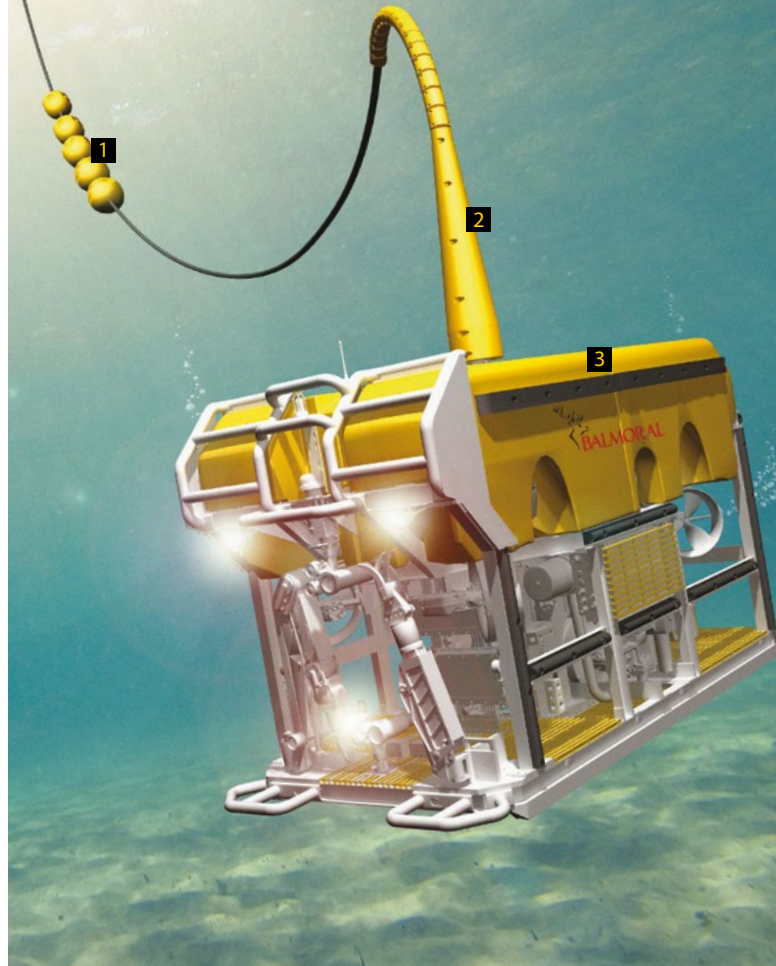
| **MORE THAN METROLOGY**, the 3D model used for metrology serves as an As-Built model of the subsea installation and the surrounding area to provide a baseline for future intervention work

When asked about the demonstration, Pieter Jansen, Geomatics Global, said "The combined system components brought together and showcased in Fort William were proof of further advancements within the survey industry, combining technological advancements with operational efficiencies. A much welcome and needed approach in an economically hard hit Oil and Gas Industry."

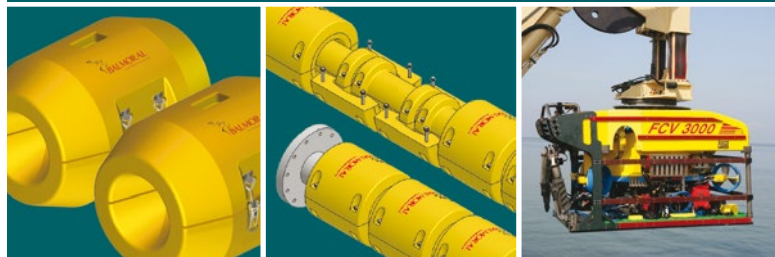
Speaking about the success of the demonstrations, Colin Cameron, DOF Subsea said, "At DOF Subsea, we pride ourselves on working in partnership with industry leaders to develop new technological solutions to subsea challenges. The development of this solution is hugely important for the energy sector, and we were delighted with the data that we were able to gather in Fort William. We have proven that the technologies work together in this application and that the method can generate the quality and complexity of data required. We believe that using this combination of technology to provide a full metrology solution is an industry first – we can save days on traditional metrology work, and provide much higher quality data. This in turn brings savings to the operations teams running the projects."



Courtesy of DOF Subsea



ROV, AUV BUOYANCY and umbilical flotation



1 Umbilical floats

A standard range of floats is available to suit most control umbilicals. Comprising symmetrical half shells Balmoral floats are designed to permit flexing within specified bend radii.

2 Flexlink™ articulated umbilical buoyancy

Designed to ensure umbilical lines remain out of the ROV work zone, Flexlink is installed onto lines of 25-75mm with uplifts of 6-12kg in operating depths to 6000msw.

3 ROV buoyancy

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

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



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Booth 731

2017 MATE ROV COMPETITION:



PORT CITIES OF THE FUTURE: COMMERCE, ENTERTAINMENT, HEALTH, AND SAFETY

By Jill Zande, President, MATE Inspiration for Innovation (MATE II)
Associate Director & Competition Coordinator, MATE Center

The 2017 MATE student ROV competition highlights the role that ROVs play in the safety and operations of ports and harbors. The scenario focuses specifically on the Port of Long Beach, California, which is the city hosting the 16th annual international event June 23-25. What follows is a synopsis of the background information provided to the student teams that includes the fictitious request for proposals (RFPs) that they must respond to when designing and building their vehicles. A listing of the tasks that the teams participating in the EXPLORER (advanced) class will have to tackle is also included; tasks for the RANGER, NAVIGATOR, and SCOUT competition classes can be found on the MATE web site (<http://www.marinetech.org/missions-specs--scoring/>).

In addition to the tasks for 2017, the MATE Center recently launched the Marine Advanced Technology Education Inspiration for Innovation, or MATE II, corporation, whose tax exempt status under the U.S. Internal Revenue Code Section 501(c)(3) is pending. For more information about MATE II, including sponsorship and other partnership opportunities, please contact jzande@marinetech.org.

CONTEXT

The Port of Long Beach is one of the world's busiest seaports. It is the second-busiest container port in the United States, after the Port of Los Angeles, which it connects to. Acting as a major gateway for trade between the United States and Asia, the port occupies 13 km² of land with 40 km of waterfront in the city of Long Beach, California. The Port of Long Beach is located less than 3 km southwest of downtown Long Beach and approximately 40 km south of downtown Los Angeles.

The port has 10 piers, 80 ship berths, 66 gantry cranes, and 22 shipping terminals. More than 2,000 vessels call at the Port of Long Beach each year, moving \$180 billion in cargo. Each year, it handles more than 6.8 million 20-foot container units; on a daily average, it is possible for the port to handle of up 30,000 cargo containers. In U.S. dollars, the seaport generates nearly \$100 billion in trade each year. It provides more than 316,000 jobs in Southern California; 1.4 million jobs throughout the U.S. are related to Long Beach-generated trade. In addition to commerce, the port includes cruise ships and activities related to tourism and entertainment.

Docked in Long Beach Harbor is the RMS (Royal Mail Ship) Queen Mary, a colossal ship bigger, faster, and more powerful than the RMS Titanic. Built

16th Annual

MATE International ROV Competition

Port Cities of the Future:
Commerce, Entertainment,
Health, and Safety

June 23-25, 2017
Long Beach City College
Long Beach, California, USA
(831) 646-3082
www.marinetech.org

MTS marine technology society ROV OCEANEERING LONG BEACH CITY COLLEGE

in Scotland, the 1,000-foot ship made her maiden voyage on May 27, 1936. After three years of hosting the world's rich and famous across the Atlantic, she was called into service during World War II. She became known as "The Grey Ghost," carrying more than 800,000 troops, traveling more than 600,000 miles, and playing a significant role in virtually every major Allied campaign, including the D-Day invasion. In 1967, she was withdrawn from service after more than 1,000 transatlantic crossings. That same year, the Queen Mary was sold for \$3.45 million to the City of Long Beach for use as a maritime museum and hotel.

With all of the activity and vessel traffic, the Port of Long Beach is not immune to accidents and pollution. Thousands of dollars have been spent on the removal and remediation of contaminated sites, such as the IR Site 7 remediation dredging project to remove chemicals that entered the harbor from the former Long Beach Naval Station operations. More than 400,000m² of contaminated sediments were sequestered during that project. In addition, each year thousands of containers fall off of cargo ships, sometimes in harbors as ships are entering or leaving port.

The Port of Long Beach is governed by the City of Long Beach. The City Charter created the Long Beach Harbor Department to promote and develop the Port. The Harbor Department's primary responsibility is the health and safety of the port and waterfront.

NEED

The Port of Long Beach has issued a request for proposals (RFP) for a remotely operated vehicle and crew that can operate in the sometimes confined and often precarious conditions of the port and waterfront. Specifically, the port managers are in need of an ROV that can **1)** assist with the installation of a Hyperloop system to expedite the delivery of goods and streamline commerce; **2)** conduct maintenance on the port's water and light show to guarantee uninterrupted entertainment; **3)** identify and collect samples of contaminated sediment then remediate the area to protect the health of people and the environment; and **4)** identify the contents of containers that fell off of a cargo ship into the harbor and map the accident site to ensure the safety of the port and its operations.

Before launch and operations, the ROV must complete a series of "product demonstrations" staged in the swimming pool on the campus of Long Beach City College and at various regional locations. (Depth requirements vary depending on competition class.) Companies that successfully complete the product demonstrations and deliver exceptional engineering and communication components (e.g. technical documentation, product presentations, and marketing displays) will be awarded the contract.

DESIGN BRIEF – EXPLORER CLASS

Shared here is the summary of the product demonstration tasks that EXPLORER class teams will face.

COMMERCE: HYPERLOOP CONSTRUCTION

- | Insert two rebar reinforcement rods into position in the steel baseplate.
- | Install the frame onto the baseplate.
- | Remove a pin to release the chains holding the frame.
- | Transport and position the hose for pouring concrete into the frame.
- | Retrieve the three positioning beacons and return them to the surface.

ENTERTAINMENT: LIGHT AND WATER SHOW MAINTENANCE

- | Disconnect the power cable from the platform.
- | Turn the valve to stop the flow of water to the platform.
- | Disengage the locking mechanism at the base of the fountain.
- | Remove the old fountain.
- | Install the new fountain.
- | Re-engage the locking mechanism at the base of the fountain.
- | Turn the valve to restore the flow of water to the platform.
- | Reconnect the power cable to the platform.
- | Return the old fountain to the surface, side of the pool.

HEALTH: ENVIRONMENTAL CLEANUP

- | Use a simulated Raman laser to determine if contaminants are present in two sediment samples.
- | Collect a 100 ml sediment sample from the contaminated area and return it to the surface. The sediments will be simulated by agar.
- | Collect two clams from the contaminated area and return them to the surface.
- | Place a cap over the contaminated sediments.

SAFETY: RISK MITIGATION

- | Locate the four cargo containers.
- | Activate each container's Radio Frequency Identification (RFID). This will be simulated by shining a light into a port on the side of the container to activate the sensor.
- | Obtain RFID data via Bluetooth.
- | Use the data to determine the container's identification number, contents, and if the contents are high risk. (MATE will provide you with a container manifest.)
- | Attach a buoy marker to the eye-bolt on the container with high-risk cargo.
- | Determine the distance from the high-risk container to the other three containers.
- | Determine the direction from the high-risk container to the other three containers.
- | Use distance and direction to make a survey map of the incident site. (MATE will provide a blank map with 0.25 meter squares.)



P L A N E T

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& ROV PROFESSIONALS!**

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INFORMATION ABOUT THE ROV INDUSTRY AS WELL
AS LATEST DEVELOPMENTS."

BOB CHRIST
President of SeaTrepid (Louisiana, USA)

"GREAT WORK RICHIE, KEEP IT UP SIR!
I AM A HUGE FAN AND SUPPORTER AND ALWAYS
TELL PERSONNEL TO CHECK IT OUT!"

SCOTT DINGMAN
President & CEO of Delta Subsea (Texas, USA)





"FOCUSING ON VALUABLE INSIGHT INTO THE EVER CHANGING WORLD OF ROV SYSTEMS, ROV PLANET DELIVERS IN-DEPTH KNOWLEDGE AND UNDERSTANDING OF ROV'S TO SUBSEA CONSTRUCTION AND ROV PROFESSIONALS GLOBALLY"

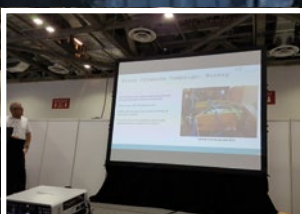
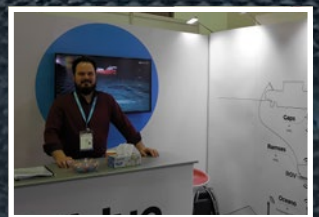
STEVEN COWIE

VP and UK Country Manager of Oceaneering (Aberdeen, UK)

"IT IS ALWAYS A PLEASURE TO READ ROV PLANET, THE WRITING IS VERY INFORMATIVE AND THE PRODUCTION QUALITY IS BEAUTIFUL."

TYLER SCHILLING

President of Schilling Robotics (California, USA)





OSEA2016

SINCE 1976

POST SHOW REVIEW

OSEA2016, the most established oil & gas industry event in Asia, concluded successfully as 18,000 trade attendees comprising exhibitors, visitors, conference speakers and delegates, and press members gathered at the 4-day exhibition and conference to network, learn and keep updated with the latest industry developments.

The 21st edition of OSEA continued to deliver and remain relevant by addressing the immediate concerns of the industry through showcasing solutions that enhance productivity and create greater cost savings. More importantly, OSEA2016 provided a source of ideas for companies to future-ready their businesses and contemplate the next best direction to steer towards amidst the challenging market conditions.

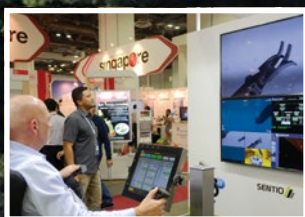
1,070 exhibitors from 48 countries/regions and an impressive line-up of 17 international group pavilions from Australia, China, France, Germany, Italy, Korea, Netherlands, Norway, Russia, Singapore, Taiwan, UK and USA showcased their latest and innovative solutions for Asia's oil & gas industry at OSEA2016.



The ROV Planet booth at OSEA2016



ROV Planet Magazines at OSEA2016



OSEA2016 held at the Marina Bay Sands Convention Centre in Singapore (Photo: Daniel Roscoe-Hudson)



A Vision for our Marine Future:

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NEW NAME IN SUBSEA MAKES WAVES FOLLOWING ACQUISITION OF FLEET OF ROVS

A fledgling subsea business is making waves in the sector following the acquisition of a fleet of ROVs.

In November last year, new start-up M² Subsea announced that it had secured a substantial injection of private equity investment to acquire a fleet of 32 ROVs. The Aberdeen and Houston based company attracted the investment from a fund advised by Alchemy Special Opportunities.

M² Subsea is now set to become one of the largest independent providers of ROV services globally. It offers its customers safe, cost-effective solutions for inspection, repair, maintenance, decommissioning and light construction. The company has already recruited around 35 onshore and offshore personnel in both the UK and North America and moved into offices in Westhill. However, the aim is to create 150 new onshore and offshore jobs over the next 12–18 months.

The business is led by subsea stalwart, Mike Arnold. He said: "We set up the business in early 2016 but the investment, which allowed us to acquire our fleet of assets, provided the solid foundation on which to build a global business that is entirely focused on delivering OPEX cost-savings without compromising on safety or quality."

He believes the business is in a great position to meet the challenges of the current environment.

"The time is absolutely right for a new ROV services provider with a fresh approach that can, through experience and expertise, the correct asset base and lean management, dramatically reduce both cost and risk whilst continuing to provide a quality service.

"It's all about recalibration," Mike stated. "The current oil price, give or take \$10 or so of fluctuations, is here to stay for a considerable period so it's still all about getting costs down. We've been able to get best-in-class assets at the right price and an overhead appropriate for the current market. Our people have the knowledge, experience and commitment required to shape a fresh approach to the market and I firmly believe it's this mind-set that will set us apart from other companies."

Key to M² Subsea's success will be partnering with vessel owners and operators, helping them to maximise utilisation



Mike Arnold, CEO of M² Subsea (Photo: Graeme MacDonald)

tion of vessels through a collaborative approach to bring about sustainable cost-savings.

Mike explained: "There's no reason why one vessel cannot be mobilised for two or three scopes of work. But this does require real collaboration and we are focused on working with operators in helping them gain the confidence and trust required to embrace our contracting model. We are convinced that we can provide greater savings through ultra-efficient operational scheduling and smart, innovative thinking rather than just cutting costs here and there which simply leads to loss of value, margins and ultimately jobs, not to mention increased risk."

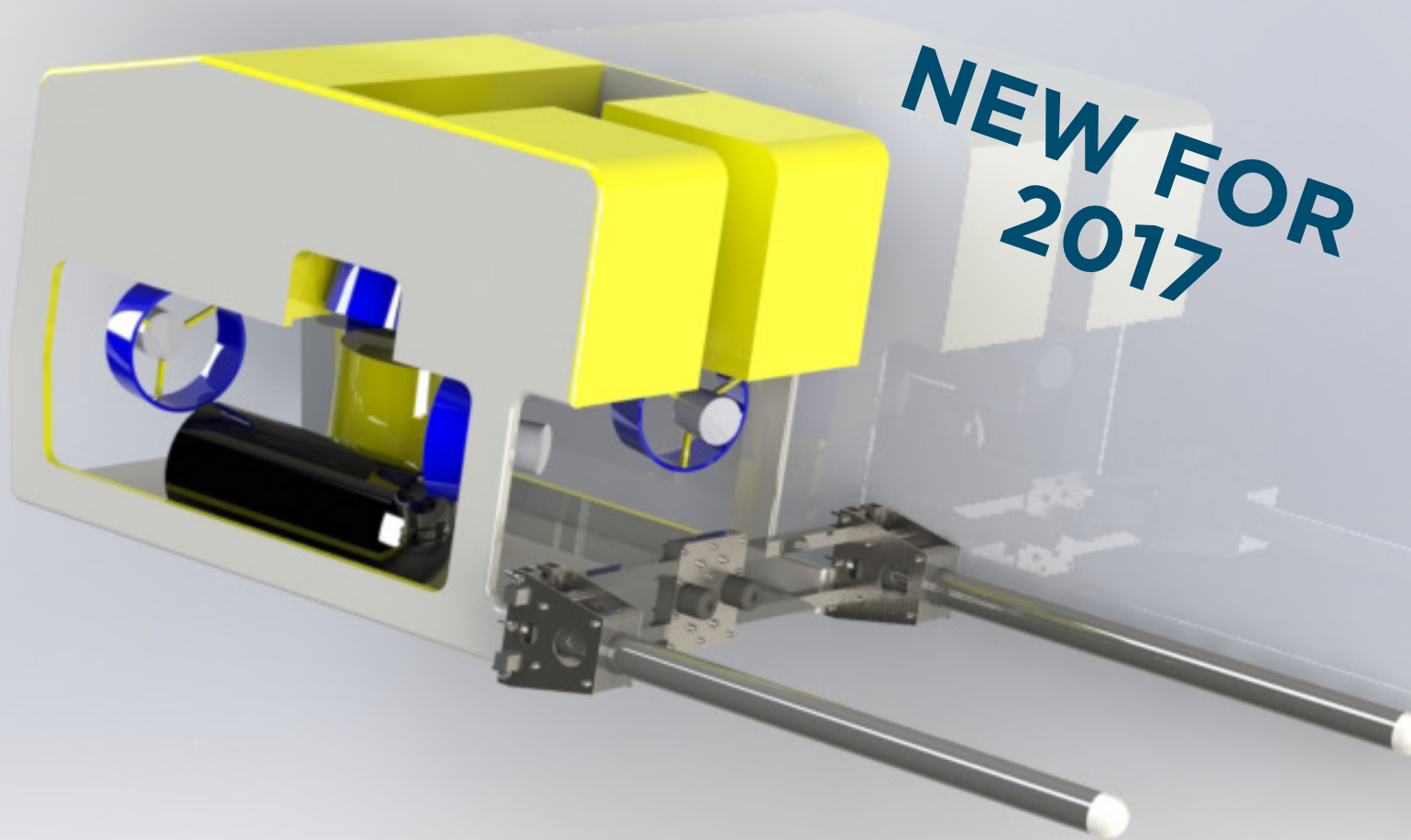
Driving true collaboration across the subsea industry is a challenge but Mike believes M² Subsea has the expertise, knowledge and contacts, particularly with vessel owners, to bring about change.

"Early engagement with operators is crucial to achieving this type of approach," Mike said. "To drive down operational expenditure and come up with the solutions that will continually add value, we need to have greater visibility around OPEX projects and a longer lead-in time. We're currently talking to customers about this and there is a growing recognition that with increased visibility, contractors and suppliers can invest more in developing the most cost-effective solutions. We know that the onus sits with us here and we welcome the opportunity to engage with all our clients and potential clients and work with them to drive their costs down."

Mike, who has 35 years' experience in the subsea industry, has brought together a strong management team which includes Chief Operating Officer, Mark Wood and Sales & Marketing Director, Mike Winstanley.

"We've been able to quickly form a team of great people," Mike said. "Many of them have been with me for a number of years in other businesses so we understand each other and intuitively know how to meet our customer's needs. We have also been able to bring in some new talent with fresh ideas and approaches which resulted in us developing, in a very short space of time, a cohesive, tried and tested team that have been able to hit the ground running."

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STR: CLASS LEADING SERVICES, BEST SOLUTIONS

Subsea Technology and Rentals (STR) is a specialist technology company providing rental and sales services globally to the offshore marine sectors. For over 20 years, STR has delivered mission critical solutions to support offshore survey, ROV, IRM, positioning, environmental, and subsea construction sectors. STR's mission is to offer all its customers a competitive edge by delivering integrated, forward thinking technology and innovative engineering solutions, complete with flexible and dedicated support from project planning to project completion.

LOCATION

STR is headquartered in close proximity to the port of Great Yarmouth and strategically placed to serve their local, national, and international clients. From their location on the East Coast of England they have direct links to major European shipping ports, direct access to London Heathrow Airport for global delivery and the use of a daily overnight trunker service to industry hub Aberdeen.

REGENERATION

After nearly 20 years of operating under the established name of Sonar Equipment Services, STR began an exciting new phase under new ownership. In 2013, with a reinvigorated push to provide the best services in their sector and with sustainable growth the company moved into a modern, purpose-developed building under the new title STR to better reflect the diversity on offer to its customers.

Following the change in ownership, premises, and a complete re-brand, investment and growth have steadily continued across all business lines. This has led to a significant investment in staff for both on and offshore support, rental equipment inventory, product research and development, cable moulding and calibration facilities.

As an innovative company STR understands the importance of developing new technology and delivering class-leading services to give their customers the best solutions. Con-

tinual investment in the latest marine technology has seen their spectrum of rental equipment increase in order to satisfy all marine and subsea activities.

RESEARCH & DEVELOPMENT

The product development team at STR has a proven track record of providing functional technical solutions to meet their client's challenging operational requirements. STR has manufactured trusted solutions for seafloor investigation and inspection for over 20 years and has recently moved into the delivery of high performance ROV video cameras, underwater lasers, LED lights and uninterruptible power supplies for ROV sensors.

FACILITIES AND SERVICES

STR operates state of the art test and engineering facilities to maintain their rental equipment inventory to the highest standards, in line with manufacturing specifications. The site even features a fantastic hyperbaric pressure test chamber and acoustic tank. These are regularly used in a range of testing, including their calibration services.

CALIBRATION FACILITIES

To support the maintenance programme of STR's extensive range of rental assets, STR has invested in state of the art calibration facilities to conduct manufacture equivalent calibrations in-house. With collaboration from industry leading manufacture Valeport, their calibration facility can support customers requiring fast turnaround 3rd party calibrations.

PERSONNEL

STR equipment supply can be complemented with highly skilled offshore survey engineers to attend vessel mobilisations and support their customers' offshore operations. Their offshore personnel are qualified in a relevant engineering discipline and certified for offshore deployment to effectively integrate into their customer's offshore team.

CABLE MOULDING

The STR cable moulding and termination facility offers expertise in the design, manufacture and testing of OEM and custom electrical, video and fibre optic cables for use in underwater, topside and other harsh environments.

Their OEM equivalent polyurethane moulding processes are proven to deliver the highest quality product without compromise. Alongside the supply of connectors, cables, terminations and mouldings, STR specialise in fibre-optic and oil-filled pressure balanced cable solutions. Their trained fibre optic technicians can support singlemode and multimode fibre cables and can provide their clients worksite diagnostics and re-termination services.

FLOODED MEMBER DETECTION

STR have developed an innovative flooded member detection system for launch in 2017. SeaGamma FMD system has been designed with substantial input from industry inspection experts and is expected to be the method of choice for the inspection and monitoring of subsea components for the detection of water ingress. FMD inspection technique can also be applied to locating blockages in pipelines as a result of pigging or silt build up.

AGENCIES

Unparalleled experience in marine technology has meant many of the leading industry manufacturers have selected STR to represent their interests to provide expert procurement guidance. With industry recognised expertise in the field of sidescan sonar and sub-bottom profiling, STR have been selected to represent leading sonar manufacture EdgeTech as their sales and service centre for UK customers.

So, as you can see STR boasts the skills, equipment, and industry experience required to meet all of your marine technology needs. If you have any further questions or would like to contact STR, follow the details below. Their team looks forward to helping you succeed.

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- ROV Services, Support & Sales
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ROV PILOT TRAINING

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SUBSEA SOLUTIONS

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Barcelona - Las Palmas de Gran Canaria

QSTAR ROV PILOT TRAINING



View over the Port of Las Palmas

Some readers may be aware that I started my oil and gas career as an ROV Base Technician at Oceaneering in Aberdeen. After spending some time in the company and completing my university education, I moved into an engineering design/support role working for KBR, Aker Solutions, and Cameron/OneSubsea. This role saw me working in several locations around the world, both in offices and fabrication yards. During that time I always dreamed of going offshore as an ROV Pilot and actually seeing how the kit I designed was being installed and operated underwater. Now after all these years it appears that this dream is going to become a reality.

I was recently offered a position on an ROV Pilot Technician training course with QSTAR ROV Training and Subsea Solutions in the Las Palmas de Gran Canaria and Barcelona facilities.

As the course progresses I plan to write a series of articles recording my experiences, which will hopefully inspire other potential candidates to follow suit and enrol.

Las Palmas is located off the coast of the Western Sahara in Africa, although it is actually a part of Spain. As such it enjoys all the advantages of being within the EU, whilst still being located in close proximity to the North and West African oil fields and offshore operations. The island has high speed internet coverage even in remote locations, motorways make it easy to get around, and it even boasts its own deepwater port. Recently the island started to attract a lot of Oil&Gas companies to setup logistic bases by providing suited infrastructure and services for multipurpose and drilling vessels, semisubmersible platforms. Its strategic location in relation to Africa and Europe and the local tax system makes it an interesting option for business development.

When I landed in Las Palmas a taxi was waiting for me to drive me to my accommodation. Once I arrived and got settled in I had a whole day to myself to explore the area. As such, I decided to take a 30km walk to the Bandama Vulcano, and try some of the local cuisine. It proved to be a lovely daytrip.

On day one of the training course we were taken to the QSTAR Base, located in an industrial estate within the port of Las Palmas. Victor and Jose Maria Sepuvela (e.n. brothers) have started up the subsea services and training company after having worked offshore. The vast oceans of the world are second home to them: they grew up and lived on a boat sailing around the world for over 10 years exploring all kinds of exotic locations before settling down on the Canary Islands permanently.

“We have been working in the ROV industry for many years and we wanted to share our knowledge and experience with other persons that want to get into this industry, so we decided to open a ROV Training division at QSTAR located in Canary Islands and Barcelona” explained Victor.



Christian Gurgu (Courtesy of QSTAR)

At the training school we were greeted by Cristian Gurgu, one of the ROV trainers, who showed us around the premises. After our tour we had a coffee break on the roof of the building which has a breath-taking view over the harbour. We were lucky enough to experience 20°C (68°F) heat whilst most of Europe was suffering from the sub-zero temperatures of mid-winter.

Module number 1 of the course lasts approximately one week and covers the introduction to offshore life, basic ROV architecture, and general ROV operations. Basically it acts as an overview for the course. With this cohort the intro to offshore operations went relatively quickly; everybody on the course had some background in offshore, oil and gas, or seismic work, not to mention a valid BOSIET (offshore survival certificate).

One participant in the course, Mathieu Le Noac'h – a French seismic navigator with 10 years of offshore experience – already had a job lined up in Tahiti, French Polynesia. He was eager to learn about ROVs and was excited to pick up his brand new ROV from ECA, scheduled to be ready for him right upon completion of the course.

"I grew up by the sea and have always been attracted by the marine environment. I graduated in Oceanography specialized in survey and monitoring sensors. After more than 10 years surveying for CGG, I obtained a contract with ROVotik, a freshly created Polynesian Company that is going to conduct ROV inspections down to 1000m. Piloting an ROV, a new underwater adventure!

I therefore decided to be trained as Pilot Tech. QSTAR quickly turned out to be the most convenient provider for my needs. Very responsive to emails, lodging proposed with shared house in a residential area downtown, transportation taken care of, great training facilities, well experienced and knowledgeable trainers. Another advantage is the location in Las

Palmas offering a nice climate for a course hold in January and February. First week done, I feel really happy about having chosen QSTAR and calling for more!" said Mathieu.

The next segment of the module was ROV architecture which covered more technical things. This segment provided an overview of the main parts of an ROV, their purposes and various types, related principles of working, navigation and positioning principles (USBL, LBL, etc.), sonars, ROV tooling options including hotstabs, 5 and 7 function manipulators, and also the hydraulic parts, pressure principles, and their basic calculations for different scenarios.

Then there was the ROV operations segment. This touched on the possible type of works performed and main offshore operational procedures that were likely to be encountered on a job.

Normally the training hours were between 8:30am and 4:30pm. However on a couple of occasions we stayed on until 8:00pm, when there were a lot of questions to cover or we had to collect and try on our PPE from the nearby store in the harbour. Afterwards we would normally relax with a couple of beers at our villa.

During the module we tried the ROV simulators, practised manipulator operations by trying to retrieve and reinsert a dummy hotstab using the 5 function manipulator and also piloted a mini-ROV in the test tank. It was great to get a bit of practice and experience piloting first hand.

Cristian Gurgu, our trainer, has spent time offshore with Fugro-TSMarine and GSP Offshore working as an ROV Pilot Technician. He also has an extensive electrical background, and I found him to be a very competent trainer both in terms of knowledge and experience. He also possesses the skill and ability to transfer that knowledge to his audience.

"Gaining experience in the ROV field requires passion and persistence. Now, being part of QSTAR I can give it forward, intending to inspire the future pilot-techs into their new careers. We are glad that recently a new IMCA training guideline has been issued and we have contributed to it, therefore the quality of our services is in line with the most recent requirements." explained Cristian.

The ROV Pilot Technician Premium Course that I'm taking with QSTAR consists of eight modules, and is normally seven weeks long. It can be completed in one round or on a modular basis with the weekends reserved for rest and regeneration. It is also a good opportunity to explore the islands that have so much to offer: be it the sandy beaches of Lanzarote, or the rainforests and volcanos of Tenerife, or the party scene of Playa del Ingles, everybody can find something to entertain themselves.

Gran Canaria has proven to be a splendid location for both training and leisure. As I was standing at the airport awaiting my departure, I was looking forward to my return visit. And when that happens, I will be sure to keep you all updated.



In the Classroom (Courtesy of QSTAR)



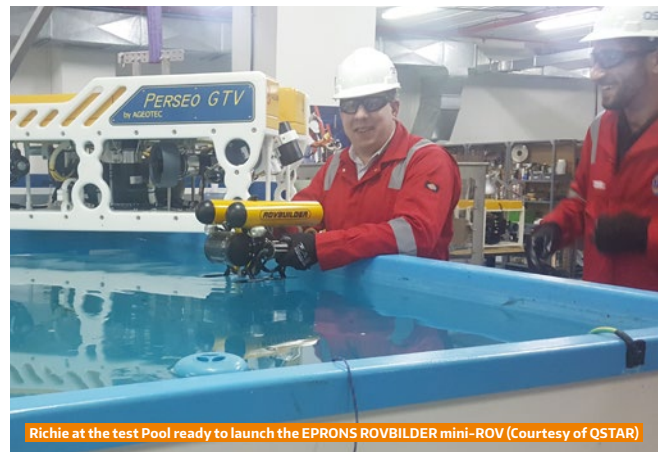
ROV Instructor on the Forum VMax Simulator (Courtesy of QSTAR)



ROV Trainee Team on the Atlantic Explorer – Nov 2016 (Courtesy of QSTAR)



In the Simulators Training Room (Courtesy of QSTAR)



Richie at the test Pool ready to launch the EPRONS ROVBILDER mini-ROV (Courtesy of QSTAR)

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Remote Operated Vehicle (ROV) PRODUCTION, SALE AND SERVICE:



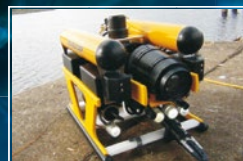
RB 150

Working depth till 100 meters,
Tether length 120 m (up to 150 m),
Color camera 700 TVL,
4 Thrusters: 1 vertical, 2 horizontal, 1 lateral.



RB 300

Working depth till 200 meters
Tether length 220 m (up to 300 m)
Color camera 700 TVL
5 Thrusters: 2 vertical, 2 horizontal, 1 lateral.



RB 600

Working depth till 300 meters,
Tether length 300 m (up to 1200 m),
Full HD, zoom, autofocus color camera,
7 Thrusters: 2 vertical, 4 horizontal, 1 lateral.



RB MIRAGE

Working depth till 400 meters,
Tether length 400 m (up to 1200 m),
Full HD, zoom, autofocus color camera,
12 Thrusters: 4 vertical, 6 horizontal, 2 lateral.

COMMERCIAL DIVING SERVICES:

Inland/Onshore Diving • Ship Husbandry

MAKING THE RIGHT UNDERWATER CONNECTIONS:

A SUPPLIER'S VIEW

By Jock Nicol, CRE

Like many other Aberdeen-based oil and gas businesses, CRE was born during times of plenty in the North Sea.

During the 1990's horizontal drilling – which delivered high production rates from single wells – led to the growth in subsea developments. At that time such developments were initially tied to platforms and then to stand-alone FPSO's, which further stimulated growth in the North Sea oil and gas sector. Over a relatively short period, subsea developments became the norm as new, massive fields were found in deep waters around the world. To support drilling, completion, and production in such a rapidly growing market, supply chains had to develop just as rapidly.

Fast forward to 2014. The subsea oil and gas industry had managed to avoid the world-wide economic crash of 2008 relatively unscathed. This was a real surprise for those of us who had been in the industry for a while. However, we did encounter the first signs of concern in our industry about its growing cost base. The Macondo disaster in 2010 had raised awareness within the industry about the risks and costs associated with deep water drilling, while the relatively low cost shale gas/oil revolution had resulted in the US becoming the third largest producer of oil after Saudi Arabia and Russia. All the indicators were suggesting that the deep water oil and gas industry was about to enter a period of significant change.



Courtesy of CRE

Hindsight is a wonderful thing and it's easy to see how the oil and gas industry could become disengaged from general industry. The high oil price and expected growth in demand had led to significant investment in new production developments. When the link between growth in consumption and production levels was finally broken, the only logical way this could be quickly addressed was for OPEC to reduce production. This was something they had done previously and with great success.

However, certain members of OPEC chose to break ranks and do the opposite. They decided to pursue their goal of increasing market share through increased production, thereby driving the unit cost of oil even lower. Unfortunately, this culminated in the worst crisis our industry has had to face in decades.

Everyone in the supply chain knows what usually happens next in these situations: headcount reductions, cost reduction initiatives, followed by reduction in investment. Hunger for down mentality prevails. Hold on for 12 months and we'll be fine, surely the oil price will come back up....?

It didn't. Poorly managed and over-leveraged businesses started to fail. At the same time mergers between the larger companies increased as they attempted to find the necessary economies of scale and further cost reductions in order to survive in the new world. Newco's entered the market, snapping up assets and chasing business on a reset cost base. Eventually, companies realised that they needed to seriously review their business processes; how can you make a step change in performance when a 10% overall cost reduction doesn't make the difference required for your business to survive?

Fortunately out of the pain a golden opportunity presented itself to forward thinking businesses which could allow them to achieve gains in a depressed market. In reality, smaller businesses are always more client-focused and faster mov-



ing in these situations. By nature, they have to be able to quickly identify trends and opportunities and process these into an order backlog. These turbulent market conditions tend to be far more positive for smaller businesses, giving them the opportunity to accelerate their growth strategies.

A key feature of the underwater connectivity market is that it never stands still. New technology is constantly being developed and placed, quite literally, below the water line.

Although oil and gas based ROV activity has reduced, there has been a significant level of change in system design and the technology used on-board ROVs. These vehicles are now routinely operated to their design, depth capability, and the increase in band-width requirement results in an even stronger focus on cable and connector performance. Coax, Ethernet, and fibre performance at pressure has become the norm. This has resulted in many system upgrades with new build ROV's requiring a different design approach.

It's clear that AUV's are going to play an important role in the IRM and survey markets as customers target savings of 50–65% on their current spend. The only way this can be achieved is through a combination of reduction in vessel cost and the time taken to capture and process data. We expect significant developments in this area as operators challenge their established procedures and focus spend on the underwater element rather than the vessel.

However, while there has been a fall in oil and gas activity, there has been slow but steady growth in demand for ROVs, of all types, within the renewables, civil engineering, oceanography, survey and marine salvage sectors. We have seen companies specialising in servicing and refurbishment of ROV's buying older work-class ROVs with the intention of upgrading them. These suppliers are enjoying high utilisation of their vehicles and we in turn are also benefiting by supplying cabling for enhanced sensors and other new equipment.

We have also seen the renaissance of the Smart Tether Management System (TMS); there are now around 50 of these vehicles in service worldwide. The Smart TMS can best be described as a heavy armoured TMS, with powerful thrusters and an attachment point for heavy tools.

First developed in The Netherlands in the 1990s, the initial machine was a refinement of the diver-guided grab. Early models were large, with a lift capacity of 50 tonnes or more, capable of carrying a fly-out observation ROV and usually equipped with very large clam grabs or rotating dredge heads. These TMS's were primarily used for marine salvage or dredging operations.

Today's Smart TMS has a reduced lift capacity, is smaller and more flexible and designed for dual operations. A Smart TMS can be used in isolation or in conjunction with a larger electric ROV for fly-out support. In situations where increased capacity is essential, a Smart TMS may be deployed as an alternative to a light work-class ROV which may be unable to deliver sufficient lifting capacity. This could include boulder and UXO clearance on cable routes, marine mining, salvage, IRM, and civil engineering.

Whilst the offshore drilling market is subdued, the impact of Macondo continues to be felt with upgrades to drilling support ROVs and new ROV designs required in order to address many of the issues now known to have been associated with well control incidents. Of course, there have been significant levels of activity and development around the drilling riser, where sensors, pressure control, and surface fluid handling have come to the market. All of these have a reliance on cables and connectors to make the system operate reliably.

The new kid on the block, the renewables industry, is also gaining momentum; nearly 60% of Scotland's electricity production came from this source in 2015. This was before the massive investment which is currently being made in marine-based systems translates into power for the grid. Frequently held up as a replacement for the declining oil and gas sector, the myriad of types of next power generation often get pulled together under a single umbrella. This is, however, a complex and diverse industry where activities range from large-scale onshore and offshore wind turbine farms and complex wave and tidal systems through to tried-and-tested hydro schemes and smaller river-based ventures.

Success in this area will inevitably lead to investment in hydrogen production as a method of storing and transporting 'extra' energy, rather than the current approach of incenti-

vising producers to switch off their turbines. We conducted our own market research into this sector and have initially focused our resources on the wave and tidal niche within it; our new range of robust power connectors and cables have been specifically developed to accommodate the wave and tidal energy generation market and support our existing product range. We have also been encouraged by early interest from the emerging river power generation market segment where replacing diesel-based schemes is relatively straightforward and practical.

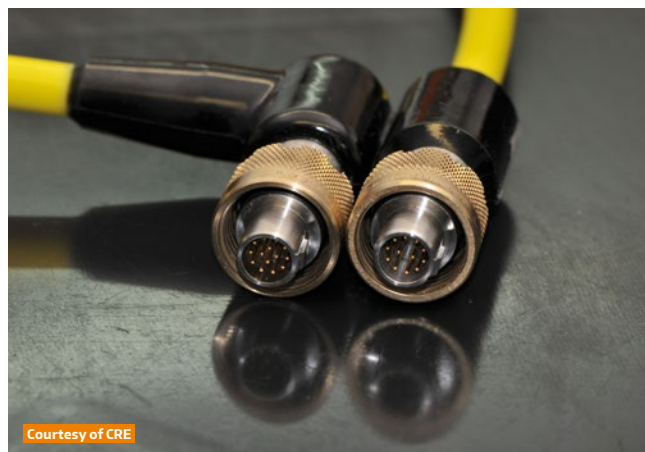
It's clear that we are at the dawn of a new energy age, with the world striving to reduce the environmental impact on the planet for the benefit of future generations. Recent reports have indicated that in the last 5 years \$5.2tn of investment funds across 76 countries has been committed to selling off fossil fuel assets and reinvesting into sustainable energy.

However, a group of high profile billionaires – including Bill Gates, Mark Zuckerberg, and Richard Branson – have pledged funds to support the efforts of 21 governments in doubling the amount of money going into clean energy innovation. It has been reported that this group are dismissing calls for disinvestment in fossil fuels and are focusing on high risk investments in breakthrough technologies as they do not believe that current renewables will be able to meet the projected energy needs by 2030. What this means for the oil and gas industry isn't clear. What is clear, though, is that all sources of energy from the marine sector will still require sensors, connectors, cabling, inspection, repair, and maintenance.

The markets for manufacturers of diving systems has remained robust with significant growth in both the number of air diving and saturation diving systems being built. Many of the new systems being deployed are now equipped for up to 25 divers and incorporate both sophisticated electrical systems and communication networks. The demand for diving services in the renewables market continues as the adoption of diverless systems has, to date, not been widely accepted as a suitable alternative.

Demand for more sophisticated and deeper diving in the civil engineering sector has also increased. As businesses in many countries standardise and adopt global best practises, this has resulted in a growing demand for advanced diving systems to be developed. In order to deliver certified products to system manufacturers in this sector, CRE has secured a Manufacturing Survey Arrangement (MSA) with DNV and increased manufacturing capacity for this market segment.

We believe oceanographic research, underwater defence and deep ocean tourism have similar characteristics as they routinely place personnel at a variety of depths in the water column in a one atmosphere submersible. What was once the preserve of Jules Verne's imagination, is now a day to day experience for scientists, filmmakers, service personnel, wealthy individuals, and holidaymakers on cruise liners.





Courtesy of CRE

We've been quick to meet this exciting challenge and now offer sector-specific hull and pressure vessel penetrators.

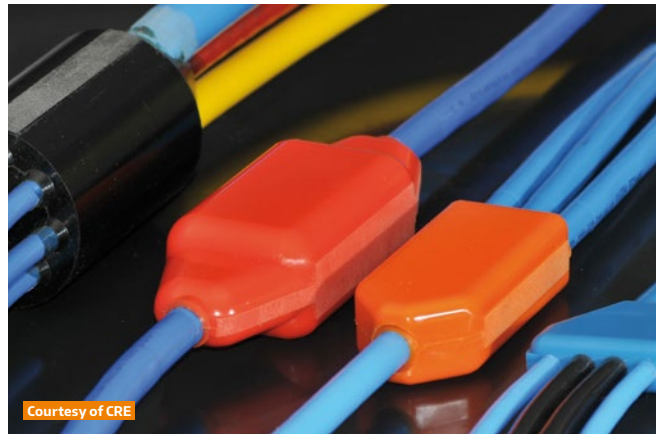
Overall, we – like all SME exporting companies – enjoy working in fairly turbulent times. In many ways this supports our long term strategy for product development, market segmentation, and geographic growth. Being able to focus and remain committed to implementing a long term strategy during a recession can be a challenge for many businesses as often they find themselves in survival mode. CRE is in the enviable position of being a member of the FrontRow Energy Partners (FEP) investment portfolio; as a member CRE has access to upstream industry specialists and investment capital.

The technical knowledge and experience of the founding directors in conjunction with the resources now available, have allowed CRE to remain fully focused on its long term strategy and continue to invest in the business. Our new moulding facility, delivering a 100% increase in production capacity, along with a new dedicated fibre optic assembly facility opens this month. The addition of hyperbaric, electrical and signal testing capability for our new R & D facility provides us with the opportunity to offer a unique level of performance during product development and production manufacturing. These changes are only the start of what we envisage for the business as we strive to offer a completely different level of service to the underwater connectivity market.

Our ability to service the various demands and expectations of different markets – many of which require a fast turnaround on small order quantities – has only been possible through the flexibility and experience of our dedicated staff, our supply chain that we have developed over many years, and the support we have received from Scottish Enterprise. Whilst many in the industry are focussed on riding out this storm, CRE's focus is firmly on making the most out of the latest rebirth of our industry. We have been in business since 2002. We know that as we enter 2017 we do so as a stronger business, with a broader product portfolio, a position in new exciting markets, and many new clients on board.



Courtesy of CRE



Courtesy of CRE



Courtesy of CRE

UNMISSABLE TRAINING & DEMONSTRATION PROGRAMME AT THE HEART OF

With demand for the Ocean Business show at a record high, the organisers are excited to unveil an action-packed training and demonstration programme for Ocean Business 2017, taking place in Southampton, UK at the National Oceanography Centre on 4-6 April 2017. The full programme is available online and free visitor registration is open at www.oceanbusiness.com.

ocean BUSINESS 17

The show's unique training and demonstration programme is one of the biggest attractions to Ocean Business. Cheri Arvonio, Event Manager, explains: "With some of the leading names in the business presenting their new innovations, this really is an unmissable opportunity to learn about the latest technologies. We have over 180 hours of free training and demonstrations, where customers can actually try out the latest technologies in their real environments, be it in a test tank, in classrooms, on the dockside waters or onboard vessels, the demonstrations bring the technologies to life!"

The training and demonstration programme at this year's show reflects some remarkable advances in underwater mapping and imaging technologies, as well as autonomous vehicles. Companies such as Teledyne and Sonardyne International will be demonstrating cutting-edge developments in mapping and imaging, with Sonardyne exploring the potential of mobile mapping, and Teledyne demonstrating its portable 3D imaging sonar and multibeam echosounding technologies, along with sessions about the latest trends in data processing and analysis.

Sessions held in the dockside waters will demonstrate some of the latest advances in autonomous vehicles with ASV Global demonstrating how to execute advance autonomous operations at sea and Rockland Scientific demonstrating the LAMTOV (Light Autonomous Microstructure Turbulence Observation Vehicle).

Other interesting sessions include Planet Ocean introducing the ecoSUB range of innovative, low cost, micro AUVs demonstrating how this disruptive technology can change the way ocean data is gathered; Liquid Robotics presenting how USVs have a natural role in the 'Digital Ocean', linking acoustic communications of the subsea with the radio communications of air and space to enable new capabilities and Seafloor Systems demonstrating their EchoBoat-ASV, a 2-man portable, customised vehicle, featuring multibeam sonar integrated with INS/GNSS and real-time SVP.

And if that's not all, in addition to more than 340 international exhibitors and 180 hours of training and demonstration sessions all free to attend, many of the exhibitors bring their own vessels to Ocean Business and moor them alongside the show in the dockside waters to demonstrate their latest equipment – visitors are simply spoilt for choice! For the full training and demonstration programme and to register, please visit www.oceanbusiness.com. Training and demonstration sessions are on a first come, first served basis, so visitors are advised to beat the queues onsite and register for free online in advance.



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DEMO!

ocean
NOC Southampton, UK - 4-6 April
BUSINESS 17

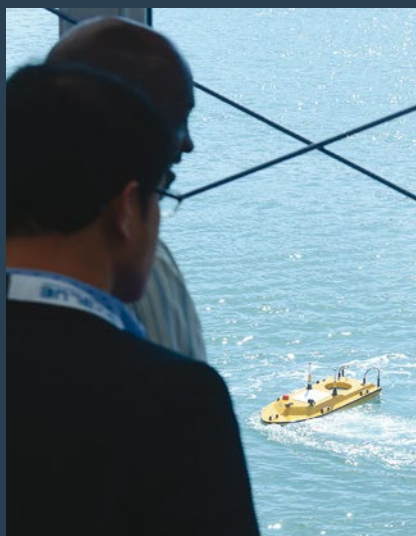
Visit booth N8 at Ocean Business to book your place for a live demo of the Investigator ROV.

4 - 6 April 2017
Southampton UK

ocean BUSINESS 17

**REGISTER
FOR
*FREE**

The hands-on ocean technology
exhibition and training forum



- **International exhibition**
showcasing 340+ exhibitors from across the globe
- **Cutting edge conference**
presenting the latest developments in the industry
- **Hands-on demonstrations**
held in 180+ workshop sessions
- **Industry associated meetings**
held by leading organisations
- **Ocean Careers event**
providing recruitment and careers advice
- **Networking opportunities**
at the welcome drinks, wine trail and gala dinner

For further information:



+44 (0)1453 836363



info@oceanbusiness.com

* The exhibition, workshops, associated meetings and Ocean Careers are FREE to attend. There is a fee to attend the conference.

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