ROV PLANET

15

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The magazine of choice for Subsea Construction and ROV Professionals

ABOUT

With approximately 13,500 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.

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Front Page Cover Photo: Courtesy of Forssea Robotics | Poster Photo: Courtesy of Seatronics

WELCOME TO ROV PLANET

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

Dear Reader,

We've had a busy show season behind us with several underwater related conferences and exhibitions to attend. You can read the review about the Subsea Expo in Aberdeen and the summary of the ROV and AUV tracks at the Underwater Intervention that took place in New Orleans. At Oceanology International, the most recent event this year, many companies chose to premier their new vehicles. There was a wide array of new ROVs, AUVs, and USVs on display: the ATOLL from Forssea Robotics, the VALOR from Seatronics, the XLe Spirit from Forum Energy Technologies, the Perseo GTV from Lighthouse, the DexROV, and the DriX autonomous surface vessel from iXblue. Speaking with the manufacturers of mini-ROVs at the event, I have come to the conclusion that these small vehicles are also selling well!

The ATOLL ROV developed by Forssea Robotics is the first autonomous docking ROV. Forssea is an innovative new start-up headed by Gautier Dreyfus and a team of engineers with clever outside of the box thinking. The company's visual positioning system utilizes QR code like markers and smart cameras to autonomously position objects underwater.

Seatronics has developed VALOR (Versatile And Lightweight Observation ROV) that is to replace their previously successful Predator ROV. Meanwhile the Integra from Aquabotix makes AUV/ROV hybrid missions cost effective.

In our training column you can read about the practical module of the QSTAR ROV Premium Pilot Tech course. This is the final module I had to pass before officially becoming a certified ROV Pilot Technician.

Finally, you can learn about the Nekton Mission II, headed up by Oliver Steeds, who has been a broadcast journalist for over 20 years and has experience as a documentary film maker and storyteller. He has set out on a journey to investigate how the ocean is changing and raise awareness of its potential plight.

Best regards,
Richie Enzmann

UPCOMING EVENTS

9-11 April, 2018 – MCEDD – Milan, Italy
World-class technical discussions focusing on the offshore technology, innovation and experience.

30 April - 3 May, 2018 – Offshore Technology Conference (OTC) – Houston, TX, USA
The World's largest annual offshore exhibition and conference.

2-3 May, 2018 – All-Energy – Glasgow, UK
The UK's leading renewable energy exhibition and conference.

4 June, 2018 – BlueTech Expo – Washington, D.C., USA
Ocean Technology Exhibition and B2G Networking Event.

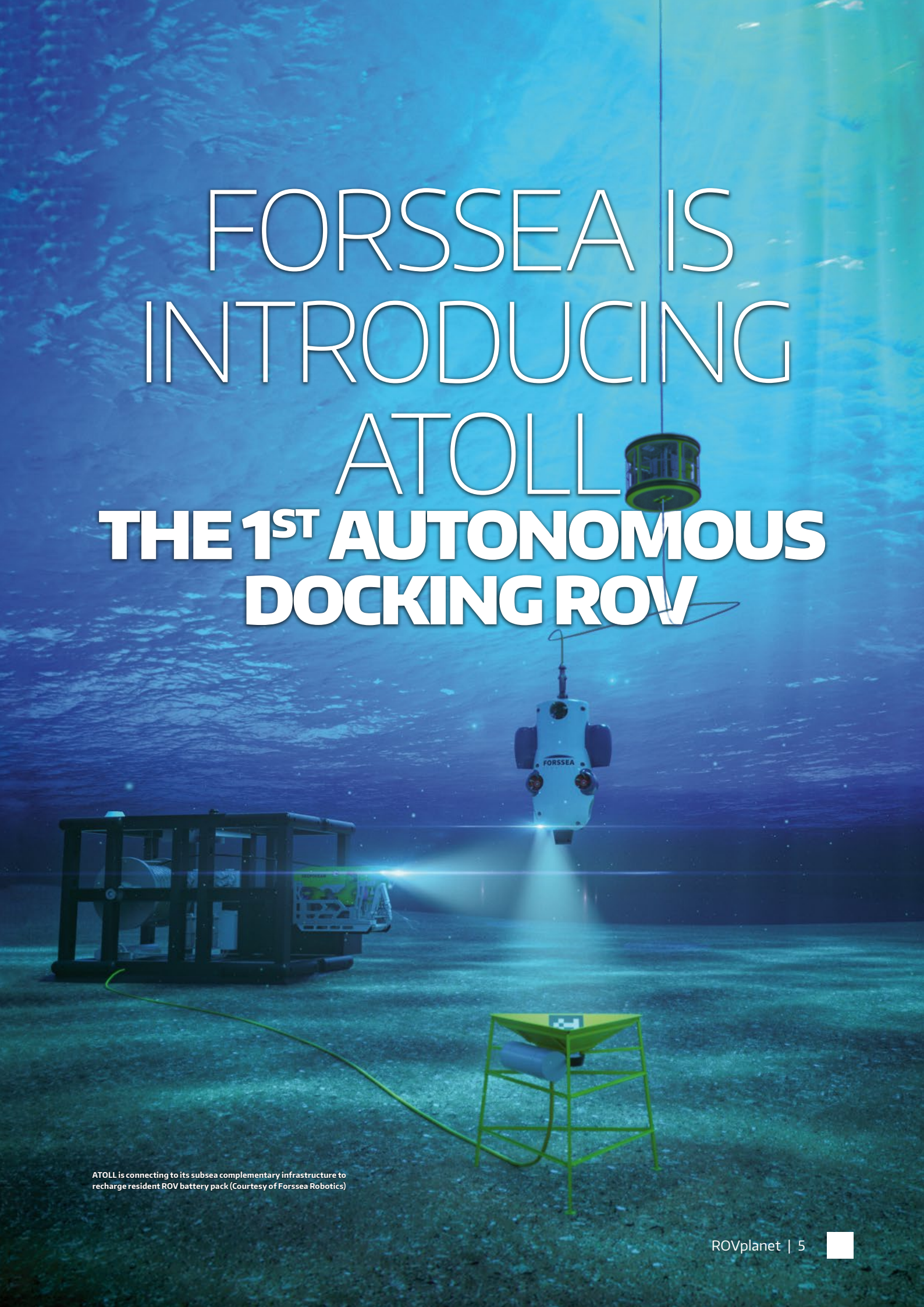
12-14 June, 2018 – Underwater Technology Conference (UTC) – Bergen, Norway
Conference focused on underwater operations and developments in subsea technology.

26-28 June, 2018 – Undersea Defence Technology (UDT) – Glasgow, UK
The underwater defence & security community's most relevant exhibition and conference.

Please check out our website on:
www.ROVPlanet.com

FORSSEA IS INTRODUCING ATOLL

THE 1ST AUTONOMOUS DOCKING ROV



ATOLL is connecting to its subsea complementary infrastructure to recharge resident ROV battery pack (Courtesy of Forssea Robotics)

Forssea team during sea trials with the 1st ATOLL prototype (Courtesy of Forssea Robotics)

Forssea Robotics is a subsea robotics and R&D startup, created in 2016 to cut down operating costs in the offshore ROV market. Forssea was launched at the Ecole Polytechnique (French 1st School for Engineering and Science) and now is based in the center of Paris, in the heart of the new European "Tech" capital.

FORSSEA was created as a spin'off of the ROV operator Searov Offshore, now recently part of DeepOcean group, who brings amazing offshore experience to the project. Forssea currently has a team of 12 full-time engineers with backgrounds ranging from Mechanical Engineering, Computer Vision & Machine Learning, to Electronic & Robotics Engineering. Forssea have a highly skilled, multi-discipline work force that can perform research and development, concept design, and assembly of subsea products to be utilized in the ROV industry.

ATOLL, THE 1ST AUTONOMOUS DOCKING ROV

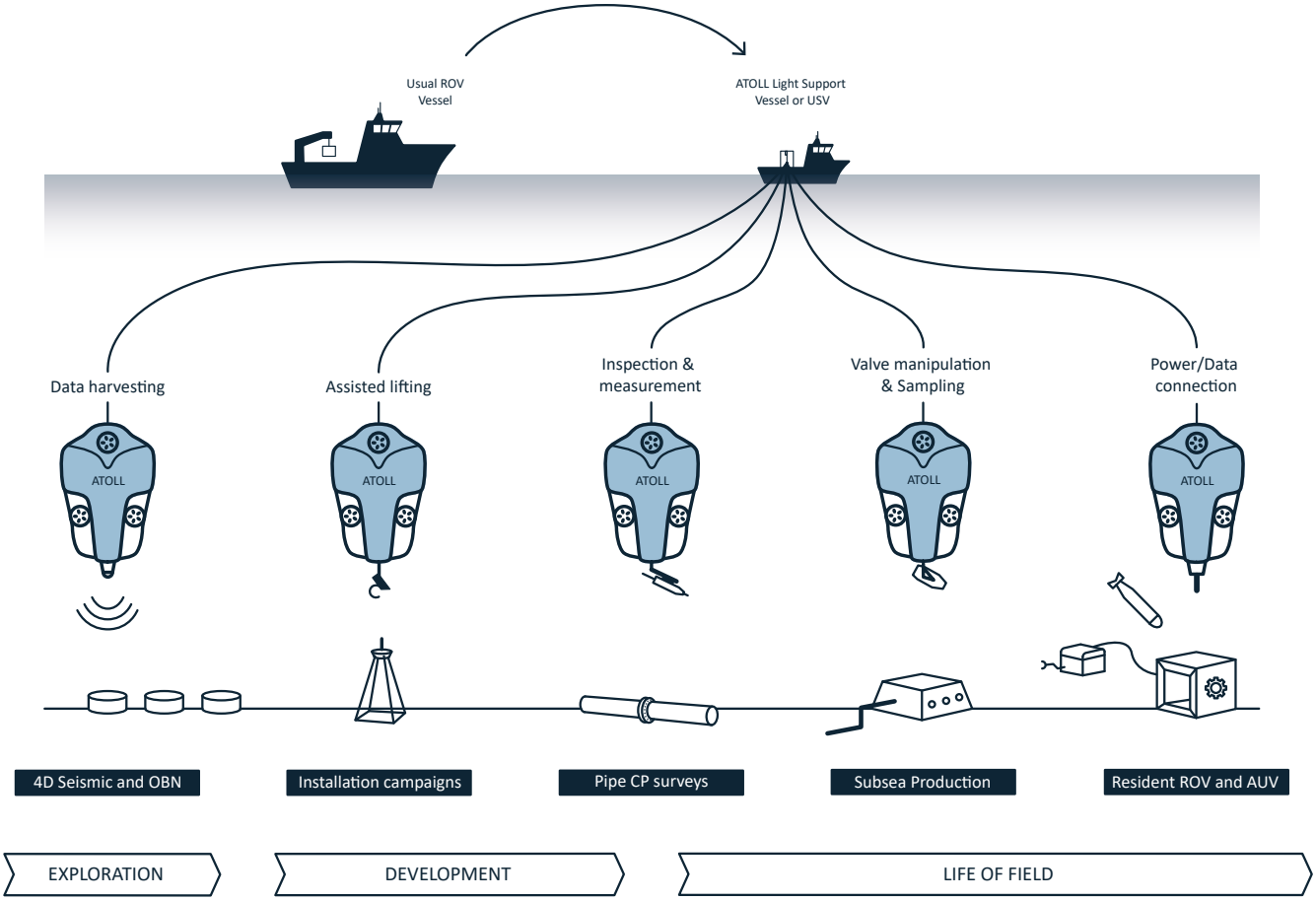
As the industry of autonomous underwater robotics rapidly develops, there is an increasing demand for simple and efficient power and data transfer solutions. Forssea Robotics is currently developing ATOLL, a system capable of establishing a physical link between subsea infrastructures and surface vessels.

ATOLL is an observation sized ROV deployed from a light surface vessel. It is connected to the vessel using a standard main lift umbilical and tether that have been optimized for high power and data transfers capacities. Once the ATOLL ROV has passed the splash zone, it navigates autonomously towards the subsea target, while communicating with it, and positions itself by using the vessel mounted USBL system and transponder installed on the subsea target.

The autonomous positioning is achieved by using Sonardyne's latest acoustic systems during the descent phase. "We believe that Forssea is developing a key technological enabler for various upcoming underwater resident applications" says Ioseba Tena, Global Business Manager – Marine Robotic Systems at Sonardyne, "This will be to the benefit of many of our existing customers. The ATOLL concept really benefits from our 6G acoustics. We are excited to take part in this new concept".

When ATOLL is within 5 metres range of the target, its relative positioning with respect to the subsea target is achieved by using visual-inertial methods. This is where ATOLL uses advanced real-time computer vision technology (image treatment, target recognition, machine learning). ATOLL finally manoeuvres to dock with the subsea target, enabling the connection of the energy and data exchange between surface and subsea.

Identified ATOLL use-cases (Courtesy of Forssea Robotics)



ATOLL was developed to meet the growing demand for enhanced subsea autonomy and to reduce the overall end-user cost. "The main goal of ATOLL is to bring an ROV system to the market that can perform the tasks already undertaken by a standard ROV system with one exception: ATOLL will perform many of these subsea operations fully autonomously" said Stephen Miller, Project Manager at Forssea Robotics.

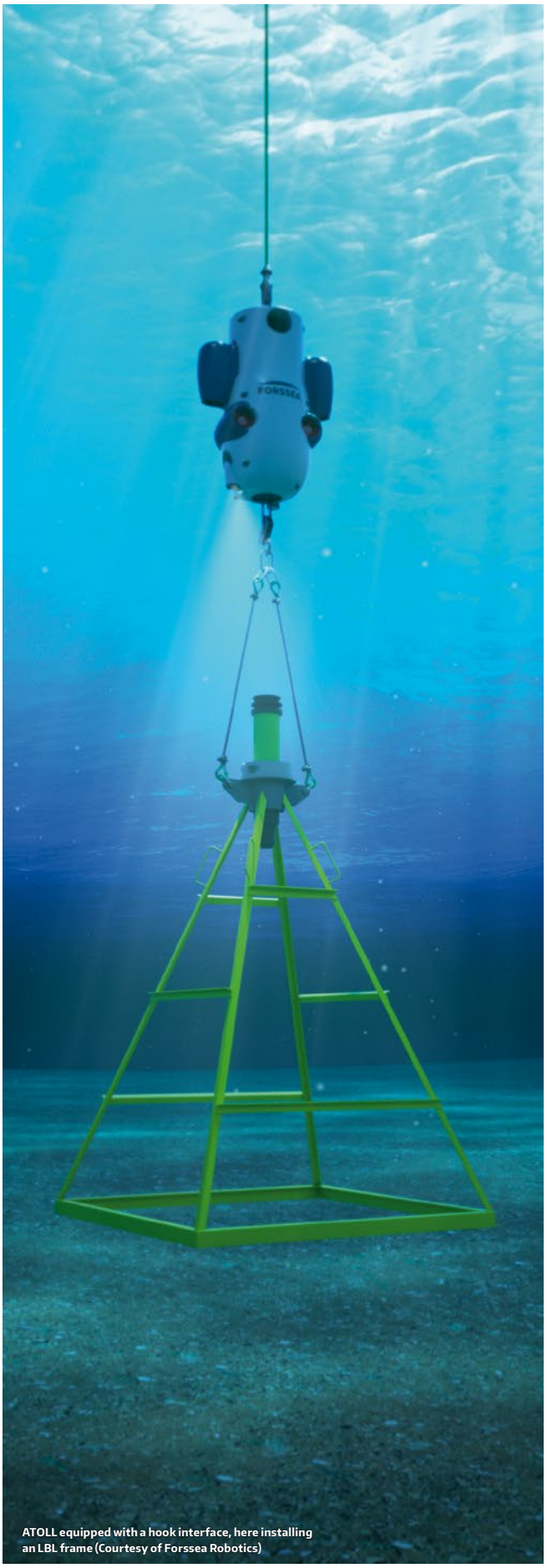
We like to compare ATOLL to a Swiss Army knife; the ROV system is both compact and versatile, and switching between tooling on deck is performed very efficiently. Different subsea tooling packages can be installed onto the modular docking interface to meet the client demands depending on what operations are being performed.

The Forssea Robotics Engineers and Operations team are currently developing several-use cases for the ATOLL ROV. We have had advanced discussions with several major Oil & Gas and subsea service providers to define the operational ability for such a unique vehicle with autonomous capabilities. ATOLL will be equipped with existing subsea intervention tooling packages and survey sensors. This will allow it to perform tasks ranging from Drill support operations, IRM, survey operations, light construction work, and seismic acquisition through OBN data harvesting.

CHARGE BATTERY PACKS AND LIFT LIGHT ASSETS

In recent years, the Resident-ROV concept is fast becoming a reality to help reduce the overall end user cost for Oil & Gas operators. To enable the Resident-ROV to work longer, Forssea developed the modular electrical wet mate connector. This will allow ATOLL to dock with the Resident-ROV station and transfer power (up to 100kW) and data communications (up to 1 GBits) to re-charge the battery packs located on the Resident-ROV. It's not only the Resident-ROV market that Forssea is targeting. We are also in discussions with a major defense organisation to develop a system capable of docking with and transferring power and data to an Autonomous Underwater Vehicle (AUV). This would mean that AUV's could remain subsea whilst their batteries are re-charged, data is downloaded, and new mission re-programming is performed.

One of the modular tooling interfaces developed by Forssea is the hook application: an automatic latch and release hook will be used to deploy and recover subsea equipment weighing up to 1T. This application is particularly interesting for Forssea as one of the solutions for LBL frame and COMPATT deployment on Greenfield sites is to utilise ATOLL for this task. Due to the autonomous capabilities of ATOLL and the automatic latching hook, we believe that the overall timescale for subsea arrays to be populated and calibrated ready for field installation will be greatly reduced.



ATOLL equipped with a hook interface, here installing an LBL frame (Courtesy of Forssea Robotics)

FORSSEA IS ALREADY COMMERCIALIZING ITS VISUAL POSITIONING SYSTEMS

The ATOLL full scale prototype has been assembled and successfully tested in pools last February. Offshore qualifications will be supported this summer by subsea service provider DeepOcean who already expressed an interest in the ATOLL vehicle for both power transfer and lifting applications.

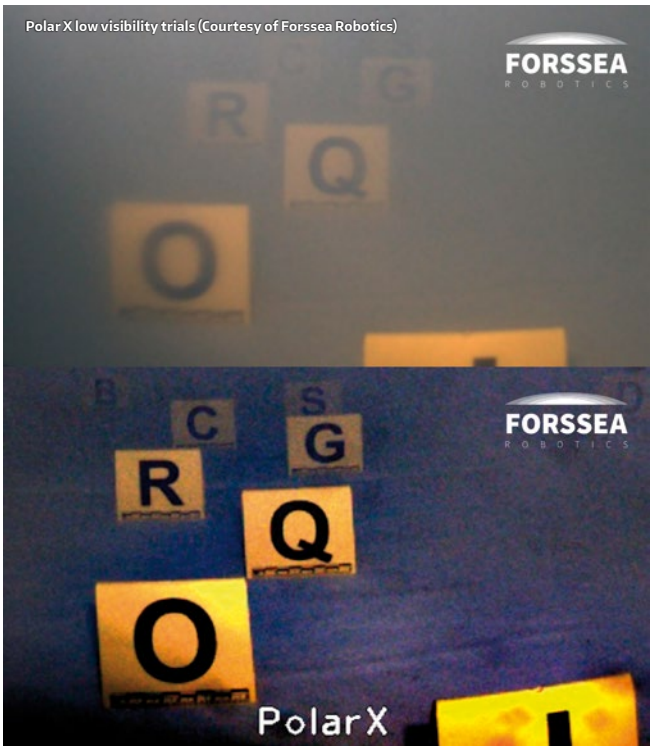
In addition to the ATOLL system, Forssea is developing a product range of subsea vision systems to be used in the ROV industry.

The Forssea Robotics Smart Cam is a low-cost IP camera. Information processing facilitated by the Ethernet output makes the product perfectly adapted to artificial intelligence and stereo-vision applications.

Due to ATOLL requiring the use of optical based positioning for the autonomous docking capabilities, Forssea also developed 2 sub-systems to equip current ROV fleets.

| V-Loc uses a calibrated Smart Cam and QR code marker to recognize and position subsea assets. The 6 degrees of freedom are given to the ROV pilot in real-time with less than 0.5% error at 5m. V-Loc will be used to accurately position several subsea assets such as a BOP and Wellhead for the Drilling industries. Greenfield subsea construction projects can also benefit from this real-time positioning software as it allows instant recording and traceability for the end users.

ATOLL full scale prototype currently tested in pools (Courtesy of Forssea Robotics)

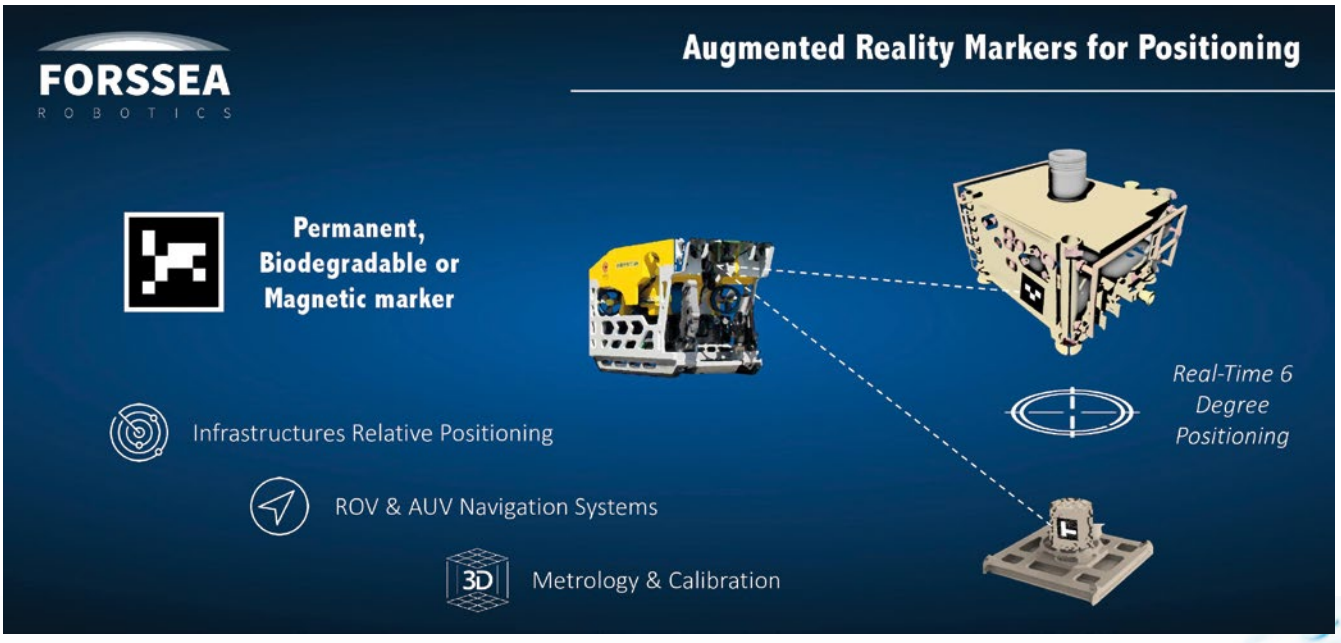


Polar X low visibility trials (Courtesy of Forssea Robotics)

ATOLL full scale prototype currently tested in pools (Courtesy of Forssea Robotics)

Polar X is an enhanced subsea visibility system based on light polarization. One of the many issues faced by operators today is target identification in low visibility, whether this be valve status identifications or close visual inspections on subsea assets during construction and installation campaigns. Thanks to polarized lights and software treatments, Plar X manages to multiply the visibility factor by 3.

"Our strategy is to stay focused on end-user feedback", says Gautier Dreyfus, CEO of Forssea, "We aim at pushing our technology step by step as Oil & Gas operators require long qualifications. We started to sell our visual positioning systems to mitigate the technical risk perceived with by ATOLL new concept deployment. We have already had several orders for the Smart Cam units and the qualification planning with some major Oil & Gas operators is scheduled for Polar X and V-Loc system over the coming months!"



OCEANEERING ACQUIRES ECOSSE SUBSEA LIMITED

EXPANDS SERVICE LINE CAPABILITIES TO THE GROWING RENEWABLE ENERGY MARKET

Oceaneering International, Inc. announced that one of its wholly owned subsidiaries has acquired Ecosse Subsea Limited, a provider of offshore engineering, seabed preparation, route clearance and trenching services to the renewable energy and oil and gas industries, for approximately 50 million pounds sterling.

Headquartered in Aberdeen, Scotland, Ecosse builds and operates seabed preparation, route clearance and trenching tools for submarine cables and pipelines on an integrated basis that includes vessels, ROVs and survey services. Enabling technologies acquired in the transaction include Ecosse's modular SCAR Seabed System, capable of completing the entire trenching work scope (route preparation, boulder clearance, trenching and backfill), and its newly developed SCARJet trenching system. The SCARJet is an evolutionary trenching system designed for use with standard work class ROVs and adds state of the art jetting and post-lay trenching capabilities to the existing pre-cut methods offered by the SCAR plowing tools.

Roderick A. Larson, President and Chief Executive Officer of Oceaneering, said, "We are pleased to complete the acquisition of Ecosse, which we believe offers Oceaneering the opportunity to expand our service line capabilities and grow our market position within the offshore renewable energy market, and provide our customers with proven tools to optimize installation projects. The addition of Ecosse reflects our commitment to expand into the adjacent renewable energy market to more comprehensively serve the offshore energy industry. We expect the acquisition to be accretive to Oceaneering's 2018 cash flow and earnings."

Mike Wilson, former Chairman of Ecosse, said, "This is a strategic opportunity for our customers and our employees. Oceaneering has outstanding people, a global presence, innovative technologies and diversified services and products. Together we can establish a stronger platform to take on even larger and higher profile projects in the renewables and oil and gas industries."

Mark Gillespie, Director, Global Renewables and Subsea Projects of Ecosse, said, "We are excited to become part of Oceaneering. With Oceaneering's global strength, we expect to be better positioned to further penetrate the growing and emerging renewables and cable markets in Europe and the United States."

Larson concluded, "We are looking forward to the contributions that Ecosse will make to our operations and growth, and we welcome its employees to the Oceaneering team."

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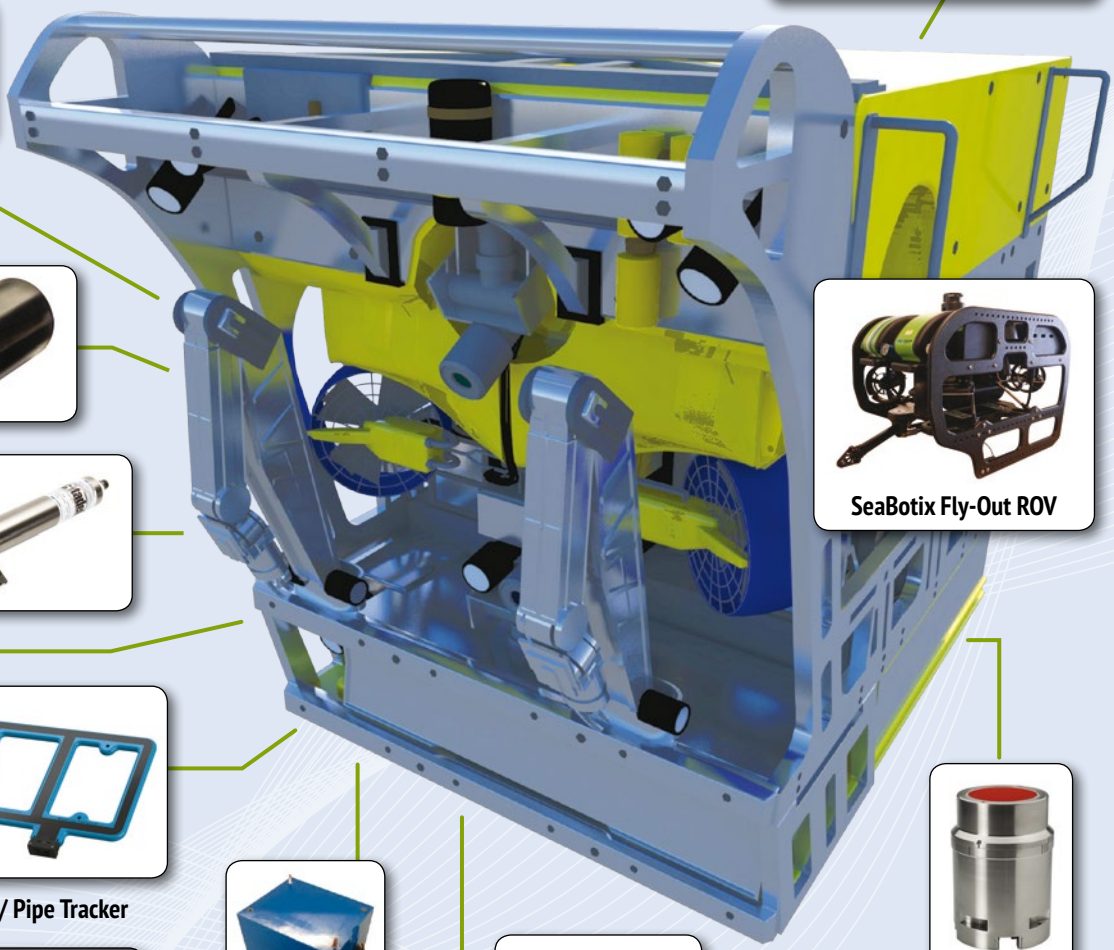
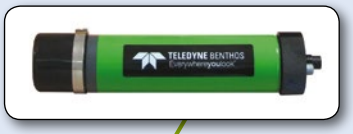
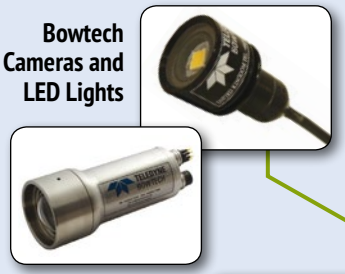


Benthos USBL/Acoustic Modem



Bowtech Cameras and LED Lights

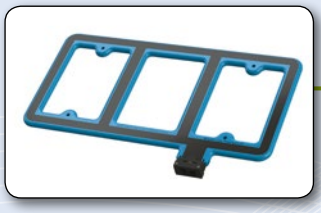


BlueView Imaging Sonar

RD Instruments CTD

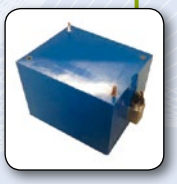
SeaBotix Fly-Out ROV

TSS INS/IMU/MRU



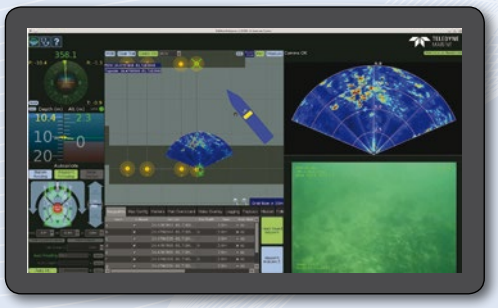
TSS Cable / Pipe Tracker

RD Instruments Doppler Velocity Log (DVL)



Benthos Sub-Bottom Profiler

Impulse Connectors utilized throughout



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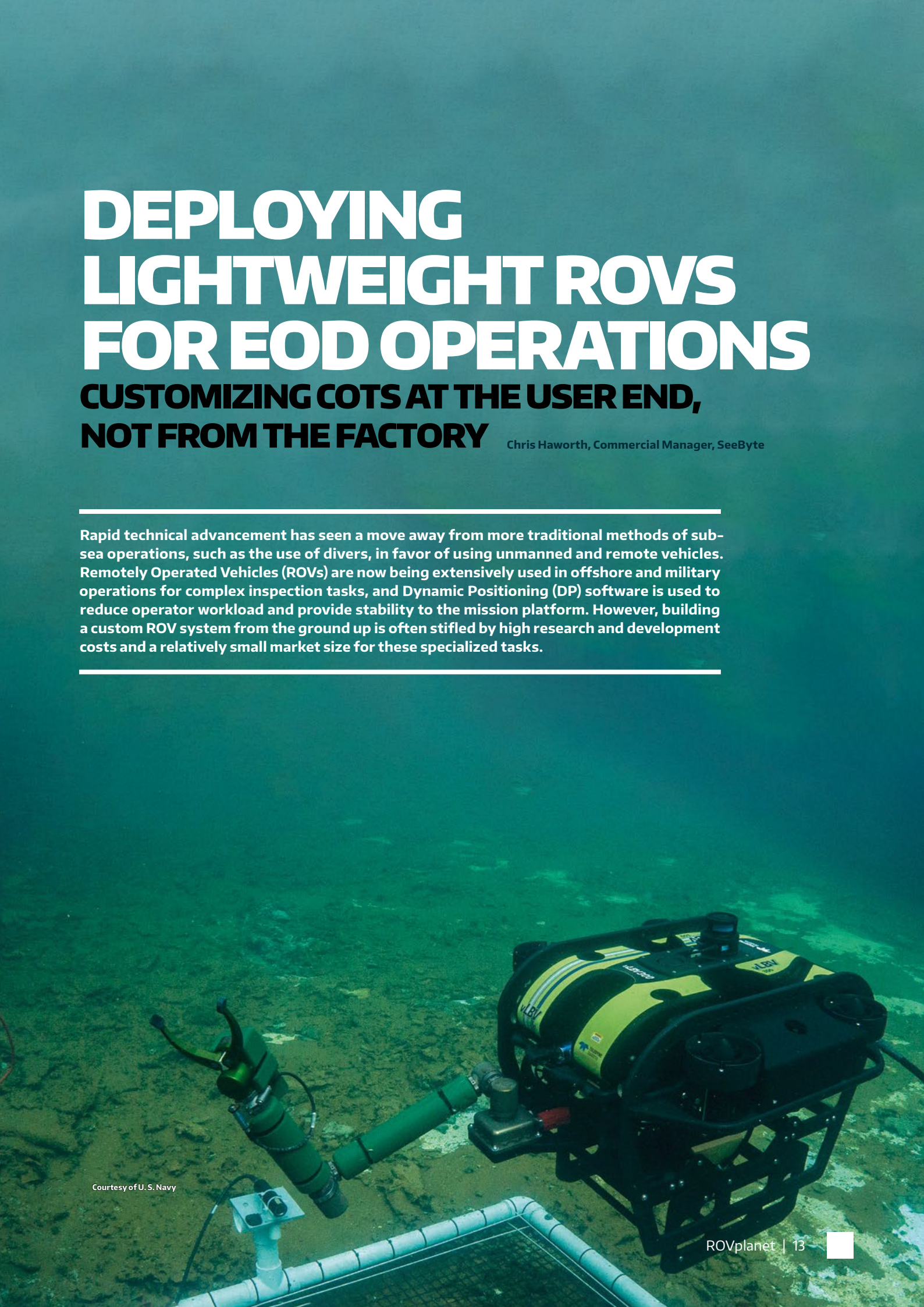
DEPLOYING LIGHTWEIGHT ROVS FOR EOD OPERATIONS

CUSTOMIZING COTS AT THE USER END, NOT FROM THE FACTORY

Chris Haworth, Commercial Manager, SeeByte

Rapid technical advancement has seen a move away from more traditional methods of sub-sea operations, such as the use of divers, in favor of using unmanned and remote vehicles. Remotely Operated Vehicles (ROVs) are now being extensively used in offshore and military operations for complex inspection tasks, and Dynamic Positioning (DP) software is used to reduce operator workload and provide stability to the mission platform. However, building a custom ROV system from the ground up is often stifled by high research and development costs and a relatively small market size for these specialized tasks.



Courtesy of U. S. Navy

One way to efficiently move into unchartered waters, so to speak, is to create a specialized system composed of existing commercial off the shelf (COTS) hardware and software components – effectively creating a vehicle that is more than the sum of its parts.

This article will discuss the challenges of designing a non-standard ROV system comprised of the best of breed vehicle hardware, sensor, and software systems that the market has to offer, regardless of manufacturer. Rather than one specialist manufacturer building a niche-application ROV from the ground up, the key to this approach is for the user's representative, in this case a Government Laboratory, to focus on providing the key requirements needed by the system operators; to create a team of Government and Industry focused on the providing the capability the user needs, and to use existing offerings to tackle the challenges from an after-market perspective. This way the focus of the program moves away from development to an engineering integration problem, helping to get the new capability into the hands of the operators more quickly.

There are several hurdles that need to be overcome to create a seamless system from a myriad of manufacturers. Issues such as proprietary protocols, cross platform communications and complexities surrounding the dynamics of a highly modular system in the water can present significant hindrances to the efforts in designing and operating customized ROVs. This article will discuss the challenges that need to be overcome to create a fully functional and supported ROV system from COTS components that operates as fluently as if it were custom designed, manufactured on the factory floor, and provided turn-key to the user.

COTS, CONTROL AND COLLABORATION

Collaboration between specialist organizations can lead the way in developing novel systems and provide capability that is more than the sum of the various pieces and parts. As autonomous systems become more advanced, close-knit relationships between Government Laboratories, software houses, sensor and hardware manufacturers allow vehicle specialists to integrate with state-of-the-art software packages. Collaboration in this form allows each organization to contribute its individual expertise to a joint project.

In response to demand from Explosive Ordnance Disposal (EOD) teams for more light weight expeditionary systems, under the leadership of Space and Naval Warfare Systems Center Pacific (SSC Pacific), SeeByte has collaborated with Teledyne Seabotix and HDT to develop several smart ROV systems that are able to perform a range of capabilities and functions – including active intervention with underwater improvised explosive devices (IEDs) and IED neutralization. The threats against which these smart ROV systems are used also include moored, drifting, bottom, and floating mines as well as limpet mines attached to a ship's hull. The overall system is designed to provide an ROV capable of performing pre-planned (operator supervised) autonomous inspections of common port and harbor infrastructure and ship's hulls.

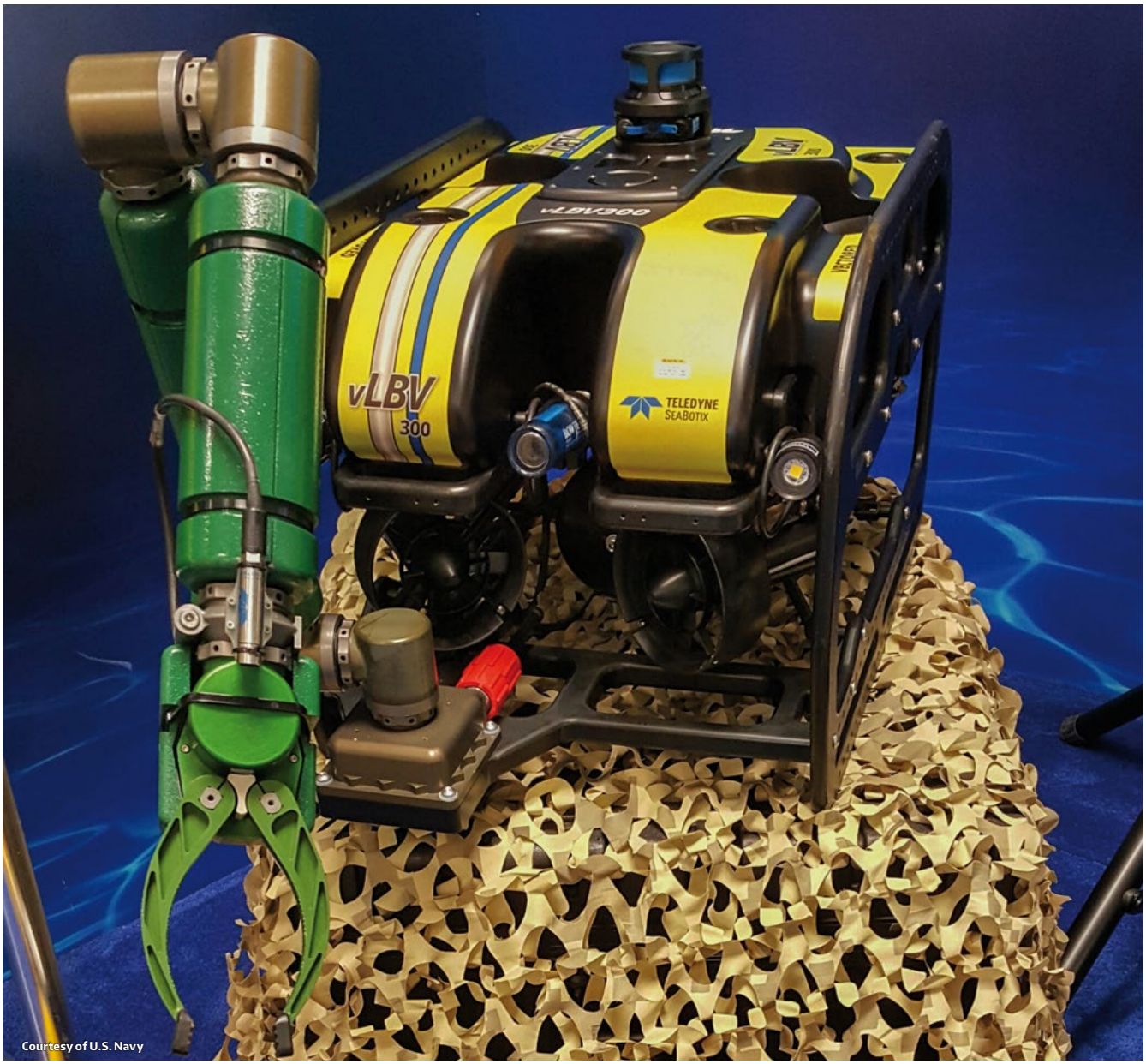
On the hardware side Teledyne SeaBotix contributed a modified vLBV300 mini-ROV that, in addition to being equipped with standard 4 horizontal and 2 vertical brushless thrusters, also has two additional vertical thrusters to enhance the stability of the system. This is will allow operation in surge and high water current environments. HDT Expeditionary Systems provided a compact, marinized, electric manipulator arm based on its land-based EOD manipulator arms. The arm is modular and it can be assembled with as many degrees of freedom as needed for the task. The arm is controlled via joystick and commanded in several position, speed and force modes.

SeeByte contributed an EOD adapted version of CoPilot – a commercially-developed smart software system originally designed to autonomously control work class ROV systems used in the oil and gas industry. Introducing automated tasks and autonomous behaviors to the ROV control was crucial to operators. With an ROV that flies itself the pilot can better focus on overall mission accomplishment, instead of the nuts and bolts of flying the vehicle while fighting the environment.

Automated tasks include routine and repeatable inspection of the seafloor, underwater infrastructure (pilings, pipelines, harbor walls), and close in identification, inspection, and manipulation of suspicious objects. SeeByte designed the CoPilot autonomy modules to act as aids to reduce both the amount of time and the complexity of operator input required during ROV operations. This allows for better overall operator mission situational awareness. The path of the ROV can easily be planned over maps, charts, and sonar mosaics using waypoints on a point-and-click interface. The operator clicks the intended path for the ROV to follow and the vehicle flies there autonomously. Also included are advanced features like the ability to backtrack the ROV (retrace a particular path to ensure safe extraction from a confined space or unwinding of the tether), sonar and electro-optic sensor driven orbiting, and mission recording and replay.

MOVING FROM INSPECTION TO INTERVENTION

EOD operators work in highly complex and dynamic environments underwater. This operational environment places a high demand on the performance of the ROV systems for control and stability. To move from purely inspection based activities to active intervention, the system must have the ability to interact safely with the target. Effective control of the manipulators is vital for safety, which means not only must the manipulators operate smoothly and with a purpose, but the platform that they are mounted on must be stable and only move with predictable move-



Courtesy of U.S. Navy

ments. Mounting small, electric, low power, high strength manipulator arms onto smaller form factor ROVs presents significant engineering and control challenges. The ROV DP software integrated with the system must not only enable accurate, responsive, and repeatable hands off navigation, but to satisfactorily accomplish the intervention tasks, it must provide the additional maneuverability, stability and predictability to the joint vehicle-manipulator system that will be interacting with the object of interest.

Subsea vehicles in general, and specifically, ones designed to be hover-capable will use thrust, buoyancy and weight to stabilize the vehicle. When submerged the vehicle's center of gravity (CG) and center of buoyancy (CB) align creating what is known as the metacenter of the system. The distance between the CG and the CB along the metacenter is the stability arm which designers use to allow the vehicle to balance itself in water and stay stable in the pitch and roll axis. This distance, which can be several meters for work class ROVs, is significantly reduced as the size of the ROV decreases, and this poses challenges to the design an EOD ROV.

While smaller vehicles have the advantage of being more manageable to deploy and recover, the significant downside is that the reduction in size, and therefore metacentric height, will increase the ROV's instability in flight. Small changes in the thruster speeds can create large movements, not always in the direction desired! This effect is further exacerbated by vectored vehicles having all thrusters available to propel the vehicle along multiple axes and also by not having the thrusters at the exact center of stability. When the vehicle becomes unbalanced, even slightly, it will begin to drift or tilt. In the case of a small EOD ROV the extra weight, drag force and subsequent imbalances added by the manipulator arm are accounted and compensated for through the advanced analytics and controls provided by the CoPilot software. Much like a modern jet fighter has a computer that virtually flies the

airplane, telling all the flight surfaces how and when to move while the pilot tells it what direction to go; CoPilot flies the ROV where the pilot indicated they wanted to go, accounting for the above considerations, as well as the environment. This offers the sensors and the arm system a stable platform to collect precise data and interact with the object of interest.

FUTURE WORK

Tackling the aforementioned challenges has been a vital step towards developing a comprehensive EOD ROV system that is a reliable tool fit for underwater applications. The collaborative design of the EOD ROV included improving the stability of the ROV through a new thruster combination and use of CoPilot software to actively control the stability of the vehicle so that the movement of the HDT smart arm would not affect the position of the ROV when viewing an object of interest. The work to date has proven effective at placing a layer of technology between the subsea operators and potentially dangerous environments. However, going forward the aim is to create a fully comprehensive system that can be deployed to accomplish tasks with minimal intervention by the human operator, other than telling it what the mission is.

The key step for an intervention task is to maintain the ROV position in the water, relative to the object of interest, at such a distance that the arm can reach it. Waves, surge, and currents must be anticipated and accounted for. There are two different possibilities to reach this desired position and to interact with an object when an underwater vehicle-manipulator system is used. The first method consists of separately commanding the vehicle to reach the vicinity of the object, stabilize the ROV in a commanded hover, and separately command the manipulator to move it towards the object and interact with it. Before CoPilot, this required two crew: one a pilot, the other a manipulator operator. This method is referred to as the decoupled strategy. This approach relies heavily on the skill of the pilot to anticipate the environment and avoid motions that will unbalance the stable state of the ROV, with the operator trying to maintain adequate control of the arm to accomplish the task. This focus of the EOD ROV program has been to reduce the crew to one.

However, a second method is to jointly control both ROV and manipulator as if they were a single system. EOD operations are one of the worst scenarios imaginable to have an unstable system and initial work suggests that the second

Extensive in-water testing in a range of environments was important to a successful outcome (Courtesy of U.S. Navy)

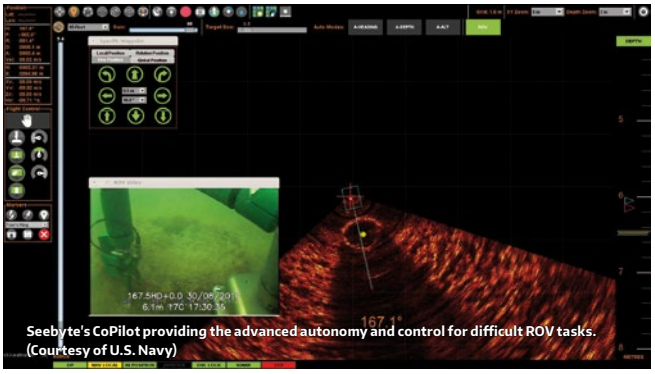
method is particularly valuable. In this approach the software integrated runs control algorithms to control both manipulator and ROV, effectively creating a single robotic system that moves as one to accomplish a coordinated task. SeeByte calls this coupled-control. With the coupled-control approach, the ROV is considered an extension of the manipulator and regarded by the software as simply a number of additional 'virtual joints'. By considering the vehicle and the arm as one system the dynamic positioning software is able to fly the ROV compensating for the weight distribution issues and drag forces in real time, rather than as a retrospective correction. This control architecture has already been demonstrated, and it is hoped that it can be incorporated in future versions of the EOD ROV to increase advanced autonomy capabilities to the EOD mission.

CONCLUSION

There are engineering and vehicle design challenges which arise when integrating a system using existing off-the-shelf components for complex underwater EOD operations. However, this project has proven that custom ROV configurations can be created for some of the most challenging applications with the right software acting as the glue between the different hardware components. The roadmap forward is for more advanced autonomy that will continue to present new challenges and require advanced solutions such as coupled control.

ACKNOWLEDGEMENTS

SeeByte wishes to acknowledge the support of SSC-PAC, JIDO and NAVSEA in managing and funding the US Navy SSPAC Unmanned Vehicle Lab project.


Seebyte's CoPilot providing the advanced autonomy and control for difficult ROV tasks. (Courtesy of U.S. Navy)


Seebyte's CoPilot providing the advanced autonomy and control for difficult ROV tasks. (Courtesy of U.S. Navy)

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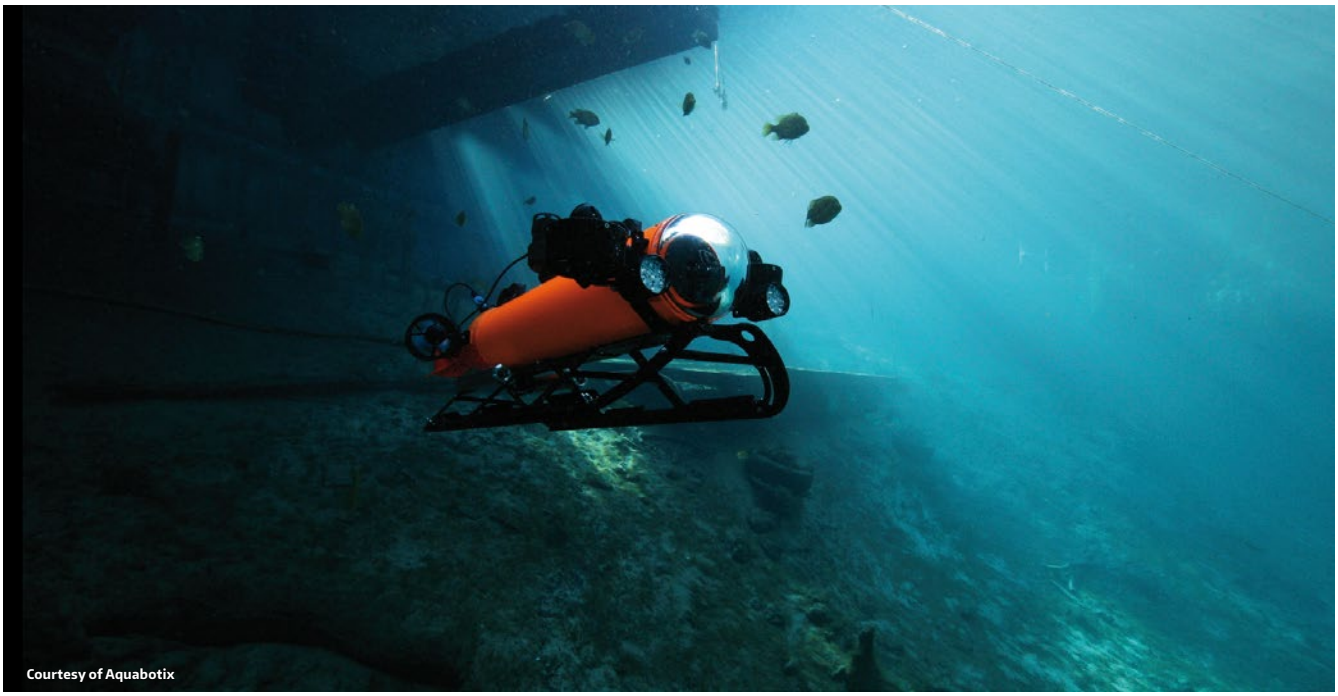
Courtesy of Aquabotix

When utilized separately, autonomous underwater vehicles (AUVs) and remotely operated vehicles (ROVs) possess distinct capabilities for users across multiple industries. Yet, while both are popular unmanned underwater vehicles, they have significant differences in their design, function and overall use.

THE INTEGRA AUV/ROV:

HOW HYBRID VEHICLES TRANSFORM UNDERWATER EXPLORATION AND INSPECTION

By Ted Curley, Chief Development Officer, Aquabotix


Courtesy of Aquabotix

AUVs, by their design, operate autonomously. Once programmed, they can move independently, carrying out underwater missions for hours or, in some instances, days. Even though being untethered enables AUVs to have a greater operational radius, they are limited in the sense that they change depths and can only maneuver in certain directions.

ROVs, on the other hand, are tethered to topside electronics where an operator will pilot or "fly" the vehicle using a computer console or controller, either on shore or on a vessel of opportunity. Typically, ROVs need a guiding hand to execute missions, leading to increased cost in manpower and the necessity to be on-site to ensure these vehicles are operating properly. Despite these considerations, ROVs are traditionally more maneuverable than AUVs, both in their design and with the aid of human pilots.

ENTER THE INTEGRA HYBRID AUV/ROV

The evolving demand for underwater exploration and inspection missions ultimately requires a multi-mission vehicle that offers users the best of both automation and control. The solution that fully addresses these needs is a hybrid AUV/ROV, an underwater vehicle capable of handling multiple underwater missions, while also changing the way underwater surveys are performed.

For broad range searches, the hybrid can be equipped with side-scan sonar and programmed to conduct grid or linear searches in AUV mode. For a more thorough analysis of underwater conditions, operators can attach the tether and maneuver the ROV to capture detailed images using multibeam sonar or high definition video and still images with a camera. The ROV can also be outfitted with a manipulator/grabber arm or water sampling sensors increasing its capability.

Recently, Aquabotix introduced its second-generation hybrid vehicle, the Integra AUV/ROV, for underwater missions. Single-person deployable, portable and lithium ion battery-powered, the Integra AUV/ROV allows users to conduct multiple underwater missions, while providing a cost-efficient alternative to deploying separate AUVs and ROVs for individualized tasks.

The Integra AUV/ROV adds more functionality into a single vehicle. Operators can have immediate and complete control of the vehicle because it has the brain power to conduct autonomous missions as well as detailed inspections, all in a single setting. The vehicle can be configured with multiple sensors and can search wide areas using AUV mode while conducting detailed inspections using ROV mode. When running the vehicle in autonomous operation, all mission planning is completed in an intuitive Windows-based application.

Among its features, the Integra AUV/ROV also includes five high-torque motors, a 1080p true high-definition camera with pan and tilt, and high intensity LED lighting (4000 Lumens). All markets – law enforcement, research, environmental assessment, defense and infrastructure included – can benefit from hybrid technology contained within the Integra AUV/ROV.

In the infrastructure industry, for example, hybrid vehicles like the Integra are prime for bridge and dam inspections as they can conduct site surveys in AUV mode, and then perform more in-depth inspections upon transitioning fully to ROV mode of the bridge and dam structures. More importantly, hybrids remove potential perils for divers when it comes to the surveying and monitoring of oceanic and inland waterways in harsh environments.

Other key sectors where the Integra AUV/ROV is poised to have the greatest impacts include:

- DEFENSE: The navies of the world continue to make significant investments in unmanned vehicles to address increased underwater threats that often occur in hazardous environments that prove difficult and dangerous for divers. The Integra AUV/ROV acts as a force multiplier and can augment and even replace divers in specific situations including explosive ordinance disposal (EOD), mine countermeasures (MCM), port security and intelligence, surveillance and reconnaissance (ISR).

- OIL AND GAS: As energy producers increasingly look for ways to save money, cut costs and maintain life-of-field, the Integra AUV/ROV and its technology will offer ways to reduce the number of assets in the water and manpower resources.

- ENVIRONMENTAL ASSESSMENT: Without proper technology, aquatic environment monitoring can prove cumbersome. The Integra AUV/ROV provides a low-cost solution for sophisticated data collection and can be custom-equipped with a wide array of scientific sensors which are displayed in the same screen as the user controls, providing real-time feedback and analysis.

HYBRID VEHICLES AND CONNECTIVITY: USING TECHNOLOGY TO GO BEYOND THE DIVE

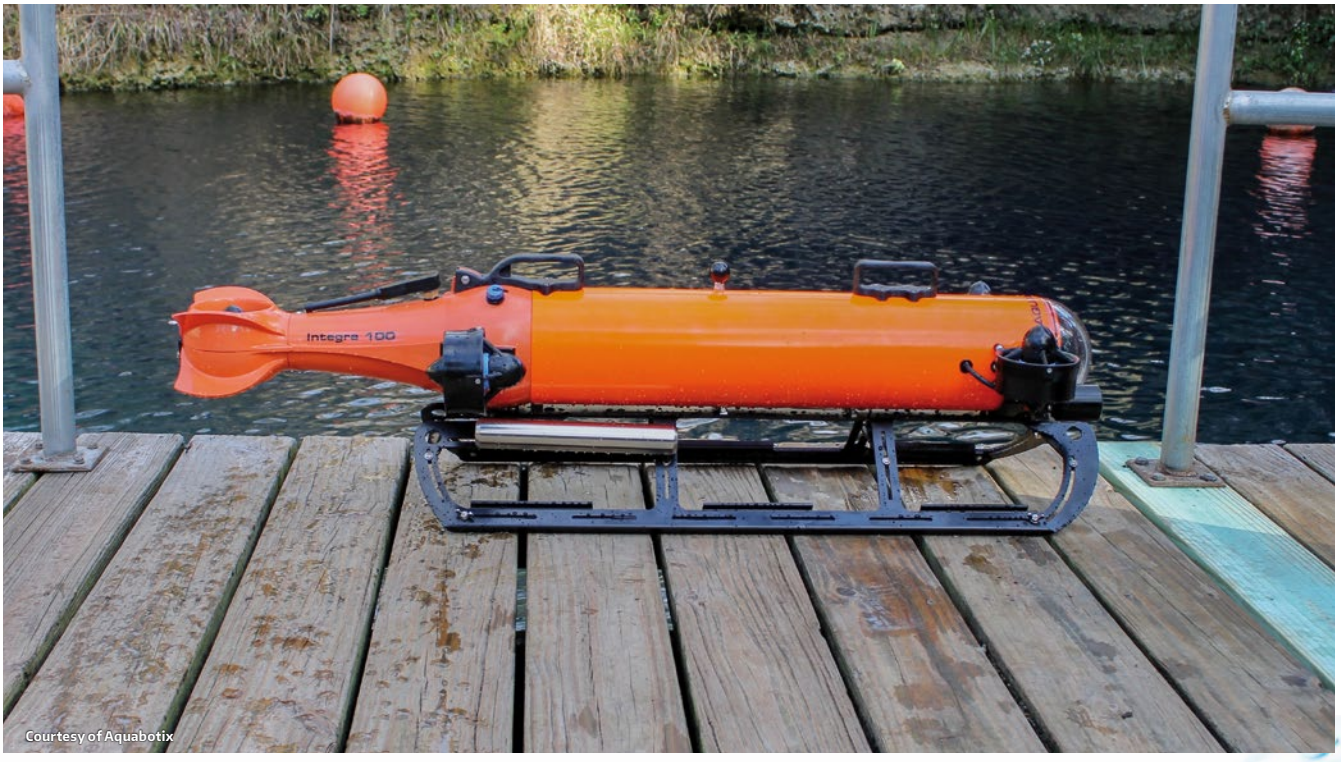
While hybrid AUVs/ROVs like the Integra prove more than capable of exploring the depths of the world's bodies of water, technological advancements like live remote viewing and cloud-based storage promote greater interactivity and connectivity during missions both below and above the sea.

Traditionally, long-term storage, analysis and report generation were left up to end users. Now, the cloud, when properly accessed and utilized by surveyors, has become the future of data collection and storage. The cloud now provides easy access to data, which can be properly archived, managed and viewed in-action during missions. Large data sets can now be safely and easily managed. In addition, users don't have to be on-site to monitor missions – cloud connectivity brings all crucial data points together in a convenient and easy way, in real-time.

For example, when hybrid vehicles are operating in ROV mode, users can apply Live Remote Viewing functionality. This feature utilizes remote diagnostics to allow crews located off-site to monitor multiple inspections, operations and explorations from a single platform in real-time. Live Remote Viewing is designed for use across several industries, including aquaculture and infrastructure. Thanks to technologies like these, the need for increased or expensive on-site manpower for underwater operations is reduced considerably.

CONCLUSION

With oceans covering 70 percent of the Earth's surface, they remain largely unexplored from a subsea perspective, making research and data collection challenging in the process. Add the burden of needing two separate types of vehicles – and essentially two separate crews – for different exploration and inspection missions, and you're presented with a significant barrier to both cost and efficiency. With the hybrid AUV/ROV, you not only have a digital framework for autonomy, but also the ability to quickly take control. This is why the Integra AUV/ROV is poised to be a new and valuable force multiplier for the underwater robotics industry.



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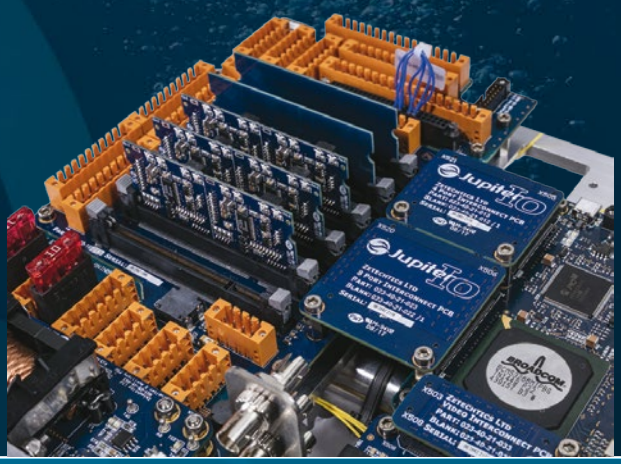

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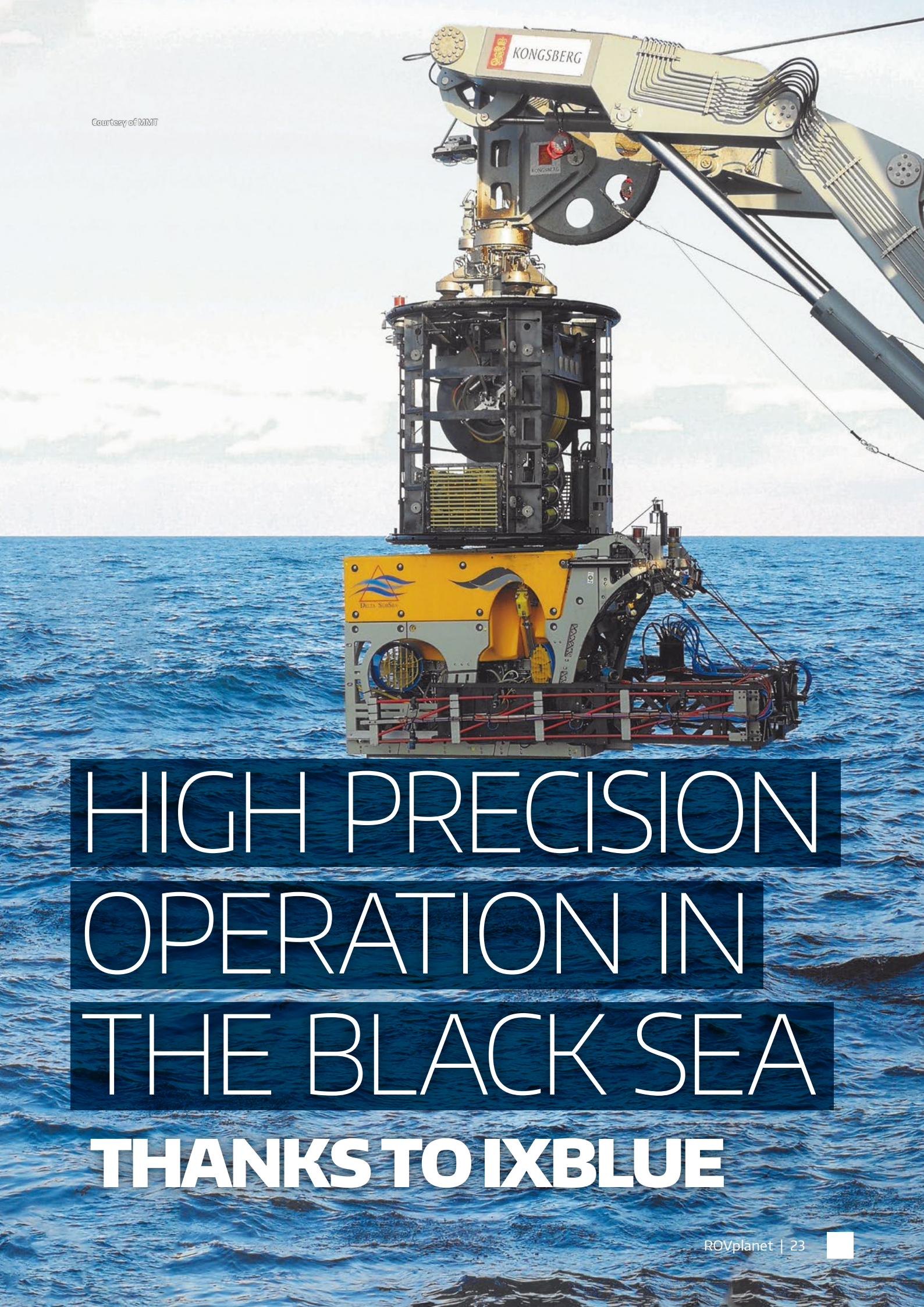


Courtesy of MMT

HIGH PRECISION OPERATION IN THE BLACK SEA

THANKS TO IXBLUE

In late September 2017 MMT, specialised in marine surveys, and Reach Subsea, provider of ROV services, contacted iXblue to investigate the possible use of Ramses sparse array LBL system on a pipelay corridor in the Black Sea.

Both companies needed to ensure that a 430km pipeline route was clear of unexploded munitions (UXO) or Objects of Cultural Heritage (CHO – wrecks and old man-made objects). Operating with two ROV's at a depth of 2000m, MMT and Reach Subsea needed to precisely follow a series of four survey lines each spaced 7.5m apart. With one of the ROVs fitted with 12 magnetic gradiometers on a 10m wide boom the 7.5m line spacing left little margin for error. The other ROV, fitted with cameras and lasers (for measurements) as well as with a hydraulic dredging attachment, was meant to be used if buried targets were encountered.

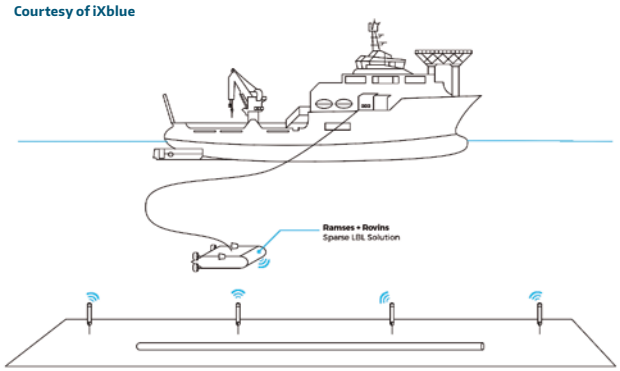
MMT and Reach Subsea were conducting operations using iXblue's Rovins INS DVL aided with USBL data, an approach usually conducted with ease at this depth of water. However, unusual environmental conditions made the operation difficult by rendering the sound velocity profile inconsistent with a very strong thermocline (34m/a change over 2m water depth). The thermocline appeared in the upper layers (top 50m) but moved significantly between sound velocity profile measurements, varying between 20 and 50 meters. The depth of the thermocline seemed to change rapidly, possibly due to internal wave action. This significant change in velocity at such a relative shallow depth lead to varying ray bending and consequently unrepeatable USBL positioning.

In order to solve this issue, MMT and Reach Subsea decided to use Ramses for sparse array positioning meaning that the critical acoustic paths would be close to the seabed and therefore not affected by the varying thermocline.

An analysis of the sound velocity profile close to the seabed, combined with the expected ROV operating altitude and that of the preferred deployment of the beacons indicated that a maximum range of around 1600m should be achievable. The use of tripods or moorings for the beacons was then discussed at length, Moorings are usually avoided for high precision positioning as they tend to move with the tide or current, however MMT and Reach Subsea were happy that moorings would be fine as their investigations into the environmental conditions causing problems for the USBL had indicated there was very little variation in the environmental conditions at the seabed.

Some work had previously been done analyzing the best layout for surveying a pipe route with very sparse beacons. It seemed at first glance, that laying the beacons close to the route would be the best option, while using a large offset from the route would lead to better across route precision. However, a compromise had to be found.

Courtesy of iXblue



The further away from the route the beacons would be, the better the across route performance. But moving the beacons away from the route meant less coverage as a smaller area of the route would be within range of those particular beacons.

The previous analysis had shown that in theory, the required precision of the position could be achieved with only a single beacon in range. Knowing that a maximum of 1800m could be achieved with Ramses, iXblue recommended that each 20km section should be covered by 11 transponders, each offset from the pipe route by 300m. With this solution, at least one beacon would be in range during all of the survey, including significant areas where two beacons would be available.

This mission being an ongoing operation, there was no opportunity to train the customer's staff. MMT and Reach Subsea thus requested that an iXblue support engineer joined the vessel to perform the mobilization and initial onboard training. The support engineer thus assisted with the integration of Ramses sparse array LBL onto the ROV, configuring the Rovins INS to work properly with Ramses and advising on the methodology for the calibration of the beacons.

The initial plan for this mission was to equip the survey ROV with one of the two Ramses systems provided by iXblue while keeping the other system as a spare. However, the vessel being equipped with two ROVS, both Ramses were used on each of them, the inspection ROV being used to deploy and calibrate the third party beacons, while the first ROV was used for the UXO survey operations.

iXblue's support engineer was thus able to install the Ramses on each vehicle. A series of tests then showed that the range being achieved on the survey vehicle was shorter than what had been initially anticipated and that the range achieved by the other ROV was more in line with expectations. Further analysis showed that Ramses was experiencing higher than anticipated environmental noise on the survey vehicle. In order to solve this issue, iXblue's engineer decided to take a number of steps to reduce the noise and improve the range performance. Ramses transducer was thus mounted on top of the ROV to optimize

the line of sight in every direction, a plastic mounting bracket was then installed between the transducer and the ROV frame for mechanical isolation, and finally, all cables were routed as far as possible from any of the ROV high voltage/power cables.

With those changes, the maximum range achieved by the survey ROV was able to reach 1715m, 115m more than theoretically possible on a flat seabed. This excess range was more than likely due to slightly different environmental conditions and a none-flat seabed. Overall, the average range achieved during the mission reached 1330m, a reasonable range when compared to the maximum theoretical range of 1600m.

For this operation MMT and Reach Subsea only used the original USBL system when calibrating the beacon positions. This was done using the SLAM algorithm in Ramses. By aiding the INS with the USBL system and circling the beacon while Ramses measured the range to this beacon, the SLAM algorithm was able to calculate the position of the beacon. The SLAM algorithm is a great solution for correcting some of the typical errors encountered with a USBL system, it is an excellent process to eliminate random noise from the position calculation, but is unable to get rid of systematic errors. By ensuring the USBL system is fitted with a recent velocity profile for each beacon calibration and minimizing the horizontal offset between the ship and the ROV, the USBL problems can be minimized for the short time required to calibrate the beacons.

During the survey of the first line of each section, marker buoys were deployed to allow a quality check on the relative positioning provided by Ramses. MMT and Reach Subsea were thus able to conclude from analyzing targets on overlapping lines that Ramses sparse array LBL was able to provide relative position accuracies on the decimeter level rather than the 15m error budget for the USBL system.

Courtesy of MMT

ROV PLANET

THE MOST ROV FOCUSED MAGAZINE

FOR SUBSEA CONSTRUCTION & ROV PROFESSIONALS!

SEATRONICS INTRODUCES VALOR ROV

THE LIGHTEST YET MOST POWERFUL OBSERVATION ROV AVAILABLE

Seatronics, an Acteon company, are developing its capability as a provider of observation class ROV's, associated sensors and tooling building on our reputation as a market leading systems integrator with a global network of contacts in oil and gas, renewables and security markets. Seatronics will partner with new and established ROV service companies in promotion of sustainable operations at a reduced cost base.

During Oceanology International 2018, Seatronics, supplier of specialist subsea solutions, announced the launch of the VALOR ROV. Seatronics' experienced in-house team of ROV and Survey engineers consulted with major players in the ROV industry on the specification of the VALOR platform taking years of operational experience into the design ensuring it is capable to carry diverse equipment load-outs, quick to mobilise and easy to maintain.

With the predecessor to VALOR, Seatronics carried out a series of programs with industry leading manufacturers and government agencies resulting in achievements such as the world's first ROV to fire an EOD disruptor (essentially an underwater shotgun); the integration of autonavigation software; and operation of ROVs over long-range links (from Ab-

Courtesy of Seatronics

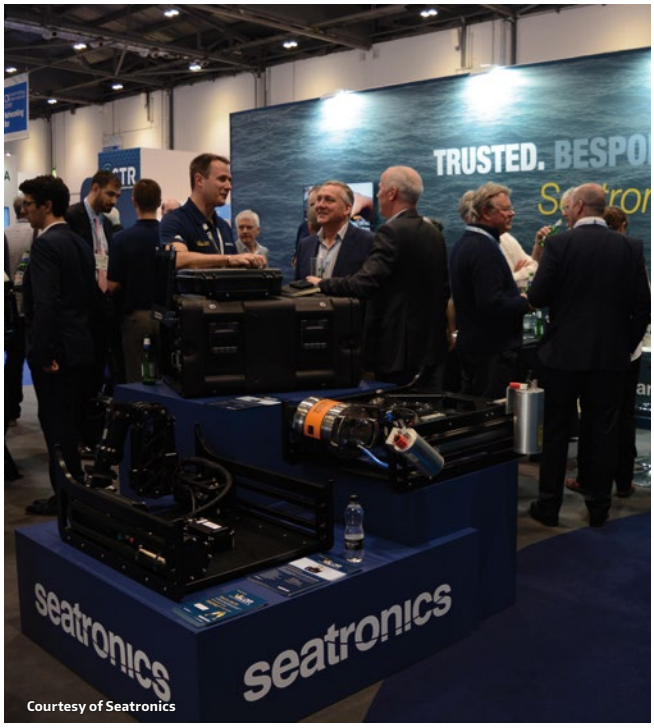
Courtesy of Seatronics

erdeen, UK to Busan, Korea). Overall, the feedback received proved the market desired a vehicle that was easily transportable, capable of operating in higher currents and with a greater sensor capacity to replace ageing 'eyeball' systems. The identified gap in the market lead to the development and introduction of VALOR.

The vehicle name VALOR was established from the acronym for 'Versatile and Lightweight Observation ROV', however, the capability of the platform far exceeds its class. The new platform leverages the advancements made in sensor technology to significantly increase the power / payload capacity from a small inspection class platform. This is achieved using proprietary syntonic flight. Pilots will benefit from the VALOR's onboard INS-based control system. With this system the current and desired position and attitude of the ROV are all considered before commanding the thrusters. This ensures that when the vehicle is commanded to move forward it doesn't just thrust ahead. Instead, the ROV will automatically gauge vehicle heading, pitch, roll- even the effect of water currents- and moves forward. The system will also station keep as soon as the controls are at the null position, thus allowing the operator time to discuss operations or change pilots, it can also be automated through use of waypoints.

At under 50kg in air, the VALOR is lightweight and easy to handle and yet incredibly powerful. When you combine the significant increase in power and payload with the increased connectivity available, again through the advancements made by the sensor manufactures it enables a significantly smaller platform to carry out tasks that were previously only possible from significantly larger platforms.

With horizontal and vertical bollard pulls in excess of 70kgF and 43kgF respectively from the 10kW vehicle PSU the system is more than capable of working in heavy current and shallow waters with additional tooling. With a 100Kg through frame capacity, bespoke skid solutions can be fitted to the vehicle to allow a range of tooling / sensor options to be added to the vehicle. Dual manipulators, dynamic laser scanning and even pipe-tracking skids can be fitted using only the standard vehicle expansion ports, allowing the system to become flexible and significantly more cost effective to the client.



Courtesy of Seatronics

Courtesy of Seatronics

Courtesy of Seatronics

For situations where the power or data capacity is insufficient, an additional 10kW of power and 8 CWDM fibre channels can be provided for the skid. This extra capacity means that power-hungry tooling can be powered from the ROV directly such as on-board cavitation cleaners and water jetters rather than relying on surface fed lines and topside HPUs- once again minimising costs and deck space for the client.

There are multiple dedicated observation class ROV manufacturers however there are presently none that can offer immediate access to a host of survey and inspection tools. Seatronics see their USP as being able to offer a competitively priced, reliable platform supplied ready to work with all required sensors and systems integrated prior to vessel mobilisation.

Seatronics-designed control software uses this power to tame currents and keep the platform stable. The fibre-optic umbilical carries over 40Gb/s of throughput enabling the users to connect a suite of sensors through 10 x 'universal' connectors and 3 x camera connectors. Each of the 10 user connectors simultaneously provide Gigabit Ethernet, RS232/485/422 serial, analogue input and outputs as well as a whole host of synchronisation options- 1PPS, a synchronisation switching matrix, even IEEE1588v2 for nanoseconds-accurate timing. Each camera connector can take legacy PAL/NTSC composite video or SDI/HD-SDI/3G-SDI- with two cameras on each port. In addition, each port has a Gigabit Ethernet channel for Gig EVision and IP Cameras. Expansion is also available on request for 12G-SDI, 10Gig Ethernet, HDMI 2.0 and other upcoming standards. The Versatility of VALOR is beyond reproach.

The VALOR has a depth rating of 300 metres but is available with a 1000 metre depth rating on request. The system can be utilised as a free flying vehicle or as a TMS launched system. HD cameras come as standard, chosen for their high image quality and excellent low-light performance.

The VALOR systems' versatility is near-limitless given the significant payload, unrivalled power capability and ability to manage complex tooling and sensor packages. It is lighter and smaller than its competition both as a vehicle and as a system (entire system fits on a single europallet). The VALOR platform is available for rental or sale from Seatronics global bases in Aberdeen, Abu Dhabi, Singapore and Houston.

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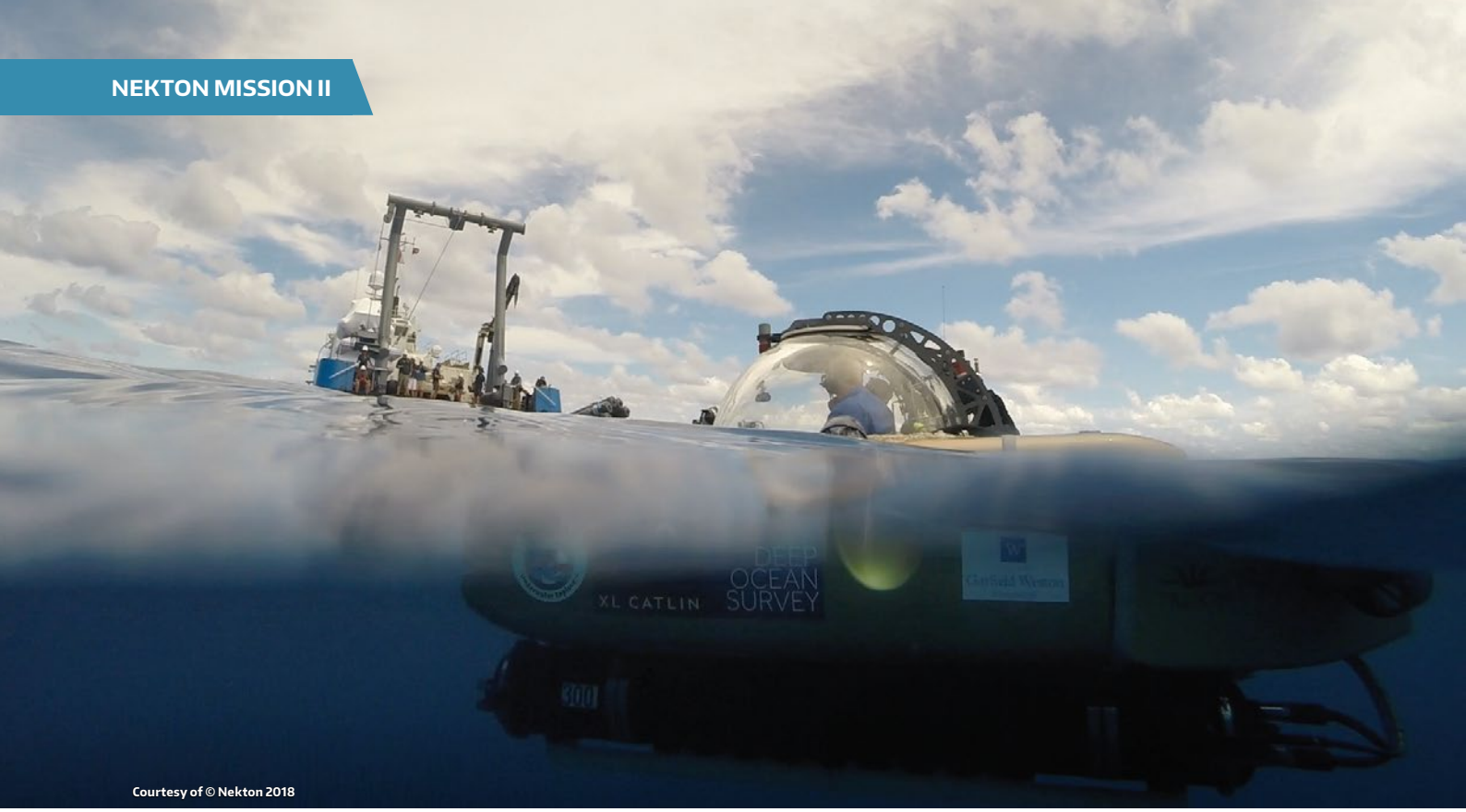
NEKTON
DEEP OCEAN EXPLORATION

NEKTON MISSION II

There are two things in the Ocean: nekton and plankton. Whilst plankton is everything that floats in the ocean, Nekton refers to everything that swims against the current. Then there was Project Nekton, the U.S. Navy codename for the expedition with Don Walsh and Jacques Piccard that went to full ocean depth in the 1960s. These sources are where the 'NEKTON Mission' got its name.



Courtesy of © Nekton 2018

The vision of this organisation is to explore the deep ocean: to reveal the unknown for the benefit of humankind, and to accelerate its sustainable governance of Earth's oceans. The most important part of our planet is also the least known. 12 people spent 300 hours on the moon; only 3 people spent 3 hours on the bottom of the deepest part of the ocean.

OUR CHANGING OCEANS

Oliver Steeds, the CEO and Founder of NEKTON, has been a broadcast journalist for over 20 years, and has experience as a documentary film maker and storyteller. He has set out on a journey to investigate how the ocean is changing and raise awareness of its potential plight.

'The ocean is changing and the headlines aren't good.', Steeds says. 'However, we have an opportunity to change course before we further undermine its resilience to support our lives and livelihoods.

'The good news is that we have already gathered more data on the ocean in the past two years than we have in the rest of human history. We also now possess the technology to discover more about our ocean in the next ten years than we did in the last 100,000 years.

'We are now at the crossroads.', he explains. 'With exploration comes the opportunity to discover new knowledge, new species, new cures for diseases, new deposits of minerals, on and on: different ways in which new discoveries can drive our progress. With exploration also comes exploitation; if there is something of value then people are going to want it.'

Steeds has strong views on what needs to be done to prevent further loss in our oceans. 'The greatest challenge which we now face as scientists and industry (sic) is to understand what we can do to ensure the sustainable development of our economies and the sustainable governance of our oceans.', he says. 'Our role – as a scientific lead organization – is to gather the actionable data to help inform the legal, political, and economic decisions around the sustainable development and governance of our oceans.'

EXTENSIVE RESEARCH

There are two sides to NEKTON: the Innovation Hub and the Missions themselves. The aim of the Innovation Hub is to accelerate scientific discovery and ocean governance by making investments into specific operational areas, such as big data. One of the largest databases of open sourced marine data is called 'Octopus', developed alongside the University of Oxford and Oxford Martin School. All open source data is harvested and harmonised to identify both what we know and where the gaps in our knowledge are.

Having been manually annotating hundreds of hours of subsea video over the past few years, NEKTON are now fundraising for another innovation initiatives to use machine learning to accelerate video analysis. The idea is to take the data from an ROV (or AUV or submersible) and put it into an algorithm through the machine learning system for automatic analysis.

The main focus of this is biology; identifying the species of animals that are in the water column. Through Oxford University's 'Zooniverse', thousands of citizen scientists would be working to manually identify what the images are of in order to teach the algorithm. However, NEKTON is currently looking for more partners to further develop this project.

The other side of NEKTON are the Missions themselves. The rationale behind these missions are based on four pillars: scientific research, storytelling, informing sustainable governance, and capacity development (particularly in low income countries).


Courtesy of © Nekton 2018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THE TECHNOLOGY

NEKTON's scientific focus is in the top 3,000m of the water column. These represent the greatest biodiversity peaks within the Bathyal Zone. The work is performed by technical divers in the top 100m, manned submersibles down to a 1,000m, and then ROVs/AUVs down to 3,000m depths.

The manned submersibles in particular have a very specific utility, operating in areas of complex topography often where strong currents make it challenging for ROVs. The transparent acrylic pressure hulls of the Triton submersibles that NEKTON use provide the perfect platform for observation. The payload on the Triton submersibles also enable NEKTON to adapt them with a whole range of different sensors, camera systems, and sampling equipment, to allow for a range of different tasks.

NEKTON are pioneering a new multi-disciplinary approach to marine research. They have recently brought together 16 world leading marine scientists from across an array of major disciplines to define and publish a new standard framework for all marine sciences to measure the state of the ocean. The General Ocean Survey and Sampling Iterative Protocol ('GOSSIP') deploys a full swath of scientific research tools including ROVs, AUVs, and submersibles.

'ROVs enable us to visualise and sample a deep-sea world for extended periods that is just not possible with any other equipment.', explains Dr. Lucy Woodall, NEKTON's Principal Scientist. 'The precise flying of the ROV allows us to accurately document seafloor life, and we are also able to sample selected organisms very careful so they are undamaged. Having a video and photo or an organism in its natural habitat, combined with a specimen provides us with the ability to measure biodiversity and understand the ecology of the deep ocean.'

Teledyne Marine have joined forces with Nekton to provide a wide range of different equipment from across their business lines. Their 'Sea of Solutions' includes tech for imaging, instruments, interconnect, seismic and vehicles. This is a great fit for NEKTON who share a common purpose with Teledyne Marine: exploring and monitoring the depths of the ocean.


Courtesy of © Nekton 2018

Paul Crowther – CEO of Atlantic Marine and NEKTON Trustee – has been giving advice and guidance on how the organisation can achieve its goals. He says, 'The sustainable development of the Blue Economy is critical for the long-term success of all maritime businesses.

'Our industry has a social, corporate, and environmental responsibility to improve the sustainable governance of the ocean. We can't do this in isolation and must establish more partnerships like Nekton has developed with Teledyne Marine to find ways in which business can support scientific research.'


Courtesy of © Nekton 2018

SUBMARINE STEM AND A GLOBAL AUDIENCE

In addition to the scientific discoveries that NEKTON has produced, they also created an educational programme called Submarine STEM. The hope was to inspire a new generation of young people to become engineers and scientists and to explore the oceans. The programme provides different educational resources online in order to experience the underwater world and learn about the challenges of operating in the ocean. The resources are aimed at different age groups from 7 to 11, and 11 to 14.

The first NEKTON Mission had a global audience of 750 million viewers; with even more viewers expected for the subsequent missions. It's not an exaggeration to say that the ROV/AUV professionals are some of the greatest and most important explorers of our time. How we define our relationship with the ocean could change our future, and how the oceans change will have an effect on all of us for a long time to come.

'We now possess the technology to discover more about our oceans in the next ten years than we did in the last 100,000 years of human history.'

DEEPSEA POWER & LIGHT RELEASES

4K UHD CAPABLE APEX™ SEACAM®

DeepSea Power & Light has elevated their HD zoom camera offerings with the Apex SeaCam. Both HD and 4K UHD configurations have 12x optical zoom, and HD output modes feature a lossless digital zoom which extends the zoom range to 24x.

The Apex SeaCam incorporates proprietary corrector optics with a low-distortion 70° horizontal FOV. Features include several HD formats and impressive sensitivity to low light with a faceplate illumination of 0.56 lux. Rigorously tested with over 10,000 pressure cycles during the design and qualification process, the titanium housing and optically polished dome are depth rated to 6,000 m.

A wide variety of supported connectors along with fiber optic and coax transmission methods make integration of this camera straightforward.

SUBSEA EXPO 2018 REVIEW

More than 5,000 people from 49 countries visited the Aberdeen Exhibition & Conference Centre from 7-9 February at the Subsea Expo 2018, Europe's largest, annual subsea conference and exhibition. This year's theme – 'Facing the Future' – examined what must be done to reinvent the industry in a lower price environment and ensure the UK maintains its world-leading position.

Neil Gordon, chief executive of Subsea UK said: "The industry has recognised the need for change, innovation and diversification, and made great efforts to ensure the UK remains competitive within the rapidly evolving marketplace.

"It has taken some time, but the industry is now adjusting to a more stable oil price between $60-70/bbl. We are also starting to see some progress in terms of improved behaviours leading to more successful collaboration outcomes, but there is still much to do in this area ensuring supplier engagement earlier in the project lifecycle.

"Projects are being re-worked, priorities are being re-evaluated and enabling technologies are being applied to maximise efficiencies, reduce cycle times and lower costs. It's now time to embed these new ways of working to ensure the future is bright, regardless of the oil price. With 55% of UK subsea revenue now attributed to exports, it's important that we maintain our efforts to increase overseas opportunities. We have also seen strong growth in offshore renewables and many subsea companies have improved their resilience in the current climate by increasing their activities in wind, wave and tidal. We look forward to discussing and debating these topics, amongst many others, at Subsea Expo 2018."

More than 150 organisations were showcasing their products and services, including 36 first-time exhibitors. The 2018 programme was packed with high profile industry speakers from a number of companies including Aker Solutions, BP, Wood and Shell UK. Presentations covered maximising global opportunities, small pools, data gathering, ROVs, visualisation, pipelines, life extension and efficiency, and inspection and integrity.

The event's plenary session, chaired by Mr Gordon, has set the scene for the week and stimulated debate with presentations from a number of high profile industry figures including Andrew Reid from Westwood Global Energy Group, Mike Backus of Nexen Petroleum UK, Simon Elliston from BEIS and Tim Cornelius of Atlantis Resources.

Courtesy of Subsea UK

Courtesy of Subsea UK

Courtesy of Subsea UK


Courtesy of Subsea UK


Courtesy of Subsea UK

As part of Subsea Expo's 'Global Opportunities' programme, the Department of International Trade (DIT) was hosting one-to-one meetings with in-country experts in a bid to match UK expertise with demand from key oil and gas provinces, including Azerbaijan, India, Brazil, and Mexico.

Subsea Expo's gala dinner and awards ceremony has seen a selection of the country's most innovative, dynamic and successful subsea businesses recognised for their success over the past 12 months.

SUBSEA UK AWARDS 2018

Tekmar Energy Limited was named company of the year at Subsea UK's annual awards while Richard Marsh was recognised for his outstanding contribution to the industry.

The awards, which celebrate the achievements of companies and individuals in the UK subsea industry, were presented at a gala dinner in Aberdeen during Subsea Expo – the world's largest subsea-focused exhibition and conference.

Sponsored by Baker Hughes a GE Company and Helix Energy Solutions, the awards were presented in front of over 600 people from the subsea sector. Neil Gordon, chief executive of Subsea UK hosted the ceremony with former UK Government minister and chairman of Triumph Motorcycles Limited, Lord Digby Jones as guest speaker.

The top award, Company of the Year, was presented to Tekmar Energy Limited. Having grown from a small, family owned business founded in 1985, Tekmar now has more than 4,000 protection systems in operation around the globe protecting billions of pounds worth of subsea assets. The company has experienced rapid growth over the past five years, despite the economic challenges, it has continued to expand its product offering and diversified into new markets.

Neil Gordon, chief executive of Subsea UK commented: "The past two years have been extremely challenging for the subsea sector, however we have continued to see an unwavering commitment from companies of all sizes to drive a real change across our industry.

"Once again, we received an incredible standard of entries for this year's awards, demonstrating the greatest attributes of the UK subsea sector. Despite the ongoing challenges we face, it's vital that we continue to celebrate and recognise the finest talent, leadership and contributions as we adapt to this new environment in the coming years."

Founder and former managing director of Tritech, Richard Marsh scooped the Outstanding Contribution Award. One of the most charismatic characters and early proponents of the subsea sector, Richard began his career at British Aerospace where he was responsible for 1,600 technicians and engineers who built 16 concords in the UK. He also helped to develop one of the first ROVs, Consub.

Maritime Developments Ltd won the Innovation & Technology award. During its eighteen-year history, the company has successfully diversified its client base away from the fishing industry and now designs, manufactures and delivers back-deck equipment for the global oil, gas and renewables sector.

This year's event saw the launch of the David Pridden Young Emerging Talent Award, a commemorative accolade in memory of the inaugural Subsea UK chief executive, David Pridden who sadly passed away last year. Arnold Grundy of Oceaneering was the proud winner. Responsible for the design, manufacture, testing and deployment of subsea cables and related subsea distribution, Arnold was praised for his technical know-how, and collaborative and enthusiastic approach.

AgileTek was crowned the Small Company of the Year and The Underwater Centre was presented with the Innovation for Safety award for the second year running. The Global Exports award went to STATS Group for its rapid expansion into key international markets and Bristol-based Rovco won the New Enterprise award.

UNDERWATER INTERVENTION (UI) 2018 REVIEW

Greensea Systems, Inc. of Richmond, Vermont has received the 2018 Corporate Excellence Award presented by the ROV committee of the MarineTechnology Society (MTS) at Underwater Intervention in New Orleans, Louisiana.

The award is presented to companies that have made significant contributions to the ROV community. The award was accepted for Greensea by CEO and President, Ben Kinnaman and Chief Operating Officer, Marybeth Gilliam.

"It was very gratifying to receive the Corporate Excellence Award from the ROV Committee", said Ben Kinnaman. "We've spent 10 years working to improve the relationship between operators and their vehicles. Our goal has always been to make the operator's job easier, even as their underwater tasks become more difficult. It feels great to come full circle – from scholarship recipient to holding this award."

"I was pleased to present this prestigious award to Greensea. Their products, specifically the OPENSEA™ operating platform, is a significant advancement for all subsea vehicles. It contributes to simplifying complex robotic operations, resulting in increased productivity and reduced operator fatigue," said Chuck Richards, Chair of the MTS ROV Committee. "It's also worthy of noting that Ben Kinnaman, CEO and President of Greensea was a past MTS ROV Committee Scholarship recipient."

The MTS ROV Committee began its award program in 1990 to recognize outstanding individuals and organizations in the ROV community. To maintain a high degree of distinction, awards are not necessarily presented annually, but only as deemed appropriate. Greensea was honoured to be included amongst previous award recipients such as Schilling Robotics, SAAB Seaeye, and VideoRay.


Courtesy of Greensea Systems

THE UNMANNED MARITIME VEHICLES (UMV) TRACK

Justin Manley, UUV and USV Technical Track Chair

Underwater Intervention 2018 technical tracks included robust content from the unmanned underwater vehicle (UUV) and unmanned surface vehicle (USV) community. A full day of content was divided into two morning sessions, allowing participants to engage the exhibits without missing the latest in unmanned vehicle technology.

The tracks addressed recent technology developments and applications in UUVs and USV as well as enabling technologies. Session Chair Justin Manley, founder of Just Innovation, kicked off with an overview of the state of the industry including recent technology and business developments.

The UUV presenters included updates from industry veterans such as Teledyne Gaiva and SAAB as well as more recent entrants Riptide Autonomous Solutions and QinetiQ North America. UUV concepts discussed included modularity, seafloor resident systems, open-architecture and air deployed expendable systems.

On the USV side presenters included well known providers such as ASV Global and Liquid Robotics as well as newcomer Seatrac. All did an excellent job connecting surface systems to the demands of underwater intervention. The growth in both numbers and applications for USVs is especially fast and interesting to watch.

Presentations from Ocean Infinity, Blue Ocean Monitoring and University of South Florida provided insights into ongoing applications of UUVs and USVs. Ocean Infinity is pioneering combined operations of a small fleet of vehicles while Blue Ocean an USF presented field results from the application of buoyancy gliders.

Courtesy of Greensea Systems

Courtesy of Bob Christ (SeaTrepid)


Tritech has released the 720im sonar, which adds another model to the popular Gemini range. The sonar's small size and competitive price, brings multibeam imaging technology to situations not previously possible.

Rounding out the session were enabling technology presentations from Sonardyne, Greensea and Trelleborg. Engineering developments in acoustics, software and buoyancy are all enabling ever more capable UUVs and USVs.

With a full room for all sessions the USV/UUV track brought these developments to a diverse audience of industry, academic and government attendees.

THE REMOTELY OPERATED VEHICLES (ROV) TRACK

Bob Christ, ROV Technical Track Chair

The ROV Track at the 2018 Underwater Intervention conference in New Orleans was indeed superb! Some of the latest in technical developments were showcased with emphasis on new technologies and applications. Some of the more notable speakers discussed theoretical future developments including former NASA roboticist Matt Ondler discussing human-machine interaction, Schlumberger's Sudhir Pai discussing his company's efforts at long-duration data capture of seismic information and Kongsberg's Arnt Olsen discussing the latest development with their Eelume: the Flexible Subsea Resident IMR vehicle.

Some other remarkable discussions included ABS's John Preston on their latest guidelines for UWILD inspections, Joseph Podrebarac from Canada's Naval Mine Counter Measure Community discussing the latest developments in MCM within Canada's Navy and Marybeth Gilliam of Greensea, creator of OPENSEA™ (their universal marine industry operating platform), discussing the open architecture movement within the subsea robotics industry as well as their product's use within the search and discovery of the USS Indianapolis in conjunction with Paul Allen's Vulcan Productions.

Special about UI is our grassroots meeting deep within the heart of the Western Hemisphere's operational hub of Southeastern Louisiana. Good friends rekindle relationships, vendors find a steady source of repeat customers and Manned Intervention continues to roll into technological innovation within the broader backdrop of the latest developments in underwater intervention.

Next year's show is in the same venue with broadening scope. Come and visit us in New Orleans to experience the city's soul along with its culture – and to do some business!

QSTAR ROV

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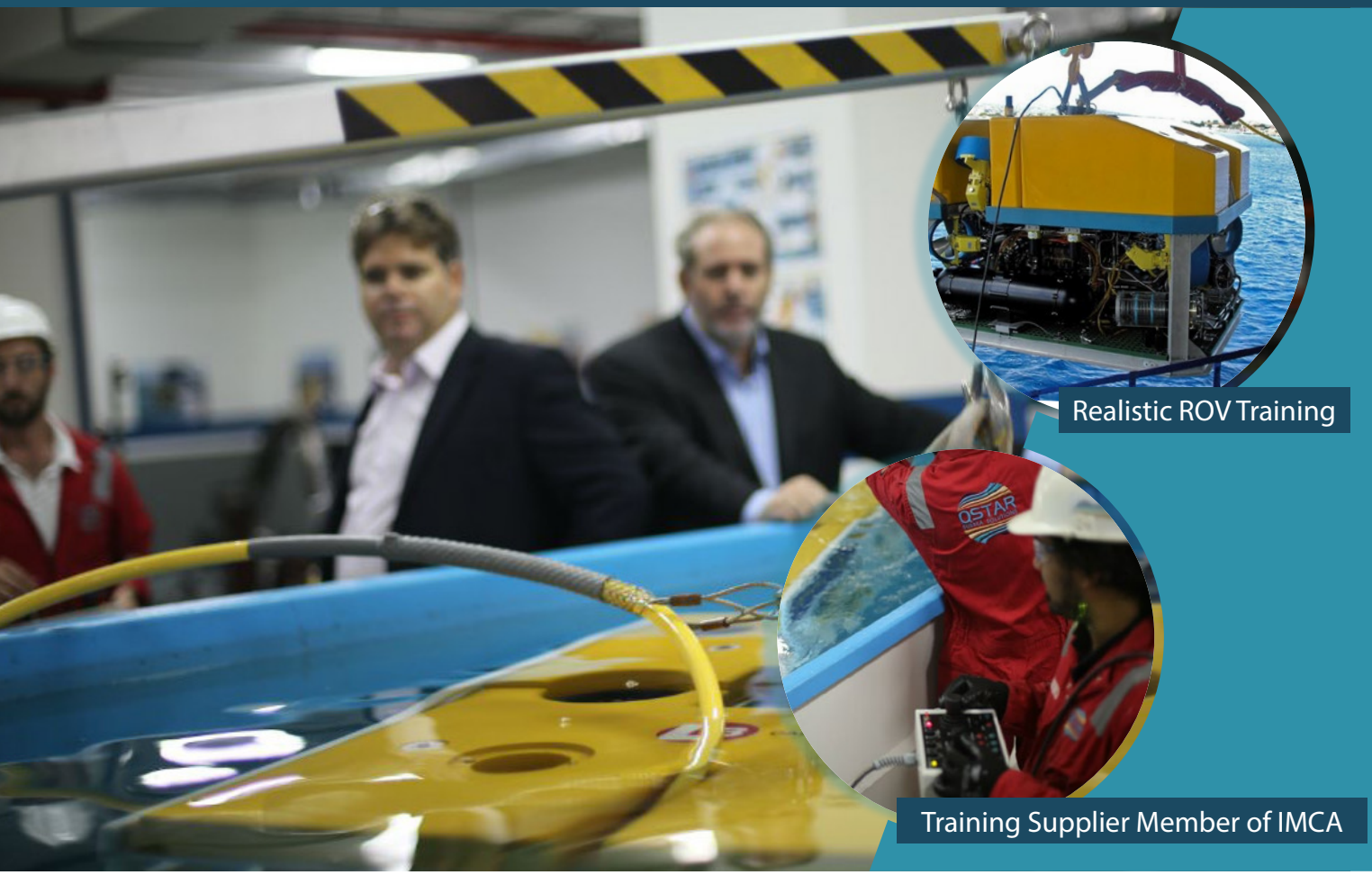

The features of our TRAINING

Our trainees receive a thorough ROV Pilot education along all over the courses, which includes a professional development module program with experts from across the marine industry to enhance your understanding, achieve and develop the professional skills required for a successful career as a commercial ROV Pilot.

Our training develops part of the ROV practical training Modules on-board a Multipurpose Supply Vessel performing real operations in onshore and Offshore waters found in the industry.

QSTAR is known throughout the world for the high standard of training it provides. Our unique training philosophy aims not only to achieve excellent test´s results, but also to build a solid foundation of knowledge that will enable you to progress to basic, intermediate and advanced ROV training – and beyond to an ROV Pilot career..

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QSTAR PRACTICAL ROV TRAINING MODULE

ROV PILOT TECHNICIAN PREMIUM COURSE

Richie Enzmann, ROV Planet

The final part of QSTAR's 7 week long ROV Pilot Tech Premium course was the Practical Module that takes place on the Multipurpose ROV vessel R/V "Atlantic Explorer". This 150 tonne 25 m long boat has been a training boat of the British Royal Navy before being sold off to the QSTAR Training Centre many years ago. The inside of the vessel hosts the living quarters, the ROV control room, workshop facilities and the deck hosts the winches for the Ageotec/L3 Perseo and Perseo GTV Light Work Class ROVs.

This particular course had two other ROV trainees this time: Antonio Núñez and Jason Hendrickx.

Antonio Núñez was a commercial diver and is also a partner of the Oriente Marine Group, C.A., an industrial diving, marine and underwater construction contractor located in Puerto La Cruz, Venezuela. Recently, he has founded his new ROV company named Underwater & Marine Inspections, C.A.

"I chose this course for its excellent references worldwide. As a company we are looking to venture into the area of ROV operations, therefore we decided to look for the best option and we decided on QSTAR. Their instructors were very professional and dedicated. Undoubtedly, the most interesting part was the practical experience on the Atlantic Explorer vessel, in Las Palmas de Canarias, where we could apply everything we previously learned in theory!", explained Antonio.

Meanwhile Jason Hendrickx, from Belgium, has 10 years of experience as a commercial diver and decided to do the ROV course as he wanted a change from physically working underwater.

"As I became older (and wiser) I decided to do my ROV course, as I needed to find something I could do when it was time to say goodbye to working in the 'water'. I really enjoyed the course in Spain as it was well thought out and had nice facilities. The best part of the course was hands down the practical part flying the ROV's.", explained Jason.

The practical part started with the more in-depth familiarization of the system manuals and then the complete mobilization of the ROVs onto the vessel. We have installed and connected up the winch deck cables to the control room, SCU (Surface Control Unit), VRU (Video Recording Unit) and then to the main vessel power supply prior to powering up the whole system. It was a great experience because we had to complete the whole mobilization that also included the outfitting and cabling of the control room and connecting onto the vessel electrical supply.

Once finished with the mobilization we had to take the different ROVs apart to perform maintenance on them. These tasks included the removal of the buoyancy, checking through the different parts of the system, connecting up the connectors and cables, and taking the thrusters apart for maintenance. Performing the scheduled maintenance on the ROVs helps to ensure the longer life of the vehicles.

When the maintenance was thoroughly practiced and completed, the ROV trainee team moved onto the next stage of the course: practicing the launch and recovery operations.

Launch and recovery is one of the most critical parts of ROV operations where great care must be taken not to damage the ROV, the vessel, and of course not to endanger the personnel on board. This is especially true in rough seas when even simple tasks can be difficult to perform. Initially, we have launched the Perseo in the Harbour of Las Palmas where the water was calm, before actually going out to open seas. With the Atlantic swell creating wave heights of 1-2m, the pilots are faced with the challenges of launching the ROV in rough weather conditions.

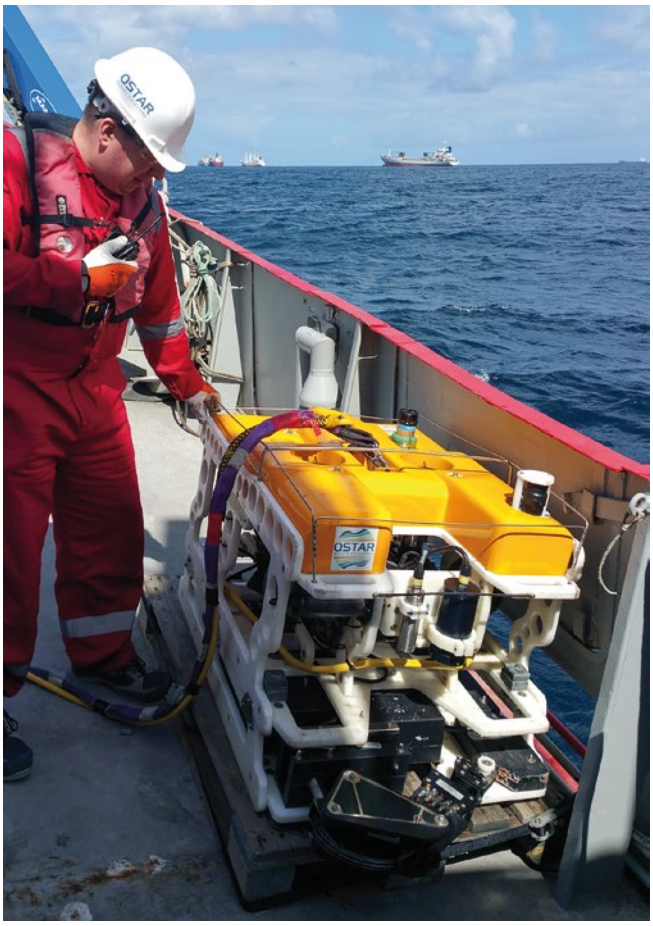
Overseeing the course Victor Javier Sepúlveda López, the Managing Director of QSTAR, has further explained the practical module:

"During the practical training, the ROV trainee team had the opportunity to perform a complete ROV mob & demob of the ROV systems. We found this training module very helpful for the trainees as it's one of the most important situations they can find themselves in a real ROV operation. This mob includes a full mob & demob of the ROV system going through:

- Packing lists and documentation (ROVs, tooling, sensors, spare parts, ROV logbooks, etc.)
- System mobilization to the Vessel
- Toolbox talk and safety procedures on-board
- Installation in the Vessel deck & Control Room.
- ROV systems pre-dive & post dive checks
- ROV Ballast and buoyancy tests
- Radio communications in the vessel; between bridge & deck officers and the ROV team located in the Control Room & deck
- Full installation and calibrations of a USBL ROV positioning system
- Installation of dedicated skid with hydraulic 5 DOF manipulators
- ROV systems maintenance and demobilization

"The ROV Pilot Technician Premium course complies with the IMCA competence documents and goes further with additional ROV modules, ensuring that the skills gained will help further you in your new career. Based on feedback we've received from the Industry and Marine Contractors, we've added innovative and important modules including High Voltage and Electrical Safety, Fibre Optics, 5 & 7 DOF hydraulic Manipulator training, USBL positioning systems and Work-Class ROV Simulators among other modules"

During these two weeks we got into the routine of pre and post dive checks, working to operational procedures, and



learnt the radio protocol that is required for safe and seamless operation of the ROV systems.

Once out in the open seas we have launched the ROV in the water to around 40 meters depth and had to locate the anchor chain of the vessel and then follow it down to the anchor point on the seabed. We were lucky to find an octopus sitting on the top of our boat anchor and at a later stage we also encountered a sting ray, which was an interesting experience to see some of the wildlife underwater.

During the training module we have installed, calibrated and used the Tritech obstacle avoidance sonar for navigation and the Blueprint Subsea SeaTrac USBL for ROV and Vessel positioning. Also, we have installed the Hydro-Lek 5 DOF hydraulic manipulator skid to the Ageotec Perseo ROV to practice the manipulator operations. We have lowered the basket down to about 60 meters with dummies that we picked up with the arm and took them to another location, logged by the USBL, before returning to the original basket location. It was an experience to practice the navigation of the ROV around the anchored but moving boat.

Then we went onto piloting the Perseo GTV ROV. This is a more powerful machine with a lot of thrust and agility to go against the currents, although still in the light work class ROV range. It was a different experience and was interesting to have the opportunity to compare the way of piloting the two different ROV types.

The time spent on the course went way too fast at the superb location of the QSTAR ROV Training Centre on the beautiful island of Gran Canary where the temperature averages 25°C all year around. Although the islands are only 40 miles offshore from Western Sahara, they are still located in the EU with great infrastructure and facilities.

Jose Maria Sepúlveda López, Technical Manager of QSTAR, said: "We have very deep waters around the Canary Islands so it makes it a perfect location for deepwater ROV operations. Everyday can be a challenge as weather conditions are not always calm, with waves from the Atlantic Ocean and windy conditions that students need to learn to work with after practising in the sheltered waters of the harbour.

"QSTAR also has an ROV Training Center located in Barcelona, the city that has excellent & cheap flight connections from all over the world. In QSTAR we offer the best training as possible and always simulating as many real life conditions as possible. Since 6 months ago we introduced an 11 week long ROV Pilot Technician course that we call the "FULL PREMIUM". Since QSTAR has a Subsea Solutions department where ROV Services are performed, after the completion of the 7 weeks of the Full Premium course, the Trainees start their 4 weeks long internship with us. In the internship they can put all the skills in practice that they have learned during the course and help in ROV maintenance, repair works, teamwork and real ROV operations to achieve and gain work experience that will help them for their future ROV Pilot Career."

Overall, the 7 week ROV Pilot Technician Grade II premium course offered by QSTAR was exceptional. They have knowledgeable and experienced trainers, good facilities, a great vessel and a fleet of ROVs to practice on. Special thanks go to Victor Javier Sepúlveda López, Jose Maria Sepúlveda López, Cristian Gurgu, Elliott Ramos Madrid, Jesus Niz Bautista, Gerard Busom, and Gianluca Belardinelli for giving their full support and passing over their experience during the course.

My favourite part, similar to most trainees, was the practical part of the course where we had the opportunity to perform ROV operations from a vessel out in the open sea under real conditions. Although, for someone who has worked in electrical, instrumentation and subsea controls engineering in the past decade or so, it was still amusing to refresh my knowledge of the electrical, electronics, and hydraulics disciplines and to practice some of the hands on skills required to be a successful ROV Pilot Tech. In the near future I plan to take part in QSTAR's new Work Class ROV training module at their facility in Barcelona and will take more training to increase my ROV flying hours and to gain more practical ROV experience.

With the offshore industry showing promising signs of recovery, in my opinion, this could be the ideal time to refresh and develop the skill pool further before another upturn in the oil & gas industry happens!

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EQUIPMENT REVIEW

THE RUD ROV HOOK

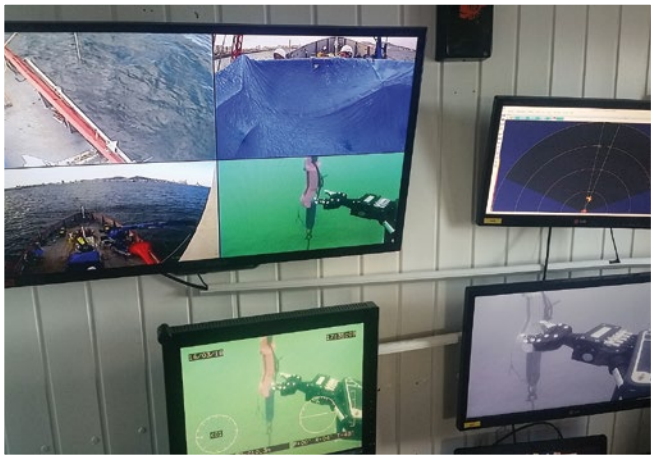
ROV Planet had the opportunity to try out the latest ROV hook specifically designed for the use of Subsea and ROV operations by the chain manufacturer RUD Ketten in cooperation with Subsea 7. The trial was carried out on board the Atlantic Explorer Vessel in cooperation with QSTAR Subsea in Gran Canaria.

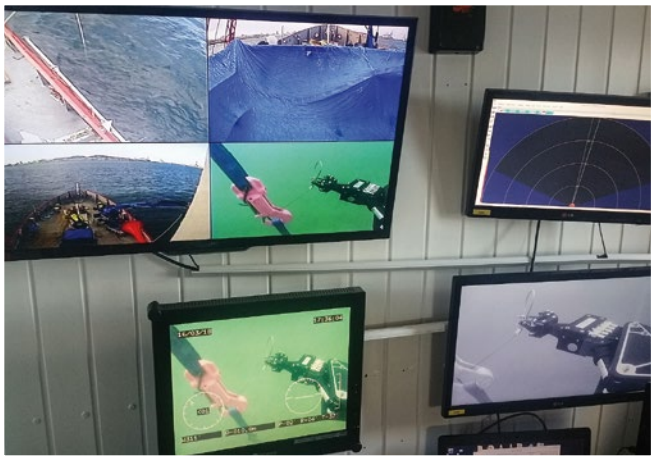
Some of the advantages of using the ROV hook are that it eliminates the risk of snagging and accidental rigging. The safety latch is substantially stronger compared to the 'snap hook' type hook safety latches to resist impact loads from rigging within the hook and from external impacts.

We could visually inspect and function test the ROV hook pre and post subsea trial. The mechanism is straight forward. It is easily handled by deck crew and minimises risk of sharp edges, pinch points and any stored energy that may harm personnel. According to RUD it is fully functional at all ROV operable water depths and with a lifting (WLL) range of up to 10t for a single point lift and up to 21t for a symmetrical four point lift at 45° sling inclination.

The safety latch on the ROV hook was securely locked in the closed position, while lowering down the load. Once at the target location the load had to be released.

The hook is operable by all commonly used ROV manipulators. The rigging within the hook is releasable by the ROV itself operating a trigger and also by upending using a separate lanyard release. In our case, using the Lighthouse Perseo Class 2 – Visual and Instrumental Inspections ROV and a 5 DOF Hydro-lek hydraulic manipulator, we used a





lanyard release to operate the hook. The safety latch must remain in the open position when operated by ROV to allow attachment or detachment of rigging. The operation of the hook is possible at inclined angles up to 30° from the ideal gripping position perpendicular to hook flat side. Then the safety latch automatically closes when the ROV releases the trigger or releases the operating lanyard.

In our opinion the new RUD ROV Hook has the potential to become the preferred solution in attaching load in subsea applications. The innovative and robust design addresses and solves all known issues of traditional ROV hooks. This long awaited solution from the industry can become the new standard for safe lifting loads underwater by means of ROVs.

IOSTIA

ADVANCING THE BUSINESS OF OCEAN TECHNOLOGY

ADVANCING THE BUSINESS OF OCEAN TECHNOLOGY

Rich Lawson, CEO, IOSTIA

It's an exciting time for the blue technology, and the launch of IOSTIA (International Ocean Science & Technology Industry Association) has been met with great enthusiasm. Never has there been a trade association squarely focused on the specific needs of the ocean science and technology industry working here in Washington, D.C. Now with a little more than six months since our launch, it's worthwhile to look in the rear-view mirror and reflect on all that we have accomplished.

Beyond the routine and time-consuming activities involved with turning on the lights of any new enterprise, our launch gave us the opportunity to connect with many ocean leaders and discuss the challenges they face and how our association could help them. It gave us a chance to create some very early focus areas for IOSTIA that we could take to Capitol Hill and the federal agencies. And when we did so, we found great interest in IOSTIA as a voice for the industry and a resource for lawmakers. We found ourselves very quickly engaged in a range of important discussions including the NOAA Hydrographic Reauthorization, the shutdown of the Deep Ocean Test Facility, and facilitating the collection of industry feedback to assist Congress spur technology innovation and jobs in the fields of ocean data and monitoring.

While pursued these important industry issues, we also focused on tangible benefits for our members. Working with leading publications, including ROV Planet, we crafted unique advertising programs that passed along substantial savings to our members. We were also warmly received by major trade shows like Oceanology International and Ocean Business, where we will work to grow IOSTIA and support our members. We also negotiated a best-in-industry affiliate program that offers substantial savings on wide array of business products and services. And finally, we launched an innovative online daily news service that curates the latest updates from industry giants to emerging companies. These are just a few examples of the programs and services IOSTIA is working on for our members.

Throughout the fall we were very busy putting our "Founding Twelve" in place. These organizations were our earliest members and clearly understand the role and need for a blue-tech industry association. We will work together with these founders to drive the strategic direction of the association, develop programs that have tangible, real-world value, and to help us grow the association. Our founders range from start-up innovators to well-established industry leaders. They all understand the value of the diversity of viewpoints and experiences, and most importantly, a rising tide lifts all boats.

The recent Oceanology International Conference in London, in many ways was an important milestone for IOSTIA. It marked the end of our launch period and was a microcosm of all we have focused on at IOSTIA. As we look ahead to our innovative BlueTech Expo showcasing the very best of our innovative technologies, it's hard not to be excited at the possibilities for our young organization. I hope you'll think about joining our community and help us advance opportunities for all.

BLUE EXPO Tech

June 4, 2018 Washington D.C.

The EXPO

10:00 a.m. – 3:00 p.m.

Rayburn House Office Building Foyer
Co-sponsored by the House Oceans Caucus

EVENING NETWORKING SOCIAL

5:00 p.m. – 7:00 p.m.

Senate side of Capitol Hill
9th Floor of the Hart Senate Office Building
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IOSTIA
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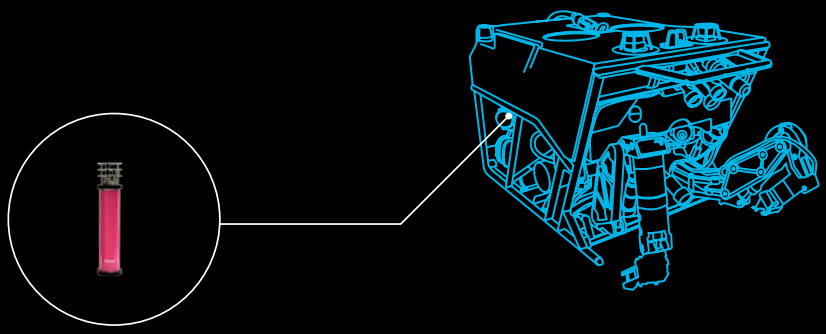

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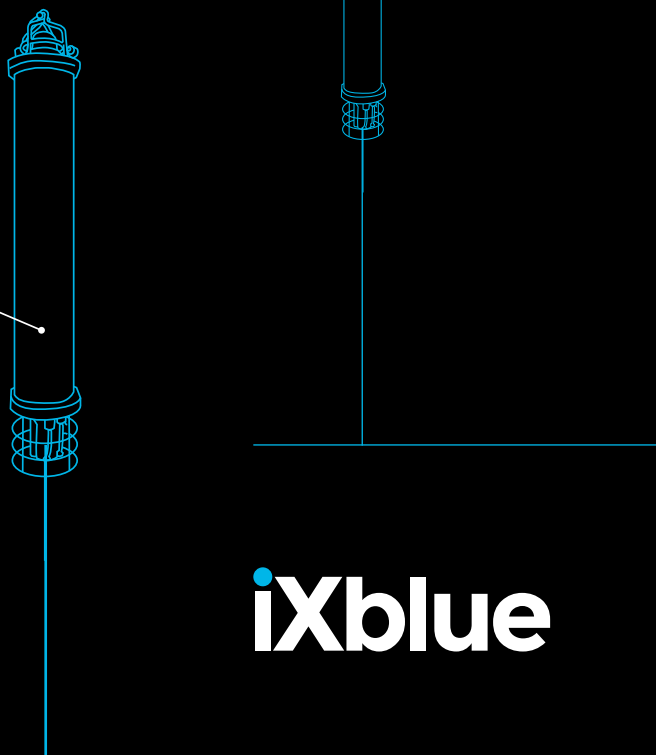

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