Underwater Vehicles Conference

Tuesday 11th September 2018
Aberdeen Exhibition & Conference Centre
Aberdeen
09:30 Registration

10:00 Welcome and Scene Setting

10:10 Remote Operation Vehicles: What does the UK Subsea Market look like now and where is it going?

The presentation focuses on the current ROV market in the UK sector. It looks at the current activities, service providers, supply v demand, technology (operational and conceptual), cross industry utilisation and the growths and trends that stem from these factors.

Furthermore, the presentation looks to explore the relationship between ROV’s and the assets they are currently deployment from looking primarily at how resident ROV’s and AUV could/will impact on the vessel market.

It will also present AKL’s opinion on the future of the ROV market in the UK over the next few years and how this could impact on the industry as a whole.

David is part of the senior leadership team at subsea strategy support specialists, Archer Knight Limited based in Aberdeen. His role oversees the company’s business acquisition, market intelligence, software development and PR & marketing functions. Previously he worked for almost 10 years at Bibby Offshore, most recently holding the position of General Manager: Global Business Development.

10:30 Looking Under the Surface of Inspections in Offshore Wind

The oil and gas industry has a wealth of expertise in subsea inspections and offshore wind represents a unique opportunity for marine robotics and autonomy technologies from the sector. Inspecting an offshore wind farm is very different from an oil and gas platform for example. Wind turbines are far more numerous, and disperse. The London Array wind farm is 100km² and consists of 175 individual turbines. This raises several questions regarding inspection practices:

1. Are all the turbines inspected in every campaign?
2. If not, which ones are inspected?
3. How is the immense volume of data adequately managed?
4. Does a wind farm deploy one or several systems for inspection?

Several companies are however innovating in attempts to address these questions. For example, resident AUV systems could reduce the number of systems required and turning the video feeds from inspection cameras from meaningless data into actionable knowledge could reduce the volume of data.
These innovations are happening now, however what technologies are on the horizon for wind farm inspections. Do any other industries have a head-start which could be deployed in this sector, or is offshore wind leading the way? Where are the biggest gains in quality and reductions in cost likely to come from over the coming years?

Alex Louden joined the Offshore Renewable Energy Catapult as Innovation Coordinator in 2017. Since then, robotic and autonomous systems, including underwater systems, and their applications in offshore wind have become a key focus for him. His work involves identifying key industry trends and drivers, supporting technology development projects, and facilitating technology transfer from other sectors. Alex Louden’s role sees him exposed to all facets of the wind industry as well as cutting edge robotics R&D activities and high-tech companies developing robotic solutions.

10:50 A Technical Road Map to our Autonomous Future

Underwater robotics have played a key role in subsea operations for over 30 years. However, the basic technology has not been developed much further than a ‘dumb’ robot operated by a person at the surface, or an autonomous one simply following way points.

The application of modern Computer Vision and Artificial Intelligence technologies to these platforms will underpin the present and future of subsea IMR, Environmental and Decommissioning surveys. Rovco is at the forefront of this technical curve developing technologies for our subsea digital future.

Robots capable of autonomously navigating, inspecting and reporting on subsea assets will be available over the next 5 to 10 years, and will improve vastly over time, providing operators with higher quality data at a fraction of the cost. Pre-cursors to fully autonomous inspection, such as Live 3D and automatic reporting, are already being used on commercial projects, providing the highest quality data available. This presentation will outline Rovco’s road map to our fully autonomous future, covering recent advancements and individually deployable, enabling technologies and processes that will culminate in a complete revolution of subsea inspection.

Brian is CEO of Rovco, a rapidly growing innovative subsea robotics business focused on using new technology to reduce costs for subsea operations in the oil, gas, renewables and defence sectors. He founded Rovco, based from a career built from leading change, and the implementation of innovative ideas to solve client subsea problems.

Brian has been working with subsea robotics on large offshore projects for over 10 years. He started his career as an ROV technical specialist in electronics, electrical systems and networking, leading to managing the delivery of multi-million pound ROV projects across the globe. He has completed thousands of subsea inspection, maintenance and construction orientated tasks, and is now bringing new technology to solve the problems he encountered throughout his career.
11:10 – 11:30  Coffee Break

11:30  Blue Ocean Monitoring – Autonomous Survey Solutions, Environmental Exploration and Inspection

Blue Ocean Monitoring (Blue Ocean) provide offshore autonomous survey solutions, utilising long range, low cost and ultra-low-cost autonomous platforms. Blue Ocean are currently the largest commercial owner and operator of the Teledyne Webb Research Slocum Glider, globally and as such, most projects to date, have been carried out using the Slocum Glider. With this in mind, I would like to concentrate on the Glider Platform, with particular focus being paid to the environmental (Passive Acoustic Monitoring) and exploration (Geochemical) areas of the oil and gas industry and the potential force multiplier effect, generated, using these platforms.

Furthermore, Blue Ocean have invested in mini and micro Unmanned Underwater Vehicles and are actively investigating a number of Unmanned Surface Vehicles to compliment our existing fleet of autonomous platforms, with particular focus on inspection related applications.

Previously worked for Nortek, in a sales and business capacity, gaining 7 years of experience with Nortek Acoustic Doppler Instrumentation. For the last year and a half, Ramsay has worked for Blue Ocean Monitoring (Blue Ocean) in a Business Development capacity, aiding in the development and promotion of low-cost autonomous solutions into offshore industry. Blue Ocean focuses on pushing low cost and ultra-low cost autonomous technology platforms to their limits, advancing capabilities of these platforms to a point where they can be used to augment current solutions and/or considered as low cost alternative solutions. Ramsay’s focus has been on understanding the limitations and capabilities of the current low cost and ultra-low cost autonomous market and understanding applications Blue Ocean can achieve using existing and new autonomous platforms. With the UK office growing in capacity, Ramsay has recently been promoted to General Manager, providing oversite and direction, in line with company policy, within the EMEA region.

11:50  Variable Autonomy Tech for Remote Robotic Operations

There are several companies that have demonstrated (or will be demonstrating soon) the ability to transition ROV control to remote land-based piloting facilities. Some of these companies are now developing the ability to execute some intervention tasks. Nevertheless, as latency and bandwidth challenges grow, the promise of effective remote robotic operations involving intervention becomes increasingly difficult to deliver without the introduction of special software to aid task execution. Software will need to enable the robot to monitor its position in the workspace, keep itself from bumping into things, compensate for disturbances without direct input from the pilot.
and provide advanced levels of situational awareness to the remote piloting operation.

This task will introduce keys to enabling robotic telework, a few examples of key software technologies that enable variable autonomy, some demonstration videos offer a glimpse at how future remote intervention scenarios can be executed efficiently with confidence. Ultimately, variable autonomy is the key to unlock advanced remote intervention capabilities by allowing the pilot to choose assistive features that balance operational efficiency with scenario risks.

As Vice President of Commercial Operations for Olis (formerly BluHaptics), Luke Wissmann is responsible for the commercial strategy and the development of the organisation to address market opportunities. He oversees marketing, sales, product development and customer service to drive business growth and market share.

Previously, Wissmann held several management positions at Lockheed Sikorsky, where he led the proposal team to win the multi-billion dollar U.S. Presidential Helicopter program. Wissmann has also held positions with Ford Motor Company, General Motors and United Technologies Aerospace Systems.

Wissmann is a published author on value-driven product management and holds a Bachelor of Science degree in Industrial Engineering and a Master of Science degree in Engineering from the University of Illinois. Wissmann loves spending time in the mountains and is a novice surfer.

12:10 Dynamic 3D Scanning: A case study of real-time 3D scanning of a moving structure from a ROV using the ROV3D video inspection system

Whitecap Scientific’s ROV3D product augments traditional video inspection and HD underwater cameras. We present a summary of outcomes following the simultaneous deployment of two scanning technologies – ROV3D and a 3D sonar system. Both systems were deployed from a moving ROV for the 3D imaging buoyancy modules along a riser undergoing dynamic motion throughout the scan. ROV3D is shown to be a compelling solution for fast and practical 3D scanning of dynamically moving structures from a mobile ROV.

Dr. Sam Bromley holds a PhD in Computing and Intelligent Systems Engineering. He serves as a Director of the Newfoundland Association of Technology Industries, and served as Director and Treasurer of the OceansAdvance ocean technology innovation cluster. Sam is Co-founder and Managing Director of Whitecap Scientific Corporation, providers of the ROV3D Live 3D Underwater Video Inspection System.

12:30 – 13:30 Lunch
13:30 **Increased Efficiency with Vision Technology**

Typically the installation of structures above and below the waterline has required the installation of positioning aids and attitude sensors onshore in a yard prior to the load out of the structure. Often these sensor’s need to be calibrated on to the structure incurring additional time and cost. This presentation will cover vision based solutions that increase efficiency, are contactless, reduce the need for yard calibration and reduce overall HSE exposure and risk.

In the subsea environment Fugro’s ROV based QuickVision toolkit is based on heads-up instruments, augmented reality and pattern tracking. Using vehicle mounted accurately pre-calibrated cameras with internal MEMS and precise time synchronisation of images with auxiliary data sources we can measure position, heading, inclination and depth. This removes the need for installation complex survey sensors onto structures and enable contactless survey without the need for an ROV butting-up of docking with subsea infrastructure.

This presentation will present proven field applications of this technology that reduce cost and risk while creating operational efficiencies.


With ever increasing focus on performance, integrity and ease-of-integration, Sonardyne International Ltd has developed novel new technology and systems that tightly combine acoustic, inertial and pressure sensors to provide unprecedented levels of self-contained navigation and guidance performance for Underwater Vehicles. This new level of navigation and guidance capability supports more efficient operations, reducing the need for supporting systems and infrastructure even in extremely challenging environments. The real-time performance achieved in underwater vehicle operational scenarios will be presented along with suggested applications improving efficiency for future underwater vehicle operations. Applications for this technology include: high speed pipeline inspection, high resolution dynamic laser and multibeam echosounder surveys (including contactless spool-piece metrology and wide area mapping of subsea assets) and the application of inertial acoustic technologies for the current and next generations of autonomous field resident subsea inspection and intervention vehicles.
In November 2017 a “Major O&G company” set out to do a trail pipeline survey using a combination of FORCE Technology’s field gradient sensor, FiGS® in combination with Laser and Imaging system.

The survey was performed at several elevations and speeds:

- Operational “distance from pipe” envelope of FiGS® (tested 1-5m above pipe)
- Operational velocity (tested at 0.5m/s and 1.2m/s)

The overall objective was to find a common operational envelope were both FiGS® and the Cathx systems can work together, giving both good quality CP data and a wide enough corridor of high resolution images, and to qualify the setup as a new standard for pipeline inspections within the O&G company globally.

The results showed that it is possible to obtain high-quality FiGS® data at high altitude, and that the results were unaffected even at maximum velocity. This approach enable the client to complete the survey 5-6 times faster than with their traditional approach.

The presentation will focus on the results obtained by FiGS® at different speeds and altitude. Furthermore, it will focus on the efficiency and cost savings obtained from the use of FiGS®, Laser and Imaging on FROV.

The presentation will also include new development of the FiGS® hardware and software, as well as examples from operation and results.

**Håkon Hallem** has a theoretical background and education as PhD in materials technology from NTNU in Norway.

*He has extensive industrial experience from research and development (e.g. SINTEF Norway), fabrication of offshore structures (e.g. Kvaerner and Aker Solutions) in addition to offshore operations, maintenance and inspection.*

*His objective is to be innovative and push business into the future, by challenging standard technology and solutions. He is today; VP Asset Integrity Management in FORCE Technology Norway.*

**14:30 – 14:50**  **Tea Break**
14:50 **USBL – The Unseen Tether of the ROV**

Subsea positioning is often misunderstood within an ROV scope. It is an unseen tether of the subsea vehicle, allowing those in control to enhance spatial awareness in the underwater environment. This presentation aims to expose the myths and make the audience aware of the capabilities of the system, how it should be used and address the common challenges that regularly crop up in an ROV scope.

- The need for calibration and verification
- Common misunderstandings
- Models and uses
- Challenges within USBL systems
- The impact of errors
- INS (Inertial Navigation System) myths

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15:10 **Enhancing Observation-Class ROV Capability**

Observation class ROV’s have often been seen as the poor relation to work-class ROV’s regarding features such as auto-functions, sensor interfaces, tooling interfaces, system monitoring and diagnostics. Increasing availability of smaller sensors with common Ethernet or serial interfaces and electric tools means it's becoming practical to fit many of these items to the smaller ROV’s. This presentation will discuss how Forum are enhancing the capability of their latest observation-class surface data distribution.

Forum are introducing the ICE++ platform, the latest generation of their well-established ICE (Integrated Controls Engine) platform. This versatile control system is designed to be used on all Forum ROV’s, from <10 kW XLe observation-class ROV’s, through XLX work-class ROV’s, to 1000 Kw XT trenching systems, as well as many non-ROV Forum products. For example, this allows a suite of navigation sensors traditionally used on work-class ROV’s to be fitted to the smaller ROV’s immediately enabling auto-positioning and real world waypoint following. Control, configuration and diagnostics are identical for all sizes of ROV thus reducing operator training requirements.

The underlying stability of the ROV platform is improved by precise propulsion control regardless of voltage drops in the umbilical and efficiency variations in thruster drive trains. An Ethernet backbone from the ROV upwards allows distribution of the real-time data, including video, around the surface vessel and beyond using the operator’s existing infrastructure and conversely, provides the means of controlling or monitoring the ROV from remote locations.
Ivan Bielby has over 30 years’ experience in the ROV industry with roles in design, manufacturing, training and offshore support. After graduating in Physics from the University of Durham, he initially specialised in electric and fibre optic interconnections for both manned and unmanned subsea systems, and for nuclear applications. Moving into ROV design he focussed on materials applications before becoming a project/lead engineer. This encompassed leading engineering teams both on bespoke projects and on Perry ROV systems, such as TMS developments and bringing Forum’s Perry XLX-C work-class ROV to production. His present role is New Product Development manager for Forum Energy Technologies’ range of ROV systems, concentrating on bringing Forum’s new range of electric ROVs to market.

15:30 DC Power Transmission for Subsea Vehicles (Lighter, Smaller, Smarter)

The battle between AC and DC power transmission dates back to the late 1800s, when the invention of the transformer made AC transmission much more attractive, despite Edison’s best efforts to prove otherwise. Over a century has passed and AC is still firmly in place as the dominant means of power transmission. Times are changing, and as we approach a new era of development in the wake of the recent offshore industry downturn, it’s time the UK subsea industry got ahead of the game.

As the semiconductor industry rapidly develops capable high-voltage devices, the use of unwieldy low frequency AC transformers becomes more and more unnecessary in weight sensitive applications. It is commonly understood that increasing the AC frequency of tether transmissions reduces the size of the load transformer. Any benefit of this approach is soon lost however, as AC resistance due to the skin effect makes this an impractical and expensive approach.

Proposed in this presentation is a smart High Voltage DC (HVDC) transmission system for weight sensitive subsea applications that can reduce the weight of the vehicle power supply by a factor greater than ten. The traditional scepticism of DC over AC is explored and the benefits specific to (but not limited to) subsea vehicle applications are demonstrated. We can strive to reduce the size and weight of tooling or shave ounces off the incumbent AC transformers with a law of diminishing returns, all of which surely makes a difference. In the present day, however, the drive for cheaper, smaller and more reliable systems is greater than ever, and as we move forwards into a future of smarter electric vehicles, it’s time to design smarter power systems. It’s time to move back to DC.

15:50 Close