

# Subsea Springboard

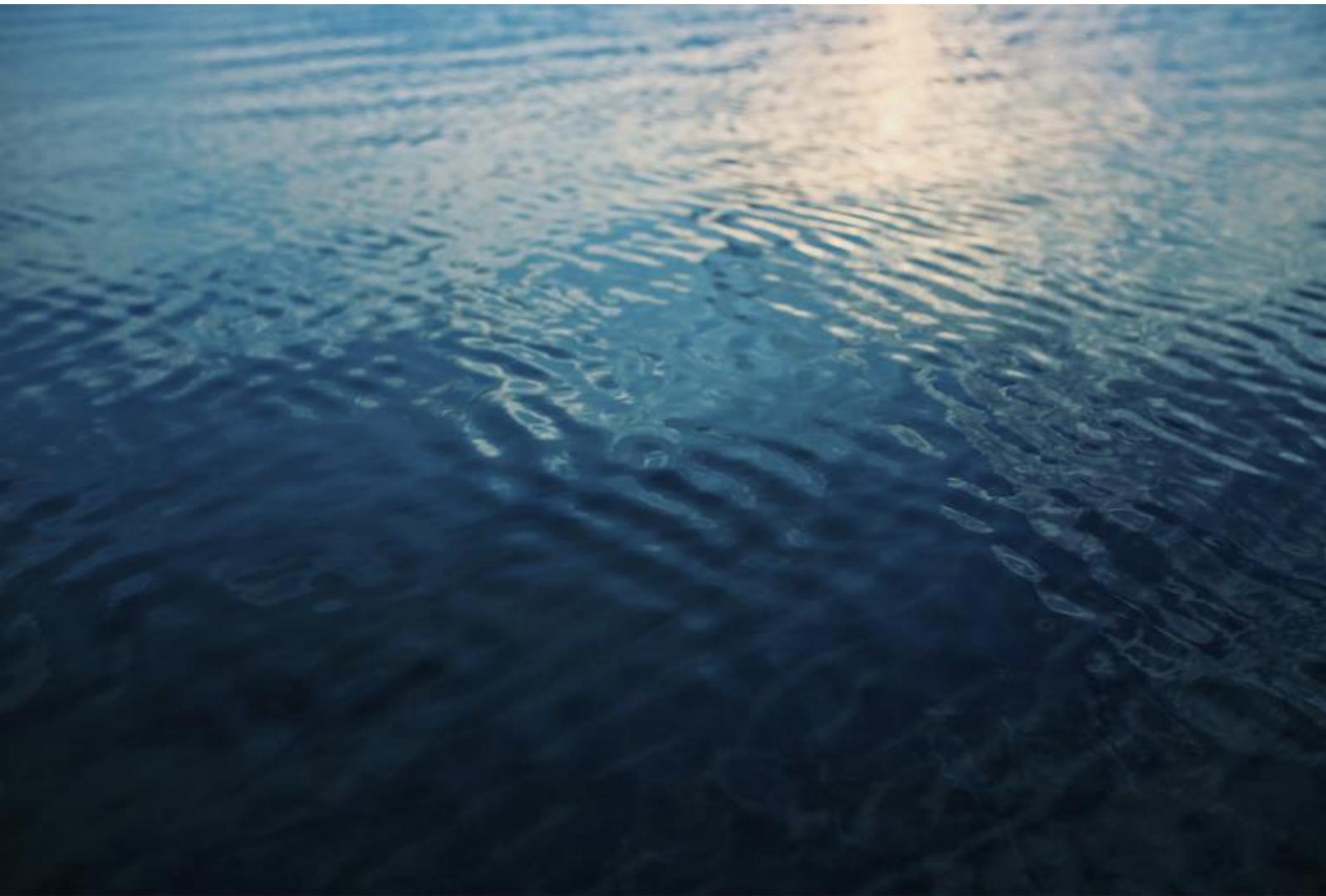
Focusing on Pipeline Inspection Maintenance and Repairs

**18<sup>th</sup> September 2018**

Subsea UK Office

30 Abercrombie Court

Westhill



**7:30**

**Coffee and Bacon Rolls**

**8:00**

**Introduction**

**Neil Gordon & Tony Laing**

**8:05**

**Bringing Leak Detection out of the Dark**



**Dave Johnston**  
*Technical Sales  
Manager*  
**OceanTools**

At OceanTools we have been known for our subsea technology for over 20 years. From the early days of video overlays to the present day, we continue to develop, design, build and test technologically advanced subsea equipment through either internal research and development programmes or as solutions-based projects for specific clients.

For this presentation we will look at the OceanSENSE subsea leak detection system. The OceanSENSE leak detection systems are field proven on offshore worksites with a detection rate of almost 100%.

OceanSENSE has two designs: one for deployment by ROV and the other for use by divers.

Whilst OceanSENSE is known as a leak detection system, it can also be used to monitor cement returns. Using OceanSENSE instead of pH detection can vastly reduce the amount of cement used, saving 6-figure sums per top-hole cementing job.

As the system is not reliant on black-light for visual dye detection, OceanSENSE can be used without the need to switch off the ROV lights. This provides a safer operating environment and an easier system for the ROV crews to operate, reducing the risk to subsea infrastructure.

The system is capable of detecting almost all of the dye based fluids that are currently on the market, with a detection capability approximately 50 times that of the human eye and that of conventional black-light detection systems.

*Dave has spent over 25 years in the Oil and Gas industry, predominantly in the subsea sector. During this time Dave has had spells working in the design office at Dril-Quip and Vetco Gray, where he moved into project management. This was followed by Aker Kvaerner where he was a Programme Manager within the Research and Development group.*

*He then moved into the ROV sector where he took on the role of Intervention Tooling Manager followed by a time in Oceaneering's DTS division as Engineering Manager.*

*Dave is now the Technical Sales Manager at OceanTools, assisting in the expansion of their bespoke engineering and research and development divisions.*

**8:20**

**Scan the issue as you find it**

A typical approach to subsea inspection often comprised three activities:

- The periodic inspection during which the anomaly freespan or buckling is discovered.
- The additional inspection which focusses on detailing the anomaly.
- The recovery drive, which aims to rectify (as applicable).

In 2018, there is no reason that the anomaly cannot be surveyed during the discovery dive. Modern software developments permit 3D scanning and modelling using any subsea camera, where the method of capture is understood. This allows the offshore team to temporarily re-purpose the dive, and collect a set of image data that can later be reconstructed into a measurable 3D shape.

We were approached by a customer last year with video footage of a 'gouge' on the protection sleeve of an export line. The anomaly could be seen clearly in the video, but what mattered was the depth of the gouge. The video footage was subsequently processed into 3D and analysed, allowing us to issue advice to the customer on the depth of the gouge. The decision was then made that the gouge was insignificant and needed no further attention.

This helped to avoid the intermediate dive, and also confirmed that any recovery or repair dive was indeed negated.

Image based scanned is becoming the go-to technology for subsea work and is available today to help your offshore operations.

*Richard Drennan is a co-founder of Viewport3 Ltd and has over 20 years' experience in the subsea sector. Richard's technical career began with Aker Kvaerner (now AkerSolutions) progressing from trainee technician to senior engineer in the subsea environment over a 14 year period. This was followed by more customer facing roles in the BD and commercial areas before taking up an engineering position with Centrica Energy in 2014. Along with Chris Harvey,*



**Richard Drennan**  
*Director*  
**Viewport3 Ltd**

*Viewport3 Ltd and the focus on simplification of subsea scanning processes were developed following an alignment of views during the Elevator's 'Accelerator' programme in 2016.*



**Giuseppe Rizzo**  
*Technical Solutions  
Manager*  
**Oceaneering  
International  
Services**

**8:35**

### **Oceaneering Pipeline Repair Systems – A Technical Overview**

The United Kingdom Continental Shelf (UKCS) contains a considerable amount of oil, gas and condensate fields. The North Sea Oil Province, for example, is one of the world's major producing regions. Thus, it is paramount for the operators to ensure that the pipelines' integrity is maintained through the field life.

Although, proper Asset Integrity Strategies are put in place, (cathodic protections, Predictive Failure analysis approaches etc), pipelines can be subjected to damages.

For minor damages such as pin hole, corrosion, dents, Oceaneering Pipeline Connection and Repair Systems (PCRS) can provide reparation by the use of structural SMART CLAMPS which are installed on a localised damaged section of the pipe.

In the event that the extent of the damage does not allow the installation of smart clamps, the damaged section of the pipeline needs to be cut away and replaced with a spool piece and structural Repair Connectors (SMART FLANGE) on both sides.

During the initial setting on the connector, the seal piston is driven axially to set the main and test seals around the pipe. The pressure is then increased to drive the slip piston axially in the opposite direction from the seal piston to set the gripping mechanism on the pipe. Both pistons are locked into final position by a series of spring-energised ratcheting locking mechanisms positioned radially inside the connector housing.

The use of Oceaneering mechanical connectors eliminates the needs of weldments, thus the associated procedures and qualifications.

The elimination of repair through welds reduces considerably the reparation lead time by also eliminating the NDT procedures required when using standard methods.

Both SMART CLAMP and SMART FLANGE can be either diver or ROV operable, hence they are suitable for both shallow and deep water, however today trend is to reduce divers' intervention to minimise both associated costs and potential

hazards, hence hydraulically activated equipment is also provided for shallow water operations.

*Giuseppe is a Chartered Engineer, member of the Institution of Mechanical Engineers (IMechE). He holds a MEng in Polymeric Science and a BEng in Chemical Engineering, both from the University of Palermo (Italy).*

*He has covered different leading roles from Project Management to Commercial in the Oil and Gas industry, mainly for subsea applications.*

*As a Technical Solutions Manager within Oceaneering® Pipeline Connection and Repair Systems (PCRS) division, he is responsible, in Europe and North Africa, for the provision of standard and bespoke subsea solutions, namely, Mechanical Connectors for new fields, Pipeline Repair Systems and Grayloc® Clamp connectors.*

**8:50**

### **Subsea In-Riser Monitoring System**



**Carly Graham**  
Development  
Project Manager  
Expro

Expro is currently in the process of qualifying our 10ksi rated 'Expro In-Riser Monitoring Systems' (EIRMS) which can also be adapted to suit future 20ksi applications.

EIRMS is designed as part of Expro's forthcoming API 17G 3<sup>rd</sup> Edition compliant in riser well intervention system and is a self-contained, autonomous product which is designed for accurately and robustly gathering and understanding dynamic loading on Subsea equipment during well operations. This compact memory based product is equipped with an electronics package consisting of sensors, batteries, and a data logger, which is intended to sit just above the Blowout Preventer flex joint.

EIRMS has two independent systems which records the combined load capacities for longitudinal loads due to axial load and bending combined with pressure subsea, with one system measuring small combined load ranges (as would be expected in fatigue) and the second measuring large load ranges (up to and including accidental loads which are imposed on the well intervention system during abnormal and/or unplanned conditions such as loss of station keeping or compensator lock up) which records tension, compression, annulus temperature and internal pressure, above the Flex-Joint.

Once retrieved to surface, the data can be downloaded via the easily available data port. The downloaded data is then processed from raw voltage to strain and subsequently dynamic loadings of tensions, bending, pressure and all the data will be time stamped. This data can be investigated and compared with surface measurements and sea states, which will provide improved

understanding and learning of the actual values against the theoretical values resulting in more representative global riser analysis models in conjunction with design life and fatigue capacity analysis for the subsea products.

The EIRMS product forms part of Expro's dedication to the provision of life cycle information and can be added to any in riser well intervention system.

*Carly has worked at Expro for 12 years and for 9 of these years she has been a Project Manager focused on delivering projects into Africa for BP. For the last 5 years Carly has been responsible for delivering all new subsea development products and is currently working on the delivery of the NGLS programme of work, which includes the Expro In Riser Monitoring system.*

9:05

### Transforming Subsea

#### Export Lines

Recovery inspection repair redeployment and reuse.

Export lines cost £100's of millions to build and install. What if we could recover them, take them to shore for cleaning, inspection, repair if necessary and then install somewhere else?

Ambient lifting in conjunction with Olympic Spoolbase (both technologies developed and owned by EIP) allow this to happen safely and economically.

#### Infield Lines

Recovery inspection repair redeployment and reuse.

Infield step out lines cost £10's of millions to build and install. What if we could recover them, take them to shore for cleaning, inspection, repair if necessary and then install somewhere else?

Ambient lifting in conjunction with Olympic Spoolbase (both technologies developed and owned by EIP) allow this to happen safely and economically.

#### Manifold

Recovery and deployment.

Conventional thinking means that delicate in-service lifts in and around manifolds are either not possible or have to be performed with very expensive heave compensated crane vessels in flat calm conditions. This is no longer the case, e.g. a 200 tonne subsea pump unit can be changed out using Ambient Lifters and ROV's in very lumpy sea conditions. Whole manifolds, can of course be installed and removed using Ambient Lifters.



**Mike Wilson**  
Chairman & CTO  
Ecosse IP Ltd

## Umbilical Systems

Is it possible and economic to recover and reuse umbilicals or parts of umbilicals? E.g. the Hydraulics from one and the power and signal lines from another, Using EIP Olympic Spoolbase enables such a scenario to be entertained.

*Mike is an inventor, entrepreneur, business builder, offshore construction expert, subsea engineer. Having founded Ecosse Subsea in 1996, Mike built the company to a £30m turnover, £7m EBITDA and sold to Oceaneering in March 2018 for £53m. Mike is a subsea expert witness and subsea technology project problem-solver, with a Mechanical Engineering HND from RGIT. In July 2018 EIP was launched to commercialise technologies in the range of innovative subsea products invented in response to Mike's mantra is "There must be a better way".*

9:20

### Enhancing our approach to pipeline inspection and repair

Proserv prides itself on listening to industry. Through lessons learned from coating removal scopes globally over the past 14 years, we believe the industry is looking for an enhanced and more efficient approach to pipeline inspection and repair, challenging conventional methods and addressing problem areas.

FBE and hard PU-type pipeline coatings typically found in our industry are a challenge to remove efficiently, with no guarantee around removal rates. This challenge is further compounded in deep-water applications. Until recently, this was due to the use of manual hydraulic control systems that utilised high-pressure water jetting technology, producing unpredictable results and which became ineffective beyond 300msw.

Proserv has developed technology through lessons learned from previous campaigns, looking inwards at alternative water jetting applications being deployed throughout our organisation. This identified a natural and evolutionary step to high-flow, ultra-high-pressure technology, combined with intelligent electro hydraulic subsea control systems mounted to the proprietary subsea coating removal manipulator.

Proserv's evolutionary solution increased coating removal rates with significantly improved surface finish, allowing for superior pipeline inspection results.



**Gregory Croft**

*Head of Sales & BD –  
Subsea*

*Proserv*

Predictable performance and ease of ROV interface has reduced vessel operational time with a tooling range that now covers up to 90% of the world's pipeline diameters in water depths up to 500msw.

Future enhancements include utilising the existing tooling to mount pipeline severance, weld seam removal and end prep tooling for pipeline repair or tie-in activities. Developing a subsea pump that allows ultra-high-pressure jetting operations in water depths in excess of 2000msw.

Future developments to increase operational efficiency in pipeline IRM projects will see a move towards a combined service of coating removal and inspection utilising tool mounted inspection equipment.

*Gregory Croft has worked in the O&G industry for 14 years starting with Petrofac Training, then moving to Hydrasun and latterly Proserv where he has been Head of Sales and BD for the last 12 months. It's challenging role but very rewarding when we plan and successfully execute a difficult scope of work.*

*Over the years he has gained experience in IWOCs, Subsea IRM, Well Abandonment & Decommissioning, Asset Integrity, Flexible Hose Assemblies, Small Bore Tubing, Training & Competency and Consultancy.*



**Andy Buchan**  
Managing Director  
Hiretech Limited

### 9:35

Hiretech Limited is a leading equipment rental, sales, service and maintenance company offering pumping spreads, powered umbilical reels, hydraulic power packs and supporting equipment.

With an ethos of integrity, Hiretech is leading the way in working with clients and responding to industry demands to reduce costs and increase efficiency through a solutions based approach to projects.

Following significant investment, Hiretech offers a range of equipment suitable for interfacing, pigging, pressure testing and cleaning topside and subsea pipelines around the globe.

Capabilities include:

- Self Deployed Umbilical Reels and Downlines suitable for pipeline interface
- Centrifugal Pumps suitable for flooding and pigging pipelines up to 40 Bar
- Positive Displacement Pumps suitable for pigging and pressure testing pipelines up to 1000 Bar
- Range of Pumps suitable for chemical cleaning
- Solids Recovery System suitable for handling pipeline returns during cleaning runs
- Zone 1 Heated Chemical Tanks

Case Study 1 – Temporary crude oil export bypass pumping capability.  
Hiretech supplied two off 1100 hp V16 Pumping Units, each rated for Zone 2 specification with a duty of 100 Bar at 2.5 m<sup>3</sup> / min. The pumps were required to continue circulation through the land based oil export pipeline while isolation valves were replaced. The scope required modification of the pumping units to allow remote operation of the units and the fitting of a Gas Detection System in to the engine shut down system. The lead time for the project was short. Hiretech proved able to meet technical project requirements 3 months ahead of any rival proposals, allowing the project to proceed on the planned schedule date.

Case Study 2 – On line wax removal / degassing from pipeline returns.  
Hiretech worked with Paradigm Flow Solutions to manage the flow returns during the jetting of a waxed up pipeline. Paradigm used their Flexi Coil jetting system to successfully clean the wax from the pipeline. Hiretech used its Zone 1 certified Solids Recovery System and personnel to degas the returns prior to separating off the wax and settling the liquid returns prior to re-using the returns for continued jetting operations. The Solids Recovery System is modular for easy assembly offshore and has a Cold Flare Stack, Degasser, Shaker System, Settling Tanks and Transfer Pump System. The completed project resulted in increased flow line production from 1100 to 2500 bbls / day.

*Andy Buchan is the founder and managing director of Hiretech Limited. He has over 33 years' experience working directly in the oil and gas industry, complimented by qualifications in engineering and oilwell technologies, as well as holding a Masters degree in Business Administration. He is a Fellow of the Chartered Management Institute and a Member of the Institute of Marine Engineering.*

*Andy has more than 20 years' experience founding and managing two businesses focusing on the design, manufacture, refurbishment and hire of oilfield equipment. Hiretech Limited was founded in 2010 and has grown steadily, currently employing 22 staff. Prior to this, Andy founded and managed Buchan Technical Services Ltd for 11 years, growing it successfully and employing 50 people, before selling it in 2007 to James Fisher and Sons PLC.*

*Andy previously worked across a range of technical and engineering roles both onshore and offshore. He started his oil and gas career as an apprentice offshore technician for Shell UK Exploration and Production in 1984, before working for fluid pumping, pipeline inspection, subsea excavation and pipeline isolation businesses prior to starting his own businesses.*



9:50

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