Subsea Springboard

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3pm – 4:30pm

GoToWebinar

SUBSEA UK™

NSRI National Subsea Research Initiative

Gary Yeoman
Sales Director
Balmoral

Product lifecycle rejuvenation through innovation

Traditionally, distributed buoyancy has been applied to tubulars by means of a discrete clamping system and two buoyant half elements. The clamping system is installed onto the tubular and, in turn, the buoyancy elements are fitted around the clamp creating an integrated buoyancy module assembly.

An equivalent but more cost-effective solution that can be offered is an 'integral buoyancy module'.

Significant cost reductions can be achieved by modifying the design to combine the clamping and buoyancy components into a single product.

In the case of the integral buoyancy module, clamping interface springs are attached directly to the buoyant elements removing the need for a separate clamping system. The buoyant halves are retained on the tubular using Kevlar securing straps.

While a separate clamp and buoyancy system can honour specification requirements, the opportunity for cost optimisations are limited compared to the integral module, which can offer reduced:

- manufacturing costs
- procurement lead times
- component and spares quantities
- transportation costs
- short/long term storage requirements
- deck space requirements
- technical complexity of installation
- installation time.

In addition to these cost optimisations the integral module has been taken through a development phase to improve functionality and improve field application.

Through conceptual design and iterative finite element modelling (FEM) development, Balmoral has produced an integral buoyancy module with a revised rubber spring (patent pending).

The innovation uses the non-linear stiffness properties of natural rubber combined with interface geometric variations. This combination provides predictable homogenous even clamping pressure at the required radial load about the circumference of the line. This is highly favourable when applied to a low compression strength umbilical or flexible.

The global contact pressure between the product and the tubular can be significantly reduced compared to traditional designs. This innovation creates synergies with clients where a flexible line's compressive robustness need not be increased to enable high clamping pressures.

Balmoral believes that the powerful combination of retained historical benefits with added improvements provide the best and only solution for distributed buoyancy at an optimised cost.

Gary is a highly experienced Sales Director having previously held a similar role in the construction manufacturing sector. At Balmoral he has global responsibility for sales and proposals relating to the company's oil and gas and offshore renewable energy-related product solutions.

Embracement of subsea simulations into Digital Twin

Charlie Reith
Ops Director-Principal Consultant
SeaFlo Consultancy Limited

Subsea field development dynamic simulator tool, software developed by, Canadian company GRi Simulations and being used by Seaflo Consultancy, Services across various "Case Studies". This technology, is going to be deployed in the Mediterranean Sea region for an active project focused on delivering reduced OPEX life cycle costs performed across subsea tie-backs and IMR activities in both remote and deepwater operating environments.

The software helps Clients, visualize the design progress during FEED Phase detailed engineering being performed at the moment, to be complete in 2021. The final GRi Simulation models will be 3D Digital Twin format. Enabling various real time data to be remotely monitored at various stages of new well start up, periodic subsea inspection surveillances performed by autonomous underwater vehicles (AUV's) and links to real time data configured from (GIS) geographic information systems being fed into the Digital Twin subsea facility, asset models.

Our "Case Studies" include well design models of subsea intelligent well completions, demonstrating robust, cost effective application of latest technologies in virtual reality simulations. Together with subsea risers and controls umbilical(s) that will also be built into the operational Digital Twins of the respective client assets.

Providing robust basis of designs (BoD), reliable cost effective OPEX life cycle condition monitoring, performance data tuned to evolving global economical market conditions and fully embracing Digital Technologies.

Charles (Charlie) has over 35 years experience in marine and subsea engineering. He started his career as a Marine Engineer with Texaco Overseas Tankships in the 70's after gaining a BSc in Marine Engineering from Strathclyde University, with 10 years service achieved Chief Engineer (C.Eng.) status. He then transferred across into subsea engineering with Texaco Upstream North Sea and worked on the FEED Studies Phase of the Highlander subsea production template at Fluor Engineering in London and worked on its fabrication to offshore installation in 1985.

He also gained an MSc in Project Management from the University of Aberdeen in 2007 worked for Vetco Gray, Cameron Offshore, J.P.Kenny (Wood) as a Lead Subsea Engineer and Project Manager latterly, founded SeaFlo Consultancy Ltd in 2010 a now well established (SME) as Operations Director, Principal Consultant working for a

number of oil & gas operating entities and on International assignments such as Total E&P U.K. Laggan-Tormore long subsea 140km tie-back West of Shetland and other interesting and challenging assignments for Qatar Gas (LNG), Bumi-Armada (Malta) LNG-FSRU, B.P. Caspian Sea Shah Deniz 2, B.P. Angola, Premier Oil Far East, Beach Energy, Australia and presently Eni Joint Venture offshore Libya in the Mediterranean Sea. Together with setting up a training services division of SeaFlo with recognized, accredited (CPD) modular training via SUT-IMarEST partnership under a business licensing agreement with Canadian software company GRi Simulations.

The First Ever Mechanically Connected Pipeline Offshore Malaysia

Alasdair Cowie
Managing Director
Cortez Subsea

Cortez Subsea leads the charge in championing new and proven technology for quicker, safer and cleaner subsea pipelay. In March 2019, Vestigo Petroleum, a wholly owned subsidiary of PETRONAS Carigali Sdn Bhd awarded the Engineering, Procurement, Construction, Installation and Pre-Commissioning (EPIC) contract for the Tembikai Non-Associated Gas (TNAG) Development gas pipeline system to Alam Maritim (M) Sdn. Bhd. in a consortium with Cortez Subsea.

The scope of work consisted of a 12-inch, 58km gas pipeline tied in from the new TNAG unmanned wellhead platform (WHP) to the Berantai floating production, storage and offloading (FPSO) facility, offshore Peninsular Malaysia.

We championed the Zap-Lok™ mechanical interference connector as a weld-free alternative to traditional pipelay. This was the first time this technology, which allows for much faster and more efficient pipelay, has been used offshore Malaysia.

In another industry first, the rigid pipe was connected to the flexible risers using the Cortez Subsea and AFGlobal developed Stinger Deployed Diverless Connector (SDDC). The SDDC is based on the AFGlobal Retlock™ clamp to connect the rigid pipeline to the flexible riser using a Remotely Operated Vehicle (ROV) and a deployment frame.

There were no divers used in the TNAG gas pipeline system installation. Mounted on the ROVs was our Photo Realistic 3D Cloud (PRC) technology. This cutting-edge subsea camera and software system scans structures and pipeline sections to create a 3D Cloud with millions of points, presenting an as-built, 3D visualisation of any scanned object.

It was used for the inspection and survey of the pipeline system once installed and allowed us to ensure operational excellence regarding positional measurement throughout.

The pipeline installation, end to end, was completed in 20 days with best average lay rate of 4.7 km in 24 hours, three times faster than traditional pipelay. Overall, this means the project was completed at a cost saving. Our methods offer a complete diverless approach to pipelay. Our technology allowed the pipeline installation and tie-ins to be completed without the use of divers ensuring the increased safety of our people offshore. The time savings on the project, and a reduction on the reliance of equipment and manpower, means we reduced our carbon footprint.

Alasdair Cowie has spent more than three decades working in the subsea and marine sector of the energy industry. After serving an apprenticeship with the Ministry of Defence and working offshore he moved into onshore management roles, quickly moving up the ranks to senior management positions with Kvaerner Oilfield Products and Saipem before co-founding and becoming managing director of TSMarine, a subsea intervention and construction support company. In 2010 Alasdair founded Cortez Subsea, where he is managing director, and champions new and proven technology for quicker, safer and cleaner subsea pipelay and inspection. Cortez is now part of a group of companies, including MCS and DeepTech, and transforms the industry landscape with designed and patented technology solutions for subsea inspection, intervention and installation.

Pipeline inspections using Machine Learning, turning hours into minutes

Mike Gallo
Technology Business Development Manager
Rovco

Pipeline inspections are amongst the most time consuming, error-prone operations in O&G surveying. At Rovco we set out to use our Machine Learning (ML) expertise to solve this issue.

We created a capable ML tool that allowed users to identify features and defects quickly, turning hours into minutes. After the first iteration however, we were left with the following questions:

- How do you verify that the ML output is correct?
- How do you get the system to spot unexpected features and anomalies, things it hasn't seen before?
- We all understand ML systems can improve over time, but how do you train a ML engine, whilst still saving time?

Our solution to all of these challenges was bringing the Human in the Loop. Using sorting criteria to spot anomalies and find similarities, allowing users to improve the ML engine, whilst still turning hours into minutes. All of this with the peace of mind benefit of a Quality Check step.

Our Machine Learning solutions are part of our Intelligent Digital Platform offering, enabling operators to store their data securely and digitally so that it can be easily retrieved and shared with colleagues and subcontractors. On top of this operators can take years of legacy data and have them analysed objectively, spotting changes and allowing focused future campaign planning, saving time and costs.

We have only started on pipelines, but we will use this strong foundation to extend our capabilities to other types of assets.

Rovco was founded in 2016 as an ROV services company, with a vision to develop Computer Vision, AI and Machine Learning technology to make truly autonomous surveys subsea a reality. The unique technology developed by the company is now commercialised externally. This technology is capable of meeting its true potential to improve safety and reduce manual work offshore at a global level, through the launch of a new tech-provider company called Vaarst in Q1 2021.

Mike Gallo is Rovco's Technology Business Development Manager, with almost a decade of technology sales experience, he has a background in offering successful solutions for offshore positioning and 3D real-time vision systems.

Long Range Autonomous Shore Launched Inspection Capability

Matt Kingsland
Senior Robotics Engineer
National Oceanography Centre

Traditional offshore surveys are carried out by equipment based on-board large ocean going ships with day rates ranging up to £112K, it is therefore a very expensive resource. The industry currently spends ~£638K surveying 50km of pipeline, the NOC's proposed solution would cost ~£30K. Ships are also carbon intensive and the offshore sector is seeking to achieve carbon neutral O&M operations. For these reasons the industry is slowly moving toward resident AUVs/USVs. These systems have their drawbacks, the USVs cannot achieve near object inspections while resident AUVs still require local infrastructure and vessels to service them.

Since 2012 the NOC have been developing Autosub Long-Range, a low power AUV, currently capable of achieving ranges up to 3500km. This would provide operators with an alternative, low cost, low carbon option for survey. ALR1500 is in its final acceptance stages, the vehicle will be deployed in spring 2020, to demonstrate its multi-month capabilities.

ALR is built on NOC's 20 years+ of successful AUV development. A pedigree that has enabled NOC to push the boundaries of science. The NOC has also worked collaboratively with partners in commercial and defence sectors to help them to understand MAS capabilities for their needs.

For a survey application with imaging sensors, the system has an available range of ~2300km: example missions could include 1500km of transit range enabling the vehicle to transit to and from inspection sites while on site the system could survey up to 800km in a single mission, or survey a pipeline continuously from shore 900km out and 900km back allowing the vehicle to inspect both sides of the pipeline.

Due to the duration of such a mission, it is currently not possible to conduct an accurate 800km long survey using only on-board navigation systems. Therefore, for a survey grade mission the ALR1500 will be accompanied by a USV providing navigation aiding via acoustics.