SUT at the Subsea Forum at AOG Energy 2023

Australasian Oil and Gas (AOG) Energy 2023, hosted in Perth, WA, from 15-17 March 2023, reflects the evolution of oil and gas with a fresh focus on energy transition, including hydrogen, renewables and emissions reduction technology. The Subsea Forum was one of three conference streams addressing opportunities and challenges in the energy industry; the other two streams were on Knowledge and Industry Supply.

The Subsea Forum, which focused on how the Australian Subsea industry can adjust to the evolving market, is organised in conjunction with:

- Society for Underwater Technology (**SUT**)
- Subsea Energy Australia (**SEA**) and
- Global Underwater Hub (**GUH**)

Over the three days of the forum, a wide variety of topics was covered from offshore wind, autonomous and other remote systems, decommissioning, well plugging and abandonment (P&A), considerations of submerged cultural heritage, cost efficient subsea developments, the subsea factory approach, pipeline innovation and technology culminating with a session dedicated to decarbonisation and energy transition.

Subsea Forum: Day 1

Lively discussion reflected the interest and the diverse expertise and experience of presenters and audience when winds of change blew through the sessions dedicated to offshore wind. Presentations encompassed a range of relevant topics, from turbine failure mechanisms (Allison Selman, **Atteris**), marine life monitoring (Brett Phillips, **Oceaneering**), field measurements from a floating wind turbine (Guy McCauley, **University of Western Australia**), how offshore wind contributes in the energy transition (Brian Thornton, **Flotation Energy**), monitoring corrosion and retrofitting cathodic protection (David Flanery, **Deepwater**), environmental scoping and approvals for offshore renewable energy (James Keating, **Hydrobiology**) and inter array power cable configuration selection for floating wind farms (Nitin Repalle, **2H Offshore**) to cable fault location (Tony Walker, **Megger Limited**). The final session of the day was related to autonomous and remote operations.

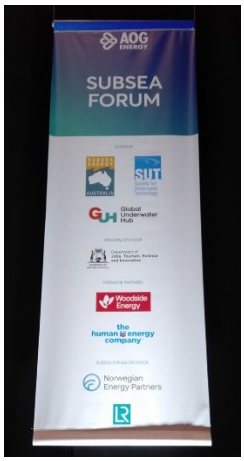
The drive towards autonomous operations is coming from operators, looking for safer operation with fewer people offshore, as well as savings on cost. The session included insights on the roadmap (Dipali Kuchekar, **Lloyd's Register**) as well as examples of the use of unattended surface vessels and short-term resident subsea ROVs from various service providers (Brett Phillips, **Oceaneering**) (Francesco Cavallini, **Saipen SpA**) (Torsten Marten, **UTEC Survey Australia Pty Ltd**).

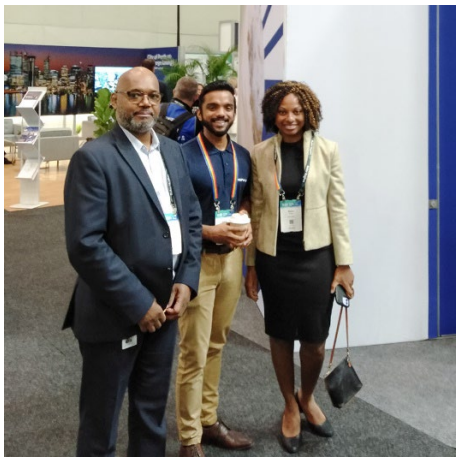
Subsea Forum: Day 2

Day 2 was a contrast, starting with a presentation by Daniel Thomas (**Woodside**) about an Australian first approach to understanding the potential heritage values of the submerged cultural landscape for a proposed pipeline route. This was followed by a panel session on Decommissioning Learnings from the UK/Europe. Neil Gordon (***GUH***) brought together guests from the UK Department of International Trade, highlighting the UK decommissioning export strategy, Scottish Development International supporting Scottish companies in their international activities, and UK companies sharing their knowledge and experiences operating in the global decommissioning environment.

This was complemented by the Norwegian Technology Showcase session which featured solutions that can reduce the cost of well P&A by enabling rig-less operations. Ivar Holm (**Hydrawell**) showed a world first CT application of the PWC operation. Hein Langåker talked about how ePlug has revolutionised the well interventions market. Keith Oddie (**InterWell**) showed examples of how Cannseal product line has re-instated or implemented annular isolation. Eirik Espe (**WellGuard**) developed a new measurement principle for through tubing barrier evaluation, a key enabling technology needed for rig-less P&A. Tore Moe presented the research initiative, supported by Norwegian industry, research institutions, and government, aiming for an ambitious 50% cost reduction target for P&A operations on the Norwegian continental shelf.

The final session on Day 2 was on Cost Efficient Subsea Developments. Eric Jas (**Atteris**) and Scott Draper (**UWA**) presented an open ditch with rock burial shore crossing instead of a tunnel or drilled crossing, which was a good example of how local Universities can assist industry. UWA's alignment with industry was further highlighted when the effectiveness of Worley's Pseudo-Dry Gas subsea separator, presented by Andrew Rafty, was demonstrated by Bruce Norris using hydrate kinetics modelling. The presentations by Frederik Hansen (**CCB Subsea**) and John Spain (**CSS**) were about eliminating conventional tools in a scope, creating solutions that can be cheaper, faster and safer with reduced emissions and overall risk.





Subsea Forum: Day 3

Day 3 started with Sotiri Battalis' (**Chevron Australia**) presentation on the Gorgon Stage 2 Project, highlighting the factory concept for future subsea tiebacks, mentioning the different working groups and lean model vendor led approach. The first pipeline and innovation session started with a joint presentation by Celine Lanoelle (**Atteris**) and Garrick Aberle (**Icon Engineering Pty**) on the conceptual design of mid water arches, which needs to have clear design requirements upfront. The HSE benefits, as well as carbon dioxide reduction, of small ROVs and subsea robotics were presented by Nick Veitch (**Geo Oceans**) with case histories when small ROVs provided solutions where conventional ROVs were unable to access and client needed immediate mobilization.

Tore Moe presented **Kongsberg**'s Ferrotech subsea working habitats as a gamechanger for the Subsea IMR business for pipelines. This was illustrated by a pipeline repair in GOT last year conducted on a producing pipeline. The second pipeline and innovation session was deemed the coolest session of the Subsea Forum, as it focussed on flow temperature measurement and hydrates. Olav Brakstad (**ClampOn**) demonstrated the application of ultrasonics to measure flow temperatures.

Stephan Freychet (**TSC Subsea**) showed how to find hydrates with some high-tech tools. **UWA**'s Dr Kwang-hee Jeong closed out the session with a novel investigation of hydrate formation downstream of a throttle point. All these topics are relevant to current operating facilities and have implications for future applications involving CCS. The most forward-looking session of the Subsea Forum was the last, bringing in decarbonisation and energy transition through the tales of two molecules, carbon dioxide (CO2) and hydrogen. Stephen Stokes (**Wood**) showed the importance of understanding the composition of the CO2 rich fluid and how low portions of some impurities could be problematic for pipeline design and operation.

Alex Clifford (**SIA**) put forward the SURF EPCI perspective for offshore carbon capture and storage (CCS). Cyril Holst (**TechnipFMC**) brought in the use of hybrid flexible pipe risers for CCS, relieving us of stress corrosion cracking, reducing weight and smoothing our flow. The switch of focus to hydrogen as an energy storage source in preference to Lithium-ion batteries by Nitin Repalle (**2H Offshore**) stirred up the audience.

Finally, Robby O'Sullivan (**Strom**) talked about the application of thermoplastic composite pipe for hydrogen transportation, where its negligible permeation makes it ideal for decentralised hydrogen production, as well as being lightweight, and steel, therefore corrosion, free. This was a thought-provoking series of presentations on which to end the Subsea Forum.

I'd like to thank my fellow session chairs for their input to the Subsea Forum and to this summary:

- Marius Martens (**IntecSea**)
- Britta Bienen (**UWA**)
- Ashley Duncan (**TechnipFMC**)
- Neil Gordon (**GUH**)
- Tore Moe (**NORWEP**)
- Iain Wylie (**Oceaneering**)
- Bukkie Orugun (**TechnipFMC**) and
- Matthew Allen (**MMA Offshore**)

See you all on March 13 - 15 at AOG Energy 2024!

Dr Julie E P Morgan (**SUT**)