

# KOMtech: How research and innovation is key to tackling the cycles of the maritime industry

Report interviews Aziz Merchant, Executive Director of Keppel Offshore & Marine Technology Centre (KOMtech).



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**Q:** We all know that the global oil and gas industry has seen a downturn. What, in your opinion, will be the most significant changes in the floating production industry as a result of this?

**A:** "One of the differences in this cycle was the growth of US shale oil and its reduced costs of development, which contributed to the drastic fall in oil prices. It means that the offshore oil and gas industry needs to focus on achieving greater efficiencies in cost control and sustainability to be competitive with shale."

**Q:** Keppel group like other companies has undoubtedly suffered from the downturn as well. What strategy is Keppel group following to combat this slump?

**A:** "Across Keppel Offshore & Marine, we are restructuring to achieve greater efficiencies, increase synergies between business units and share

resources to develop compelling solutions that are economical, well-designed and well-executed for customers across industries. We continue to execute our projects well and ensure that we maintain our strong reputation for safety, quality and timeliness. We are also exploring opportunities where we can repurpose and maximise our offshore technology to ensure a wider portfolio of product offerings."

"In response to the current low oil price, emphasis was placed on repositioning and improving existing core products/services to stay relevant to the changing market conditions and customer preferences, developing new products such as the 'Rig of Tomorrow' that would be price-competitive compared to shale oil development, increasing our services through acquisitions such as Keppel LeTourneau, as well as providing solutions along the Gas Value Chain."

"We have made significant progress in our gas strategy, delivering the world's first Floating LNG vessel conversion last year and captured new opportunities as demonstrated by new contracts for the construction of two Liquefied Natural Gas fuelled containerships, dredgers and the conversion of a Floating Production Storage and Offloading vessel."

**Q:** How do you see the current market perspective for deepwater oil and gas, and which regions or countries will present the largest growth opportunities?

**A:** "There are expected to be some pockets of activity for deepwater exploration in Brazil, Mexico and West Africa but long lead times for deepwater projects means that the effects of this won't be seen in the short term. At the moment, there is a sweet spot for mid water semis in the North Sea, while deepwater remains generally depressed."

**Q:** How is Keppel innovating to meet these challenges?

**A:** "Innovation has always been a part of Keppel's DNA – our focus on Research & Development (R&D) and commercialisation have yielded world-leading proprietary technology and processes. The environment we operate in is increasingly complex with change occurring at an unprecedented speed."

"New technologies and business models are evolving rapidly, disrupting and impacting industries in myriad ways across the world. Businesses must constantly adapt to market trends to stay relevant and push ahead of competitors. Keppel continues to invest in technology and innovation to maximise its value proposition and stay ahead of the competition."

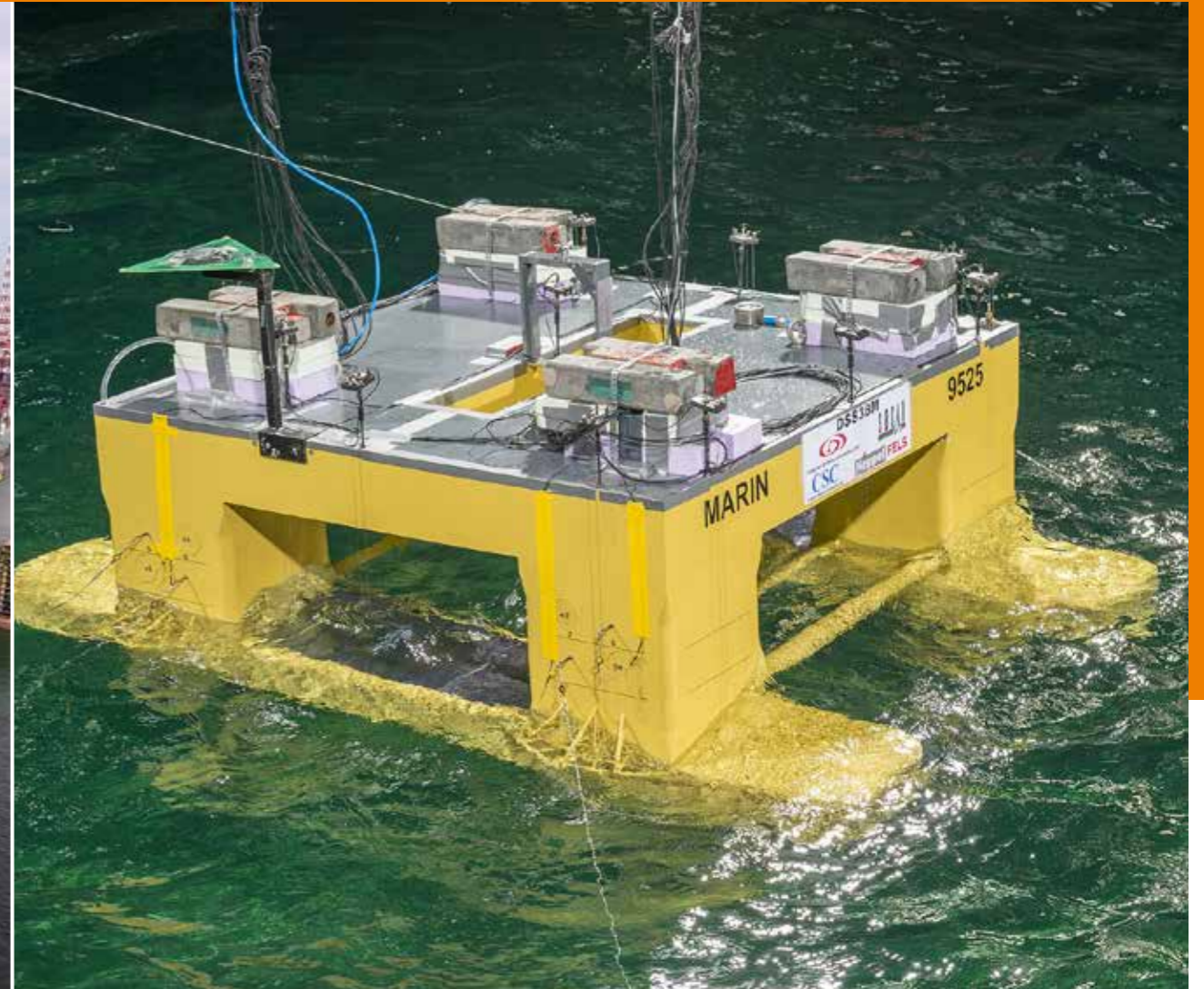
**Q:** Current fleet utilisation and day rates of oil and gas drilling vessels are very low. Is there still a market for new built platforms?



**A:** "The industry is back to being competitive by significantly cutting costs, improving efficiencies and tightening up the supply chain. Older rigs continue to be scrapped and it will take some time before there is an equilibrium between supply and demand. Oil companies and fleet

operators will always prefer newer, higher specification rigs that are safer while remaining cost-efficient."

**Q:** In 2015, a serious accident happened with a deepwater drilling rig in the North Sea, which was struck by a steep wave,



leading to the death of a crewmember, several injuries, and extensive damage to the living quarters. Do you believe that the industry is sufficiently aware of the complexity of the motions and wave loading of floating assets in extreme weather conditions?

**A:** “Real ocean states are complex and difficult to define numerically due to their irregular wave patterns, strong non-linearity and non-Gaussian statistics. This is further complicated by the response of the floating body to the actual wave, making the accurate prediction of the required motion and air gap for the safe operation of a semisubmersible a real challenge. Current methods make use of model testing to help resolve these issues. This method is time consuming and requires multiple test runs in attempts to fully capture all possible combinations of the waves and headings.”

**Q:** What kind of research would be needed to reduce risks, without making the design overly expensive?

**A:** “A conventional design approach requires a significant amount of resources and physical model testing. CFD is vital in speeding up the process with the use of digital models instead of just physical models. Once validated, it can complement and eventually push the boundaries towards digitisation for the marine and offshore industry.”

“KOMtech makes continuous efforts to collaborate with industry partners to develop more robust and safe solutions that can benefit all our stakeholders. We utilise state-of-the-art numerical modelling capabilities to provide more effective analysis to improve semi-submersible designs, thereby helping to ensure safer operations in deeper waters and harsher environments. The accurate prediction of motion and air gap require-

ments, between maximum wave height and the underside of a platform deck, for the design of deepwater semi-submersible platforms for operations in harsh environments and extreme weather conditions is crucial. This is especially the case for operations in areas such as the Arctic, North Sea and Western Australia and other deepsea frontiers.”

**Q:** MARIN has assisted KOMtech with model tests for many years. Through this long-term, continuing cooperation we have built up a good relationship. Why does KOMtech return to MARIN time after time?

**A:** “MARIN has consistently provided high quality service and reliable model test results, enabling KOMtech to develop products in a robust manner. We believe this partnership will continue to help KOMtech improve the in-house capability of developing advanced marine and offshore vessels.”

**Q:** Physical model tests have always been one of MARIN’s key technologies. Model testing is however a labour intensive technique when studying the complex physics of floating structures at sea. Today, we see rapid development of modern CFD calculation techniques. What, in your opinion, is the future role of CFD, model testing and simulations?

**A:** “Due to the rapid increase of computing resources, CFD has become a more powerful numerical tool in the maritime industry. While it will still be quite some time before CFD could replace most of the physical testing, at the moment CFD can be a good tool to assist model tests before the testing and to complement physical testing by reducing test cases and hence, the cost. A so-called ‘digital twin’ can be another area where CFD and physical testing work together to provide a more effective way of product design. MARIN may consider aiming

for a fast transition towards CFD as MARIN has significant advantages of having large amounts of testing data, which can be used to establish CFD practice and guidelines.”

**Q:** The Singapore government actively stimulates education, research and development in the maritime sector. What notable effect does this have for KOMtech and other Singaporean maritime companies?

**A:** “Keppel actively embraces technology to maximise our value proposition. As part of its efforts to advance technology and innovation, Keppel O&M partners leading industry players, government agencies and academic institutions to develop customised, market-relevant solutions.”

“Singapore has carved a niche for itself as the world leader in rig building and FPSO conversions. Singapore’s pro-business

environment, coupled with the presence of established yards like ours, has attracted many members of the global offshore and marine value-chain to set up shop in Singapore to create a maritime cluster. As such, their world-class products and services are readily accessible within the country.”

“The steady and constant infusion of talents and technologies into Singapore’s offshore and marine sector also contributes to the dynamism of the industry. This infusion is sustained through knowledge and skills initiatives promoted by government and industry organisations with the active support of offshore and marine companies. Through industry partnerships and tie-ups with academic institutions, KOMtech has been able to leverage industrial knowledge to make continuous improvements and breakthroughs in its R&D efforts.” □