

# OFFSHORE MARINE

A newsletter of Keppel Offshore & Marine

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## SETTING NEW MILESTONES



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As part of its regular engagements with key stakeholders, Keppel Offshore & Marine hosted Mdm Halimah Yacob, then-Speaker of Parliament, to a dialogue session on 23 May 2017, during which a range of topics focusing on employees' well-being was discussed.

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# Demonstrating resilience

Despite the strong headwinds faced in the offshore sector, Keppel Offshore & Marine (Keppel O&M) continued to perform creditably in the first half of 2017. Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M, discussed strategic developments and outlook at Keppel Corporation's 2Q & 1H 2017 results briefing. *OffshoreMarine* reproduces highlights of his speech.

We have had a busy quarter, during which Keppel continued to make important strides towards strengthening our track record as a solutions provider for sustainable urbanisation.

Three weeks ago, we held the naming ceremony for the world's first converted Floating Liquefaction Vessel (FLNGV), Hilli Episeyo, at Keppel Shipyard.

Even as we navigate through the challenges faced in the offshore sector, we are seizing

opportunities and developing new capabilities to strengthen Keppel O&M.

## STAYING RESILIENT

Amidst the continuing downturn, Keppel O&M achieved a million dollars in profit. Rightsizing efforts undertaken by Keppel O&M helped to achieve an operating profit of \$36 million, but it was not sufficient to cover higher financing costs for the enlarged working capital. Contributions from associates helped the Division to break even.

Building on strong relationships with our network of customers, Keppel O&M secured contracts of around \$300 million, year to date, including for newbuild Liquefied Natural Gas (LNG) carriers and dredgers as well as Floating Production Storage and Offloading (FPSO) conversions.

We have closed the deal for the novation of the five Transocean rigs to Borr Drilling and received the downpayment of US\$275 million, which has

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Keppel O&M delivered three major projects in 1H 2017, including FPSO John Agyekum Kufuor (pictured)

Continued from page 3.



Through its subsidiary, Caspian Shipyard Company, Keppel O&M delivered Heydar Aliyev (pictured), the first modern semisubmersible to be almost completely built in Azerbaijan

improved the Division's cash flow. The first two rigs will now be delivered in 2018 and a third in 2019, while the remaining two will be delivered in 2020.

Despite some pick-up in activity in the offshore market, the general consensus is that, with the prevailing uncertainty in the oil market, and oversupply in the jackup market, a quick recovery is unlikely. Our rightsizing will enable us to weather through a prolonged downturn. We will continue to build new capabilities, look for new markets in the gas industry and non-oil and gas plays such as Jones Act vessels and dredgers. We will also explore opportunities to re-purpose our offshore technology for other uses.

#### **MAJOR DELIVERIES**

As at 30 June 2017, Keppel O&M's net orderbook was \$3.4 billion,

excluding our projects for Sete Brasil. We will continue to focus on executing our projects safely, on time and on budget, and with the quality synonymous with Keppel.

In 1H 2017, Keppel O&M delivered three major projects – an FPSO conversion for Yinson Production, an FPSO integration for BW Offshore and a semisubmersible for SOCAR.

In 2Q 2017, we reached agreements with our customers to defer three offshore projects. The delivery of two semisubmersibles will be moved from 2019 to 2020. The projects are cash flow neutral and we will be compensated for the deferrals. The liftboat for Crystal Heights will also be deferred from 2018 to 2019. We will likewise be compensated for this deferral.

We are on track to deliver the world's first FLNGV conversion in partnership with Golar LNG within three years and with a safety record of 18 million manhours worked without Lost Time Incidents. The converted FLNGV will be a game changer in the LNG industry, providing a solution that is not only significantly more cost effective but also much faster to market.

The second vessel for Golar, the Gandria FLNG, is slated for deployment by Ophir in Equatorial Guinea. In May 2017, Ophir announced the signing of the Umbrella Agreement, one of the four key milestones required for the Final Investment Decision (FID). We look forward to embark on the conversion once we receive the Notice to Proceed after the FID is achieved, which is expected to be in 2H 2017.

To streamline operations and effectively capture new opportunities, Keppel O&M recently reorganised its operations into two divisions – the New Builds division, covering Offshore as well as Gas & Specialised Vessels, and the Conversions & Repairs division.

The reorganisation saw the integration of key functions in the New Builds division, comprising Keppel FELS and Keppel Singmarine, which allows Keppel O&M to improve efficiency and more importantly, better leverage synergies and different capabilities within



Keppel O&M's strong track record in oil and gas projects include the completion of the world's first Floating Storage and Regasification Unit (FSRU), Golar Spirit (pictured) in 2008 as well as another two FSRUs after that.

its group for new build solutions.

In the Conversions & Repairs division, Keppel Shipyard can similarly draw on the group's diverse resources to undertake a wider variety of complex projects. For example, by combining Keppel FELS' expertise from complex offshore projects with Keppel Shipyard's capabilities in executing LNG-related EPC (engineering, procurement, construction) projects, Keppel O&M would be even better able to provide customers with reliable end-to-end solutions. We have already benefitted from such collaboration recently, with Keppel FELS and Keppel Shipyard working together on the commissioning phase of the Golar Hilli FLNG vessel.

In line with Keppel O&M's efforts to rationalise its global yard network according to business

needs, we have completed the sale of a supporting yard in the Netherlands to the Damen Shipyards Group for a total consideration of EUR 23.5 million. Keppel O&M has the capacity and resources to continue servicing its customers in Europe and the North Sea region, as well as pursue new opportunities in these markets through our global network of yards. Our commitment to *Near Market, Near Customer* execution remains intact.

#### **GAS INDUSTRY PARTNER & ENABLER**

With our ability to design, develop and integrate solutions across the gas value chain, Keppel is poised to be the gas industry's preferred partner and enabler.

Keppel O&M's deep cryogenic expertise is supplemented by a strong track record in oil and gas projects, including over 110 complex conversions and 400 new

build vessels. We had completed the world's first Floating Storage and Regasification Unit (FSRU) conversion and will soon deliver the world's first FLNG vessel conversion. We have also won an LNG bunkering licence with Shell in Singapore, and are building dual-fuel LNG tugs and small-scale LNG carriers.

Keppel's value proposition extends beyond that of an EPC yard. We are pushing boundaries to meet growing demand for small-scale LNG in archipelagic markets across Southeast Asia, the Caribbean and the Mediterranean, in regions unserved by pipelines. Our contribution in the gas value chain also extends to playing a role as a co-owner and co-developer. We can help source for funds to invest in these floating infrastructure assets which can generate long-term recurring income for Keppel and our co-investors.

*Continues on page 6...*



Continued from page 5.

## IN CONVERSATION

*OffshoreMarine* highlights management's responses to key questions from media and the investment community on the Group's results for 2Q & 1H 2017.



Mr Loh Chin Hua (fourth from right), Chairman of Keppel O&M and CEO of Keppel Corporation, and Mr Chris Ong (second from right), engaged media and analysts at the 2Q & 1H 2017 results briefing

**Q: You talked about how you see opportunity in gas and LNG, as well as Jones Act Carriers. Could we get a sense of the scope of jobs that you are interested in and the sizes in terms of the work that you are pursuing? Timing wise, when might we see some decisions or potential contract awards?**

**LCH:** It is important to look for new topline. This means looking at our gas strategy, non-oil and gas segments such as Jones Act vessels and dredgers, as well as re-purposing some of our offshore technology for other uses. While projects are harder to come by, we do see some projects in these areas which I have just mentioned. Not too long ago, one of our potential customers, Pasha, from the USA, mentioned in a press briefing that they have selected Keppel AmFELS,

our US yard, to build two Jones Act LNG containerships. All I can say is discussions are still ongoing and we will make an announcement when appropriate.

**CO:** It is a reality that projects are hard to come by, because the sector is in its downturn, but what we have done is to engage our customers early. For example, the potential contract with Pasha and other contracts secured in 1H 2017 are LNG-related projects. Even for Pasha, they are looking for dual-fuel vessels and there is LNG involved. The world is basically going for cleaner energy and we are engaging our customers to help them change the profile and capability of their fleets. When we have good news, we will share it with all of you.

**Q: What sort of markets are you targeting in the gas sector? What type of floating infrastructure assets are you looking to co-own?**

**LCH:** Assets including small-scale LNG carriers, regasification floating carriers and even floating power barges will be on long-term contracts, providing services for infrastructure assets with steady returns and cash flow. When these assets have been de-risked and are stabilised, we can put them into Keppel Infrastructure Trust, for example. This is because an infrastructure trust can own such an asset, which generates reasonable returns, without being overly geared.

**CO:** For our gas strategy to work, we have to participate at different levels of the gas value chain to

make sure that the logistics will be viable. We are not just looking at large-scale assets such as Floating Liquefied Natural Gas (FLNG) vessels, but also mid- to small-scale LNG carriers which allow us to break bulk and do the milk runs, going through various ports to enable the whole chain. Countries like Indonesia and Myanmar, which are flanked by water bodies are examples of these small-scale markets. This is how we can play in the field, not only in one part or an isolated asset class.

**Q: Were there further job cuts in the Offshore & Marine Division this quarter? What is the latest number on staff strength?**

**LCH:** For Keppel, most of our rightsizing has already taken place. In 2Q 2017, the global workforce dropped by about 5% from the previous quarter. Most of this took place as a result of natural attrition, and we have also sold the Verolme Yard in Holland which contributed to the reduction in workers.

**Q: What are the capex and technical benefits/drawbacks of converted FSRU/FLNG compared to newbuilds?**

**CO:** The selection of newbuild or conversion greatly depends on how the customer intends to develop the field. If you are referring to the converted FLNG for Golar, their business case is based on a low capex and fast-to-market solution so as to make the stranded gas field viable. There are also customers that look at newbuilds

because they have development plans over a couple of years that require a purpose-built vessel. For Keppel, we talk to different profiles of customers, and we will cater solutions based on what the customer requires.

**Q: Would you entertain the idea of a larger consolidation within the Singapore shipyard sector, i.e. with your main competitor?**

**LCH:** I answered this question at the previous results briefing. I think at this point in the cycle for Offshore & Marine, our view is that it will still take a bit longer before we can see a full recovery and we have taken very decisive steps to rightsize the Division since early 2015. Because of these painful steps that we took, we are on a better footing. Despite the drop in revenue, Keppel O&M has still been able to keep in the black. We are also looking at other markets because we need new top lines.

We believe that the industry still has a very bright future. We continue to look at R&D and acquiring capabilities. But at this point in the cycle, we think that capacity is not that important. Indeed, we think that in the short term, capacity may be a bit of a liability if you are not able to fill the yard. So we do not see any advantage in growing our capacities at this point in time.

**Q: It seems that there are intentions to co-own floating infrastructure assets. What type of assets are you looking to own?**

**And what the expected returns there? Generally the asset owning business appears capital intensive with high return on equity (ROE) only possible with leverage.**

**LCH:** Chris Ong had explained what some of the small-scale LNG floating assets, and infrastructure assets that we are looking at are. These will include small-scale LNG carriers, regasification floating carriers and even floating power barges. These assets do not operate on their own but are part of the ecosystem that would be built up.

# Taking the helm



Mr Chris Ong

Mr Chris Ong Leng Yeow was appointed CEO of Keppel Offshore & Marine (Keppel O&M) on 1 July 2017. He was formerly Acting CEO, Keppel O&M.

Mr Ong is concurrently MD (Offshore), Keppel O&M and MD of Keppel FELS. He joined Keppel FELS in 1999 and held a range of key appointments including GM (Engineering), Acting ED (Operation), ED (Commercial) and Deputy MD of Keppel FELS. He is also a board member of the Institute of Technical Education Board of Governors, and a member of Workplace Safety & Health Council Marine Industries Committee and U EnTech Steering Committee.

Mr Ong said, "I am proud to lead the team at Keppel O&M. Our immediate priority is to ensure that we continue to capitalise on

our strong track record and the capabilities we have developed to grow Keppel O&M to the next level. We must innovate, reinvent ourselves and even disrupt our own business models so that we can stay ahead of the competition.

"Besides developing advanced products in our usual markets, we are also exploring ways to repurpose offshore industry technology for other industries such as offshore wind, offshore power plants, offshore desalination plants, our suite of Liquefied Natural Gas (LNG) solutions, and even offshore real estate, among others."

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## Strengthening the local O&M industry



Mr Abu Bakar

Mr Abu Bakar Bin Mohd Nor, MD (Gas & Specialised Vessels), Keppel Offshore & Marine (Keppel O&M), was elected as the new President of the Association of Singapore Marine Industries (ASMI) Council

during its 49th Annual General Meeting held on 23 May 2017. Mr Abu Bakar succeeds Mr Chow Yew Yuen, former CEO of Keppel O&M.

The 16-member council was elected into office for a two-year term from 1 June 2017 to 31 May 2019.

Mr Abu Bakar shared in an interview with ASMI that his vision for ASMI is to be the leading trade partner and platform to further strengthen the local offshore and marine industry. In addition, he targets to enhance ASMI's membership and boost its role as

the industry champion for not just local shipyards, but also offshore and marine companies based in Singapore, as well as its supporting industries.

Despite the industry challenges, Mr Abu Bakar believes there are adjacent sectors that companies can explore.

"There are opportunities in the Clean Energy and Digitisation segment which offshore and marine companies can tap and develop further, such as gas supply-chain, wind, solar, autonomous vessels etc," he said.



# Greater synergy

To further streamline operations, optimise capacity and harness synergies, Keppel Offshore & Marine (Keppel O&M) has reorganised its operations into two divisions: New Builds (Offshore, and Gas & Specialised Vessels) and Conversions & Repairs.

This reorganisation sees the integration of key functions in the New Builds division, consisting of Keppel FELS and Keppel Singmarine, to create a centralised unit which will better harness synergies across the Group to offer more comprehensive solutions for customers.

Similarly, in the Conversions & Repairs division, Keppel Shipyard will be able to draw on the Group's resources to undertake a wide variety of projects.

This reorganisation equips Keppel O&M with the agility to respond to challenges, seize opportunities in rapidly-changing environments and strengthen its presence in the market.

Under the New Builds division, Mr Chris Ong, CEO of Keppel O&M, will concurrently assume the appointment of MD (Offshore), Keppel O&M, while Mr Abu Bakar, MD of Keppel Singmarine, will assume the concurrent appointment of MD (Gas & Specialised Vessels), Keppel O&M.

A leadership team formed within the New Builds division will be

responsible for the integration and execution of common key functions such as operations, engineering and commercial.

The team will enable the New Builds division to harness operational efficiency and adapt to market forces.

Mr Mohamed Sahlan, ED (Operations) of Keppel FELS, will be redesignated as ED (Operations), New Builds, Keppel O&M. He will be assisted by Mr Edmund Lek, ED (Operations) of Keppel Singmarine, who will be redesignated as ED (Operations-China), New Builds, Keppel O&M.

Mr Tan Leong Peng will also be redesignated as ED (Engineering), New Builds, Keppel O&M, while Mr Jay Singham will be redesignated as ED (Commercial), New Builds, Keppel O&M.

Dr Foo Kok Seng, ED of OTD, will be concurrently appointed as ED of GTD, and Mr Keith Teo, GM (Marketing), Keppel FELS, will concurrently be appointed as Director (Special Projects), Keppel O&M.

The Conversions & Repairs division will be led by Mr Chor How Jat, MD of Keppel Shipyard, who will concurrently assume the appointment of MD (Conversions & Repairs), Keppel O&M.

Mr S. Jayakumar will be redesignated as ED (Projects Management, Gas), Keppel Shipyard.

As part of the reorganisation, Mr Yong Chee Min, Director (HSE), Keppel O&M, will be concurrently appointed as Director (Risk & Compliance), Keppel O&M and Mr Lim Ah Cheng has been appointed as ED of Keppel Sea Scan & Green Scan.

## INTEGRATION OF KEPPEL O&M USA

In a strategic move to achieve a stronger optimisation of Keppel O&M's operations in the US, Keppel AmFELS, Keppel LeTourneau, Keppel O&M USA, Keppel Marine Agencies International, Bennett Offshore and Keppel FloaTEC have been integrated under one unified banner – Keppel O&M USA.

With this integration, Mr Simon Lee Kim Foong, President of Keppel AmFELS, was concurrently appointed as President of Keppel O&M USA on 5 June 2017.

# Building the world's first EU Stage V dredger



With the new contracts to build two TSHDs secured, Keppel Singmarine is set to deliver a total of up to five dredgers for Jan De Nul Group from 2H 2018 onwards

Keppel Singmarine will be the first shipyard in the world to build an EU Stage V dredger in compliance with stricter international limits on emissions such as the International Maritime Organisation's (IMO) Tier III and European Union (EU) Stage V regulations.

On 23 May 2017, Keppel Singmarine announced that it had secured contracts from Codralux S.A., a wholly-owned subsidiary of Jan De Nul Group, to build two Trailing Suction Hopper Dredgers (TSHDs).

The first of the two dredgers in the new order is expected to be completed in 2H 2019. Construction of the second dredger will require Codralux S.A to exercise the option within a six month window. When completed, both TSHDs will be able

to dredge to a maximum depth of 35m and have a hopper capacity of 6,000m<sup>3</sup>.

Keppel Singmarine is currently building three dredgers for Jan De Nul Group, based on contracts that were secured in July 2016.

Mr Abu Bakar, MD of Keppel Singmarine, said, "We are pleased to build two more high performance dredgers of higher specification for Jan De Nul. Keppel O&M has also previously undertaken various other projects for Jan De Nul such as shiprepair, and this reaffirms our position as their preferred partner."

"Constructing the world's first EU Stage V dredgers will extend our track record in the non-oil and gas segment, and broaden

our expertise as we continue to seek opportunities where we can leverage our capabilities to provide value-added solutions."

When completed, the two TSHDs will be able to dredge to a maximum depth of 35m and have a hopper capacity of 6,000m<sup>3</sup>.

The three TSHDs currently being built by Keppel Singmarine will be able to dredge to a maximum depth of 27.6m, and have a hopper capacity of 3,500m<sup>3</sup>.

Mr Robby De Backer, Director of Newbuilding Department of Jan De Nul Group, said, "We have chosen Keppel Singmarine again as they have proven to be reliable partners in the construction of the existing three dredgers. We look forward to a long-term partnership as we expand our fleet of dredgers to meet the needs of a wide variety of dredging activities worldwide."

# Steady stream of repairs and conversions

With a proven track record of quality execution, Keppel Shipyard continues to be the preferred shipyard by new and returning customers in the industry in spite of headwinds. It announced on 28 June 2017 the securing of four contracts for the conversion, repair and modification of vessels.

The first contract from Dixstone Holdings Ltd involves the conversion of the M/T *Tempera* into a Floating Production Storage and Offloading (FPSO). Keppel Shipyard's job scope includes the installation of topside process skids as well as a new accommodation module, amongst others. Work is expected to commence in 3Q 2017 and upon its expected delivery in 3Q 2018, the FPSO will be deployed to the Yombo field operated by Perenco off the Republic of Congo, Africa. It will replace the FPSO *Conkouati* which has served in the field for more than 25 years and was also converted by Keppel Shipyard in 1991.

Extending its expertise in FPSO conversion, the second contract will see Keppel Shipyard carry out repair work for the life extension and conversion of an oil tanker into an FPSO, *MTC Ledang*, for new customer, MTC Engineering Sdn Bhd. Work by the shipyard will include the fabrication of a flare tower and foundation; the lifting and integration of the crude stabilisation unit, as well as other refurbishment works. Upon its

completion in 3Q 2017, the FPSO will be deployed to the Ophir Field in offshore Peninsular Malaysia.

The third contract secured by Keppel Shipyard is from Royal Boskalis Westminster N.V. (Boskalis) for the conversion of a semisubmersible heavy lift vessel, *Finesse*, into a crane vessel. After the upgrade, *Finesse* will be equipped with a 3,000 tonne crane, dynamic positioning capabilities, as well as accommodation for up to 150 people. The vessel, which is already berthed at Keppel Shipyard, will also be capable of transporting and installing offshore wind turbine foundations upon completion in 3Q 2017.

Rounding off a successful streak, the fourth contract scope includes major refurbishment for LNG (Liquefied Natural Gas) *Lerici*, a gas

carrier managed by EXMAR Ship Management. Work on the vessel has commenced and is expected to be completed in 1Q 2018.

Mr Chor How Jat, MD (Conversions and Repair), Keppel Offshore & Marine and MD, Keppel Shipyard, said, "Even in the current challenging market conditions, we continue to receive a regular stream of conversion, repair and modification work from both new and long-standing clients. There remain opportunities in a variety of segments in the offshore and marine market and we are proud to be the industry's preferred shipyard. These four contracts bear testament to our strong expertise in the conversion, upgrading and repair works for FPSO vessels, LNG tankers, as well as heavy lift vessels."



Keppel Shipyard won four contracts for the conversion, repair and modification of vessels



# State of the art drilling rig delivered in Azerbaijan

Keppel Offshore & Marine (Keppel O&M) through its subsidiary in Azerbaijan, Caspian Shipyard Company (CSC) has delivered a semisubmersible drilling rig to Caspian Drilling Company, a subsidiary of the State Oil Company of Azerbaijan Republic (SOCAR). It is the first modern semisubmersible to be almost completely built in Azerbaijan.

The rig was named Heydar Aliyev by the President of Azerbaijan, Mr Ilham Aliyev at a ceremony in Azerbaijan on 18 May 2017.

Built to Keppel FELS' proprietary DSS™ 38M design, the rig has been

customised for the Caspian Sea's harsh environment condition.

President Ilham Aliyev said at the ceremony, "We are celebrating launching of the new semisubmersible drilling rig. This is a momentous event for the Azerbaijan oil industry because until now such a giant drilling rig has not been built in Azerbaijan. This is another successful project with cooperation of the foreign partners."

Mr Chris Ong, then-Acting CEO of Keppel O&M said, "The completion of this project adds to Keppel's strong track record of

delivering customised value-added solutions to Azerbaijan. The DSS™ 38M design is a technologically advanced rig equipped with the latest safety and environmental features to operate efficiently in the Caspian Sea. We are proud that Keppel-designed rigs are a proven and preferred solution around the world.

"To meet the requirements of our customer, we were able to construct this rig almost completely in-country, a first for land-locked Azerbaijan, by leveraging the synergies of Keppel O&M's network of yards. With the trust and partnership we have developed over the years, we look forward to supporting Azerbaijan in the long-term growth of their oil and gas industry."

CSC undertook the fabrication, integration, testing and commissioning of the rig while its sister yard, Baku Shipyard (a joint-venture yard between Keppel and SOCAR), fabricated the pontoons. In Singapore, besides providing the engineering, procurement and technical support, Keppel FELS also fabricated the columns and bracings which were shipped to Baku through the narrow Volga Don canal.

Equipped with well control piping, BOP handling and foundations rated for 20,000 PSI, the DSS™ 38M will be the first deepwater semisubmersible to have the capabilities to perform drilling in



The President of Azerbaijan, Ilham Aliyev (centre), on board the Heydar Aliyev with Mr Lau Kuat Pin (second from left), CEO of CSC; Mr Farid Akhundov (third from left), General Director of CDC, and Mr Rovnag Abdullayev (far right), President of SOCAR

expanded areas of operation in the oil fields of Azerbaijan.

It is able to work at a drilling depth of up to 40,000ft and operations in 1000m water depth. Designed to be fully moored, the rig will be able to stay in position via an 8 point wire rope mooring system which is capable of self-contained mooring up to the full range of the water depths of the Caspian Sea.

Jointly developed and owned by Keppel's Deepwater Technology Group and GustoMSC, the DSS™ 38M design is an enhanced design of the successful DSS™ 38 rigs that are operating in Brazil.

CSC is the most established yard in the country and has a track record of completing rigs for the Caspian Sea, having delivered the first semisubmersible (the DSS™ 20

Maersk Explorer), the first jackup rig (Transocean's Trident 20 jackup rig) and the first ice-class Floating Storage and Offloading (FSO) vessel built or integrated in-country. These projects were done in collaboration with its sister yards in Singapore which fabricated modules that were then shipped through the narrow Volga Don Canal for completion at CSC.

## Borr Drilling takes over Transocean's rigs

Borr Drilling has taken over Transocean's contracts to build five KFELS Super B Class jackup rigs with Keppel FELS and will undertake the remaining payment installments to the yard. The completion of the deal was announced on 1 June 2017 after a Heads of Agreement was first revealed on 20 March 2017.

The price for each rig, which includes the milestone payments already made by Transocean, is USD\$216 million, compared to the original contract price of USD\$219 million. Borr Drilling has also made a down payment of USD\$275 million.

Based on the finalised agreements, the first three rigs will now be delivered in 1Q 2018, 2Q 2018 and 2Q 2019 respectively, while the remaining two rigs will be



Keppel's deal with Borr Drilling is a testament to the reliability of and strong demand for its KFELS Super B Class rigs, even in challenging market conditions

delivered in 2020. The deal is a testament to the reliability of and strong demand for Keppel's proprietary KFELS Super B Class rigs, even in the present challenging market conditions.

The KFELS Super B Class rigs are designed to operate in 400 feet water depth and drill to

35,000 feet. With a two million pound drilling system and a maximum combined cantilever load of 3,700 kips, the KFELS Super B Class is equipped with tremendous horsepower during drilling operations. The rig is capable of drilling at a 75 feet outreach, allowing for coverage of a larger well pattern.

# Philippines' first-of-its-kind LNGC repair

Keppel Subic Shipyard expands expertise in LNGC repair market.



LNGC OB River at Keppel Subic Shipyard's drydock, the first of its kind to undergo repairs at a yard in the Philippines

Keppel Subic Shipyard has carried out the first ever membrane containment Liquefied Natural Gas Carrier (LNGC) repairs in the Philippines. The repairs were undertaken on two back-to-back projects for Dynagas Ltd.

The vessels, OB River and Amur River, arrived in 31 May and 26 June 2017, and were delivered on 15 June and 11 July 2017 respectively.

Equipped with the GTT Mark III containment system, the fully winterised and ice classed vessels require certified specialists to undertake the repairs. The corrugated membrane system is a cryogenic liner that is directly

supported by the ship's inner hull and necessitates the delicate handling of materials and equipment.

The repair work scope of the vessels include servicing of the main boiler as well as overhauling of the main turbine, steering gear and HD/LD (High Duty/Low Duty) compressor system. In addition, cargo pumps and spray pumps were taken out from the cargo tanks and the cargo valves from the deck were transported to the clean room for overhauling and testing while working closely with the specialist maker.

Keppel Subic Shipyard invested in a clean room facility, complete with

overhead crane services to cater to the stringent requirements and delicate equipments for the repair and upgrading of the LNGC vessels. Dome houses and other equipment were likewise fabricated and added to support the operations.

The yard also leveraged the technical expertise of Keppel Shipyard by sending its team to the Singapore yard for training on cargo tank work scopes. The LNG team from Keppel Shipyard also provided technical support and advice on the specialised works.

Mr Leong Kok Weng, President of Keppel Philippines Marine, Inc., said, "With the successful repair and on-time delivery of



the LNGCs with zero lost-time incidents, Keppel Subic Shipyard has demonstrated its capability to undertake sophisticated repair work on highly specialised vessels for the midstream sector of the gas industry.”

“We thank Dynagas for their trust and confidence in our shipyard as we venture into this niche shiprepair segment. Adding these projects to our track record has opened us up to more enquiries and we are well-equipped to meet the repair needs of LNGC ship owners,” added Mr P. Shanmugam, Senior Vice President of Keppel Subic Shipyard.



New facilities such as a clean room have been added for the handling of sensitive materials and equipment of LNGCs

## Divestment of Keppel Verolme completed

Keppel Offshore & Marine (Keppel O&M) has completed the sale of Keppel Verolme BV, situated in Rotterdam, the Netherlands, to Damen Shipyards Group (Damen) for a total consideration of Euro 23.5m.

The sale is part of Keppel O&M’s efforts to optimise its operations

and rationalise its global network of yards in line with its business needs. Through its network of yards in Singapore and globally, Keppel O&M has the capacity and resources to continue servicing its customers in Europe and the North Sea region, as well as pursue opportunities in these markets.

The total consideration was arrived at on a willing buyer willing seller basis taking into account Keppel Verolme’s expected net asset value at the close of transaction and the shipyard’s position in the Netherlands ship repair and conversion market.

# Preferred yard in the Gulf of Mexico

As the foremost shipyard in the Gulf of Mexico (GOM), Keppel AmFELS in Brownsville, Texas continued to deliver projects on time, within budget and safely in the last quarter, showcasing its trademark strong project execution and efficient operations. The yard was also recognised for its safety efforts.

## Q4000

In April 2017, Keppel AmFELS secured a contract from Helix Energy Solutions for the repair of the Q4000 multi-purpose semisubmersible. It was the third time the vessel has returned to its preferred shipyard in the GOM for drydocking.

The work scope for the Q4000 comprised fabrication, inspection, repair & testing of all sea chest

valves and full blasting and painting of the hull.

Being familiar with the vessel, Keppel AmFELS is able to optimise its work on the project. The Q4000 was serviced in the yard's floating dock, one of the largest in the region with a capacity 42,000 short tonnes (ST).

The Q4000 sailed off on 1 May 2017 after the repairs and upgrade works were successfully completed.

Mr Richard Patton, Helix Energy Solutions' Project Manager said, "The *Can Do!* spirit shown by all personnel involved, from engineers in the office to the crew in the field, enabled the smooth execution of the project. Thanks for a job well done!"

## WFD 300

Another project secured by Keppel AmFELS was the reactivation and repair of White Fleet Drilling's WFD 300 jackup rig which arrived in the yard on 7 May 2017.

Docked in Keppel AmFELS' floating dry dock which has a rated lift capacity of over 41,000 ST, the repair work scope consisted of hull, mat, leg and piping repairs along with blasting and painting of the bottom and side shells.

Work on WFD 300 was expediently completed in just two weeks and the rig departed Keppel AmFELS ahead of schedule on 21 May. It was White Fleet Drilling's first rig reactivation and the WFD 300 will be operated by Enterprise Offshore Drilling in the US GOM.



Strong cooperation between Keppel AmFELS and Helix Energy Solutions enabled the successful re-delivery of semisubmersible Q4000



Keppel AmFELS delivered WFD 300 in just two weeks, within budget, ahead of schedule and with a perfect safety record





Keppel AmFELS employees were recognised for helping the yard achieve its fourth safety award from the American Equity Underwriters during Employee Appreciation Day on 8 May 2017

For achieving an excellent safety record of zero lost time incident throughout the project, Keppel AmFELS received a safety award cheque of US\$10,000 from White Fleet Drilling on 26 June 2017.

At the award ceremony, Mr Larry Greenshield, Project Manager of Enterprise Offshore Drilling said, "I would like to recognise the extraordinary performance of the Keppel AmFELS Production, Project Management, Engineering, Safety and Quality teams in completing the leg repair project to the WFD Rig 300 with zero incidents, ahead of schedule and under budget."

### **SAFETY AWARD AND EMPLOYEE RECOGNITION**

Keppel AmFELS was recognised with the 2016 American Equity Underwriters (AEU) Safety Award for Large Shipyard. The award is a validation of the ongoing efforts at Keppel AmFELS to provide a safe and healthy work environment with

an established HSE program that is continuously improving to ensure the safety of all employees, customers, contractors and subcontractors.

This is the fourth time that Keppel AmFELS has won a safety award from the AEU. Ms Adele Hapworth, Chief Operating Officer of AEU, said, "AEU insures dozens of shipyards, and last year Keppel AmFELS ranked number one in safety among the larger shipyards. We truly believe that your success in safety is a team effort. Being safe is not just the job of the safety staff; it takes everyone at Keppel AmFELS making a daily commitment taking extra steps in order to stay safe."

AEU challenged Keppel AmFELS to win the award again next year, which would make Keppel AmFELS the only company ever to win this safety award five times.

Mr Simon Lee, President of Keppel AmFELS added, "We are proud to

once again win this award as it is a demonstration of the consistency of our safety vigilance not just on one project but over a period of 12 months. Some of the key factors in Keppel AmFELS achieving this prestigious shipyard safety award multiple times is due to the support from management, the effectiveness of front-line supervision and a dedication by everyone to maintain an excellent safety record."

The award was given out at a luncheon during Keppel AmFELS' Employee Appreciation Day on 8 May 2017.

It was an apt recognition for the hard work and dedication of Keppel AmFELS' employees. As part of the annual Appreciation Day, members of management cooked and served beef fajitas, sausage, rice and beans to production and administrative personnel to thank them for their service.





Keppel Shipyard will soon deliver the world's first converted Floating Liquefaction Vessel, Hilli Episeyo (pictured), to Golar LNG

## Keppel to deliver world's first converted FLNGV

Keppel Shipyard will soon deliver the world's first converted Floating Liquefaction Vessel (FLNGV) owned by Golar Hilli Corporation (Golar), a subsidiary of Golar LNG Ltd. The vessel was named Hilli Episeyo at a ceremony in Keppel Shipyard on 2 July 2017. Upon its completion, the FLNGV will be put into operation in offshore Kribi, Cameroon for Société Nationale des Hydrocarbures and Perenco Cameroon SA. It will be the first FLNGV project in Africa.

Mr Chris Ong, CEO of Keppel O&M said, "We are proud to be able to deliver the world's first

FLNGV conversion in partnership with Golar LNG within three years and with a commendable safety record. By combining our expertise from a variety of complex offshore conversion projects and our capabilities in executing LNG-related EPC (engineering, procurement, construction) projects, we are able to offer innovative and reliable floating liquefaction solutions to meet the growing midstream needs of the LNG industry.

"Compared to newbuilds, converted FLNGVs are significantly more cost-effective and faster to

market, without compromising safety and processing capabilities. With the experience gained from this first FLNGV conversion project, we are in a unique position to provide customers with reliable end-to-end solutions for the EPC and commissioning of FLNGV as well as FSRU (Floating Storage and Regasification Unit) conversions."

Hilli Episeyo was converted from a Moss LNG carrier with a storage capacity of 125,000 m<sup>3</sup>. Sponsons were added on both sides of the hull to house the topside equipment comprising of pre-treatment systems, four



Celebrating the naming of the world's first converted FLNGV are: Mr Loh Chin Hua (far left), Chairman, Keppel O&M and CEO, Keppel Corporation; Mr Chris Ong (third from left), CEO, Keppel O&M; Mrs Sue Yeo (centre), Lady Sponsor and Mr Dan Rabun (third from right), Chairman, Golar LNG

### FAST FACTS ON THE CONVERSION OF HILLI EPISEYO

- Length overall: 294m
- Breadth: 62.6m
- Storage capacity: 125,000m<sup>3</sup>
- 37,000 tons of new steel and equipment added
- 206.3m long 10.5m wide sponsons added on each side
- 8900 tonnes of added steel works including new sponsons, topside and mooring structures
- 9000 tonnes of process equipment installed
- 1800kms of cables pulled onboard which equates to going around Singapore more than nine times

PRICO® single mixed refrigerant liquefaction trains, boil-off gas compression and offloading equipment. The project has achieved an impressive safety record of exceeding 18 million man-hours without any Lost Time Incident to-date. Hilli Episeyo is also designed for a liquefaction capacity of about 2.4 million tonnes of LNG per annum.

Mr Oscar Spieler, CEO of Golar LNG said, "Being at its final leg towards completion, Hilli Episeyo represents a game changer in the LNG industry with its fast track, low cost project execution. The development of this FLNGV positions us as forerunners in providing offshore liquefaction solutions to meet the growing demand for liquefied natural gas.

"We are uniquely positioned to take on projects also in a low commodity price environment and determined to enable unlocking of reserves from remote, marginal and stranded gas fields."

Demand for natural gas is expected to increase significantly as the world pushes towards cleaner energy. FLNGV solutions enable operators to overcome the geographic, technical and economic limitations of developing natural gas resources located in marginal fields while FSRUs help reach consumers in remote areas.

Keppel O&M has accumulated a wealth of experience and capabilities in LNG technology dating back to its first LNG carrier repair in 1990. Its sterling track

record includes converting the world's first Floating Storage Regasification Units (FSRU) as well as two dual-fuel diesel LNG harbour tugs currently being built based on its award-winning proprietary design and two dual-fuel LNG carriers.

Through its Gas Technology Development arm, Keppel O&M has developed a suite of solutions to address the growing needs of the LNG industry. These include FLNGVs that can work in combination with Floating Storage Units (FSU) to provide cost-effective solutions for gas export terminals and are faster to market compared to land-based terminals.

*Continues on page 20...*



Continued from page 19.

## Strategy in action

Following Hilli Episeyo's naming ceremony, Mr Loh Chin Hua, CEO of Keppel Corporation and Mr Chris Ong, together with other members of senior management, briefed close to 20 analysts on 3 July 2017 on the Group's strategy to be the partner and enabler for the gas industry.

As one of the world's leading experts in LNG vessel repair, Keppel has built up critical knowledge for handling materials at extremely low temperatures below -160°C.

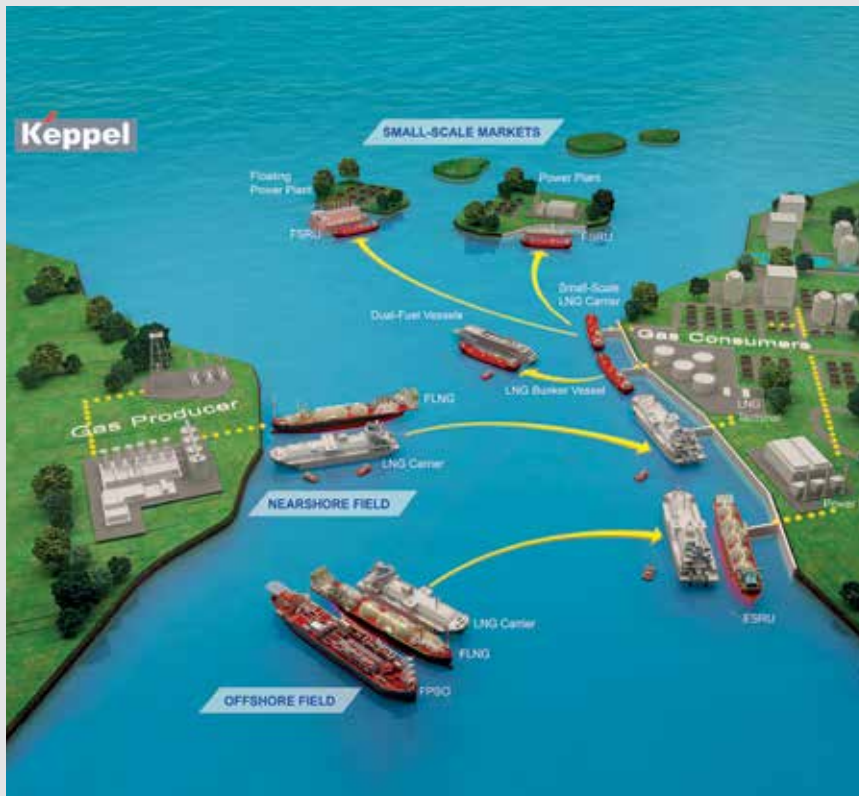
This deep cryogenic experience, coupled with a strong track record in oil and gas projects, has enabled Keppel to achieve many firsts in the delivery of floating LNG solutions.

Elaborating on Keppel's end-to-end capabilities, Mr Loh said, "Our strategy is not just about building or converting a vessel. It is about stitching up the value chain from one end to the other. We are becoming a co-developer, working alongside partners like Golar LNG who can operate these assets."

Just last year, Keppel added another important piece to its gas strategy through the winning of a joint licence with Shell to supply LNG bunker to vessels in the Port of Singapore. This has extended the Group's presence in the gas value chain from Upstream and Midstream to Downstream. Through the joint venture with Shell, Keppel is pushing boundaries to meet growing demand for LNG as a marine fuel in coastal areas, inland waterways and the international maritime sector.

The ability to offer end-to-end solutions has also primed Keppel to meet rising demand for small-scale LNG in archipelagic markets across Southeast Asia, the Caribbean and the Mediterranean, places unserved by gas pipelines.

"Gas assets are floating infrastructure that can provide income streams for many years. Keppel's ability to bring in co-investors may help get some of the LNG projects started," Mr Loh added.



Keppel designs, develops and integrates solutions for seamless delivery of LNG across the gas value chain



# Preferred partner



Keppel FELS and Keppel Shipyard worked closely together to ensure that Atwood Oceanic's jackup rig, Atwood Orca (pictured), was re-delivered on time and with zero incidents

Displaying its trademark strong project execution and efficient operations, Keppel Offshore & Marine's yards continue to deliver projects on time, within budget and safely.

## **ATWOOD ORCA**

On 17 October 2016, Atwood Oceanic's jackup rig, Atwood Orca, arrived in Keppel Shipyard for repair and refurbishments works. Leveraging the complementary strengths within its network of yards, Keppel Shipyard worked closely with Keppel FELS to ensure that the rig was re-delivered on time and with zero incidents on 20 April 2017.



Upon re-delivery, Atwood Condor (pictured) will be deployed to the Greater Enfield Project located in Western Australia

The job scope included a five-year Special Periodic Survey (SPS), leg anodes replacement, deep-well pump guide repairs and spudcan-chord connection upgrades, among other requirements.

## **ATWOOD CONDOR**

Following the successful re-delivery of Atwood Orca, longstanding client Atwood Oceanics commissioned Keppel FELS for the refurbishment of semisubmersible (semi), Atwood Condor, on 22 March 2017.

The yard's work scope consists of life extension and refurbishment works, the installation of a Blowout Preventer and thruster, as well as hull cleaning. The semi will be chartered by Woodside Energy and deployed to the Greater Enfield Project located in Western Australia.

# Renewing friendships at OTC Houston

Industry leaders and experts gathered at the annual Offshore Technology Conference (OTC) in Houston, Texas, from 1-4 May 2017 to discuss market prospects and explore opportunities for collaboration. A wide range of topics were covered during

the conference, including developments in the gas market, deepwater exploration, as well as the role of big data in the oil and gas industry.

As part of the conference, Keppel Offshore & Marine (Keppel O&M)

hosted its annual private cocktail reception on 2 May 2017. Over 800 customers, partners and associates attended the reception where they re-connected and discussed potential opportunities.



(L-R): 1. Mr Fabio Teixeira, Vice President (Strategy) of ENSCO; Mr Chris Ong, then-Acting CEO of Keppel O&M; Mr P. Carey Lowe, Executive Vice President and COO of ENSCO; Mr John S. Knowlton, Senior Vice President (Technical) of ENSCO; Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M; Mr Jon Baksh, Senior Vice President and CFO of ENSCO; 2. Mr Jorge Anzaldúa, COO of Grupo R; Mr Chris Ong; Mr Ramiro Garza Vargas, CEO of Grupo R; Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M; Mr Patricio Garza, Director of Grupo R; 3. Cdr. Sunil Dhulekar, CEO of Arya Offshore; Mr Siddhartha Roy, President of Arya Offshore; Dr Lee Boon Yang, Chairman of Keppel Corporation; Mr Manav Kumar, President and Director of Dynamic Drilling; 4. Mr Chan Wai Keong, Assistant Commercial Manager, Keppel Singmarine; Mr Jonathan Kennefick, Senior Vice President, Project Execution & Delivery, McDermott Inc; Mr Chris Ong; Mr John MacPherson, Senior Director QHSES, McDermott Inc; Mr Abu Bakar, MD (Gas & Specialised Vessels), Keppel O&M; 5. Mr Chor How Jat, MD (Conversions and Repair), Keppel O&M; Mr Eirik Barclay, CEO of Yinson Production; Mr Flemming Gronnegaard, COO of Yinson Production; 6. Mr Chris Ong; Mr Barry Smith, SVP of Technical Services, Atwood Oceanics; Mr Simon Lee, President of Keppel O&M USA





7. Mr Nick Routledge, MD of Aibel Thailand; Mr Chor How Jat; Mr Leon Harland, CEO of Bumi Armada; Mr Chris Ong; Mr Tan Leong Peng, ED of Engineering, New Builds, Keppel O&M; 8. Mr Hatem Elgamiel, Projects Director of Noble Corporation; Mr Chris Ong

## Nor-Shipping 2017

As part of its efforts to seek new business opportunities, Keppel Offshore & Marine (Keppel O&M) participated in the bi-annual Nor-Shipping exhibition held in Oslo, Norway, from 30 May to 2 June 2016.

Keppel O&M featured its capabilities and extensive track record in conversion, fabrication and shiprepair, as well as its network of yards in countries such as Philippines and Qatar.

The highlight of the exhibition was Singapore Nite, a popular networking event which allows guests to build business relations while sampling Singapore delicacies. Held for the sixth consecutive time, Singapore Nite underlines the strong industry ties between Singapore and Norway.



Dr Lam Pin Min (sixth from left), Senior Minister of State, Ministry of Transport and Ministry of Health at the opening of the Singapore Pavilion at Nor-shipping 2017, together with Keppel O&M's management, including Mr Michael Chia (fourth from left), MD (Marine), Keppel O&M, and Mr Chor How Jat (far left), MD (Conversions & Repairs), Keppel O&M

One of the leading global maritime events, Nor-Shipping attracted over 30,000 visitors and

900 exhibiting companies from some 48 countries this year.



# Steady progress

In the second quarter of 2017, BrasFELS received a new repair job and celebrated milestones for two Floating Production Storage and Offloading (FPSO) projects for Petrobras.

## UPGRADE ON OLINDA STAR

On 23 May 2017, Queiroz Galvão's

semisubmersible (semi), Olinda Star arrived at BrasFELS for upgrade and repair works. This is the third repair project to be carried out by the shipyard for Queiroz Galvão.

The work scope includes the modification of the helideck and moonpool, installation of bulk and

sludge silos, replacement of piping lines, as well as various structural reinforcements.

Capable of drilling at water depths of up to 3,600 feet, the deepwater semi will be deployed to support the Indian Oil and Natural Gas Corporation.



FPSO P-66 achieved first oil on 17 May 2017 in the Lula Sul field, Santos Basin, Brazil

## FIRST OIL FROM P-66

The first of the Replicante series of FPSO units, P-66, left BrasFELS on 4 February 2017. The unit achieved first oil on 17 May 2017 in the Lula Sul field, Santos Basin, Brazil, where Petrobras has partnered Shell and Galp Energia.

Maria Cristina Pinto, Deputy Project Director, BrasFELS said, "Working towards the delivery of this FPSO has been a challenging but rewarding journey. I am proud that P-66 has successfully achieved her first oil milestone and this would not have been possible with the strong teamwork between BrasFELS and all parties."



Semisubmersible Olinda Star is the third repair project to be carried out by BrasFELS for Queiroz Galvão

## P-69 COMPLETES LIFTING CAMPAIGNS

Over the quarter, the final lifting campaign for the FPSO P-69 project was also completed with integration works progressing well. P-69 is the second Replicante unit to be undertaken for Petrobras at BrasFELS.

The P-69 has a production capacity of 150,000 barrels of oil per day and six million cubic meters of gas per day. It also has storage capacity of 1.6 million barrels of oil. The FPSO unit is scheduled for delivery in 2018.

# Strengthening union ties

As part of its regular engagements with key stakeholders, Keppel Offshore & Marine (Keppel O&M) hosted Mdm Halimah Yacob, then-Speaker of Parliament, to a dialogue session in the yard on 23 May 2017.

During the visit, leaders and members from the Keppel FELS Employees Union (KFEU) engaged in a lively dialogue with Mdm Halimah where they covered a range of different topics focusing on employees' well-being. Keppel's management led by Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M, as well as Mr Chris Ong, CEO of Keppel O&M, also hosted Mdm Halimah to a lunch with the rest of the union members.

In her Facebook post on the same day of the visit, Mdm Halimah said, "Always a delight to catch up with brothers and sisters of Keppel FELS Employees' Union. To me, Keppel is an iconic brand that puts Singapore on the world map for

Offshore and Marine Engineering. I feel assured that the union and management are working together to navigate these challenging times, and remain hopeful that together, team Keppel will emerge stronger."



Madam Halimah (left in white), then-Speaker of Parliament, interacted with Keppel O&M employees to find out more about their well-being

# Safety Initiative Award



Mohamed Sahlan, ED (Operations), New Builds, Keppel O&M, received the Safety Initiative Award for Keppel FELS' "Intervene! Don't look away" campaign which encouraged workers to intervene in unsafe situations

For its extensive outreach and engagement with various stakeholders during its annual Health Safety & Environment (HSE) Excellence Promotion Campaign, Keppel FELS won the Safety Initiative Award at the Seatrade Maritime Awards held on 23 June 2017.

Themed "Intervene! Don't look away", the HSE excellence promotion campaign launched in July 2016 aimed to equip the workforce with the knowledge and ability to intervene whenever an unsafe act was committed.

This message was promoted through various platforms such as poster design competitions, games, as well as a song which was composed by Keppel FELS employees.

The campaign garnered strong participation from workers and created a multiplier effect in driving a safer workplace by encouraging intervention in unsafe situations. Workers were more motivated to take ownership of not only personal safety, but also the safety of others at work.

# WSH outreach



The launch of the National WSH Campaign 2017 was graced by Mr Chan Chun Sing (centre in red), Minister in Prime Minister's Office and Secretary General, NTUC, and attended by management from Keppel O&M

As part of ongoing efforts in safety excellence, Keppel Offshore & Marine (Keppel O&M) participated in the 2017 National Workplace Safety and Health (WSH) Campaign launched on 22 April 2017 and showcased projects such as the

Coupler Repair Workbench, which bagged the WSH Innovation Award in the 2015 WSH Awards.

This year's WSH Campaign took the form of a family carnival to encourage families to be involved

in WSH. The event also featured various outreach platforms, such as short videos, print collaterals, exhibits, and online e-learning modules for children and adults.

The campaign message, "Prevent all injuries. Go home safe and healthy", highlighted the importance of taking preventive measures since injuries at work not only affect workers, but also the people around them.

Organised by the WSH Council, National Trades Union Congress (NTUC) and Singapore National Employers Federation (SNEF), the annual National WSH Campaign sets the stage for the WSH Council's year-long outreach efforts to promote safety and health in workplaces.

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## Helming Keppel O&M Alumni



Mr Hoe Eng Hock

Mr Hoe Eng Hock, former MD of Keppel Singmarine, has assumed the role of Chairman of the Keppel Offshore & Marine (Keppel O&M) Alumni from 1 June 2017. Mr Hoe succeeds Mr Tong Chong Heong, former CEO of Keppel O&M.

In his first letter to alumni members, Mr Hoe, who is also the former President of Keppelite Recreation Club, shared that he would do his best "to continue the good work achieved in the Alumni".

Mr Hoe retired in April 2016 after 41 years of service with Keppel O&M. His career began with Keppel in 1975 as a Ship Repair Management Trainee. He subsequently rose through the ranks and played a key role in the company's global expansion into other countries such as Azerbaijan, Brazil, China and Philippines.

Thereafter, Mr Hoe took on senior management positions in Keppel Shipyard and Keppel Singmarine. He retired as MD (Special Projects, Marine) of Keppel O&M in April 2016.



# Tightening up on safety

During its annual safety review, Keppel FELS uncovered a trend of incidents relating to finger injuries. After a more thorough investigation, the Health, Safety & Environment (HSE) team discovered that finger injuries were usually sustained during the tightening and dismantling of pipe spools, valves or flanges.

Traditionally, two workers are involved in the installation of pipe spools, which are prefabricated components of a piping system. The first worker would need to

hold the bolt in position, while the second worker tightened the nut on the other end using a spanner. As such, there were several pinch points which could potentially result in finger injuries. Pinch points are points in between moving or stationary parts of a machine where a person's body part may get caught, thereby leading to an injury.

Motivated to eliminate the risk of finger injuries among fellow Keppelites, Team Shark from the Production Piping department at

Keppel FELS, set out to develop a safe and efficient way to tighten bolts and nuts.

After a vigorous process involving several rounds of product design and testing, Team Shark successfully developed the 'Handy bolt and nut tightener'.

The team's invention consists of a spring lock mechanism and neodymium alloy magnets to firmly secure the bolt and nut in place. The spring lock can also be adjusted to fit different sizes of bolts and nuts. This reduces the possibility of injury, especially in constrained spaces onboard rigs and vessels.

The safety innovation was a hit in the trials conducted by the team – not only did the innovation prevent fingers from being caught in between the spanner and pipe during the tightening of the nut, it also improved productivity.

Further analysis revealed that use of the 'Handy bolt and nut tightener' can save over 200 man-hours during the construction of a B-Class jackup rig. Keppel FELS has since revised its standard operating procedures and trained its workers to use the improved tightener.

The 'Handy bolt and nut tightener' recently won the Workplace Safety and Health (WSH) 2017 Innovation Award and has been well received by different stakeholders including rig owners, class societies and contractors.



The newly developed tightener, which consists of a spring lock mechanism, reduces the risk of finger injury in constrained spaces especially onboard rigs and vessels

# Knowledge sharing



Mr Aziz Merchant, ED of KOMtech, presenting a token of appreciation to Professor Chua Chee Kai, Executive Director of SC3DP, for his sharing on 3D printing

Keppelites from across Keppel Offshore & Marine (Keppel O&M) participated in knowledge sharing sessions on future forward technologies such as 3D printing and robotics.

Keppel Offshore & Marine Technology Centre (KOMtech), through its collaboration with Singapore Centre for 3D Printing (SC3DP), organised a lunch talk on 7 June 2017 featuring Professor Chua Chee Kai, Executive Director of SC3DP.

Speaking to a crowd of over 60 participants, Prof Chua shared SC3DP's vision and strategy, highlighting key research pillars and capabilities. With exciting possibilities in industries such as manufacturing, aerospace, and offshore and marine, Prof Chua urged the audience to ride on the 3D printing wave.

As part of the partnership between

National University of Singapore (NUS) Advanced Robotics Centre Faculty of Engineering, Singapore-MIT Alliance for Research and Technology (SMART) and KOMtech, Keppelites also attended various talks on robotics.

Mr Ioannis Rekleitis, Assistant Professor of the Computer Science and Engineering Department at University of South Carolina, spoke about increasing autonomy of robotic systems in challenging environments, while Mr Gregory Dudek, Professor with the School of Computer Science at McGill University, shared ways to exploit machine learning to refine the performance of amphibious vehicles.

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# Engaging students

Keppel Offshore & Marine's shipyard in Brazil, BrasFELS, regularly engages a wide range of external stakeholders to share industry knowledge, glean new insights as well as to continually build relations.

On 13 April 2017, BrasFELS received 45 students taking up Naval and Oceanic Engineering at the Federal University of Rio de Janeiro (UFRJ).

During the visit, BrasFELS shared its history, track record and projects, as well as Brazil's offshore and

marine industry. The students were also brought on a tour around the shipyard where they

got to see close-up floating production storage and offloading (FPSO) units and drilling rigs.



45 students from the Federal University of Rio de Janeiro had the opportunity to learn more about BrasFELS' operations during their yard visit on 13 April 2017

# Broadening expertise



The opening ceremony was attended by management from the Singapore University of Technology and Design (SUTD) and Keppel Offshore & Marine (Keppel O&M), including Professor Chong Tow Chong (sixth from right in first row), Provost of SUTD, Mr Chris Ong (fifth from right in first row), then-Acting CEO of Keppel O&M, and Mr Paul Tan (fifth from left in first row), CFO of Keppel O&M

After a successful first edition in 2016, the Keppel Offshore & Marine (Keppel O&M) Technology and Engineering Development (KTED) programme commenced its second run on 17 April 2017.

A collaboration with the Singapore University of Technology and Design, the KTED programme is designed to deepen participants' knowledge by providing learning opportunities with industry leaders, researchers and academics from renowned institutions such as Massachusetts Institute of Technology (MIT) and National University of Singapore (NUS).

38 Keppelites from Keppel O&M enrolled into the eight-month programme, which challenges participants to solve real-life business and engineering issues.

Held in three phases from April to November 2017, the KTED programme covers not only technology and engineering related topics like Design Thinking and Disruptive Innovation, but also industry-specific topics such as Gas Technology and Arctic Offshore Engineering.

# Distinguished partner award

In recognition of its strong partnership with the Institute of Technical Education (ITE) throughout the years, Keppel Offshore & Marine (Keppel O&M) was awarded the ITE 25th Anniversary Distinguished Partner Award at the anniversary celebration held on 26 May 2017.

The award acknowledges the efforts of Keppel O&M in developing technical capabilities as well as enhancing learning and development opportunities for ITE staff and students.

Keppel O&M provides traineeship and internship places to ITE students in courses such as Marine and Offshore Technology, and



Representing Keppel O&M, then-Acting CEO, Mr Chris Ong (centre), receives the ITE 25th Anniversary Distinguished Partner Award from Mr Tharman Shanmugaratnam (second from left), Deputy Prime Minister & Coordinating Minister for Economic & Social Policies

Marine Engineering. ITE also works closely with Keppel O&M to develop and review course curriculum to ensure that these courses remain relevant.

In addition, Keppel O&M

collaborates with ITE to offer the Assistant Technical Associate and Technical Associate schemes, two-year work-and-study programmes which include classroom learning and on-the-job training.



# Trading ideas

Through engagements, as well as workshops and lectures, BrasFELS' employees deepen industry knowledge and improve collaboration with one another.

## ENGAGING OVER COFFEE

On 19 April and 6 June 2017, BrasFELS' Human Resource Department organised "Coffee with the President" sessions where employees had the opportunity to engage in an open dialogue with Mr Marlin Khiew, President of BrasFELS.

During the session, Keppelites also took the opportunity to share their work experiences and exchanged ideas to improve work processes. Mr Khiew encouraged Keppelites to continue to be guided by Group's core values and operating principles as they pursue higher standards of excellence in their jobs.

## MANAGING RISK

Members of the BrasFELS' Alumni Programme also organised a workshop covering risk management on 28 April 2017.

The workshop was attended by a workshop covering risk management on 28 April 2017. The workshop was attended by 30 existing Keppelites, as well as alumni members.

In his opening address, Mr Samuel Wong, CFO of BrasFELS, highlighted Keppel's commitment to innovate while being prudent. Other topics covered include the Keppel Group Risk Guidance that aims to adopt a balanced approach to risk management, with a focus on four areas: Strategic Risk, Operational Risk, Compliance Risk and Financial Risk.

In an effort to give back to the community, participants of the workshop contributed items of personal hygiene to the Child and Youth Care Center in Angra dos Reis, Rio de Janeiro, Brazil.

## DEEPENING INDUSTRY KNOWLEDGE

Seeking to deepen the knowledge of employees in the offshore industry, the Alumni Programme organised a lecture, titled "Engineering approaches in the naval industry" on 9 June 2017.

Conducted by BrasFELS' employees as well as PhD students from the Ocean Engineering faculty at the Federal University of Rio de Janeiro, the session covered topics ranging from hydrodynamic effects of waves and currents on floating structures to structural analysis of offshore systems.

Participants of the workshop also contributed non-perishable food items to the 'Irmãos de Coração' (Brothers of Heart), which goes towards the preparation of meals for the homeless in Angra dos Reis, Rio de Janeiro, Brazil.



BrasFELS holds regular "Coffee with President" sessions where employees engage in an open dialogue with the shipyard's President, Mr Marlin Khiew (centre in white)

# Cherished experiences

After completing Maersk Intrepid, then the world's largest ultra-harsh environment jackup rig back in March 2014, Firdaus Rahim was offered a role in Caspian Shipyard (CSC) located in Baku, Azerbaijan.

Despite having little knowledge of the Azerbaijani culture, Firdaus took the plunge and convinced his family to join him in a whole new world of sights, sounds and experiences.

The then-Construction Manager at Keppel FELS was determined to take on the challenge. Firdaus shared, "It was a tough choice but I decided to take up the job offer as the experience gained would be priceless and I did not want to miss this opportunity."

"Even though the Azerbaijani culture is vastly different from what we are familiar with in Singapore, we were determined to assimilate quickly so we stayed in an apartment within Baku (the capital and commercial hub of Azerbaijan) and made an effort to interact with the locals regularly."

During his three-year secondment, Firdaus took charge of both the construction methodology as well as site execution of ongoing yard projects. As the Shipyard Manager overseeing construction, he was involved in all phases of the project from supply chain management to subcontracting.

"The biggest obstacle I had to overcome was the difficulty in sourcing of available project

materials in Baku. Importing materials in was equally challenging due to Azerbaijan's strict customs clearance. The project team had to be nimble and agile enough to adapt the construction schedule based on the availability of materials, while ensuring that the project would be delivered safely and timely."

Firdaus, together with his project members, achieved that and more, with the recent delivery of Heydar Aliyev, the latest sixth generation DSS 38M semisubmersible drilling rig, to Caspian Drilling Company (CDC), a subsidiary of State Oil Company of Azerbaijan Republic (SOCAR).

Outside of work, Firdaus enjoys exploring the Azerbaijani streets with his family. To escape the hustle and bustle of the city, they

would take road trips to venture out of Baku.

"Our trip to Sheki, a city 300km from Baku, was particularly unforgettable. It was our first winter experience and we did not expect heavy snow throughout the journey. What would have taken four hours on normal road conditions took us seven hours instead. On hindsight, we were very lucky to arrive safely and it was a fun experience nonetheless."

When asked for his advice to Keppelites who intend to embark on an overseas stint, Firdaus quipped, "Take up the challenge as the experience will truly be yours to gain. The inertia to take the next step will always be there but just go for it. I did, and I never looked back."



Firdaus and his family enjoying a road trip to the Besh Barmag Mountain located in the Siazan district of Azerbaijan

# Guardians of the Earth

To raise awareness for nature conservation, the Keppel FELS CSR committee organised a day excursion to Gardens by the Bay for children with special needs from MCYC Community Services Society on 1st June 2017.

Affectionately named Guardians of the Earth, the event saw volunteers from various departments of Keppel FELS interacting with over 70 children who learnt how Singapore can play an active role in the conservation of the environment.

The event was the first collaboration between Keppel FELS' CSR committee and MCYC. Ms Yap Lin Yi, MCYC Programme



After a successful event at Gardens by the Bay, Keppel FELS hopes to continue the ongoing collaboration with MCYC Community Services Society

Executive, said, "The Keppel team displayed excellent skills in interacting with the children, and were friendly, patient and encouraging. We would like to express our appreciation to Keppel, whose support and generosity made this event possible."

MCYC Community Services Society is a voluntary welfare organisation which helps children and youths-at-risk with educational, social, emotional and moral development.

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# Giving Blood

In partnership with the Philippine Red Cross, Keppel Volunteers in the Philippines organised a blood donation campaign at Keppel Batangas Shipyard and Keppel Subic Shipyard on 14 June 2017, which coincides with World Blood Donor Day.

The World Health Organization (WHO) celebrates World Blood Donor Day every year since 2004 to raise awareness on the need for ready supply of safe blood in times of disaster. The slogan for this year's campaign is "What can you do? Give Blood, Give Now, Give Often".

"It is our duty to help others. Giving blood is one of those small and simple acts of kindness that has a profound impacts on the lives of others," said Mr P. Shanmugam, SVP of Keppel Subic Shipyard, as he donated blood together with other Keppelites.

The successful blood donation campaign collected different blood types amounting to a total of 69.3 litres from 154 donors from Keppel Volunteers Philippines.



A total of 154 donors participated in the blood donation campaign at Keppel Batangas Shipyard and Keppel Subic Shipyard



# Community workshop

A classroom workshop in Brownsville, Texas that will enable young adults to receive construction training was opened on 26 April 2017 by YouthBuild, an initiative of the Community Development Corporation of Brownsville (CDCB). It was named the Keppel AmFELS Construction Workshop in recognition of the contributions by the yard to the workshop.

Besides receiving training conducted by Youthbuild instructors, the beneficiaries will also have opportunities for job placements in companies like Keppel AmFELS.

At the opening ceremony, Melissa A. Landin, Public Relations and Marketing Coordinator for CDCB, said, "We are grateful to Keppel AmFELS for supporting the

community through donations such as the one provided to YouthBuild for the Keppel AmFELS Construction Workshop."

Keppel AmFELS donated US\$12,000 in 2015 for the construction of the workshop as well as the cement pavement outside for students to work on construction projects. As a continuous supporter of the local community, Keppel AmFELS actively looks for ways to help improve the lives of families and children of Brownsville.

"We have the same vision as YouthBuild Brownsville, which is investing in our community, especially investing in our youth, because we see it as an opportunity to grow the talent pool for the industry", Production Department Yard Manager Nino Salinas said.



The opening of the Keppel AmFELS construction workshop provides opportunities for young adults to be trained in construction

# Green lighting garners savings

The introduction of the first phase of Keppel AmFELS' LED lighting retrofit across its offices, customer offices and workshops has helped the company reduce their annual consumption by 75 percent, from 1,782,797 million to 406,990 kilowatts.

For its efforts, the yard received a US\$50,000 rebate by the Brownsville Public Utilities Board (BPUB), the largest rebate given to

a single entity by BPUB. The rebate was announced on 25 April 2017 and is part of BPUB's Green Living Programme geared to incentivise their electric customers for their energy efficiency and water conservation efforts.

Ms Alejandro Cepeda, BPUB's Energy Efficiency and Conservation Coordinator said, "The recognition to Keppel AmFELS aligns with BPUB's 2018 Strategic Plan

Issue 1, Strategy 2 that states environmental stewardship enables the community to conserve resources. This reduction will help reduce BPUB's peak demand and help reduce strain on the grid."

The second phase of Keppel AmFELS' lighting retrofit will include the yard, customer warehouses, engineering, production, commercial and finance buildings.

# Celebrating friendship

Spreading the festive cheer, volunteers from Keppel FELS organised a Hari Raya celebration at the Keppel Leadership Institute for over 60 elderly from the Taman

Jurong branch of Thye Hua Kwan Moral Charities.

Held on 6 July 2017, the event was hosted by management and

volunteers from Keppel Offshore & Marine (Keppel O&M), including Mr Chris Ong, CEO of Keppel O&M, and Mr Chor How Jat, MD (Conversions & Repair) of Keppel O&M and MD, Keppel Shipyard.



Seniors from Thye Hua Kwan enjoying the ketupat making session with Keppel Volunteers and management, including Mr Chris Ong (centre), CEO of Keppel O&M, and Mr Chor How Jat (second from right), MD (Conversions & Repairs) of Keppel O&M and MD, Keppel Shipyard

The celebrations kicked-off with a ketupat making session. Many of the elderly expertly weaved the ribbons, with some even guiding the younger volunteers. Through the hands-on activities, traditions were handed down from the elderly to the younger volunteers and new friendships were forged in the process.

The happy occasion wrapped up with a Best Dressed competition. Spirits were high as the audience cheered on the sporting contestants who gamely showed off their colourful ethnic costumes as they walked down the runway.



A volunteer from Keppel FELS accompanying contestants of the Best Dressed competition as they walked down the runway

Kenny Tan, Assistant Business Development Manager, Keppel FELS, said, "I am thankful for the opportunity to spend the afternoon making ketupat with the elderly and hearing their life stories. It was my first volunteer experience with Keppel Volunteers, and I am looking forward to the next event."

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# Keppel strengthens LNG business with new contracts



Keppel Singmarine has been selected by long-standing customer Stolt-Nielsen to build their first two small-scale LNG carriers

On 24 May 2017, Keppel Singmarine announced that it had secured a contract to build two Liquefied Natural Gas (LNG) carrier vessels for Stolt-Nielsen Gas, a subsidiary of Stolt-Nielsen Limited.

The scope of the contract includes options for Keppel Singmarine to build an additional three similar units for Stolt-Nielsen Gas, to be exercised six, 12 and 18 months from the effective date of the contract.

Mr Abu Bakar, MD of Keppel Singmarine, said, "We are pleased to be selected by Stolt-Nielsen Gas to build their first two small-scale LNG carriers. Keppel yards have repaired a number of vessels for Stolt Tankers previously and we are glad to be able to further support

them with our wide range of products and services.

"This order extends our track record in providing solutions along the LNG value chain, which includes two dual-fuel harbour tugs that we are currently building. Thanks to our shipyard's capabilities and innovative LNG research and development, we are able to meet our customer's needs."

The LNG carriers are expected to be completed in 2Q and 3Q 2019 respectively. They will each have a capacity of 7,500m<sup>3</sup> and will be equipped with engines that can run on both diesel and LNG.

The carriers will have a class notation for bunkering which

adds to their versatility to not only transport but also provide LNG bunkering services if required.

There is a growing demand for small-scale LNG carriers especially for end users located in remote areas not served by pipelines.

Tighter regulation on emissions continues to encourage growth in small-scale LNG projects which are economical and quick to market.

As a specialised shipbuilder, Keppel Singmarine is at the forefront of developing vessels that can run on LNG. In October 2016, it secured orders to build two dual-fuel (diesel/ LNG) harbour tugs based on its award-winning proprietary design.

The 65-tonne bollard pull capacity tugs can run on both LNG and diesel fuel and was awarded the Outstanding Maritime R&D and Technology Award by MPA.