

# OFFSHORE MARINE

A newsletter of Keppel Offshore & Marine

September – October 2016

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**KEPPEL CELEBRATES  
DOUBLE DELIVERIES**

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Keppel Offshore & Marine has signed a memorandum of understanding with the new Technology Centre for Offshore and Marine Singapore (TCOMS)

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# Agility and resilience

Keppel Offshore & Marine (Keppel O&M) continues to stay resilient amidst the ongoing headwinds, and is exploring new opportunities through diversification. Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M, presented the Group's performance and key developments for 3Q & 9M 2016 via a 'live' webcast on 20 October 2016. *OffshoreMarine* reproduces extracts of his speech.

## MACRO ENVIRONMENT

Global growth remains slow. Weak demand in the major advanced economies, coupled with the transition to slower but more sustainable growth in China, are also weighing on global trade.

Against these headwinds, gross domestic product (GDP) growth in Singapore has slowed. According to the Ministry of Trade & Industry Singapore's advance estimates, GDP grew by only 0.6% in the third quarter, compared to the same quarter a year ago, which is the weakest rate of growth since the 2009 global financial crisis.

The landscape for Offshore & Marine (O&M) remains very challenging. The big news for the Oil & Gas sector during the quarter was OPEC's announced deal to cut production. Although still scant on details, the news was welcomed by the oil market and we have seen oil recover to above US\$50 per barrel.

Despite the gradual recovery in oil price, demand in the offshore market is expected to remain tepid. Oversupply remains a key concern, worsened by the overhang of rigs still under construction. With priority given to strengthening their balance sheets, the oil majors



Keppel O&M is also looking at re-purposing technology that it has developed for the offshore industry for other uses, such as floating power plants

are expected to continue holding back on offshore exploration expenditure. On a more positive note, we see continuing interest in Floating Production Storage and Offloading conversions and production solutions such as tension leg platforms and semisubmersible production units, as well as opportunities in the development of specialised vessels.

## BUILDING A STRONGER KEPPEL

Keppel is responding with agility and resilience to the challenging environment, underpinned by our multi-business strategy.

Despite the strong headwinds affecting the O&M industry, Keppel O&M has remained profitable.

Rightsizing of our Keppel O&M business will continue as we prepare for an extended period of weaker demand for new oil rigs. We are not just cutting costs and surviving the downturn in the offshore industry, but are also investing prudently in new capabilities and exploring new markets and opportunities.

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Our aim, as always, is to emerge from the downturn stronger. We are looking at re-purposing the technology that we have developed for the offshore industry for other uses, such as floating power plants and floating desalination plants. We expect that our O&M business will be increasingly diversified beyond just oil and gas.

In the short term, painful measures

which have kept Keppel O&M profitable despite the sharp drop in revenues and operating profits will have to continue.

#### **QUARTERLY REVIEW**

In this quarter, Keppel O&M continued to rightsize, further reducing its direct workforce by about 3,080. This includes a reduction of around 660 in Singapore and 2,420 in our overseas yards.

For the first nine months of the year, Keppel O&M has reduced its direct workforce by close to 8,000 or around 26%.

Much of the reduction has so far been through natural attrition. However, we will also increasingly look into early termination of contracts and selective retrenchment in Singapore, in line with the drop in workload, while ensuring that



Keppel O&M is well positioned to capture opportunities in new markets. It is undertaking the world's first liquefaction vessel conversion

Keppel O&M continues to retain its core capabilities. Other parts of the Keppel Group are still growing and are in need of good people, especially those with strong engineering and project management expertise. Where possible, we will look to redeploy displaced talents to other business units within the Group.

Apart from reducing variable costs, we have also worked on cutting our overheads which have come down by close to 20% year-on-year in the first nine months of 2016.

These efforts, together with cost savings achieved on our projects, have allowed our operating margins to remain at 11.4% for 3Q 2016 and 12.5% for nine months of this year despite the lower top line. We are also reviewing our yard capacity in light of declining workload.

The harsh winter in the O&M market will not last forever. We are not just cutting costs to survive the short term. We are taking advantage of the downturn to restructure Keppel O&M and make the company leaner, more competitive and stronger when spring returns.

The O&M Division has secured new contracts worth about S\$500 million year-to-date.

Even as we work at optimising

our operations and resources, we remain focused on the timely and effective execution of our order book. Twenty projects were delivered on time and on budget in the first nine months of 2016, including nine in the third quarter. Four additional projects are slated for delivery in the last quarter of the year.

We are looking out for opportunities to leverage our expertise to service niche, adjacent, or even new markets. These include production solutions, gas solutions and specialised vessels, as well as non-oil and gas solutions.

We see a promising future for the liquefied natural gas (LNG) market over the long term. The use of LNG as an alternative marine fuel is on the rise as a result of emissions reduction goals set by the International Maritime Organisation and the United Nations Climate Change Conference.

Keppel is well-positioned to capture opportunities across the value chain in the growing gas market. We have secured orders for our first two dual-fuel tugs, which will be built to Keppel's award-winning proprietary design.

Our joint venture with Shell, FueLNG, has also secured its first two contracts from Shell to provide

bunkering services for Keppel Smit Towage and Maju Maritime's dual-fuel tugs.

Keppel will leverage its shipbuilding and design capabilities, and LNG bunkering services to provide end-to-end solutions for vessel owners turning to LNG as a marine fuel.

Keppel O&M, through its subsidiary Gas Technology Development, has also signed an MOU with Shell to jointly explore potential opportunities catering to the demand for LNG as a fuel in coastal areas, inland waterways and the international marine sectors.

Keppel has long been known for our innovative solutions, and we will continue to expand our suite of solutions and pursue new opportunities for growth.

**"We are looking out for opportunities to leverage our expertise to service niche, adjacent, or even new markets. These include production solutions, gas solutions and specialised vessels, as well as non-oil and gas solutions."**

# Execution excellence

Despite a weak medium-term outlook for the oil and gas sector, Keppel Offshore & Marine (Keppel O&M) continues to perform creditably by focusing on executing its projects well, delivering safely and on time, to the satisfaction of its customers.

In the past month, Keppel O&M celebrated milestones for a number of major projects, including the delivery of two Floating Production Storage and Offloading (FPSO) vessels and a high-specification accommodation semisubmersible (semi) as well as the launch of an ice-class multi-purpose vessel.



Keppel Shipyard commemorated milestones for two quality conversion projects, Armada Olombendo and Karapan Armada Sterling III, both of which were executed to the satisfaction of long-standing client, Bumi Armada

## ARMADA OLOMBENDO

Keppel Shipyard is on track to deliver one of the world's largest FPSOs to long-standing client Bumi Armada Berhad (Bumi Armada). The vessel was named Armada Olombendo at a naming ceremony held on 14 October 2016.

In this project, Keppel Shipyard converted a Very Large Crude Carrier (VLCC) tanker to an FPSO measuring 58 metres in width and 382 metres in length, inclusive of the external turret. Armada Olombendo has a design life of 20 years without dry-docking and will be deployed to Block 15/06 East Hub Field Development off Angola to fulfill its charter contract for the exploration and production company, Eni Angola.



Celebrating the naming ceremony of Armada Olombendo are Lady Isabel dos Santos (first row, middle), Lady Sponsor and Chairwoman of the Board, Sonangol; Mr Chow Yew Yuen (first row, far right), CEO of Keppel O&M; His Royal Highness Tunku Ali Redhaudin ibni Tuanku Muhriz (second row, second from left), Chairman, Bumi Armada; Mr Leon Harland (second row, far right), CEO of Bumi Armada; His Excellency Mr Fidelino Figueiredo (second row, third from left), Ambassador of Angola in Singapore; and His Excellency Mr Paolo Crudele (last row, fourth from left), Ambassador of Italy to Singapore

Mr Michael Chia, MD (Marine & Technology), Keppel O&M, said, "This conversion of the VLCC tanker to FPSO Armada

Olombendo is the 16th conversion project that Keppel has executed for Bumi Armada and we are glad to have built a strong win-win partnership with our long-standing client.

“We have recently also delivered a Liquefied Natural Gas (LNG) Floating Storage Unit (FSU) and a North Sea-worthy FPSO to Bumi Armada, their first of such projects. With the current low oil price environment, it is a testament to Bumi Armada’s strong operational excellence that their FPSOs continue to receive good charters. Keppel is proud to support Bumi Armada with our conversion solutions that are cost-effective, robust and reliable.”

“Armada Olombendo FPSO is one of Bumi Armada’s great achievements as this is the largest FPSO project undertaken by the company. The vessel incorporates both the highest oil production

capacity to date and features ones of the largest external turrets used offshore. This is a testament of the capabilities and dedication of our employees, our partners and our contractors,” shared Mr Leon Harland, CEO of Bumi Armada.

Keppel Shipyard’s work scope for the Armada Olombendo project includes refurbishment and life extension works, upgrading of living quarters to accommodate 100 personnel, fabrication and installation of an external turret mooring system as well as the fabrication, installation and integration of topside process modules.

Armada Olombendo is able to handle crude oil production capacity of 80,000 barrels of oil per day (bopd), 120,000 bpd of water injection, 120 million standard cubic feet (MMscf) of gas handling and has a net storage capacity of 1.7 million barrels.

### **KARAPAN ARMADA STERLING III**

Separately, Keppel Shipyard celebrated a naming ceremony on 15 October 2016 for FPSO vessel, Karapan Armada Sterling III.

The spread-moored FPSO unit will be delivered to Armada Madura EPC Limited (Armada Madura), a joint venture between Shapoorji Pallonji Group (Shapoorji Pallonji) and Bumi Armada Berhad). Karapan Armada Sterling III will be deployed to the Madura BD Field in the Madura Strait of East Java, operated by Husky-CNOOC Madura Limited (HCML).

Mr Michael Chia shared, “Our strong partnership with long-time client Bumi Armada has enabled us to execute this project safely and to the highest quality, with the project recording more than three million safe man-hours without any lost time incidents.

*Continues on page 8...*



Project teams celebrating at the naming ceremony of Karapan Armada Sterling III

Continued from page 7.

“As the third conversion/upgrading project for the Shapoorji Pallonji and Bumi Armada joint venture to

date, we are certain that Karapan Armada Sterling III will be as successful as the first two FPSOs,

Armada Sterling and Armada Sterling II.”

Mr Leon Harland said, “Armada Sterling III FPSO is a unique project as she is the world’s first floating facility that has a large sulphur processing plant installed that is capable of producing molten sulphur. The FPSO is able to process approximately 25 tonnes of sulphur per day. It was a challenge to operate with such high sulphur levels, but thanks to the capabilities and collaboration of the teams at BAB and all our partners and contractors, we have completed a fit-for-purpose solution for our client HCML.”



Mr Michael Chia (third from right), MD (Marine & Technology), Keppel O&M, Mr Ravi Shankar (third from left), CEO of Shapoorji Pallonji Oil and Gas, and Mr Leon Harland (fourth from left), CEO of Bumi Armada affirmed their strong partnership at the naming ceremony for Karapan Armada Sterling III

Keppel Shipyard’s work scope for the Karapan Armada Sterling III FPSO includes refurbishment and



Keppel FELS has delivered Floatel Triumph, the fifth high-specification accommodation semisubmersible built to Keppel’s proprietary SSAU™ 5000NG design, safely and on time



life extension works, upgrading of living quarters to accommodate 80 personnel, fabrication and installation of mooring systems as well as, installation and integration of topside process modules.

Karapan Armada Sterling III is designed to process 110 mmscfd scales gas, 7,500 barrels oil condensate, and is equipped with sulphur handling facilities. It has a 12-point spread mooring arrangement and has a storage capacity of 370,000 barrels.

#### **FLOATEL TRIUMPH**

On 29 September 2016, Keppel FELS delivered Floatel Triumph, a fifth high-specification accommodation semi, to Floatel International Ltd (Floatel) safely and on time.

The semi, which is built to Keppel's proprietary SSAU™ 5000NG design, will be chartered by Chevron Corporation for work in the Wheatstone field in Western Australia. Floatel Triumph arrived on location in mid-October 2016. Thereafter, it will work for INPEX Operations Australia in Ichthys field, off Western Australia.

Mr Chris Ong, MD, Keppel FELS, said, "In spite of the low oil price environment, Floatel was able to secure charters for Floatel Triumph. This is a strong indication of the market's preference for the reliable and superior performance offered by Keppel-designed rigs as well as the operational excellence of Floatel.



Project teams from Keppel Singmarine and Maritime Construction Services celebrated the successful launch of the ice-class multipurpose vessel, Everest

"We have worked closely with Floatel to ensure that the semi meets all the requirements of Chevron in the Wheatstone field. From design to engineering and execution, Keppel FELS collaborates closely with our clients to develop cost effective solutions for the market."

#### **EVEREST**

On 15 October 2016, Keppel Singmarine celebrated the successful launch of an ice-class multipurpose vessel, Everest, built for New Orient Marine, a subsidiary of Luxembourg-based Maritime Construction Services.

Designed by Keppel's Marine Technology Development unit, the completed vessel will have an Ice Class Arc 5 notation and capabilities such as Class 3 dynamic positioning and diving support functions, making it suitable for operations in harsh climates with temperatures as low as minus 30 degree Celsius.

Everest is Keppel Singmarine's 11th ice-class specialised newbuild and is scheduled for completion in mid-2017.

*Continues on page 10...*

## Preferred partner

In addition to its strong capabilities in executing newbuild projects, Keppel FELS' sterling track record in the repair of mobile offshore drilling rigs and semisubmersibles makes the yard the preferred choice for customers worldwide.

### ENSCO 107

ENSCO 107, a KFELS B Class jackup rig, arrived at Keppel FELS in March 2016 for an upgrade, repair and refurbishment job. The job scope comprised life extension works, including the removal of marine growth, hydro jetting as well as the replacement of pipelines and anodes.

Mr Binh Thai Dang, Rig Asset Manager, ENSCO, shared, "Completing the different repair works within the tight timeline was a challenging task. However, the Can Do! spirit of Keppel FELS and the close collaboration between project teams ultimately prevailed, enabling us to achieve a safe and timely delivery."

Following the completion of refurbishment works, the rig left the yard in September 2016 to begin operations in Australia.

### PVD-1

PetroVietnam's first jackup rig, PVD-1, arrived in Keppel FELS for spudcan works, steel renewal as

well as paint works on the hull in September 2016.

Mr Ian Parr, Rig Manager, PetroVietnam, shared, "As always, Keppel FELS' professionalism and dedication ensured a successful re-delivery of our rig. I look forward to our next collaboration together."

To meet the timeline for PVD-1's next contract with Total in Myanmar, the project teams banded together to complete all the works within an impressive timeframe of 10 days. The Keppel-built rig left the yard in October 2016, with the job being completed safely and on time.

### JACK BATES

Jack Bates, a 30 year-old

semisubmersible rig managed by Transocean, completed its Underwater Inspection In Lieu of Drydocking Survey (UWILD) at Keppel FELS from July to September 2016. The yard also integrated and installed new third-party equipment on the rig, upgraded its mud mixing system, repaired its mud manifold and renewed its high-pressure piping.

Mr Ray Berry, Project Manager, Transocean, shared, "This is the first time that Jack Bates had its UWILD performed at the quayside instead of being anchored offshore. Despite a tight schedule, our strong partnership with Keppel enabled us to deliver yet another successful project."



Close cooperation between Keppel and Transocean enabled the repair on Jack Bates to be completed safely and on time

# Fueling the LNG business

Since securing Singapore's Liquefied Natural Gas (LNG) Bunkering license in a joint venture with Shell in January 2016, Keppel Offshore & Marine's (Keppel O&M) Gas Technology Development (GTD) has continued to make inroads in the LNG-related business.

The International Maritime Organisation's (IMO) confirmation that the global 0.5% cap on the sulphur content of marine fuel will come into force in 2020 will spur widespread adoption of LNG as marine fuel.

Keppel O&M's equal joint venture company with Shell, FueLNG, will be well positioned to benefit from this as it primes itself to begin LNG bunkering in 2017, starting with truck to ship bunkering.

Mr Michael Chia, MD (Marine & Technology) of Keppel O&M explained, "Keppel and Shell can combine our resources and expertise as a leading global shipbuilder and energy supplier, and work together in collaboration with stakeholders such as shipping companies, terminal operators, local governments and regulators to meet their needs which may include engine retrofit or setting up coastal LNG storage infrastructure."

Adding its voice as a prominent player in the sector, Keppel also participated at the inaugural LNG Bunkering Roundtable held



Celebrating the partnership of FueLNG are (from left to right) Ms Goh Swee Chen, Chairperson of Shell Singapore, Mr Michael Chia, MD (Marine and Technology), Keppel O&M and Mr Lauran Wetemans, GM, Downstream LNG Shell International

in October 2016 in Singapore, where key organisations across the value chain discussed on demand and supply, regulatory and infrastructural issues.

To further extend Keppel's network and support, Keppel's GTD recently joined SEALNG, a non-profit collaborative industry foundation, which works to accelerate the widespread adoption of LNG as a marine fuel.

Mr Chia is also a member of the Society for Gas as Marine Fuel (SGMF), a premier non-governmental organisation that promotes safety and industry best practice in the use of gas as a marine fuel.

The technical committee of SGMF was hosted to a tour of Keppel's yards in October 2016 to learn more about the company's innovations in gas-related technology.

"As Keppel grows its LNG business to tap this promising market, bunkering will form only one part of its gas strategy, which also includes conversion, repair and newbuild solutions. As a comprehensive solutions provider, we will be able to reap the synergy in marketing and reach out to a larger clientele," Mr Chia added.

# Industry engagement

## PARETO CONFERENCE

Keeping abreast of the latest industry trends and offerings, Keppel O&M participated in the annual Pareto Securities Oil & Offshore Conference, the largest oil and offshore investor conference in Europe.

The 23rd edition of the conference, held in Oslo, Norway, from 14 to 15 September 2016, observed that there are early signs of market improvement. Pareto Securities, the organiser of the conference, shared that oil companies have adapted well in the low oil price environment and forecasted that

the industry is at or near the bottom of the down cycle.

As the only speaker representing a rigbuilder at the conference, Mr Chow Yew Yuen shared on Keppel's multi-pronged approach in responding nimbly and flexibly to market needs. From rightsizing and optimising its operations to broadening product and service offerings, Keppel O&M continues to focus on execution excellence while exploring new opportunities in the market.

Presentations from other leading oil and gas companies likewise

saw a focus on capturing value through safer and more efficient operations, increased cost competitiveness with faster and deeper cost reductions, as well as investments in next-generation portfolios.

## EXCHANGE ON THE OSV INDUSTRY

Emerging technologies and improved designs for the Offshore Support Vessels (OSVs) of tomorrow were the central themes of the 6th International Conference on Technology and Operation of OSV – OSV Singapore 2016, which took place from 8 to 9 September 2016 at Singapore Polytechnic.

The biennial conference, which gathered experts from the OSV community for technical presentations and discussions to further advance the interests of the industry, was supported by Keppel Singmarine for the sixth consecutive time since 2005 as its sole Solitaire Sponsor.

Mr Chow Yew Yuen addressed industry players in the conference's opening ceremony as its Guest-of-Honour. He exhorted the importance of continuing to invest wisely in innovation amidst current headwinds faced by the offshore and marine industry.

Mr Chow said, "While we cannot predict when the oil price will recover, we can continue to engage in technology foresight and study market trends so that when the time is ripe, we can seize new opportunities."



At the Pareto Securities Oil & Offshore Conference, Mr Chow Yew Yuen (right), CEO, Keppel Offshore & Marine, networked with customers, investors and partners, including Mr Bill Rose (left), President, Prism Offshore Services LLC



Keppel Singmarine participated in OSV Singapore 2016 both as a sponsor and exhibitor

# Opportunities for growth

Keppel continues to spearhead innovative ways to stay ahead, remain robust and seize opportunities in new markets despite challenges facing the offshore and marine industry.

In the case of Keppel Offshore & Marine (Keppel O&M), the company has been judiciously streamlining operations and increasing productivity while developing products for new adjacent and non-oil and gas markets.

Mr Chan Chun Sing, Singapore's Minister in the Prime Minister's Office and Secretary-General of the National Trades Union



Minister Chan Chun Sing (in orange) was briefed on operations in the yard by Mr Chow Yew Yuen (right), CEO of Keppel O&M, and Mr Chris Ong (left), MD of Keppel FELS

Congress, visited Keppel O&M on 26 September 2016 to gain a deeper understanding of these measures and explore ways where the government can provide support.

During his visit, Mr Chan noted

that many of the innovative products and projects that leveraged Keppel's technology expertise, such as its offshore desalination plants, LNG products and jackup projects, could have viable applications in Singapore and globally.

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## Offshore solutions for the Arctic

As a leader in the design and construction of ice-class vessels and services, Keppel Offshore & Marine (Keppel O&M) was invited to present a breakout session for the first time at the Arctic Circle Assembly (ACA), which took place from 7 to 9 October 2016 in Reykjavik, Iceland.

Led by Keppel O&M Technology Centre (KOMtech), the team delivered a presentation titled 'Singapore and the Arctic: Partnership between Academia and Business through Research and Innovation'.

The Arctic Circle is the largest

network of international dialogue and cooperation focused on the development and sustainability of the Arctic environment.

Mr Abu Bakar, MD, Keppel Singmarine, who headed the Keppel delegation, shared, "Keppel O&M's maiden presentation at the ACA was well-received and the team gleaned fresh perspectives from the robust discussions. As the only Singaporean organisation presenting a breakout session at the ACA, we are proud to fly the nation's flag high at this prestigious international forum."



Mr Abu Bakar (third from right), MD of Keppel Singmarine, presented a token of appreciation to Mr Olafur Grimsson (third from left), Chairman of the Arctic Circle and the former President of Iceland

# Engaging with India

Keppel Shipyard, together with its clients Bumi Armada and Shapoorji Pallonji, hosted an Indian delegation led by Mr Dharmendra Pradhan, Honorable Minister of State (Independent Charge) for the Ministry of Petroleum and Natural Gas, to a visit on 10 September 2016.

Minister Pradhan and his delegation, comprising government officials and national oil company representatives, were in Singapore for a roadshow to reach out to international investors.

During the visit, Mr Chow Yew Yuen, CEO of Keppel Offshore &



Mr Chow Yew Yuen (left), CEO of Keppel Offshore & Marine, hosted a visit by Mr Dharmendra Pradhan (right), Honorable Minister of State (Independent Charge) for the India Ministry of Petroleum and Natural Gas, at Keppel Shipyard

Marine, shared more on the group and in particular Keppel Shipyard's conversion capabilities. The Indian delegation also took a tour

onboard the Floating Production Storage and Offloading (FPSO) vessel being converted for Bumi Armada and Shapoorji Pallonji.

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# Building presence in Norway

In conjunction with Singapore President Dr Tony Tan Keng Yam's state visit to Norway, the Singapore Business Federation (SBF) led a business delegation to the country from 9 to 15 October 2016.

The delegation, comprising representatives from 13 Singapore companies in the energy, offshore and maritime, food sourcing and urban solutions sectors, participated in conferences, site visits, networking sessions and

briefings by government agencies during the week-long visit.

Mr Chor How Jat, MD of Keppel Shipyard, was part of this high-level delegation and represented Keppel Offshore & Marine in a panel discussion at the Norway-Singapore Business Forum which was graced by President Tony Tan and His Majesty King Harald V of Norway. Mr Chor shared perspectives on opportunities amidst a challenging energy environment and potential areas for collaboration in maritime research and development with Norwegian companies.



Mr Chor How Jat (left), MD of Keppel Shipyard, and Mr Sven Bang Ullring (right), Chairman of Keppel Technology Advisory Panel, exchanged market insights with Ms Dilek Ayman (centre), State Secretary for the Norwegian Ministry of Trade, Industry and Fisheries

# Keppel partners TCOMS



Representing Keppel O&M, CEO Mr Chow Yew Yuen (fifth from left) signed a memorandum of understanding with the Technology Centre for Offshore and Marine Singapore during its launch which was officiated by Mr S Iswaran (eight from left), Minister for Trade and Industry (Industry) (Photograph courtesy of the National University of Singapore)

To explore research collaborations in offshore and marine engineering technologies, Keppel Offshore & Marine (Keppel O&M) was one of eight key industry leaders that signed a memorandum of understanding with the new Technology Centre for Offshore and Marine Singapore (TCOMS).

Launched on 31 October 2016, the centre aims to enable the local offshore and marine engineering industry to undertake higher-value activities through global partnerships with the industry, research institutions and academia.

Mr Chow Yew Yuen, CEO, Keppel Offshore & Marine, shared, "As part of our ongoing efforts to innovate and identify growth areas, Keppel is always seeking opportunities to collaborate with leading educational and research

institutes. Through our partnership with TCOMS, we hope to leverage its R&D capabilities and combine them with ours as well as industrial expertise to develop more robust and innovative solutions that can effectively address the challenges and needs of the offshore and marine industry."

The facility, slated to be completed in 2019, will be equipped with wave and current generation systems that can simulate harsh ocean environments, including those in ultra-deep waters. This will help develop innovative concepts like intelligent floating platforms and ships, autonomous systems, marine robotics and subsea systems.

During the launch, Guest of Honour, Minister for Trade and Industry (Industry), Mr S Iswaran shared that the Government is

looking into measures to help offshore and marine businesses in light of the current challenging landscape. However, he added that it is critical that companies "take appropriate measures in their own long-term interests to ensure that good businesses survive, respond to the industry's challenges and build capabilities for future growth."

Mr Iswaran said the industry should also continue to build capabilities for the long term and "be ready for the next up-cycle".

The Government will invest close to \$107 million into infrastructure at the new TCOMS facility at the National University of Singapore. A key feature of the centre will be a next-generation Deepwater Ocean Basin that comes with simulation capabilities, including smart sensing and data analytics.

# Safety, our collective responsibility

Keppel's stakeholders, including employees, contractors, subcontractors, partners and business associates, reaffirmed their collective commitment to uphold the Group's core value of safety at the annual Keppel Group Safety Convention.



The 10th Keppel Group Safety Convention brought together over 900 Keppelites, contractors, subcontractors, partners and business associates to reaffirm their collective commitment to safety

"Keppel's safety goals are best achieved through a coordinated, integrated approach, where business units learn from one another, not just within each vertical, but across the Group. We must continue to harness our strengths, resources and expertise as OneKeppel to bring us another step closer to Health, Safety and Environment (HSE) excellence."

This was one of the key messages conveyed by Mr Loh Chin Hua, CEO of Keppel Corporation, during the 10th Keppel Group Safety Convention held on 28 October 2016 at The Star Performing Arts Centre, Singapore.

Themed "Harnessing Strengths towards HSE Excellence", the convention brought together



Learning more about this year's winning safety innovation projects are (L-R): Dr Lee Boon Yang, Chairman of Keppel Corporation; Mr Loh Chin Hua, CEO of Keppel Corporation; Guest-of-Honour Mr Sam Tan, Minister of State, Prime Minister's Office and Ministry of Manpower, Singapore; and Mr Tan Ek Kia, Chairman of Keppel Corporation's Board Safety Committee





Mr Chris Ong (right), MD of Keppel FELS, received the Chairman Safety Challenge Trophy on behalf of Keppel FELS from Dr Lee Boon Yang (left), Chairman of Keppel Corporation



This year's convention saw the inclusion of a live sharing session by six employees from across the Group

over 900 Keppelites, contractors, subcontractors, partners and business associates – a record attendance for the event – to reaffirm their collective commitment to safety.

Gracing the event as Guest-of-Honour was Mr Sam Tan, Minister of State, Prime Minister's Office and Ministry of Manpower of Singapore, who said in his keynote address, "I am heartened by Keppel's strong support of our national initiatives and efforts by allowing stakeholders to be regularly updated on the latest best safety practices and innovations. Your commitment to high standards of safety in your yards, offices and worksites in Singapore and around the world is indeed commendable."

While recognising the myriad safety achievements, milestones and efforts of the various Keppel business units over the past decade, Mr Loh emphasised that more must be done to raise the bar, especially in light of the Group's recent spike in Accident

Severity Rate. "There is much room for improvement in our safety efforts across the Group, and we cannot continue business as usual," he said.

Mr Loh also applauded Keppelites who continue to come up with innovative solutions to enhance safety at work. A total of 53 teams participated in this year's safety innovation competition, up from 48 entries last year.

The convention recognised winners of the Keppel Group Safety Awards, which recognises Keppelites who have gone the extra mile to foster safe and healthy working environments, as well as the Keppel Group Safety Photography Competition, for photos that captured this year's safety theme. The coveted Chairman Safety Challenge Trophy was awarded to Keppel FELS for its strong safety performance and innovative safety measures.

This year's convention also saw the inclusion of a live sharing session by six employees from

across the Group, who discussed on-stage how they actively make a difference at their respective work sites, as well as a safety game show hosted by Keppel Infrastructure's Mr Paul Rodrigues, also chairman of the event's organising committee.

In his closing remarks, Mr Tan Ek Kia, Chairman of Keppel Corporation's Board Safety Committee, touched on how safety contributes significantly to sustainability in Keppel's businesses.

"We therefore cannot overemphasise the importance of commitment and ownership of safe working practices. I can see among the management and staff strong desire, determination and commitment to improve further," he shared.

The coveted Chairman Safety Challenge Trophy was awarded to Keppel FELS for its strong safety performance and innovative safety measures.

*Continues on page 18...*

Continued from page 17.

## 2016 Safety Innovation Award Winners

A total of 53 safety innovation teams submitted their safety innovation projects this year. Three platinum, five gold, 12 silver and 15 bronze awards were presented to project teams who developed innovative solutions to improve safety.

PROJECT NAME	BUSINESS UNIT	AWARD
Sea Water Intake Guide Online Cleaning	Keppel Infrastructure	Platinum
Roll-Ex	Keppel FELS	Platinum
Thruster Trolley	Keppel Shipyard	Platinum
Multi-Purpose Lifter	Keppel Infrastructure	Gold
Anti-Flooding Warning System	Keppel FELS	Gold
ROE Underwater Viewer	Keppel Shipyard	Gold
Good Catch	Keppel Singmarine	Gold
B.O.B	Keppel Telecommunications & Transportation	Gold
Safety Innovation Project 2016	Keppel Infrastructure	Silver
Incident Protection e-Lock	Keppel Infrastructure	Silver
Embrace Technology to Enhance Safety & Security at Workplace	Keppel Land	Silver
Installation of Safety Barrier in Refuse Compactor Room	Keppel Land	Silver
The Eye of Tower Cranes II	Keppel Land	Silver
Foldable Manhole Barrier	Keppel FELS	Silver
Cold Work Alignment Jig	Keppel FELS	Silver
No-NID	Keppel Shipyard	Silver
Safe Manhole Protection	Keppel Shipyard	Silver
Super Cradle	Keppel Singmarine	Silver
Seamless Communicator	Keppel Singmarine	Silver
Lock Stop	Keppel Telecommunications & Transportation	Silver
Working Safely at the Sifting Ash Conveyor	Keppel Infrastructure	Bronze
Safe Footing	Keppel Infrastructure	Bronze
Adjustable Trellis Balcony Ladder	Keppel Land	Bronze
Enhancement for Re-threading of Scaffold Coupler	Keppel Land	Bronze
Wuxi Safety Railing	Keppel Land	Bronze
Handy Bolt and Nut Tightener	Keppel FELS	Bronze
Safety Through Laser Scanning	Keppel FELS	Bronze
Flange Lifter	Keppel Shipyard	Bronze
Chain Block Holder: Shaft Pulling Tool	Keppel Shipyard	Bronze
New Grit Discharge Chute	Keppel Shipyard	Bronze
Manhole Guardian	Keppel Singmarine	Bronze
Smart Grip	Keppel Singmarine	Bronze
K-truck Dashcam	Keppel Telecommunications & Transportation	Bronze
Light Savior	Keppel Telecommunications & Transportation	Bronze
Racking Eye	Keppel Telecommunications & Transportation	Bronze

# Innovative edge



Senior management with Keppelites who received gold awards at the fourth Keppel Offshore & Marine Innovation Awards

Recognising that technology and innovation are two key drivers that keep it ahead of the competition, Keppel Offshore & Marine (Keppel O&M) has constantly invested in R&D and encouraged its employees to come up with new and impactful solutions to sustain its market leading position.

At the fourth Keppel O&M Innovation Awards held on 27 October 2016, the company continued to recognise talented Keppelites who have made an impact on the company and industry through their innovative solutions.

A total of 41 team across 10 business units in Keppel O&M participated this year, a 25% increase over last year. Thirty-six recipients walked away with gold awards, which include a cash prize for each team.

Addressing the winners at the awards ceremony, Mr Loh

Chin Hua, Chairman of Keppel O&M and CEO of Keppel Corporation, said, "Innovation has been a key pillar of Keppel's success and even as we go through this difficult period, we must continue to invest in R&D and reinvent our business strategies.

"As we search for opportunities in new markets, we will have to re-purpose our technologies, so innovation becomes even more important. I encourage all Keppelites to think out of the box, study the technologies we have developed and come up with new applications and systems."

Mr Chow Yew Yuen, CEO of Keppel O&M, added, "It is through innovation that we are able to differentiate ourselves from our competitors. All Keppelites must embrace the strong culture of innovation here at Keppel."

Keppel O&M has been recognised for several groundbreaking

innovations this year. In July 2016, Keppel FELS' semi-submersible DSS™ Series rigs and N-Class jack-up rigs, as well as Keppel Singmarine's arctic icebreakers, were recognised by the Institute of Engineers Singapore as being among the top 50 engineering feats that have contributed to Singapore's nation building.

Keppel O&M Technology Centre's Azimuth Stern Drive tug design with a 65-tonne bollard pull capacity, which can run on both liquefied natural gas and diesel fuel, also received the Outstanding Maritime R&D and Technology Award at the biennial Singapore International Maritime Awards in April 2016.

# Energy-efficient blowers

Proper ventilation is vital for workers performing work in confined spaces. This is where ventilation blowers play a key role in ensuring a continuous supply of fresh air. There are 300 blowers of different sizes deployed around the clock in Keppel Shipyard and finding a way to be more energy-efficient will achieve significant cost and energy savings.

A project team led by Keppel

Shipyard and comprising members from Ngee Ann Polytechnic's Centre of Innovation for Marine Offshore Technology and Safenergy, a software development vendor, set about exploring just how they could achieve such a result by tweaking the existing blower design.

Team member Andrew Chua, an engineer from Keppel Shipyard, shared the team's approach to

seeking a more efficient design, "Energy efficiency starts with a big heart for the Earth and a keen intuitive eye for inefficiency."

The previous version deployed at Keppel Shipyard was a 20 year old design known as the steel axial forced draft ventilation blower. Powered by a 7.5kW standard efficiency motor, the blower functions by evacuating harmful gases trapped within the working space, while fresh air is continually pumped into the chamber to maintain acceptable oxygen levels for work to be carried out.

In tweaking the blower's design, the project team used a more energy-efficient 3.7kW motor that allowed them to maintain the air change rate at 16,800 m<sup>3</sup> per hour. It is also a more eco-friendly design, lowering the footprint of each blower by 6.22 tonnes of carbon dioxide equivalent and 14,400kWh of energy per year. This results in an estimated cost savings of about \$2,600 for each unit per year. On top of these savings, space is also better utilised due to the new blowers' stackable design.

In recognition of its efforts in conserving energy, Keppel Shipyard received the Energy Efficiency National Partnership award for Best Practices (Honourable Mention) from the National Environment Agency of Singapore on 4 October 2016. The annual awards seek to promote a culture of sustained energy efficiency improvement industry-wide.



Mr Boo Chin Tuan (right), GM, Operations Excellence and Talent Management, Keppel Shipyard, receiving the Energy Efficiency National Partnership award for Best Practices (Honourable Mention) from Mr Masagos Zulkifli (left), Minister for the Environment and Water Resources, Singapore



Project team members worked closely to find a solution to make ventilation blowers used in Keppel Shipyard more energy-efficient

# Pride of Malampaya

Marking the success of the Malampaya Phase 3 (MP3) Depletion Compression Platform (DCP), the Malampaya Consortium unveiled a sculpture at Keppel Subic Shipyard (Keppel Subic) on 2 September 2016. The first built-in-Philippines offshore platform was delivered by Keppel Subic last year for Shell Philippines Exploration B.V. (SPEX).

“Keppel Subic saw the completion

of MP3 from the first cut of steel in December 2012 until the tow-out of the DCP on February 2015. On behalf of the Malampaya Consortium, I thank the MP3 team and Keppel Subic for helping us deliver the new Malampaya platform. We faced a lot of challenges, but I salute you for rising up to the challenge and becoming a part of Philippines history,” said Mr Sebastian Quiñones, Jr., SPEX Asset Manager.



Unveiling of the Malampaya Phase 3 sculpture are (from left to right) SPEX Managing Director Lorelie Osial, Shell National Students' Art Competition artists Melvin Anglaser and Carlo De Laza, Keppel Philippines Marine Inc. President Leong Kok Weng, Keppel Shipyard MD Chor How Jat, SPEX Asset Manager Sebastian Quiñones, Jr. Philippine National Oil Company-Exploration Corporation (PNOC-EC) Vice President for Upstream Operations Raymundo Savella, incoming SPEX Asset Manager Don Paulino, Chevron Malampaya LLC Asset Manager Belinda Racela, and SPEX Malampaya Phase 2&3 Project Manager Antoine Blik

Mr Leong Kok Weng, President of Keppel Philippines Marine, Inc, added, “Keppel Subic is truly honoured to be chosen by SPEX to be the home of the MP3 Project Marker. Let the Malampaya flame symbolise the strong partnership among the different stakeholders, the hard work of everyone involved and the resilience, dedication and creativity of the Filipino people.”

The sculpture of a Malampaya flame was created by winners of the Shell National Students' Art Competition from scrap materials used in the construction of the second Malampaya platform.

The DCP is now stationed and linked with the existing Malampaya Shallow Water Platform 50 km offshore from Palawan in western Philippines. It helps maintain the level of gas production that supplies 30% of the power requirement of the Luzon island of the Philippines.

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## Enhancing corporate governance

Keppel consistently takes a balanced approach to risk management and maintains a strong commitment to good corporate governance.

On 29 and 30 August 2016, members of the Group Regulatory Compliance Working Team attended the inaugural Train-the-Trainer cum Compliance

Training for Management programme.

This programme is part of the Group's ongoing efforts to strengthen regulatory compliance and equip designated trainers in Keppel with the knowledge and tools to conduct regulatory compliance training for their respective local and overseas business units.

Mr Suam Chee Kit, AGM of Risk and Compliance, Keppel Offshore & Marine, shared, “This programme has provided me with a better grasp of the Group's regulatory compliance policies so that we can better train our staff.”

# Specialised capabilities

With an impressive track record of more than 400 newbuild vessels, Keppel Singmarine has developed strong expertise in designing and constructing specialised units that can effectively meet market needs.

DLV 2000, a state-of-the-art derrick lay vessel designed and built by Keppel Singmarine won the Best Ships Award by Marine Log in 2016 for its innovative features, design and incorporation of breakthrough technologies. It is one of the latest state-of-the-art vessels successfully delivered by Keppel Singmarine in recent years. Built to the proprietary design of Marine Technology Development, Keppel's ship design and technology arm, DLV 2000 is the flagship vessel in McDermott's fleet of global offshore pipelay and construction vessels.

Attesting to Keppel's commitment to explore innovative and ever more efficient methods of design and construction, DLV 2000 was also Keppel's first vessel to be completely designed using the 3D graphing software, Smart3D. The software enables designers to do a virtual walkthrough of the model, resulting in less revisions during the construction phase and shortened project schedules.

Equipped with S-lay capabilities, a heavy lift crane, large deck space and accommodation for up to 400 personnel, this vessel is capable of installing pipelines with diameters ranging from 4.5 to 60 inches, in waters up to 10,000 feet in depth.



For its time and materials-saving innovative design and construction approach, DLV 2000 clinched the Silver award at the 2015 Keppel Offshore & Marine Innovation Awards

The vessel also has a fast transit speed of 14 knots and a large 43,000 square foot open deck for the transportation and assembly of large subsea structures, enabling safe and efficient stand-alone operations in remote areas.

Although DLV 2000 is designed to carry out pipelaying using the S-lay installation method, the vessel has been designed and constructed to accommodate a deepwater, 500-tonne flexlay system that can be installed at a future date, giving the owner the flexibility to provide value-added services to meet the needs of the evolving market.

"Fast, powerful and versatile, DLV 2000 gives McDermott the

capabilities to undertake projects that will expand our portfolio of target markets," said David Dickson, McDermott's President and CEO.

"As the new flagship of our fleet, this will allow McDermott to utilise one vessel on projects requiring a combination of pipelay, heavy lift and offshore workforce accommodation that would normally have to be executed by multiple vessels. We also expect DLV 2000 to provide McDermott with a key asset for field development in remote locations through the combination of these versatile construction capabilities and fast transit speed."

# Growing with Brazil

On 6 September 2016, Keppel FELS Brasil's BrasFELS shipyard held an early celebration to commemorate Brazil's Independence Day together with its employees.

Customers including Petrobras and MODEC, as well as members of the community joined in the

celebrations. These included Angra dos Reis' Secretariat of Education, Science and Technology, Ms Jane Aparecida da Rocha; Port Official, Mr Omar Neves and representatives from Cornelis Verolme Scouts and Polo Musical Educacional Yumi Imanishi Faraci (Polo Musical).

The festivities included live music in a collaboration between the Polo Musical band and BrasFELS employees.

In conjunction with the celebration, BrasFELS held a safety awards ceremony during which four employees were presented with tokens of appreciation for their exemplary safety performance and contributions towards a strong safety culture in the shipyard.

Mr Marlin Khiew, President of BrasFELS, said, "BrasFELS' achievements over the years did not come easy. They were the results of our combined dedication and hard work. Our successes were only possible with the teamwork and support of our customers as well as government, institution and community partners.

"Even as we celebrate our past successes, we must continue to keep our eyes on the future. As long as we work together as OneKeppel, BrasFELS will survive this challenging period and emerge stronger than before.

"I want to encourage everyone to continue observing our Core Values, Operating Principles and four golden pillars – execute our projects safely, on time, within budget and to high quality standards. Please also continue to prioritise safety and productivity so as to bring BrasFELS to greater heights."



BrasFELS staff celebrated Brazil's Independence Day together with members of Polo Musical Educacional Yumi Imanishi Faraci and Cornelis Verolme scouts



Recipients of the BrasFELS Safety Awards together with Mr Marlin Khiew (third from left), President of BrasFELS

# First graduates from Keppel-SUTD course



Senior management from Keppel Offshore & Marine led by CEO Mr Chow Yew Yuen (first row, fifth from right), and Mr Chong Tow Chong (first row, sixth from right), Provost, SUTD, celebrated the completion of the inaugural KTED programme with its graduates

Nine months of intensive studying and learning finally paid off for the pioneer batch of participants in the inaugural Keppel Offshore & Marine (Keppel O&M) Technology and Engineering Development programme (KTED). At a graduation ceremony held at the Singapore University of Technology & Design (SUTD) on

13 August 2016, 45 Keppelites from local and overseas shipyards threw their imaginary mortar board caps into the air and celebrated the completion of their course.

Conceived as a partnership between Keppel O&M and SUTD, the programme is designed to deepen participants' industry

knowledge by providing learning opportunities with industry leaders, researchers and academics from renowned institutions such as the Massachusetts Institute of Technology.

During the course, participants also collaborated within multi-disciplinary teams to innovate and transform their ideas into value-added solutions for Keppel O&M. Chan Beng Guan, Deputy Engineering Manager, Keppel FELS, shared, "The KTED programme provided a valuable platform for participants across different business units to share ideas and knowledge, as well as to develop innovative solutions to meet market needs."

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## Nurturing human capital

A strong learning culture is a critical corporate asset. At Keppel, employees are encouraged to upskill and grow to reach their full potential.

On 12 October 2016, Keppel Offshore & Marine celebrated the graduation of 12 Keppelites who had completed their Nitec and Higher Nitec education under Keppel's Technical Associate and Assistant Technical Associate Schemes. Thirty-two employees also attained their Higher Nitec,

Diplomas, Bachelor's Degrees and Master's Degrees under the company's Employee Development and scholarship schemes.

Mr Chow Yew Yuen, CEO of Keppel Offshore & Marine, shared, "All Keppelites are given opportunities to develop their potential, regardless of their starting point. Beyond paper qualifications, skills mastery is very important and I urge all employees to strive for excellence through lifelong learning."

Separately, four engineers from Keppel AmFELS' inaugural Operational Leadership Training Programme received their graduation plaques from Mr Simon Lee, President of Keppel AmFELS, at a ceremony on 22 September 2016. The two-year programme allows selected graduate engineers from universities in Brownsville, Texas, to learn from experienced tradesmen and production personnel by participating in construction and repair work.



# Sprint to the finish

## NETTING THE PRIZE

It was an all-out battle between the Caspian and Atlantic teams in both the Street and Mixed Challenges, as the latter's fiery fighting spirit was challenged by the almost telepathic coordination of the former.

While team Caspian emerged victorious over team Atlantic by a slight one point margin in the Mixed Challenge, it was eventually team Pacific's elegant moves and precise passing in both Challenges that helped them clinch the Overall Champions' Title for Keppel Games' Netball Challenge 2016 in the face of strong resistance from the other two teams.

## COURTING VICTORY

The deafening cheers of Keppelites supporting their respective teams engulfed the Ministry of Education Sports Hall on 25 September 2016 as 24 basketball teams entertained spectators with their fancy footwork on the court and sleight-of-hand passes.

In the Women's Category, fluid moves and coordinated teamwork were the order of the day. After several closely fought rounds, Team Atlantic eventually emerged victorious in an action-packed final against Team Caspian.

Laying claim to the Men's Basketball Championship was Team Caspian which dominated all spots in the semi-finals after grinding down Atlantic and Pacific teams in round after round of gruelling matches.

## A DANCE WITH DRAGONS

After months of intensive training and preparation, the highly anticipated Dragon Boat Challenge took place on 9 October 2016.

An early morning drizzle did little to dampen the spirits of the 200 Keppelites, who churned the waters of the Kallang river basin with their powerful and synchronised paddlestrokes. While Team Caspian and Team Pacific put up commendable performances,

it was eventually Team Atlantic's endurance and sheer grit that secured its victory in the various races.

After a morning of intense competition, Team Atlantic came up tops in all four race categories – Men's, Women's, Mixed and Veterans and was crowned Overall Champion for the Dragon Boat Challenge.

## TENPIN TITANS

Sounds of falling pins, cheers and laughter filled the bowling alley at Orchid Country Club on 16 October 2016 as teams participated in the Bowling Challenge.

The evenly matched competition between the teams had everyone at the edge of their seats. Wrestling the title from Team Pacific's 2015 victory was Team Atlantic 7, which finished with a total pin-fall of 2,462, a nail-biting one pin lead over runner-up Team Atlantic 5. Team Caspian 3 followed closely behind in third place with a total pin-fall of 2,611.

Standout individual performances were also recognised. With a respective pin-fall of 741 and 642, Damondamon Alivir Jon Ripdow, Senior Foreman at Keppel Shipyard, was crowned Best Male Bowler, and Arlina Cristina Midoranda, Accounts Officer at Keppel Blastech, Best Female Bowler.



Keppelite dragonboaters demonstrated tremendous teamwork and tenacity during the gruelling races

# Building community ties

Keppel Volunteers were out in force to make a difference in the community with diverse outreach activities for children as well as contributing to a new world record.

On 1 October 2016 at Keppel Leadership Institute, 32 Keppel Volunteers engaged senior friends from Thye Hua Kwan Senior Activity Centre Ang Mo Kio in an afternoon of art. Under

the guidance of our volunteers, the elderly beneficiaries eagerly painted their favourite animals.

Recounting his experience, See Wei Cong, Organisational Development

## Contributing to a world record feat

KK Women's and Children's Hospital (KKH) put Singapore on the world map with a new Guinness World record for its second time, this time for the "Largest reunion of people born at the same hospital" which was held at the Bishan Stadium on 16 October 2016.

The hospital first set the world record in 1966 for being the world's largest maternity hospital with a record birth of 39,835 babies born that year, a record it held for 10 years. To mark the 50th anniversary

of this achievement, those born in the record-setting year 1966 participated in this special celebration. The KKH record-breaking event was graced by Deputy Prime Minister and Coordinating Minister for National Security, Mr Teo Chee Hean.

Keppel Volunteers provided the largest team of over 40 volunteers to support the verification process in which the birth and identification documents of close to 3,000 Singaporeans had to be authenticated for participation. Adding to the festive air, our

volunteers even initiated singing "Happy Birthday" for participants born on the very day.

The event was also significant for Keppel Volunteer Vincent Koh of Keppel Shipyard who was born in 1966. He shared, "I was excited to play a part in this event and represent both Keppel and Singapore in this record attempt. For me, the biggest takeaway from today is the importance of family ties as Singaporeans came forward in droves with their families."



Keppel Volunteer Vincent Koh (second from left), Yard Manager at Keppel Shipyard, participated in the KKH record-breaking event as he was born in the same hospital back in 1966



Keppel Volunteers contributed to a new Guinness World Record achieved by KKH



Bringing smiles to senior friends with Art at Work

Executive at Keppel Singmarine, said, "It was gratifying to see the proud smiles of the elderly as they showed off their completed art pieces. In fact, many of the elderly

commented that today's painting session allowed them to relive their favourite childhood memories."

Also through art and craft,

34 children from Care Corner (Admiralty) learned from Keppel Volunteers the importance of environmental conservation by applying the 3 'Rs' – Reduce, Reuse and Recycle. At the workshop, the children were taught how to make useful everyday objects from recycled packaging, magically transforming milk cartons and coke bottles into wallets and gift boxes.

Leading the event, Ang Wen Xiang, Engineer at Marine Technology Development, shared, "Today's handicraft workshop was effective in imparting the value of recycling to children in a manner that is fun and accessible."

## Brazilian rhapsody

Thousands of park goers enjoyed an evening of charming Brazilian music amidst the lush greenery of the Botanic Gardens on 11 September 2016 during PianoBotanica, an annual outdoor concert that celebrates the friendship between Brazil and Singapore.

Keppel Offshore & Marine was once again the presenting sponsor of the classical music event, now into its fourth year. This year's concert saw Brazilian soprano Taiana Froes perform a repertoire of hits by famous Brazilian composers such as Heitor Villa-Lobos, Carlos Gomes and Chiquinha Gonzaga. She



Celebrating the friendship between Brazil and Singapore at PianoBotanica were (from L-R): Mr Ho Tong Yen, GM of Group Corporate Communications, Keppel Corporation; Mr Flávio Soares Damico, Brazil's Ambassador to Singapore; Singaporean pianist Benjamin Boo; Brazilian soprano Taiana Froes and Mr Marros Sawaya Jank, Vice President (Corporate Affairs & Business Development) BRF Asia (Image Credit: Embassy of Brazil in Singapore)

was supported by homegrown Singaporean pianist Benjamin Boo.

The evening ended on a high note when Froes wowed the

audience with her surprise finale performance, a soprano rendition of the classic Singapore National Day Parade theme song, 'Home'.

# Making a difference

Continuing its efforts to nurture the community where it operates, BrasFELS reached out to the elderly and did its part for the environment over the months of August and September.

## **FRIENDSHIP ACROSS AGES**

On Brazil's National Volunteer Day which took place on 28 August 2016, volunteers from Keppel FELS

Brazil's BrasFELS shipyard visited the residents of Associação São Vicente de Paulo, an elderly home in Angra dos Reis, Rio de Janeiro, Brazil.

Leon Ribeiro, Engineer at BrasFELS' Cost Department and an active volunteer, said, "It was a joy to be able to provide a listening ear to the residents of the home. I hope

that our conversations and songs have helped to brighten their day.

"Through small gestures such as making visits, I hope to be able to make a difference in the lives of others. I encourage all my colleagues and those around me to actively participate in such activities to bring a smile to others. I look forward to visiting the home again."



Keppel Volunteers from BrasFELS brightened the lives of the residents of an elderly home in Angra dos Reis on 28 August 2016



BrasFELS volunteers helped to clean up Amendoeiras beach at Gipóia Island on World Annual Coastal Clean-Up Day

The volunteers also donated items such as personal hygiene products and an adult walker to the home during the visit.

## **CLEANING BEACHES**

Fourteen BrasFELS volunteers participated in a beach cleanup event held at the Amendoeiras beach, Gipóia Island, on 17 September 2016.

The event was held in line with the global movement, World Annual Coastal Clean-Up Day, which is held every year on the third Saturday of September. On this day, volunteers from around the world help to clean up beaches, rivers and waterways by collecting the garbage and promoting environmental education.

BrasFELS has been regularly supporting activities such as cleaning up beaches to create a more sustainable and liveable environment for the community. The beach clean-up activity this year was organised by Angra Surf Club together with Costa Azul Radio.

# Conserving a freshwater forest wetland in the city



Mr Lawrence Wong (seventh from right), Minister for National Development and Second Minister for Finance; Dr Lee Boon Yang (eighth from right), Chairman of Keppel Corporation; Mr Loh Chin Hua (sixth from right), CEO of Keppel Corporation; Mrs Christina Ong (fifth from right), Chairman of National Parks Board; Prof Leo Tan (far left), Chairman of Garden City Fund; Mr Kenneth Er (fourth from right), CEO of NParks and volunteers from Keppel at the Keppel Discovery Wetlands at Singapore Botanic Gardens

Keppel has committed \$2.08 million to the Garden City Fund to support the restoration of a freshwater forest wetland ecosystem historically found in the vicinity of the Singapore Botanic Gardens, which is Singapore's first UNESCO World Heritage site.

In recognition of Keppel Corporation's contribution, the restored freshwater forest wetland will be named the Keppel Discovery Wetlands. Located in an upcoming Learning Forest extension of the Singapore Botanic Gardens, the restored 1.8-ha forest will be designed with ecological considerations in mind, and include a carefully curated plant collection of over 200 species. It will enhance the biodiversity found in the area and provide opportunities for the public to access and experience a freshwater forest wetland habitat right in the heart of the city.

On 27 August 2016, NParks and Keppel unveiled plans for the

Keppel Discovery Wetlands. In marking the occasion, Minister for National Development and Second Minister for Finance, Mr Lawrence Wong; Chairman of Keppel Corporation, Dr Lee Boon Yang; and CEO of Keppel Corporation, Mr Loh Chin Hua planted a Keppel Tree at the Wetlands.

Senior management from the Keppel Group were joined by over 50 Keppel Volunteers to plant trees of various species, as a symbol of Keppel's commitment towards environmental conservation.

Addressing audiences at the unveiling of plans ceremony, Minister Lawrence Wong acknowledged Keppel's contribution in restoring the wetlands. He remarked, "We would like to sincerely show our appreciation to Keppel for their support for the wetlands restoration project. Keppel will be making a contribution for the creation of habitats, trails and

boardwalks, as well as a plant collection of more than 200 species. But it is not just financial contributions. Keppel has also committed to volunteer at the Wetlands starting today. They will be helping us to plant trees later.

Dr Lee Boon Yang shared, "This initiative to restore and conserve a unique freshwater wetland habitat resonates with Keppel's commitment to sustainability. We believe that Singapore's natural heritage is a precious resource and all Singaporeans share a responsibility to care for the environment.

"Keppel Volunteers will serve as Green Ambassadors for the Keppel Discovery Wetlands, engaging schools and community groups so that students and other visitors can discover and learn more about this freshwater swamp ecosystem and its flora and fauna".

Tay Jia Wei, Vice President of Keppel Volunteers and Commercial Officer, Keppel Shipyard enthused, "Despite the hard work involved, spirits among the volunteers are high as we find meaning in conserving Singapore's natural heritage. We look forward to seeing how the saplings have grown once the Keppel Discovery Wetlands opens in 2017, and we are excited to explore opportunities to work with NParks to engage Singaporeans to learn about Singapore's biodiversity."

# Moon-gazing fun

The Mid-Autumn Festival is a time for reunion among family members and for renewing friendships. Staying true to the spirit of the season, Keppel Volunteers and beneficiaries bonded over activities ranging from lantern painting to mooncake making.

On 15 August 2016, volunteers from Keppel FELS organised a Mooncake Festival celebration for around 55 beneficiaries from Thye Hua Kwan (THK) at Taman Jurong.

This event was graced by wife of

Singapore's Deputy Prime Minister Tharman Shanmugaratnam, Ms Jane Yumiko Ittogi, who was accompanied by Taman Jurong Constituency Director, Mr Darren Fung and Thye Hua Kwan CEO, Mr Kenny Lim. Also joining in the celebrations were Mr Mohamed Sahlan Bin Salleh, ED (Operations), Keppel FELS, and Mr Tan Leong Peng, GM (Engineering), Keppel FELS.

Twenty-six Keppel Volunteers spent the afternoon hand-crafting lanterns with the beneficiaries.

The brightly painted lanterns were then used to decorate the activity room before the evening's festivities, where beneficiaries, volunteers and guests indulged in a variety of mooncakes, tea, and games.

Timothy Ow, Project Manager at Keppel FELS shared, "We had much to learn from the elderly, who eagerly shared with us their life stories. It was heartwarming to hear the elderly asking us to return soon, and we are happy to know that they have enjoyed the celebrations."



Keppel Volunteers and beneficiaries from THK at Taman Jurong enjoyed time together with lantern painting, games and feasting

In the lead up to the Mid-Autumn Festival, volunteers from Keppel Shipyard also organised mooncake-making workshops for a total of 60 elderly from THK Bedok and THK Ang Mo Kio on 13 and 14 September 2016 respectively, as well as 36 children from Care Corner (Admiralty) on 15 September 2016.

Recounting her experience, Chen Jia Hui, Hull Engineer at Keppel Shipyard, shared, "Many of the elderly needed help in measuring the ingredients and crafting their mooncakes due to their limited motor abilities. I was inspired by an elderly lady, who despite having an amputated left arm, took great pride in making sure each mooncake was made to perfection."



Joining in the celebrations were Ms Jane Yumiko Ittogi (in yellow), wife of Singapore's Deputy Prime Minister Tharman Shanmugaratnam; Mr Mohamed Sahlan Bin Salleh (second from right), ED (Operations), Keppel FELS and Mr Tan Leong Peng (first from right), GM (Engineering), Keppel FELS. They were joined by Mr Lee Kim Siang (in blue), Chairman of Thye Hua Kwan Group of Charities, and Mr Goh Peng Tong (in white), Chairman of Taman Jurong Citizen's Consultative Committee



# Keppel grows LNG business with new contracts and MOU with Shell

Keppel Offshore & Marine (Keppel O&M) strengthened its track record in the Liquefied Natural Gas (LNG)-related business when its wholly-owned subsidiary, Keppel Singmarine, secured contracts to build its first two dual-fuel diesel LNG harbour tugs from Keppel Smit Towage (Keppel Smit) and Maju Maritime (Maju) who have ordered one unit each. The two tugs are expected to use bunkering services provided by the Keppel-Royal Dutch Shell plc (Shell) joint venture company, FueLNG Ltd (FueLNG).

The tugs will be built to Keppel's proprietary design which won the Outstanding Maritime R&D and Technology Award at the 2015 Singapore International Maritime Awards. The Maritime and Port Authority of Singapore is co-funding up to \$2 million for each tug under its LNG Bunkering Pilot Programme (LBPP) Grant. The tugs are expected to be completed in 2018.

Mr Chow Yew Yuen, CEO of Keppel O&M, said, "We are happy to have secured orders to build our first two dual-fuel tugs which will be built to Keppel's award-winning proprietary designs. Keppel has a strong in-house research & development (R&D) unit that has developed innovative designs including LNG carriers and barges to meet the maritime industry's needs as the demand for green solutions and LNG rises. Combining this R&D capability with our rich shipyard expertise, we will continue to seize opportunities along the LNG value chain and help owners deliver LNG efficiently to end markets."

"We are also happy that our joint venture, FueLNG, has secured its first two contracts from Shell to provide bunkering services for Keppel Smit and Maju's dual-fuel tugs. Together, Keppel's shipbuilding/design capabilities and LNG bunkering services provide end-to-end solutions for vessel owners turning to LNG as a marine fuel in Singapore."

FueLNG is a new 50-50 joint venture company incorporated by Keppel and Shell which has secured a license as one of only two companies to provide LNG bunkering services in Singapore. For Keppel Smit and Maju's dual-fuel tugs, FueLNG will be providing LNG bunkering services while Shell will be supplying the LNG fuel over a period of 10 years under separate contracts with the towage companies.

To bolster its efforts in the LNG-related business, Keppel O&M, through its subsidiary Gas Technology Development, signed an MOU with Shell's subsidiary, Shell Eastern Petroleum (Pte) Ltd, to jointly explore potential opportunities to cater to the demand of LNG as a fuel in coastal areas, inland waterways and the international marine sectors.

The partnership will leverage Keppel's strength in ship building and design, as well as Shell's experience as a global leading energy supplier, to work with potential customers in developing technical and commercial solutions for their LNG fuel needs.

Mr Michael Chia, MD (Marine & Technology) of Keppel O&M, added, "Apart from relying on our in-house R&D, we are collaborating with leading players in the energy sector that have capabilities complimentary to Keppel's to develop comprehensive and innovative LNG solutions. Through this cooperation framework, Keppel and Shell can combine our resources and expertise as a leading global shipbuilder and energy supplier, and work together in collaboration with stakeholders such as shipping companies, terminal operators, local governments and regulators to meet their needs which may include engine retrofit or setting up coastal LNG storage infrastructure."



Keppel Offshore & Marine has secured contracts to build its first two dual-fuel diesel LNG harbour tugs to its proprietary design