

SEMCORP MARINE SECURES CONTRACT TO DESIGN AND BUILD NEW FSO VESSEL FOR MODEC

Sembcorp Marine Ltd's wholly owned subsidiary Sembcorp Marine Rigs and Floaters Pte Ltd has secured a contract to design and build a new floating, storage and offloading (FSO) vessel for MODEC Offshore Production Systems (Singapore) Pte Ltd, a subsidiary of MODEC, Inc. The FSO is meant for operations in the UK sector of the North Sea.

MODEC is founded in 1968 and is a general contractor specialising in engineering, procurement, construction and installation of floating production systems. These include Floating Production Storage and Offloading and FSO vessels, Tension Leg Platforms, Production Semi-Submersibles, Mobile Offshore Production Units and other new technologies which will meet the challenges of various types of gas production floaters. MODEC provides Floating Production System operation and maintenance services around the world.

Scheduled for delivery in 1st quarter of 2018, the FSO unit will be Sembcorp Marine's first FSO newbuilding secured on a full turnkey project basis including Engineering, Procurement, Construction and Commissioning (EPCC). MODEC will supply the internal turret and topside modules (vapour recovery unit and metering skid) which the shipyard will install and integrate.

This is Sembcorp Marine Rigs & Floater's 24th project working with MODEC and its first new build FSO. The FSO will be built using Sembcorp Marine's facilities at Tuas Boulevard Yard.

When completed, the FSO will be deployed at the Maersk Oil's Culzean field. This is the largest new oil and gas field to have been discovered in the North Sea for a decade, and was recently approved by the UK Oil & Gas Authority for development.

CRUISE SHIPS *PACIFIC EDEN* AND *PACIFIC ARIA* COMPLETED UPGRADING WORKS AT SEMBMARINE'S ADMIRALTY YARD

Sembcorp Marine (Sembmarine) has successfully upgraded the *Pacific Eden* and *Pacific Aria* at its Admiralty Yard. These vessels were formerly known as *Statendam* and *Ryndam* respectively.

The concurrent drydocking of these two cruise vessels at the same shipyard was a first for its operator P&O Cruises (Australia), which is part of Carnival Corporation and a long-term partner of Sembmarine.

With the sailaway of *Pacific Aria* in November, Sembmarine has set a record of 12 cruise ships repaired, upgraded and refurbished in a single year. Among these were *Carnival Spirit*, *Crystal Spirit*, *Sapphire Princess*, *SkySea Golden Era* and *Superstar Gemini*. This reinforces Sembmarine's position as a leader in the cruise refit market.

The 12 projects were completed for Carnival Cruise Line, Crystal Cruises, Holland America Line, Princess Cruises, Star Cruises, SkySea Cruise Line and P&O Cruises (Australia).

Sembmarine's customer portfolio today includes the world's top two cruise companies - Carnival Corporation and Royal Caribbean Cruises as well as Asia's leading cruise line, Star Cruises.



Sembcorp Marine has successfully repaired and refurbished 12 vessels for the year 2015.

KEPPEL FELS DELIVERS EIGHTH RIG OF THE YEAR SAFELY AND ON TIME

Keppel FELS has delivered *ARABDRILL 70*, a KFELS B Class jackup rig, to Arabian Drilling Company (ADC). It was completed three days ahead of schedule, on budget and with a perfect safety record.

ARABDRILL 70 is the fourth KFELS B Class jackup rig to work for ADC. Keppel FELS had previously delivered two jackup rigs, *ARABDRILL 50* and *ARABDRILL 60* in June 2013 and December 2013 respectively. These rigs have since been operating successfully for ADC and their charterer, Saudi Aramco, Saudi Arabia's national oil company. The KFELS B Class design has served ADC well.

ADC is a limited liability partnership between the Industrialisation & Energy Services Company (TAQA) which owns 51%, a Saudi government oilfield services company and Services Petroliers Schlumberger S.A., a global leader in oilfield services which owns the remaining 49%. ADC has operated onshore and offshore drilling rigs in Saudi Arabia, and the Partitioned Zone with Kuwait as well as in Yemen and United Arab Emirates in the past.

ARABDRILL 70 is the 61st KFELS B Class rig delivered since 2000. The KFELS B Class design has a market share of about a quarter of all jackup rigs delivered in the last 15 years. The innovative and cost-effective KFELS B Class jackup rig has proven to be the trusted workhorse of the industry, and has performed excellently in major offshore exploration and development programmes in various locations worldwide. It has been employed by some 20 international drilling operators in over 15 countries.

The KFELS B Class jackup design is developed by Keppel's technology arm, Offshore Technology Development. The rig is able to operate in water depths of up to 400 feet and drill to depths of 30,000 feet. It incorporates Keppel's advanced and fully-automated high capacity rack and pinion jacking system, and self-positioning Fixation System. The KFELS B Class also provides maximum uptime with reduced emissions and discharges.

Besides newbuild rigs, Keppel FELS is also actively engaged in repair and



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modification projects for its customers. By the end of this year, Keppel FELS would have completed 17 repair projects.

ST MARINE STRIVES TO GO GREEN WITH *MV NOVA STAR*

MV Nova Star, a Roll-On-Roll-Off Passenger Vessel (Ropax), owned by Singapore Technologies Marine (ST Marine), has recently completed her second season in the ferry service in the Gulf of Maine between Nova Scotia (Canada) and Portland (USA). The Gulf of Maine is stipulated by the International Convention for the Prevention of Pollution (MARPOL) as an Emission Control Area (ECA), designated by the International Maritime Organisation (IMO). In ECA, vessels are required to limit the amount of sulphur oxide (SOx) emission in their exhaust, from 1% to 0.1% by mass.

To meet MARPOL's requirements, ST Marine's Engineering Design Centre has identified the following possible solutions to help *MV Nova Star* comply with the regulations:

- Dual fuel engines
MV Nova Star is currently installed with four MAN main engines running on heavy fuel oil. The diesel engines can be converted to dual fuel engines running on both heavy fuel oil and Liquefied Natural Gas (LNG). LNG is recognised as the next generation of marine fuel due to its clean emission and competitive pricing against marine fuel.

- Low sulphur marine fuel
Use of low sulphur marine fuel available in the market. An example is the ExxonMobil HDME 50 (High

Distillate Marine ECA), formulated to meet the 0.1% SOx emission requirement.

- Scrubbers
Scrubbers are approved by IMO as the alternate means to comply with the new regulation. Scrubbers are installed in the exhaust systems to "clean the exhaust gas". There are three modes of operations for scrubbers - open-loop, closed-loop and hybrid.

Open-loop scrubbers require the least number of equipment, uses scrubbing medium or seawater which is readily available. However, the open-loop scrubber is dependent on the alkalinity of the seawater and cannot be used in the coastal area and "No-Discharge Zone". For closed-loop scrubbers, the alkalinity of scrubbing water can be controlled and the scrubber can be used in coastal areas and "No-Discharge Zone". However, more equipment would be required as compared to the open-loop scrubber and water cleaning and re-circulation system. The hybrid scrubber allows flexibility for operators to run either open-loop scrubber mode or closed-loop scrubber mode with the alkalinity of scrubbing water controlled. The hybrid scrubber can also be used in coastal areas and "No Discharge Zone". However, more equipment will be required, and more pipe



MV Nova Star is a roll-on-roll-off passenger vessel (Ropax) designed and built by ST Marine.



The Gulf of Maine is stipulated by the MARPOL as an Emission Control Area designated by IMO.

routing and re-routing would be required.

There are two types of scrubber designs - Venturi-type and In-line type. In-line type scrubbers require higher water flow rates to make up for the absence of the jet absorber in Venturi-type. For *MV Nova Star*, due to the limited space in its exhaust trunk, the In-line type is preferred.

ST Marine will explore all possible methods to determine the best solution for *MV Nova Star*. The stringent regulations from MARPOL are part of the efforts taken to create a green and sustainable future for the marine industry. ST Marine strives to be a responsible party of the marine industry and intends to do its part to adopt practices to preserve an ideal environment for the current and future generations.

KEPPEL SHIPYARD SECURES TWO CONVERSION CONTRACTS FOR LNG FSU AND FPSO

Keppel Offshore & Marine Ltd (Keppel O&M)'s local and overseas subsidiaries has secured four contracts worth a total of about S\$125 million from repeat customers. Two of these four contracts are clinched by Keppel Shipyard Ltd, a wholly-owned subsidiary of Keppel O&M.

The two contracts secured by Keppel Shipyard are conversion projects. The first is for a Liquefied Natural Gas (LNG) Floating Storage Unit (FSU) vessel awarded by Armada Floating Gas Storage Limited, a wholly-owned subsidiary of Bumi Armada Berhad; The second contract is for a Floating Production Storage and Offloading (FPSO) vessel awarded by Yinson Production (West Africa) Pte Ltd, a wholly-owned subsidiary of Yinson Holdings Berhad.

Bumi Armada Berhad is a Malaysia-based international offshore oilfield services provider with four strategic business units – FPSO operations, offshore support vessels, transport and installation and floating gas solutions.

Yinson Production is one of Malaysia's premier integrated offshore services providers. Its core business units include offshore production and support services, commodity trading, logistic services, and warehousing and port management.

Work on the LNG FSU conversion for Bumi Armada is scheduled to be completed in the third quarter of 2016. Upon completion, the LNG FSU vessel will operate at the Delimara LNG Regasification Terminal in Malta. This is the 14th conversion/upgrading project undertaken by Keppel Shipyard for Bumi Armada. It is also Bumi Armada's first LNG FSU conversion project.

As for the FPSO conversion for Yinson, work is expected to commence in first quarter of 2016. The work scope includes

modification work, new equipment installation complete with associated piping, electrical and instrumentation systems as well as installation and integration of the FPSO process topsides. Upon completion, the FPSO will be deployed to the Offshore Cape Three Point block located in offshore Ghana. Keppel Shipyard had previously worked with Yinson on an FPSO project in 2012.

The other two projects are won by Keppel O&M's overseas yards, Keppel FELS Brasil SA (BrasFELS) in Rio de Janeiro, Brazil and Caspian Shipyard Company LLC in Baku, Azerbaijan. Keppel FELS Brasil was awarded a FPSO integration contract awarded by MODEC Offshore Production Systems (Singapore) Pte Ltd. FPSO vessel *Cidade de Caraguatatuba MV27* is currently undergoing module integration work in Keppel Shipyard. Caspian Shipping Company clinched a barge enhancement contract from BP Exploration (Shah Deniz) Limited, operator of the Shah Deniz gas field development.



FPSO vessel *Cidade de Caraguatatuba MV27* currently undergoing module integration work in Keppel Shipyard.

SEMBCORP MARINE REWRITES RECORD FOR LNG SHIP REPAIRS AND UPGRADES

Sembcorp Marine, a global leader in LNG ship repair and life extension work, has rewritten the industry record for the highest number of LNG vessel repair and upgrade projects in a single year. The company tops the list for the fourth year running, securing a total of 34 such projects in the global market.

Sembcorp Marine credits long-term partners and customers for the company's continued success. As a top LNG vessel repair and upgrade specialist, the company is also proud to be contributing to Singapore's status as a global LNG hub.

Last year, Sembcorp Marine repaired and upgraded 32 LNG vessels at its Admiralty and Tuas Boulevard shipyards, up from 27 in 2013.

Owners and operators of the 34 LNG vessels repaired or upgraded at Sembcorp Marine's Admiralty and Tuas Boulevard shipyards in 2015 include China LNG Shipping (International) Co. Ltd., Chevron Shipping, Gaslog LNG Services Ltd, Northwest Shelf Shipping Services Company, Teekay Gas Services, Empresa Naviera Elcano, H-Line Shipping, Hoegh LNG AS, K

Line Shipmanagement, KLC SM Co. Ltd., MOL LNG Transport (Europe) Ltd, Nigeria LNG Ltd, NYK LNG Shipmanagement Ltd and Shell International LNG Supply.



Aerial view of Sembcorp Marine Admiralty Yard, showing concurrent repair of two LNG vessels.

STATE-OF-THE-ART STEEL STRUCTURE FABRICATION WORKSHOP AT SEMBMARINE'S TUAS BOULEVARD YARD

Sembcorp Marine (Sembmarine) launched its new state-of-the-art steel structure fabrication workshop – the largest of its kind in Southeast Asia. This 120,000-sqm fabrication workshop is expected to boost the company's steel fabrication capacity for its future needs. The fully covered facility at Sembmarine's Tuas Boulevard Yard was officially opened by Dr Beh Swan Gin, Chairman of Economic Development Board.

Comprising five bays for pre-treatment, cutting and assembly, the workshop is ergonomically designed to facilitate a seamless work flow. It operates with a suite of computerised systems, mechanised steel-cutting and welding equipment, high-capacity cranes, and a streamlined process that not only optimises production efficiency, but also reduces man-hours and production time to half of previous process requirements for every tonne of steel fabricated. Standout features of the new facility include a fully-automated panel production line that delivers high quality welding precision and efficiency as well as capabilities for producing steel components of customised shapes and sizes.

Speaking at the workshop's opening ceremony, Dr Beh reiterated the importance of the industry's push for productivity. He said, "Local champions like Sembcorp Marine have an important role to play in shaping the future of the offshore and marine industry. Today, the sector is a significant contributor to our economy, providing good jobs

for Singaporeans, but the continued transformation of the industry is critical for its long-term success. Sembcorp Marine is a good example of how companies can enhance competitiveness through the use of innovative solutions."

Sembmarine President & CEO Mr Wong Weng Sun explained that the company's new facility would integrate with all other capabilities in its flagship Tuas Boulevard Yard and allow Sembmarine to more effectively offer customers a one-stop shop for offshore and marine engineering solutions. Mr Wong stated that, "It (the workshop facility) is also a key feature of the company's ongoing development to turn the Tuas Boulevard Yard into a high-tech production hub



Sembcorp Marine's new steel structure fabrication workshop is expected to boost its steel fabrication capacity in Southeast Asia.

that underpins Sembcorp Marine's ability to compete on value and scale." In July this year, Sembmarine transitioned from a multi-business-unit organisation structure into a single brand and company under its long-term 'Transformation for Growth' strategy. The company now focuses on four key capabilities across its global operations, namely, Rigs & Floaters, Repairs & Upgrades, Offshore Platforms, and Specialised Shipbuilding.



The 120,000-sqm facility included a fully-automated panel production line that delivers high quality welding precision and efficiency.



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