News Release

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Joint industry collaboration to boost offshore and marine sector with Additive Manufacturing (3D Printing), Drone and Digital Twin technologies

- ***Sembcorp Marine, DNV GL, A*STAR's SIMTech and NAMIC team up to develop disruptive applications***
- ***The collaboration augments Sembcorp Marine Tuas Boulevard Yard as a living lab for offshore and marine technological development***

Singapore, November 9, 2017 – Sembcorp Marine, DNV GL, A*STAR's Singapore Institute of Manufacturing Technology (SIMTech) and National Additive Manufacturing Innovation Cluster (NAMIC) today signed a Memorandum of Understanding (MOU) to develop disruptive applications in Additive Manufacturing, Drone and Digital Twin technologies that could revolutionise solutions for Singapore's offshore and marine (O&M) sector and boost its global competitiveness.

The quadripartite collaboration will focus on the following three developmental areas with promising potential to bring about transformational improvement to the O&M sector:

Laser Aided Additive Manufacturing (also known as 3D Printing) for fabricating large-scale ship structures

Sembcorp Marine, DNV GL, SIMTech and NAMIC will collaborate on developing and certifying Laser Aided Additive Manufacturing technology in fabricating large-scale structures for newbuild vessels. To be funded by NAMIC, this nine-month-long project will take off by end-2017. The project involves a test-case and user-acceptance from Sembcorp Marine, with DNV GL and SIMTech assuming the roles of process certifier and technology provider respectively.

The project aims to gauge the feasibility of adopting Additive Manufacturing to produce reliable and cost-competitive components locally to support Sembcorp Marine's offshore and marine construction work. Through this collaboration, DNV GL will be able to enhance the qualification process of Additive Manufacturing and support NAMIC in developing an Additive Manufacturing ecosystem within Singapore's O&M sector.

Drones for close-up ship inspection

Sembcorp Marine will provide DNV GL with the test-bed and user-acceptance for developing close-up ship structure inspection by drones. Complementing surveyor inspections, drones are especially advantageous for carrying out surveys requiring close-up inspection at height or in dangerous and relatively inaccessible areas.

The project begins later this month. Among other outcomes, it aims to build Sembcorp Marine's capabilities in drone-based inspection of ships and rigs, while facilitating DNV GL's refinement of class rules for drone surveys.

Digital Twin for simulation-based optimisation of ship design and operations
Sembcorp Marine will provide DNV GL with the test-case and user-acceptance for investigating the use of Digital Twin technology to create a digital replica of an actual ship, and through simulation determine the ship's specific design and operational requirements for attaining optimal performance.

Scheduled to start in the first quarter of 2018, the project allows Sembcorp Marine and DNV GL to strengthen their respective know-how on developing Digital Twin solutions and progress further in their digital transformation journey.

Sembcorp Marine will test-bed the three projects at its flagship Tuas Boulevard Yard. Host to a broad spectrum of offshore and marine construction, repair and upgrade activities, the 108ha integrated facility is ideal for the required developmental work.

In supporting the projects, Sembcorp Marine Tuas Boulevard Yard augments its role as a living lab for incubating and verifying disruptive applications for the O&M sector.

Mr Wong Weng Sun, President and CEO of Sembcorp Marine, said, "Sembcorp Marine is very pleased to have DNV GL, SIMTech and NAMIC as our development partners. To support our joint efforts, Tuas Boulevard Yard will serve as a living lab to test and transform ideas into smart, sustainable and disruptive advantages.

"Singapore's competitiveness in the global O&M market depends on our continued ability to introduce innovations that deliver faster, safer and more reliable outcomes. We are confident that Additive Manufacturing, Drone and Digital Twin technologies will unlock exciting possibilities for us to stay ahead of the curve."

Elisabeth Tørstad CEO DNV GL – Oil & Gas, said, "These projects are great examples of collaboration with our partners resulting in impressive and important innovative efforts which will realise cost-savings and efficiency gains for the industry. Innovation is at the core of DNV GL's strategy and no more so than here in Asia where our Oil & Gas Technology Centre (OGTC) has been established as a sustainable centre to support the industry with high-end advisory and technical assurance services."

Dr Lim Ser Yong, Executive Director of SIMTech, said, “Additive Manufacturing is a key technology enabler under Singapore’s Advanced Manufacturing and Engineering (AME) strategy. This collaboration leverages SIMTech’s Free Form Large Format Laser Aided Additive Manufacturing capabilities, to support the offshore and marine industry, by improving the functional integrity, cost-effectiveness and responsiveness. We look forward to a fruitful collaboration.”

Dr Ho Chaw Sing, Managing Director of NAMIC, said, “Over the last several months, we have engaged with stakeholders in various strategic industry verticals in our push to industrialise AM technologies. We are delighted to enter into this collaboration partnership with Sembcorp Marine, DNV GL and SIMTech, supporting and contributing towards the transformation of the Marine Offshore/Oil and Gas industry, a key strategic sector for Singapore.”

More on Additive Manufacturing

Additive Manufacturing (AM) refers to processes used to create a three-dimensional object in which layers of material are formed under computer control. Objects can be of almost any shape or geometry and typically are produced using digital model data from a digital design file.

AM has been used in manufacturing, aerospace, medical, industrial and socio-cultural sectors, enabling it to become a successful commercial technology.

Laser Aided Additive Manufacturing (LAAM) is a novel additive manufacturing technology which can be utilised for 3D printing. It works by applying a laser beam as heat source with the additive materials melted and deposited onto the surface layer by layer. Compared to other 3D printing technologies, this patented technology has the following advantages – large print size, free form, high printing speed, diverse material adaptability and printing of multi-materials. It can be used to print large components (> 500mm) for sectors such as offshore and marine and aerospace.

More on Ship Inspections by Drones

Many offshore and marine structures are complex, difficult to access and therefore time-consuming and costly to inspect. The safety of inspectors is also an important consideration. By applying new digital tools and processes, classification societies such as DNV GL offer drone-assisted surveys of ballast and cargo tanks, cargo holds, jack-up legs and other components of offshore and marine installations.

Drone surveys have the following advantages:

- Preparation time is significantly reduced, allowing close-up structural inspections to be carried out at short notice;
- Staging is no longer required for visual inspections;
- Rafting is eliminated;
- No risk of damage to tank coatings;
- Safety of surveyors, ship's crew and other stakeholders involved in the survey is assured.

More on Digital Twin

Digital Twin is the virtual image of an asset such as a ship, maintained throughout its lifecycle and easily accessible at any time. By integrating data from multiple sources, Digital Twin provides advanced predictive analytics that yield powerful analyses, insights and diagnostics on the asset's optimal design and performance.

Among other applications, Digital Twin is useful in the pre-commissioning of ships.

The usual commissioning procedure is for the vessel to be built and then commissioned during sea trial. With the Digital Twin, it is possible to pre-commission the vessel prior to actual construction by integrating vendor data into a single consolidated virtual ship for testing.

The Digital Twin allows the testing of an integrated system in a virtual realm, compared to individual component-testing that can only be done during commissioning. This reduces costly errors and rework.

About Sembcorp Marine

Sembcorp Marine provides innovative engineering solutions to the global offshore, marine and energy industries, drawing upon more than 50 years of track record. We focus on four key capabilities, namely, Rigs & Floaters; Repairs & Upgrades; Offshore Platforms; and Specialised Shipbuilding.

Our customers include major oil companies, drilling contractors, shipping companies as well as owners and operators of floating production units.

We operate shipyards strategically located in Singapore, Indonesia, the United Kingdom and Brazil.

Sembcorp Marine Tuas Boulevard Yard
Sembcorp Marine's flagship Tuas Boulevard Yard began operations in August 2013. This 108ha integrated yard in Singapore has six drydocks catering for different types of new-generation mega-size vessels, and one extra-wide drydock for construction and repair of offshore structures. Tuas Boulevard Yard's 17 berthing quays provide a 5.8km net quay length, with draft ranging from 9m to 21m.

The yard also has a 120,000 sq m covered steel fabrication facility offering a streamlined, seamless and extensively automated production process that can fabricate up to 144,000 tonnes of steel components annually.

Sembcorp Marine Tuas Boulevard Yard has room for further expansion on the 206ha site it occupies.

For more information on Sembcorp Marine, visit www.sembmarine.com.

About DNV GL
DNV GL is a quality assurance and risk management company providing certification and independent expert advisory services to the oil and gas, power and maritime industries. Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business.

As a technology-based company, DNV GL continuously invests in research and collaborative innovation, empowering customers' decisions and actions with trust and confidence. With origins stretching back to 1864, DNV GL's reach today is global, with operations in more than 100 countries.

About the A*STAR Singapore Institute of Manufacturing Technology (SIMTech)
The Singapore Institute of Manufacturing Technology (SIMTech) is a research institute of the Science and Engineering Research Council (SERC) of the Agency for Science, Technology and Research (A*STAR). SIMTech develops high value manufacturing technology and human capital to contribute to the competitiveness of the Singapore industry. It collaborates with multinational and local companies in the precision engineering, electronics, semiconductor, medical technology, aerospace, automotive, marine, logistics and other sectors.

For more information, please visit: www.a-star.edu.sg/SIMTech/.

About the National Additive Manufacturing Innovation Cluster
The National Additive Manufacturing Innovation Cluster (NAMIC) is a pan-national initiative led by NTUitive, supported by the National Research Foundation and in partnership with SPRING Singapore and the Singapore Economic Development Board. NAMIC aims to increase Singapore's adoption of additive manufacturing technologies to enhance competitiveness in the rapidly evolving landscape of digital industrialisation. This is accomplished by nurturing promising AM technologies and start-ups, as well as accelerating translation R&D from public sector funded institutions with a focus on commercial applications. NAMIC seeds and enables public-private cross-collaboration, acting as a connector between industry, research performers and public agencies. It also assists companies seeking capital injection either through project joint-funding or leveraging on its investor networks.

To know more, visit www.namic.sg.

To find out more about NTUitive – the innovation and enterprise company of Nanyang Technological University, Singapore, visit www.ntuitive.sg.

Media Contacts

David Wong
Head, Corporate Communications
Sembcorp Marine
Tel: +65 62628036
Email: david.wong@sembmarine.com

Adeline Yap
Regional Marketing Communications Manager
DNV GL
Tel: +65 96588512
Email: adeline.yap@dnvgl.com

Edith Lim
Senior Officer, Corporate Communications
Agency for Science, Technology and Research
Tel: +65 68267617
Email: Edith_LIM@hq.a-star.edu.sg

Nur Qurratul Ain Binte Azhar (Ain)
Manager, Corporate Communications
NTUitive (for NAMIC)
Tel: +65 65927858
Email: ainazhar@ntuitive.sg