MEM Issue 5
25 April 2016

MEM

MARINE ENGINEERS MESSENGER

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MONSTROUS USE OF KONGSBERG DRONE
AND MUCH MORE...

Did you know that propeller manufacturers have different polishing techniques so as to distinguish their propellers from others?

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Telegraph

A lifetime ago I did a stint in the Royal Navy as a Marine Engineering Mechanic (MEM - geddit?) and would often skulk in the ship's workshop, taking far longer than needed to rethread old nuts and bolts or get a 7/16 inch Whitworth from the PO manning the stores. Now and again there'd be an engineering 'tiff' working on the metal lathe, which always impressed me as it seemed you could make anything on the thing. But, it seems, the days are numbered for this once invaluable piece of kit; the marine engineer's workshop will soon have a 3D printer sitting where that old lathe used to be, doing something called 'additive manufacturing.'

A pleonasm the phrase may be, but it refers to a process by which digital 3D design data is used to build up a component in layers using materials which are available in fine powder form - metals, plastics, polymer composites, etc. The technology is already taking off in the aerospace industry and each of the new CFM LEAP aero-engines, produced jointly by GE and its long-time partner Snecma will have 19 3D-printed fuel nozzles in the combustion chamber.

With several thousand orders for the new CFM LEAP– a high bypass turbofan engine used in the Boeing 737 and Airbus A322 – GE Aviation will produce more than 100,000 3D-printed parts by the close of this decade.

According to GE, the technolgy results in nozzles that are 25% lighter than those manufactured conventionally; the numberof parts used are reduced from 18 to just one; and it the durability of the 3D printed components is much higher, lasting longer than their predecessors.

What's more additive manufacturing could spur the development of new materials allowing scientists to mix powders in more innovative ways. Certainly if powerded graphene or carbyne can be used, then you may only need to 'print' a spare part once for a life-time of robust marine operation.

Ahough 3D printing materials are likely to be pricey, initially at least, the technology opens up a realm of possibilities for the shipping industry, given a vessel's operational scope and a requirement for remedial repairs should things fail at sea. Engine and machinery parts can be printed onboard immediately, reducing the need to carry stores onboard, while operating costs could be reduced substantially due to the reduced procurement need. It is also probable that any printing could be done remotely, in the same way that we can use wifi to print documents remotely at home.

For component manufacturers, the reduction in the cost of prodution that 3D printing affords is an obvious boon but those companies with all their eggs in the after-sales basket need to rethink their business models, and quickly. Similalry, shipping agents and chandlers would need to offfer another dimension in a 3D future.

FUTURE TECHNOLOGY

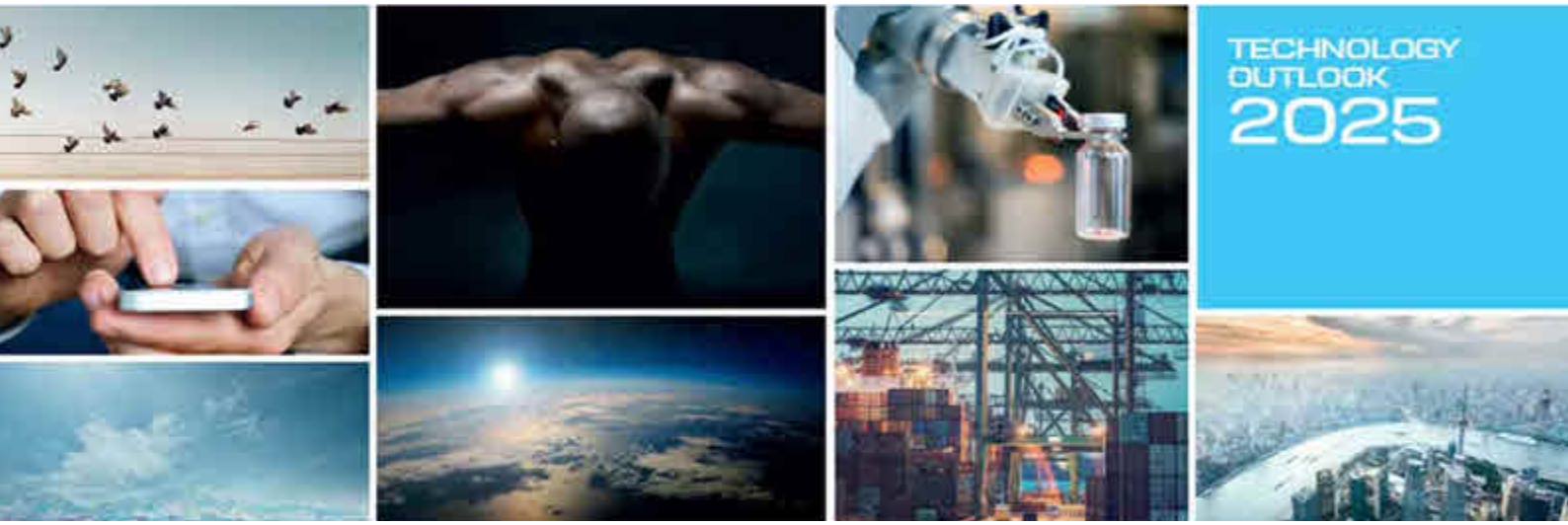
DNV GL PREDICTS A PROBABLE FUTURE

The shipping industry is on the cusp of a technological revolution that will change the way in which ships are designed, built, operated and powered, with marine cyber-physical systems, digital ships and hybrid propulsion amongst a plethora of new technologies due to emerge in little more than eight years time.

Providing this portent to a near future is classification society DNV GL, which predicts in the latest edition of its quinquennial technology report that the biggest change will be the way in which vessels are powered.

Speaking at the launch of *Technology Outlook 2025*, an 88-page report on emergent technologies amidst changing social, economic and geo-political landscapes, DNV GL's Group President and CEO Remi Eriksen said: "It is very much about the probable, and less about the possible. It is not an investigation into edgy, avant-garde technology. Instead, it explores technology likely to be taken up in the next ten years."

With environmental sustainability governing most aspects of maritime operations, DNV GL predicts that by 2025 more ships will be built with lightweight materials while the use of air lubrication-type hull forms will increase to further reduce drag and optimise efficiency. The society also forecasts that ship powering systems will become increasingly automated and optimised to include power generators, variable speed pumps, transformers, and waste heat recovery solutions, while the energy requirement will be managed to take in a mix of solar, wind and battery power.



"On the long haul trades, we could see a move toward dual-fuel engines, or pure gas fuelled, as well as other gases like ethane, and newly developed renewable biofuels becoming a part of the mix. The use of batteries to complement main engines will also grow, to smooth power delivery, drive auxiliary systems, and maximize engine efficiency. In some sectors, such as ferries and coastal vessels, the trend could even be toward vessels powered completely or largely by electricity," said Eriksen

DNV GL believes that from 2020 harbour tugs, offshore service vessels will start adopting hybrid electric propulsion, with larger vessels following from 2025. Shifting from AC to DC grids onboard is also expected to allow engines to operate at variable speeds so that the engine can operate more efficiently at low loads. The society also suggests that as new battery chemistries emerge and become commercially available, the number of hybrid propulsion systems and electric ships will eventually surpass conventionally propelled vessels; though this will be after 2025.

"It may be hard to believe we're on the cusp of a technological revolution at a time when the global economy as a whole is slowing. But our view in DNV GL is that we are indeed entering a new 'renaissance' in industrial progress, with the accelerated uptake of cyber-physical systems," said Eriksen.

DNV GL's Technology Outlook 2025 can be accessed at: http://to2025.dnvgl.com/

PROPULSION

FIRST PASSENGERSHIP REFERENCE FOR ABB'S AZIPOD D

ABB's award-winning Azipod D, the latest version of the azimuthing podded propeller concept introduced in 1987, has been selected to propel *Scenic Eclipse,* the new generation expedition-type cruiser being built in Croatia by the Uljanik Group.

With capacity for 228 passengers and 172 crew (200 and 182 rescpetively in polar regions) the 16,800gt ice-class 6 vessel will be propelled by two 3MW Azipods.

Scenic Eclipse will visit some of the world's most pristine ecosystems and selection of the Azipod system, a concept with a history of succesful Arctic operation, clocking up more than 12 million running hours since its first installation.

Juha Koskela, Managing Director of ABB's Marine and Ports business, said: "There is growing interesting in the Polar regions from the passenger segment and recent orders have shown shipowners trust our solutions in these areas.

"*Scenic Eclipse* maintains the strong tradition of Azipod propulsion powering some of the world's most innovative ships. With our unrivalled pedigree in the passenger and icebreaking segments, we are able to meet the owner's demands for a flexible and efficient propulsion system which can operate safely in all sea conditions."

Azipod D's gearless construction, high motor efficiency and advanced hydrodynamic design are claimed to reduce fuel consumption by 10-15% compared to geared thrusters.

Since its market introduction in 2015, the Azipod D has recieved orders from the offshore sector, with ABB supplying two 4.2MW units to an advanced 90m vessel under construction by COSCO.

Scenic Eclipse will be the first passenger vessel fitted with the new Azipod.

MARINE ENGINES

FIRST METHANOL-FUELLED SHIPS DELIVERED

The first MAN B&W ME-LGI 2-stroke dual-fuel engines capable of running on methanol are in operation, following the delivery of the *Lindanger*, the first three in a series of seven 50,000dwt vessels built for Waterfront Shipping (WFS) , Mitsui O.S.K. Lines, Westfal-Larsen Management (WL) and Marinvest.

"MAN developed these two-stroke engines in response to interest from the shipping world to operate on alternatives to heavy fuel oil and meet increasingly stringent emissions regulations. To hedge the risk of fuel price volatility, the vessels can switch between fuels, and operate cost-effectively," said Ole Grøne Senior Vice President, Head of Marketing and Sales, MAN Diesel & Turbo.

With demand growing for cleaner marine fuel to meet environmental regulations, methanol is a promising alternative fuel for ships that can meet the industry's increasingly stringent emissions regulations. Methanol is a biodegradable, clean-burning marine fuel that reduces smog-causing emissions such as particulates, sulphur oxides and nitrogen oxides.

The MAN designed Hyundai–B&W 6G50ME-9.3 ME-LGI engines can run on methanol, fuel oil, marine diesel oil or gasoil.

Jone Hognestad, President, Waterfront Shipping, said: "Working with our partners to advance new, clean technology is an important and innovative step in the right direction. Investing in methanol-based marine fuel

Naming of *Lindanger*

reinforces our commitment to invest in sustainable technology that not only provides environmental benefits but also an economically viable alternative marine fuel."

He also said the cost to build new and convert existing vessels to run on methanol is significantly less than other conversions for other types of alternative fuels.

Methanol is produced from natural gas and can also be produced through renewable sources, such as biomass, recycled CO_2, agricultural and timber waste. The energy contentl is roughly half that of standard heavy fuel oil, but as it is a liquid, methanol can be handled by conventional bunkering and storage solutions without extensive modifications.

It is thought that the cost to build new and covert existing vessels to run on methanol is significantly less than alternative fuel conversions. Also, as one of the top five chemical commodities shipped around the world each year, methanol is available around the world through existing global infrastructure.

Four of the vessels have been built to DNV GL class. Knut Ørbeck-Nilssen, CEO at DNV GL – Maritime, said: "This is the first time a dual-fuel engine with a Low Flashpoint Liquid (LFL) fuel system has been installed on an ocean-going vessel and it is a testament to the excellent cooperation between all the project partners that we have been able to complete this unique project and gain flag state approval. Methanol as a marine fuel is a very promising option to enable owners to reduce the environmental impact of their vessels and to comply with low sulphur and ECA regulations and we look forward to working on many more projects using this innovative marine fuel and technology."

Man Choon Kim, Vice President, Contract Management Department, Hyundai Mipo Dockyard Co, added: "We are so privileged to become the first shipyard in the world to deliver a methanol fuelled vessel. It will reduce SOx emissions by about 95% and NOx emissions by about 30% compared to conventional marine diesel oil. Methanol could become one of the popular alternative marine fuels in the future as an environment friendly solution with lower fuel costs, easier handling with the existing storage and bunkering infrastructure and lower installation and retrofit costs," said Man Choon Kim, Vice President, Contract Management Department, Hyundai Mipo Dockyard Co., Ltd.

The first three vessels will be delivered this month (April), with the remaining four due in October 2016. Built by Hyundai Mipo Dockyard and Minaminippon Shipbuilding, two of the vessels are owned by WL, two are under joint Marinvest and WFS ownership, while the remaining three vessels are owned by MOL. All seven, however, will operate under charter to Waterfront Shipping.

Readers can find out more about methanol as a marine fuel here: https://www.methanex.com/about-methanol/methanol-marine-fuel

BC FERRIES TO CONVERT FLAGSHIP FERRIES TO LNG

British Columbia Ferry Services' *Spirit of British Columbia* and *Spirit of Vancouver*, both of which are scheduled to drydock at Remontowa's Gdańsk shiprepair yard for mid-life upgrading, will be converted to operate on LNG fuel.

Wärtsilä has been awarded the contract to supply each RoPax with Wärtsilä 34DF engines, propulsion machinery, integrated automation systems, and gas handling systems, with work to begin during the 2017/18 winter season for the first vessel and the following winter season for the second. Wärtsilä will deliver equipment to the yard in mid-2017 and mid-2018.

The upgrading work will involve surveying the stern tube and renewing components, surveying and overhauling the controllable pitch propeller (CPP) hubs, redesigning and renewing the CPP propeller blades, surveying, renewing and overhauling the oil distribution boxes, and renewing two bow thrusters and E motors.

"This is an extensive project involving both conversion of the ships to upgrade their performance, as well as the gas conversion work. Fortunately, we have worked in the past with Wärtsilä and have good confidence in both their solutions and their capabilities," said Lucjan Falkiewicz, Project Manager for BC Ferries' MLU project, Remontowa.

In December 2014, Wärtsilä was contracted to supply the dual-fuel machinery for three new ferries being built at the Remontowa yard on behalf of British Columbia Ferry Services.

POWER

SAGA TURNS ON THE SWITCH FOR PM

Nascent Finnish engineering firm The Switch has been selected to supply a permanent magnet shaft generator to China Merchants Heavy Industry for installation aboard a 45,000m3 capacity LNG carrier under construction for Saga LNG Shipping.

The order is part of a complete energy efficiency system based around WE Tech Solutions' WE Drive, a variable frequency drive for shaft generator applications.

Using the active front-end low harmonic drive technology of WE Drive, The Switch's PM shaft generator can operate over the full main engine speed range while generating electricity for the vessel's electrical network with high efficiency. This feature is cited as being beneficial at part load, which is the normal electrical load condition of most ships.

The package features a 1200kW power take in (PTI) mode, whereby the WE Drive will be used as an auxiliary propulsion drive when the main engine is not in use.

The solution utilises a common DC-link in the WE Drive to enable energy-efficient DC power distribution for the vessel's bow thruster. The high-speed PMM 500 marine shaft generator will be connected to the PTO shaft of the reduction gear in the propulsion line.

"Over the past few years, we've been developing our solution together with The Switch and other close suppliers," says Mårten Storbacka, Managing Director of WE Tech Solutions.

"The main advantage of permanent magnet technology is that it significantly increases energy efficiency. Depending on how you calculate it, fuel savings are approximately 20–30%. Since this technology lowers the need for installed power on a ship, energy generation and weight are reduced significantly, thereby lowering fuel consumption and the need for maintenance."

The Switch, which was acquired in 2014by Japan's Yaskawa Electric Corporation, offers PMM 500 shaft generators with power outputs ranging from 0.5 to 4MW at speeds of up to 2000 rev/min.

Deliveries are scheduled for October 2016.

DC POWER FOR MM63 FERRY

A new car ferry under construction for Norwegian interests will utilise ABB's hybrid propulsion technology but it will also be able to run as a fully electric ferry capable of shore-side charging.

The centrepiece of ABB's scope of supply is its Onboard DC Grid power distribution system – a modular electrical system that makes use of direct current to connect energy sources with consumers. The system is cited as simplifying the integration of energy storage – in this case, two 270 kWh battery packs – allowing the engines to operate more efficiently at variable speed. The batteries will be used for "peak shaving", helping to meet the power demand, thus allowing the generators to work at a more optimal level.

Shipowner Torghatten Trafikkselskap has the option of adding another sixteen battery packs and a shore connection in order to operate the vessel with a full electric configuration.

"Energy storage has been one of the most important areas of focus for our research and development team," said Juha Koskela, Managing Director of ABB's Marine and Ports. "We recognise batteries have an important role to play on a range of vessels and is a technology for the present as well as the future."

ABB's power system is part of the total electric system which is being supplied by Acel. The so-called MM63 ferry, designed by Multi Maritime and being built by Fiskarstrand Verft in western Norway, will have a capacity of 60 cars and 250 passengers.

The announcement follows another ABB power systems order for the hybrid Seasight ferry, which will serve the UNESCO listed Nærøyfjord.

WEC TO SUPPLY MOTORS TO WORLD'S FIRST FLNG CONVERSION

Germany's WEG Electric Corporation (WEC) has been awarded a contract to supply eight 280kW flame-proof W22Xdb motors to the world's first FLNG conversion under construction at Singapore's Keppel Shipyard fir Golar LNG.

The conversion of the 1975-built 125,000m^3 Moss LNG vessel Hilli is scheduled for completion early 2017.

Manufactured at WEG's Centre of Excellence in Maia, Portugal MV and HV Flameproof induction motors will be drive Flowserve pumps.

The Hilli will be converted into a four-train vessel of modularised design to provide a total capacity of between 2.3MMt/y and 2.8MMt/y with onboard storage of 125,000m^3. Topsides will be supplied by Black & Veatch, which will supply its PRICO liquefaction technology.

Once complete, the FLNG unit will be stationed in waters offshore Kribi under an agreement made between Cameroon's state-owned oil and gas company Société Nationale des Hydrocarbures (SNH), Perenco Cameroon (Perenco) and GoLNG..

BEARINGS

COUNTING THE COST OF POLLUTION

Thordon Bearings has developed a bespoke modelling tool capable of calculating the amount of operational oil prevented from leaking into the world's oceans with each installation of a seawater-lubricated propeller shaft bearing.

Launched officially on 22nd April to coincide with Earth Day 2016, the world's largest environmental movement, now in its 46th year, the Oil Savings Calculator shows that almost 60 million litres of oil pollution has been saved to date.

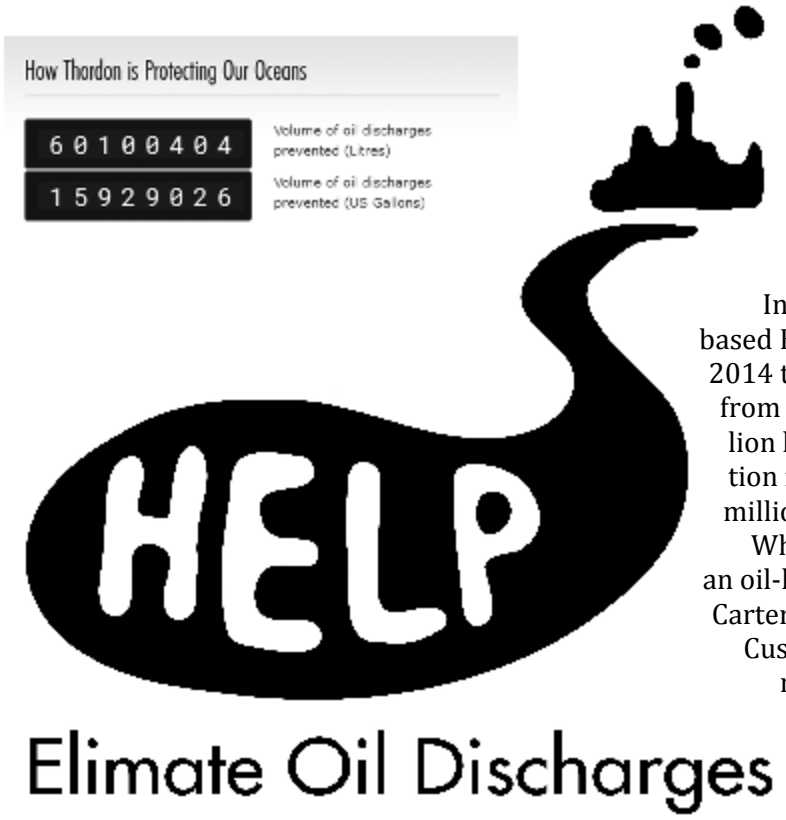
"In our opinion the only acceptable propeller shaft stern tube oil leakage is zero." said Terry McGowan, President & CEO Thordon Bearings. "Thanks to those vessels that have already installed seawater-lubricated propeller shaft bearings, over 60 million litres (15 million U.S gallons) of stern tube oil has been saved from entering our oceans, seas, lakes and rivers. The Oil Saving Calculator is updated constantly and will continue to track our contribution to removing stern tube oil from our waters with the greater goal of completely eliminating this source of pollution."

Dr Karen Purnell, the Managing Director of the International Tanker Pollution Federation (ITOPF), supports the initiative.

"As the world's largest shipowner organisation, ITOPF supports measures designed to help our members and associates meet high environmental standards. Though our primary function is to promote effective response to marine spills of oil and chemicals worldwide, we also support the maritime industry in its efforts to reduce ship-sourced pollution and provide for more sustainable marine operations," she said.

ITOPF last year presented Thordon Bearings with an environmental award for its oil-free COMPAC propeller shaft bearing system for its part in reducing the amount of oil entering the sea annually.

"The success of this measure can now be determined using Thordon Bearings' Oil Savings Calculator, aptly launched to coincide with Earth Day when thoughts turn to a greener, more sustainable future," Dr Purnell added.



The oil saving calculation is based on detailed statistical analysis of the number of vessels that have been built with or converted to seawater lubrication, the 300 days a year each vessel is typically operational and an average oil leak of 6 litres (1.6 U.S gallons) per day per vessel.

Independent research carried out by New York-based Environmental Research Consulting indicated in 2014 that the total amount of operational oil discharges from ocean-going vessels could be more than 240 million litres annually. To add perspective, the oil pollution from the *Exxon Valdez* casualty of 1989 was 41.6 million litres.

While 90% of all commercial ships continue to use an oil-lubricated propeller shaft bearing system, Craig Carter, Thordon Bearings' Head of Marketing and Customer Service, believes the industry is in the midst of a technology transition that will eventually confine oil-lubricated shaft bearing systems to history.

"Recent changes to U.S Vessel General Permit requirements and the introduction of new Environmental Protection Agency rules have resulted in an unprecedented number of commercial vessels opting for seawater-lubricated bearing technologies, and while more can be done, ship owners are now much more aware of the positive contribution they can make in safeguarding the marine environment."

Shipowners can monitor the positive impact the seawater-lubricated propeller shaft bearing is having on the marine environment by checking the Oil Saving Calculator counter at www.thordonbearings.com.

"The counter provides a good indication as to what we as a company and the shipping industry in general can achieve if we continue to work together to develop eco-friendly solutions," said Carter.

In November, Thordon Bearings was presented with the *Tanker Shipping & Trade* environmental award for its COMPAC seawater-lubricated propeller shaft bearing. The technology has also been nominated in the Seatrade 2016 Awards' Clean Shipping category and the technology category of the Green4Sea Awards.

MARINE FUELS

NEW FUEL TEST CONFIRMS CORROSIVE PROPERTIES OF SLVYANKA BUNKER

VeriFuel, Bureau Veritas' marine fuels division, has established a way of identifying the oxidation behaviour of problematic fuels, after a number of vessels experienced corrosion in the fuel system from bunker taken in the Slvyanka region of East Russia.

It is thought that the new VeriFuel is the only marine fuel testing organisation to have developed a test method that can prove that these specific residual fuels perform poorly under oxidation stress.

According to a VeriFuel case study published in March, while routine ISO 8217 analysis failed to detect any anomaly, the number of vessels experiencing corroded filter elements, centrifuge bowl parts, and fuel pumps suggested something was amiss. However, that not all of the fuels being supplied from the Slvyanka area led to corrosion compounded the investigation.

Following various testing procedures, VeriFuel developed a special in-house method to evaluate the oxidative stability of residual fuels, the "Oxidation Stress Test". During the test, fuel was heated to temperatures typical of onboard operational levels and exposed to air over a 48-hour period. Organic acids formed in the fuel and were likely to have caused the corrosion experienced in the fuel systems, the company concluded.

VeriFuel said the newly developed method is "a useful tool to provide warning about corrosive fuels, especially for operators bunkering in an area where such fuels can be encountered. Only by knowing that the bunkered fuel can become highly corrosive, can costly and potentially dangerous situations be prevented where fuel filters are corroded, separators break down and fuel pumps are damaged".

The case study can be read in full at: http://www.bureauveritas.com

WASTE HEAT RECOVERY

FIRST ORC WASTE HEAT RECOVERY SYSTEM OPERATIONAL

The first Hydrocurrent Organic Rankine Cycle (ORC) waste heat recovery system is now operational, following successful installation and commissioning aboard the 7726 TEU containership *Arnold Maersk.*

Developed by Mitsubishi Heavy Industries' marine machinery & engine division, the ORC module enables the utilisation of extremely low temperature heat sources to generate electrical power at low-cost and high-efficiency in marine applications. The system generates electricity using the waste heat of the main engine jacket cooling water and by reducing the load on the vessel's main generator, cuts CO_2 emissions and improves the efficiency of the vessel's plant.

Prior to the installation of 125kW unit to the Maersk ship, a pilot ORC machine successfully completed performance testing at Calnetix Technologies, a partner of MHI Marine Machinery & Engine, gaining ClassNK and Lloyd's Register type approval in 2015.

INDUSTRY PARTNERS SOUGHT

A new project to develop a marine waste heat recovery system capable of delivering fuel savings of at least 8% is being launched by the UK's Energy Technologies Institute, which is now inviting industry partners to be involved in the project.

Paul Trinick , the Project Manager of the marine element of ETI's Heavy Duty Vehicles efficiency programme, said: "We have identified improved waste heat recovery systems as one way of reducing the emissions and increasing the efficiency of shipping. As the ETI is focused on developing technology that will be used in the real world and provide a meaningful reduction of CO_2, we are keen to work with organisations who will be able to demonstrate the commercial viability of the Waste Heat Recovery system."

The request for proposals will close on 30th June 2016; the deadline for notification of intention to submit a proposal is 28th April 2016. The project is one of a number currently being commissioned by the ETI that will reduce emissions and increase efficiency of shipping. More information can be found at www.eti.co.uk

COUPLINGS

VICTUALIC COUPLINGS TESTED TO WITHSTAND EXTREME FORCES

Pipe joining specialist Victaulic has put its Style 07 Zero-Flex rigid and Style 77 Flexible pipe couplings through military-grade shock load tests to show how effective the couplings perform under extreme stress.

Conducted by an independent testing facility, the test followed US Navy protocol governing the ability of equipment to withstand high-impact shock load conditions and "extreme combat forces."

In the test, Victaulic couplings were subjected to forces of 120 to 200g's delivered in nine impacts by a 1361kg hammer with the test assembly set up in three different orientations. After each hammer impact, the test was paused so the assembly could be visually inspected for any signs of leakage, deformation or abnormalities.

The results were excellent, said Victualic. "No damage was found to our couplings, even with X-ray examination. In addition, their joint restraining performance was maintained throughout the tests, with internal hydrostatic pressure verified at 348 psi (1.5 times the working pressure rating of 232 psi). The results found our test samples not only to be in excellent condition but also suitable for re-use."

Both the Style 07 and Style 77 couplings emerged undamaged from military-grade shock load testing. Throughout the tests, both maintained joint restraining and pressure holding performance, demonstrating their durability and reliability in extreme conditions.

"This is good news for naval vessels that need to be prepared for the extreme forces of combat conditions, but even greater news for commercial ships that typically experience less extreme forces," said the manufacturer.

HVAC & REFRIGERATION

OCEANIC INTRODUCES COMPRESSOR EXCHANGE SERVICE

Oceanic Technical Solutions has introduced a new compressor exchange service to meet increased market demand for ship-board refrigeration compressor overhauls.

As part of the programme, the UK-headquartered refrigeration specialist will offer its customers scheduled overhauls on a service exchange basis, whereby Oceanic will deliver a completely overhauled compressor in

exchange for one that has exceeded working hours and requiring refurbishment.

David Lloyd (pictured right), Oceanic Technical Solutions' Technical Director, said: "While a lot of shipboard machinery is designed to operate with minimal maintenance, refrigeration compressors are required to have periodic overhauls based on the number of running hours, but due to the complexity of twin-screw compressors, the knowledge and skill to perform these overhauls is limited in vessel crews.

"Many of the compressors in service are older units and it is becoming increasingly difficult to find spare parts as some manufacturers no longer exist. And with new compressors costing upwards of £20,000, we are beginning to see more shipowners implement preventative maintenance measures.

"At a fraction of the cost of a new compressor, a scheduled overhaul offers serious savings for the owner, preventing cargo damage and costly downtime should a ship's refrigeration plant fail," said Lloyd, referring to a reefer ship that recently lost three compressors in one week.

Oceanic Technical Solutions has recently secured a long term service agreement with a major EU-based shipmanager to implement a programme of planned refrigeration maintenance across its fleet of refrigerated cargo ships.

Robert Chesters, Managing Director, Oceanic Technical Solutions, said: "We have recently invested in a new purpose built workshop and office facility near Liverpool's River Mersey. With lifting facilities up to 2t, the new workshop has the capacity to overhaul and repair most models of reciprocating and twin-screw compressors."

The first batch of compressors under the new agreement is currently undergoing refurbishment at Oceanic's UK facility, although the company also has workshop and servicing capabilities in Singapore & Dubai.

COATINGS

AKZONOBEL INTERCEPTS THE BIOCIDAL MARKET WITH NEW ANTIFOULING

The latest antifouling system developed by AkzoNobel could revolutionise the biocidal coatings market, providing shipowners and operators with greater operational, cost and environmental efficiencies.

Intercept 8500 LPP is designed for the deep-sea market and is the latest addition to AkzoNobel's Intercept product range, a family of patented biocidal antifouling coatings that the company says delivers consistent fouling control performance for in-service periods of up to 90 months, even on high risk fouling routes.

Supporting its claim with extended performance guarantees, the coating uses AkzoNobel's patented Lubyon technology with a silyl methacrylate self-polishing copolymer. Seatrials in areas known for increased fouling, such as the Arabian Gulf and South East Asia, resulted in Intercept 8500 LPP surpassing the fouling control performance of the company's existing biocidal coatings.

"Intercept 8500 LPP's unique polymer combination delivers a step change in biocidal coatings performance that will revolutionize the biocidal coatings market," said Carl Barnes, Antifouling Business Manager for AkzoNobel's Marine Coatings business.

While the exact operational, cost and environmental efficiencies delivered by Intercept 8500 LPP are dependent on the unique characteristics and trading patterns of each vessel, using Intertrac Vision –

AkzoNobel's 'big data' hull performance prediction technology – shipowners can access an accurate picture of product's performance on their vessels over the full dry docking cycle, prior to application.

The coating is applied using the same techniques as other biocidal coatings, with no additional costs, time or resource provisions necessary during dry-docking.

AkzoNobel is offering enhanced guarantees in its Performance Maintenance Agreements (PMA) for Intercept 8500 LPP. These include guaranteed degradation of no more than four percent and a static performance guarantee of up to 35 days, both of which offer enhanced assurance in comparison to any biocidal antifouling coatings and silicon foul release products.

GEARBULK HULL COATING DATA SHOWS SIGNIFICANT FUEL COST REDUCTIONS

Results from a five-year assessment of a Gearbulk vessel coated with Jotun's SeaQuantum X200 have shown that the coating saved the shipowner US$1.5M in fuel costs and reduced CO_2 emissions by 12,055t, across the 60-month period.

Using its proprietary Hull Performance Solutions (HPS) system, which combines the application of an advanced antifouling coating, a special application procedure, and hull sensors that record performance, Jotun analysed the data during *Penguin Arrow's* first five-year drydocking, in November last year.

According to Stein Kjølberg, Jotun's Global Sales Director HPS, the HPS system findings exceeded expectations. "As the first vessel to be coated with SeaQuantum X200, we were excited to see data on how *Penguin Arrow's* hull performed over five years. The results were even better than we hoped for, and we now have clear evidence that SeaQuantum X200's silyl methacrylate coating technology delivers clean hulls, saving money for owners."

Kjølberg added that the solution also helped cut corresponding emissions. "Jotun has long argued that the right marine coatings represent one of the most cost-effective ways for owners to reduce emissions," he said. "We expect these findings will attract significant attention not only from owners, but other industry stakeholders seeking a more sustainable industry."

Jotun met with Gearbulk regularly over the five-year period to monitor the system and had full access to the vessel's historical performance data, stretching back to January 2000, allowing for a full comparative analysis.

HPS date confirmed that speed loss was restricted to just 0.5% over the measured period, compared to a market average speed loss of about 5.9%, and a historical speed loss of 6.4% for the vessel itself. Depending on the vessel and operational scope, the return on investment can be within one year of application, said Jotun.

Jotun, meanwhile, has been working with the International Organisation for Standardisation (ISO) to establish a common industry standard for measuring changes in hull and propeller performance. ISO19030 is expected to come into effect later this year, accelerating industry-wide best practices and providing transparency for buyers of fuel saving technologies and services, including coatings.

HULL MONITORING

REAL-TIME MONITORING OF ICE ON HULL STRUCTURES TO PREVENT DAMAGE

A new monitoring system is under development in a joint Aker Arctic Technology and Light Structures projected aimed at reducing the risks of vessels operating in ice covered waters.

Using optical sensors on a vessel's steel structures, the system will monitor the external forces and loads on the hull to show operators the level of structural risk imposed by ice impacts, allowing them to make probability forecasts of expected loads and operate the vessel safely and efficiently.

"This will help operators in many ways: it provides more safe operations, improves the understanding of the ice loads and therefore the practical training will be improved. We can provide our extensive technical know-how to help shipowners in their operations and avoid unnecessary cost arising from the hull damages," said Aker Arctic Managing Director Reko-Antti Suojanen.

"Ice loads exceeding the design load is a major risk and may cause permanent damage to the hull and challenge the crew's safety. The Ice Load Monitoring system monitors the actual load on the hull in real-time and displays the utilisation factor of the hull structure – which will be of immense importance for both inexperienced as well as experienced navigators, in addition to the important input for maintenance planning and surveys," said Inge C Paulsen, CEO of Light Structures.

MARINE DRONES

MONSTROUS USE OF KONGSBERG DRONE

With sophisticated drone technology set to become a key aspect of ship monitoring and surveillance operations, Kongsberg Maritime has already achieved success with its new marine drone – discovering the Loch Ness Monster!

Operation Groundtruth, the first survey of its kind in Scotland, made use of Kongsberg Maritime's recently-launched MUNIN autonomous underwater vehicle (AUV) to map the vast depths of the legendry creature's watery habitat.

Craig Wallace, senior subsea applications engineer at Kongsberg Maritime, said: "We expect to uncover new information from the Loch during this survey, as MUNIN is the most advanced low logistics AUV on the market and is the first of the next generation AUVs from Kongsberg Maritime. Merging the cutting edge technology from the commercial sector whilst maintaining the robust reliability from the military market, the vehicle is providing insight to the Loch's depths as never before imagined. Finding Nessie was, of course, an unexpected bonus."

The Nessie to which Wallace referred, however, is a rather large model lost during the filming of the 1970s movie The Private Life of Shelock Holmes.

The search for the Loch Ness Monster continues.

CARGO HANDLING

ECO-CRUISESHIPS TO BENEFIT FROM MACGREGOR OUTFIT

MacGregor has secured orders for environmentally-friendly equipment for four next-generation eco-cruise ships which will be built in Germany and Finland. The vessels will be the first liquefied natural gas-powered cruise ships to enter the market. The orders were booked into first quarter 2016 order intake.

"Cruiseships operate in some of the world's most fragile ecosystems and a rising demand from both authorities and operators requires that onboard systems are as environmentally-friendly as possible," said Lars Öberg, Sales Manager, RoRo at MacGregor. "They also need to be efficient, quiet and cost-effective."

MacGregor deliveries include electrically-operated shell doors and electric frequency-controlled Hatlapa winches.

"Our extensive portfolio of electrically-driven equipment is ideally suited to this ship type," continued Öberg. "The greatest environmental benefits of electric drives are the elimination of potentially polluting hydraulic oil leaks and the fact that, on average, electric drives consume up to 30% less energy than their hydraulic equivalents. MacGregor's impressive reference list of providing reliable electric-drive systems in RoRo applications as well as the company's ability to make timely deliveries was an important factor in securing the contract."

HULL FORM

BOX SHIP DESIGNS FOR ALL YOUR MARKET NEEDS

Danish designer Knud E Hansen unveiled a series of three ship designs this month, following market demand for containerships to meet specific operational requirements.

The first vessel in the series, ECX-2000-C, is a 2000TEU shallow draught ship for up-river ports, such as the Port of Bangkok. It has a dual propeller arrangement comprising a direct drive, 5.8m diameter propeller and a counter-rotating pod with a 4.7m propeller. Senior Naval Architect Jesper Kanstrup said: "The total propeller disk area of the two propellers corresponds to the area of a single propeller with a diameter of approx. 7.4m and further, the counter-rotating propeller will recover some of the swirl energy produced by the main propeller, which increases the overall efficiency."

A second design, the ECX-3800 (pictured), is a 3800TEU feeder vessel for operations where draught is not a primary consideration. This design features a larger, slow-turning propeller to optimise propulsion efficiency without the need for counter-rotating solution. Unlike most feeder vessels, the design depicts a deckhouse positioned slightly forward of amidships so as to maximise the number of container slots on deck, while considering IMO requirements to the line of vision from the bridge. The vessel is also designed to be LNG ready, with a dual-fuel engine and HFO tanks that can be easily retrofitted for LNG.

The third arrangement, designated the TCX-3000, is an innovative hull form suited for carriage of both partial and full container loads. Ostensibly a trimaram with an open top, the TCX-3000 has a narrow main hull with vertical sides and outrigger hulls with a triangular cross section, but vertical sides towards the quay.

This way, said the designer, you have the narrowness associated with low accelerations at partial load, and with the triangular section of the outrigger hulls, increased stability for full loads at deeper draught.

"Many have proposed an open top container vessel, but to prevent water from being shipped over the sides of the vessel and into the open holds when the vessel is rolling in bad weather, the hull depth must be very high. And with a deep hull, the handling time for the containers will be increased because of the increased vertical travelling distance." This design, said the firm, addresses that problem.

NEWBUILDS & CONVERSIONS

BULKERS: Mitsui Engineering & Shipbuilding (MES) delivered the 60,000dwt carrier *Iconic Unicorn* to Ionic Unicorn Inc last month. It is the 11th vessel built to MES's neo60BC design and the third in its eco-ship line.

GENERAL CARGO: Royal Bodewes has launched *Arklow Valiant*, the third ship in a series of ten 5100dwt Bodewes Traders due for Arklow Shipping. The vessel features a new bow which makes it different from its two predecessors.

PSV: Brazil's new Oceana shipyard has delivered its first newbuild, an Ustein PX105 platform supply vessel. The vessel was delivered to shipowner Oceana Offshore and will operate under a 6-year charter to Petrobras. A sister vessel is nearing completion.

OFFSHORE: Keppel Singmarine is set to deliver the high-specification deepwater derrick lay vessel to McDermott subsidiary Hydro Marine Services. *DLV2000* will be deploy to the INPEX Ichthys LNG project offshore Western Australia.

CRUISE: Fincantieri's Ancona yard has started construction of *Viking Sun*, the fourth of six cruise ships Viking Ocean Cruises has ordered. The first building block, laid this month, is 11m long, 28.8m wide and weighs about 280t.

TANKERS: Crowley Maritime has accepted delivery of the third of four new Jones' Act product tankers from the Philly Shipyard, Inc (PSI). The 50,000dwt LNG-ready *Lousiana* joins sister ships *Ohio* and *Texas*, which were delivered in 2015.

HEAVY LIFT: Cosco Dalian Shipyard has delivered the first MC-class module carrier to BigRoll Shipping. BigRoll Shipping is building a further three 1A ice class module carriers capable of transporting large offshore modules in remote areas.

CRUISE: MSC Cruises has signed a letter of intent with STX France for up to four 20,000grt, LNG-powered cruiseships. The first one is scheduled for a 2022 delivery.

FEATURE ARTICLE

CRUISESHIP ENTERTAINMENT KNOWS NO BOUNDS

By Samantha Fisk

Harmony of the Seas, the third in the Oasis class of vessels, was due to set sail at the time of writing, marking the second large cruiseship for Royal Caribbean Cruise Lines this year.

The cruise trade is on the up, with further cruise vessels starting to stack up in the order book for some of the big names in European cruiseship building.

Peter Hackmann, head of corporate communications, Meyer Werft, takes up the story: “Ships are now bigger and are being viewed and promoted as the destination,” adding that the growth in vessels also relates to the cruise operator and the type of cruise they are offering, but also with economy of scale now playing an important factor. With larger vessels it becomes cheaper per person.

“One significant change is that the market for cruising is now a prolific market. Where before the market catered for a special kind of passenger, it is now totally different,” said Hackmann.

Royal Caribbean Cruise Lines (RCCL) will see two vessels being added to its fleet in the first part of the year, the third in class of the Oasis series *Harmony of the Seas* and the third in the Ovation class of vessels, *Ovation of the Seas*.

However, even as large as these ships now are, size has not increased significantly since the delivery seven years ago of the 361m long *Oasis of the Seas: Harmony of the Seas* is longer by just one metre. Nevertheless, what makes these vessels out do each other is more to the entertainment provided onboard than anything else. Thanks to modern technologies these vessels have become bigger and flashier - a true technocrats play den.

“In terms of entertainment onboard there is a difference which you wouldn’t find on a ship 5-10 years ago. The market in this area has developed tremendously”, said Hackmann.

At 227,000gt, *Harmony of the Seas* has capacity to carry 5479 passngeres over 16 decks. The Oasis class vessel will also feature RCCL’s "seven neighbourhood" concept, including a Central Park, Boardwalk, a Royal Promenade, the Pool and Sports Zone, Vitality at Sea Spa and Fitness Centre, Entertainment Place and Youth Zone.

RCCL says that guests onboard *Harmony of the Seas* will experience amenities including three multi-story water slides, the Bionic Bar with robot bartenders and Voom, the fastest Internet connection at sea which, will give guests the ability to instantly share their vacation through their social media channels. *Harmony of the Seas* also features seven distinct neighbourhoods, 20 restaurants and 2,394 crew to cater for guests.

RCCL also took delivery of its 24th ship and third in the Quantum class, *Ovation of the Seas,* at the beginning of April. "We have once again introduced yet another one of the most technologically advanced cruise ships and the very first that has been built for the China market – a market we continue to demonstrate our commitment to expanding," said Michael Bayley, president and CEO, Royal Caribbean International, upon the vessel's delivery.

The 168,666gt *Ovation of the Seas* spans 18 decks and has capacity for 4,180 guests at double occupancy.

One of the main features onboard *Harmony of the Seas* is the North Star on deck 17 which, allows guests to travel in a glass gondola at a height of 90m above sea level where they can enjoy a 360-degree panoramic view.

The ship also features dancing Roboscreens in the Two 70 entertainment venue; robotic bartenders in the Bionic Bar; RipCord by iFLY, the first skydiving experience at sea. Adding to the entertainment onboard are transformative venues, such as the Sea-Plex, the largest indoor sports and entertainment complex at sea with bumper cars, roller-skating; and the cruise line's largest and most advanced staterooms ever, according to RCCL.

However, putting all this technology onboard and creating a design that is in esence a floating entertainment plaza has produced challenges of its own for the German-based shipyard. "The North star [Gondola experience] was a big challenge. The Two 70 was also a challenge because you have windows that cover three decks and it is situated right over the azipods, so noise reduction was a challenge."

Whether cruiseships will get bigger remains to be seen and relies on market demand, of course. But what is certain is that the new generation of cruiseships and the technology and entertainment systems owners want onboard is likely to challenge the naval architect and marine engineer for some time to come.

COMPANY NEWS

MAESRK TO HELP UPGRADE ALANG RECYCLING YARDS

To reduce the financial impact of environmentally-sustainable ship recycling, Maersk has announced it will help selected yards in Alang, India, to upgrade their ship recycling facilities to meet the shipowning group's corporate sustainability objectives.

With more vessels to recycle in the future the current cost of sustainable ship recycling is not feasible, according to Maersk. Out of the total 768 ships recycled globally in 2015, 469 – representing 74% of the total gross tonnage scrapped – were sold to facilities on beaches in Indian, Pakistan and Bangladesh with challenges to workers and the environment.

"The Maersk Group's policy is to only recycle ships responsibly. There has, however, been no change in practices in this area and today, responsible recycling is only feasible in a limited number of yards in China and Turkey," said the Head of Sustainability in Maersk Group, Annette Stube. Currently, the estimated extra cost of responsible recycling at existing yards is between US$1M and $2M for each vessel.

Maersk has witnessed a "steady improvement" at several Alang facilities over the past two years, with four yards now certified to IMO and Hong Kong Convention standards.

"We want to play a role in ensuring that responsible recycling becomes a reality in Alang, India. To find sustainable solutions, we are working on building a broader coalition with other ship owners and have initiated engagement with a number of carefully selected yards in Alang. This includes improving local waste facilities and hospitals - and upgrading the housing conditions for the migrant workers in Alang," said Stube. The Maersk Group is engaging in the development of sustainable ship recycling on the long term and will in the coming years work directly with selected certified yards in Alang to further upgrade their facilities and practices to comply with the company's standards.

IMO INVITES MARINE FIRMS TO HOST TECHNOLOGY COOPERATION CENTRES

The International Maritime Organisation (IMO) is inviting companies to host 'cooperation centres' to promote marine technology as part of a joint IMO-EU project to mitigate climate change across the shipping industry

The *Capacity Building for Climate Change Mitigation in the Maritime Shipping Industry* project aims to establish a Maritime Technology Cooperation Centre (MTCC) in each Africa, Asia, the Caribbean, Latin America and the Pacific with €10 million European Union funding. The MTCCs will provide leadership in promoting ship energy-efficiency technologies and operations, and the reduction of harmful emissions from ships.

IMO is inviting organisations located in the target regions with the capacity to set up MTCCs to submit an Expression of Interest to IMO by 15 May 2016.

Each MTCC will be hosted by an existing organisation (or consortium) with credible standing in its region, considerable engagement with industry and government, a track record of regional outreach and the ability to provide the MTCC with in-kind hosting support such as office space, as well as related logistical support.

The five organisations whose bids are successful will go on to host MTCCs with initial funding support from the project. They will enter into a contract with IMO to deliver mutually-agreed project milestones over a three-year period.

More information can be found at www.imo.org

ESCA BACKS EU CO_2 REDUCTION TARGETS

The European Community Shipowners' Association (ECSA) has backed calls for EU member states to support global CO_2 reduction initiatives for shipping, following an informal gathering of European Union Transport and Environment Ministers in Amsterdam last week

ECSA President Niels Smedegaard said: "We fully support the initiative of the Dutch Presidency. The shipping industry endorses the Paris agreement on climate change and we are committed to ambitious CO_2 emission reductions across the world merchant fleet. With the shipping industry's support, Member States of the International Maritime Organisation (IMO) will be able to develop meaningful CO_2 reduction commitments for the international shipping sector as a whole that are both ambitious and realistic."

The informal Council meeting was held ahead of the 69th session of the IMO's Marine Environment Protection Committee (MEPC) session. The meeting will feature a discussion on a global data collection system that will provide information on the emissions from maritime shipping on an annual basis.

"We believe that this system should have mandatory application", said ECSA Secretary General Patrick Verhoeven. "A decision in IMO should come forward in 2016 so that ships can provide the required data as soon as possible."

ECSA also supports the proposal of its international partner ICS (International Chamber of Shipping) for IMO Member States to adopt an Intended IMO Determined Contribution. This would make IMO Member States and the shipping industry answerable to the international community, in the same way that governments committed to Intended National Determined Contributions (INDCs). The adoption of an Intended IMO Determined Contribution would also make it clear that the reduction of the sector's CO_2 emissions is being addressed robustly by IMO Member States.

"The development of an Intended IMO Determined Contribution should be part of a clear work plan and timetable, to be elaborated as of this year", concluded Patrick Verhoeven.

P&I MERGER DISCUSSIONS CONTINUE

Negotiations between the UK Club and the Britannia are continuing following meetings held independently by both Clubs to consider the proposed merger. In order to complete the process of due diligence and to allow time for the Members of both Clubs to be fully informed, the timetable for a recommendation by Boards and a final decision by Members will be extended.

LOC AND SNC JOIN TOGETHER

LOC (London Offshore Consultants) and Italy-based marine surveyors Studio Navale Canena (SNC) are combining forces to offer a greater global network of casualty response expertise.

The partnership is expected to extend SNC's reach allowing it to deliver more cost-effective, global Hull & Machinery services to the Italian community, while LOC will build its presence in the Italian market, delivering specialist services to a growing customer base across the region.

Andrew Squire, LOC Group Chief Executive said the new relationship is uniquely beneficial for all parties. "SNC benefits from being part of our global network, LOC gains an important foothold in the Italian markets and – more importantly – our combined clients benefit from a greatly enhanced service delivered much more cost effectively."

The focus will initially centre on Hull & Machinery casualty work but it is expected that this will evolve to include marine warranty surveys, offshore or energy services.

Massimo Canepa, SNC President said: "This collaboration with LOC is the ideal development that allows us to continue providing the Italian shipping and marine insurance community with high quality and effective support, particularly in times of expanding globalisation. I look forward to working with them."

SMIT AND KOTUG MERGE TOWAGE OPERATIONS

Royal Boskalis Westminster N.V. (Boskalis) and KOTUG International B.V. (KOTUG) have completed the merger of their European harbour towage operations.

The joint operations have been transferred to a 50/50 joint venture, bringing together the European harbour towage activities of both SMIT, a Boskalis subsidiary, and KOTUG.

With a fleet of 65 tugboats, KOTUG SMIT Towage will be a leading provider of harbour towage services in Northwest Europe, operating in 11 ports in Belgium, Germany, the Netherlands and the United Kingdom. The activities of both partners in other parts of the world are excluded from this cooperation.

SEACAT VESSELS TO SERVICE RACE BANK WINDFARM

Seacat Services confirmed this week a two-year 4-workboat crew transfer contract with Dong Energy to support engineering and construction operations at the 590MW Race Bank Offshore Wind Farm. Seacat Services' fleet of DNV-GL 1A1 HSLC R1 Service 1 classified vessels, will be chartered by the enegy company to service 91 wind turbine installations due to be fully operational in 2018.

"The construction timeline for UK offshore wind projects requires highly capable partners to deliver projects in a manner that keeps developments on time and on budget" said Ian Baylis, Managing Director, Seacat Services.

"So far, we're proud to say that the UK maritime sector has delivered when it comes to supporting this growing industry. Our work with DONG Energy on Race Bank over the coming months will enable us to channel further investment into the local supply chain by providing opportunities for local crew and supporting services."

"Furthermore, this contract award is a testament to the hard work carried out by Seacat crews on DONG Energy's Westermost Rough construction project and we look forward to continuing our relationship with the project development team."

Jason Ledden, Construction Project Manager for Race Bank at DONG Energy said**:** "Placing contracts with UK suppliers whenever possible is a real priority for DONG Energy and we have already worked with Seacat Services for our Westermost Rough offshore wind farm. The company's commitment to service, quality and safety meant there was no hesitation in using them again for our Race Bank project.

"These crew transfer vessels are part of a new fleet, and will help safely and efficiently transfer our engineers and technicians offshore to work on the construction of Race Bank's 91 wind turbines and two substations."

SEABORNE COMMUNICATIONS

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Edited by: Patrik Wheater
Contributor: Samantha Fisk
Publisher: Seaborne Communications Ltd
Email: mem@seabornecomms.com
Web: www.seabornecomms.com