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By making “maritime education and training” the theme of this year’s World Maritime Day, celebrated at the International Maritime Organization’s (IMO) London headquarters in September, the IMO highlighted the all-important human element in shipping. “Effective standards of training remain the bedrock of a safe and secure shipping industry, which needs to preserve the quality, practical skills and competence of qualified human resources,” noted outgoing IMO Secretary-General Koji Sekimizu.

Beyond compliance with the 1978 STCW (Standards of Training, Certification and Watchkeeping for Seafarers) Convention and Code – amended most recently in 2010 – seafarers can ensure the adequacy of their capabilities and competence only through effective, up-to-date education and training. With the increasing number of regulations and advances in technology, not least of which is growing digitalisation, the demands on those working in the maritime industry have never been higher. To help them keep pace with rising standards of safety, environmental protection and commercial sustainability, the entire industry must improve the availability and quality of education and training in the coming years.

In this vein the biennial maritime exhibition Europort, set again in Rotterdam in November, is dedicating an entire day exclusively to the human capital challenges faced by the shipping and offshore sectors, including ways to enhance maritime proficiency and maintain skills. Among the numerous important topics slated during the other three days of the exhibition’s 37th edition are technologies and systems that are energy-efficient and environmentally sustainable. Please see our overview starting on page 33 for detailed information.

More and more intelligent systems and design tools today are controlled and integrated by software. This presents new challenges to ship crews with respect to operation and maintenance. On the other hand, the further development of advanced systems and decision-support tools aimed at assisting seafarers in their work will contribute significantly to onboard safety.

In this issue we’re focusing especially on systems and methods that enhance safety in maritime environments. A suitable working and living environment for crews is a fundamental precondition in this regard. Our article starting on page 42 revolves around a mothership concept that challenges perceptions of shipboard environments in the offshore operation and maintenance sector. And the article on page 52 describes a method for optimisation of a tension-leg offshore platform orientation in order to minimise risks to personnel and assets in the oil and gas industry.

Safety and security matters are also dealt with in our Ship Operation section, including the relatively young phenomenon of cyber attacks. See page 78.

This autumn the maritime industry will also look to China, where the 18th edition of the Marintec trade fair will be held. Exhibitors will showcase their latest developments in ship design, offshore engineering, port technology and, of course, shipbuilding. For details, turn to page 24.

In our Shipbuilding & Equipment section we’re taking a closer look at the workboat market. Though low oil prices are hurting demand for sophisticated offshore supply vessels, there’s still a need for maintenance and other service vessels. See page 10.

The assessment and optimisation of a new hopper dredger’s hull lines are described on page 20, and robust chillers for the shipping industry are presented on page 22.

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Future vision of heavy well intervention

Design | At the recent Offshore Energy 2015 exhibition in Amsterdam, Herrenknecht Vertical GmbH (HVG) from Germany and Ulstein Design & Solutions BV from the Netherlands presented the Ulstein DX105 design. A future vision of heavy well intervention, the 154.4m-long and 29.4m-wide vessel is equipped with the HVG Terra Invader 750 drill tower and deployable in water depths up to 2,500m. The integration of the Herrenknecht equipment resulted in a compact, fully integrated vessel design, specifically aimed at cost efficiency in medium and heavy well intervention operations, punching well over its weight with regard to drilling capabilities, the companies said. The large, free work deck of the DP3 Ulstein DX105, with direct access to the moon pool, allows the vessel to carry a large diversity of additional well equipment, including coiled tubing equipment, wireline equipment, multiple X-mas trees and other subsea equipment, cementing equipment and storage of extra drill pipes, risers and casings, well testing equipment and future well technologies. The HVG drill tower consists of an A-frame structure, enabling easy access to the drill floor.

Maersk Tankers | Denmark’s Maersk Tankers, a subsidiary of A.P. Møller-Maersk, has ordered nine medium-range tankers of 49,900dwt from the South Korean yard Samsung Heavy Industries. The order is worth about USD 300 million, and the vessels will be able to carry refined products such as gasoline and diesel. They will be built by Samsung Heavy’s Ningbo shipyard in China. The vessels, which will be built to an eco-friendly design, are due to be delivered in 2017 and 2018. Maersk Tankers also placed an order for eight tankers from the Sung Dong shipyard in South Korea last year.

First newbuilding for Saga Cruises

Agreement | The British company Saga Cruises and German yard Meyer Werft have signed a memorandum of agreement for delivery of a new cruise vessel in summer 2019. The contract also includes an option for a second vessel, with delivery in 2021. The 55,900gt vessel will be about 234m long and 30.8m wide. Carrying fewer than 1,000 passengers, it will retain the intimacy and personal service for which the cruise line is renowned, but with some new features including balconies for all cabins, the company said. Bernard Meyer, managing partner of Meyer Werft, said this would be the first newbuilding ordered by the British cruise line, which currently operates two vessels. For this project, Meyer Werft’s Building Dock I, which is presently used for block construction, will be reactivated.

DSC takes over D. van de Wetering

Acquisition | With the aim of further improving the quality of its service for customers, Damen Shiprepair & Conversion (DSC) has taken over the Dutch repair yard D. van de Wetering BV (WPR) in Rotterdam. The integration of WPR into the DSC network will enable Damen’s customers to benefit from the availability of additional experienced and flexible specialists, whether at DSC locations or in ports across the globe. This further strengthens Damen’s commitment to making guaranteed availability and continuity for customers its number one priority. At the beginning of October, the WPR yard at Bunschotenweg ceased operations, and all activities were transferred to Damen Shiprepair Van Brink, in Pernis. Customers can continue to use existing contact details, which will be transferred directly to DSC.
SeaXplorer designs unveiled

Luxury yachts | Damen has launched a purpose-built, Polar Code-compliant range of expedition yachts that is suited both for extreme polar and remote tropical areas. The three SeaXplorer designs debuted at the Monaco Yacht Show. A dedicated Damen SeaXplorer team under the responsibility of product director Mark Vermeulen developed the three designs, while Amels, the sole yachtbuilding division in the group, is responsible for sales and marketing. The smallest yacht is 65m long and 14m wide. With a propulsion power of 3,500 kW, the 2,000gt ship reaches a maximum speed of 15 knots and can stay at sea for 40 days without a port call. It offers space for twelve guests and 20 crew members. The medium-sized version for 22 guests and 36 crew members is 90m long and 16m wide. Its propulsion power of 6,000 kW enables the 5,500gt vessel to achieve a speed of 16 knots. The largest yacht is 100m long and 18m wide. The 7,000gt vessel has a total propulsion power of 8,000 kW, also achieves a top speed of 16 knots and can accommodate 30 guests and 50 crew members.

Vard to build two OSCVs for Topaz

New customer | The Norwegian shipbuilder Vard said it had won contracts to design and construct two offshore subsea construction vessels (OSCVs) for a new customer, Dubai-based Topaz Energy and Marine. The orders are worth over USD 100 million. Developed for crane operations and light subsea construction with intervention duties, the vessels will be of the Vard 3 08 design and 98.1m long and 20m wide. Designed by Vard Design in Alesund, Norway, and with hulls to be constructed at Vard Tulcea in Romania, the vessels are scheduled for delivery from the Vard Brattvag yard in Norway in the third and fourth quarters of 2017, respectively. The DP2-class vessels will have a 120-tonne active heave-compensated offshore crane with the capability to reach working depths of 3,000m. Subsea equipment can be lowered onto the seabed through a moon pool or over the ship’s side. In addition, both vessels will be prepared for two remotely operated vehicles (ROVs), to be deployed via launch and recovery systems in the ship’s side.

LNG hybrid barge for Rotterdam

Becker Marine Systems | Hamburg-based Becker Marine Systems, a leading provider of high-performance rudders and energy-saving manoeuvring technology solutions, and KOTUG, a Dutch towage operator, have signed a memorandum of understanding to launch an LNG hybrid barge in the port of Rotterdam. The LNG hybrid barge, a floating energy plant, is designed to provide environmentally friendly electricity produced from LNG for cruise ships while in port. The world’s first LNG barge, *Hummel*, started operation in the port of Hamburg this spring. Becker Marine Systems is the owner of the LNG hybrid barge and provides services to charter out the barge. The concept is patented by LNG Hybrid, a division of Becker Marine Systems.

> IN BRIEF

LARS | Global Davit, in collaboration with the Dutch company TBV Marine Systems, is developing, manufacturing and implementing a stern launch and recovery system (LARS) that can launch and recover bigger fast rescue craft. It can be used in wave heights up to 2.25m.

App launched | ZF Marine has launched an app called ZF MarineInteractive. It can be downloaded from both the Apple App Store and Google Play.

Bunker operations | The Bomin Group has announced the launch of a physical bunker supply operation in Antwerp, called Bomin Belgium BVBA. The expansion significantly strengthens Bomin’s position in a critical European bunkering hub and is in line with the company’s ambitious plans for growth throughout 2015.

100th delivery | Huisman has celebrated delivery of the 100th Chinese-built crane at its production facility in Zhangzhou, China. The 100 cranes have a total lifting capacity of 65,000 tonnes. The 100th crane is a 1,500-tonne heavy-lift mast crane for Jumbo’s *Fairmaster*.

New venture | Peter Jorgensen, former managing director of UK-based offshore services provider CWind, has set up a new company called CPower Energy. CPower Energy will provide services to support the renewable power industry, offering a suite of packaged solutions for energy companies looking to create and maintain the billion-pound investments that wind farms represent.

Coating testing | Following investment in its Singapore laboratory, global testing group Exova now offers an extended range of coating qualification testing for the oil and gas and marine sectors.

Safety report | Software specialist Helm Operations has published a new report on workboat and OSV safety. The independent report summarises six months of research by Fathom Maritime Intelligence and primary data collection and analysis by Southampton Solent University.
New managing director

Schottel | Dr Christian Strahberger has been appointed managing director of Schottel GmbH effective January 1st 2016. He will succeed Professor Dr Gerhard Jensen.

Dr Strahberger began working for Siemens AG in 2001 and moved to the mechanical engineering company Voith in 2009, where he held several managerial positions. Most recently, he has been serving as chairman of the board of management for the marine division of Voith Turbo Schneider Propulsion.

Well intervention vessel launched

Siem Helix 1 | The German shipbuilder Flensburger Schiffbau-Gesellschaft mbH & Co KG (FSG) has launched the well intervention vessel *Siem Helix 1*. The vessel is the first of a series of two ordered by Siem Offshore in February 2014. Upon its delivery, which is scheduled for 2016, the ship is expected to enter into service for Petrobras in Brazil. The 158.65m-long and 31m-wide *Siem Helix 1* will be operated by Houston-headquartered Helix Energy Solutions to execute subsea well intervention operations. It is compliant with the Mobile Offshore Drilling Unit (MODU) and Well Intervention Unit 2 class notations. *Siem Helix 1* will be equipped with a dynamic positioning system (Dynpos-Autro) and a subsea crane with a capacity of 250 tonnes at a depth of 3000m. Accommodation is provided for 150 people.

Launching at FSG's premises in Flensburg, Germany

Contract for first project in Asia

A2SEA | Denmark’s A2SEA, a provider of offshore wind transport, installation and service solutions, has signed a contract to install two foundations and two Siemens 4-MW turbines in the Taiwanese project *Formosa 1* with Swancor/Formosa Wind Power Co, Ltd.

The foundations and turbines will be installed by the jack-up installation vessel *Torben*, previously known as *Friedrich Ernestein* and owned by RWE. A2SEA will have ship management and operation of the vessel with its own crew on board. The two turbines are the first phase in creating the *Formosa 1* offshore wind farm. The entire project consists of 32 turbines, with the second phase to be constructed in 2018 and 2019.

“We are very proud to be the first European offshore wind contractor to install turbines in Asia. It is a very important step for our company. A great part of the future of offshore wind lies in Asia and therefore, naturally, it is a very important step for the continuous evolution and growth of our company,” said Jens Frederik Hansen, CEO of A2SEA.

The *Formosa 1* offshore wind farm is expected to deliver its first electricity by the end of 2016.

The jack-up vessel *Torben* will install the first foundations and turbines of the *Formosa 1* offshore wind farm off Taiwan

Design of new polar logistics vessel

Aker Arctic and Piriou shipyard have signed a contract for a polar logistics vessel *L’Albatros* and the polar logistics vessel *L’Astrolabe*. The vessel is to be delivered in early summer 2017. It will be deployed in the Indian Ocean in autumn 2017 and carry out the first supply mission to the Dumont d’Urville Station in Adélie Land, Antarctica, in winter 2018.

The 72m-long vessel is a logistics ship and patrol icebreaker that can accommodate up to 60 persons on board, carry 1,200 tonnes of cargo and fit one helicopter. The new vessel will replace the existing patrol vessel *L’Albatros* and the polar logistics vessel *L’Astrolabe*.

Agreement | Aker Arctic and Piriou shipyard have signed a contract for the basic design of a polar logistics vessel. Aker Arctic will also provide technical support in hull- and ice-related matters to the shipyard during construction of the vessel in Concarneau, France.

The new vessel is to be delivered in early summer 2017. It will be deployed in the Indian Ocean in autumn 2017 and carry out the first supply mission to the Dumont d’Urville Station in Adélie Land, Antarctica, in winter 2018. The polar logistics vessel is based on a concept developed by Marine Assistance (France). Its icebreaking capability will be verified by model tests at Aker Arctic’s ice model basin in Helsinki, Finland.
Arctic tanker design jointly developed

Aframax | Finnish marine architect Deltamarin and Finnish yard Aker Arctic Technology have jointly developed a new Aframax-sized tanker design for Arctic use, focusing on safe operations. The ice-strengthened vessel aims to provide cost-efficient and reliable tanker operations both in open water and ice for crude oil and oil product transport. The vessel is strengthened to ice class PCS level, equal to Russian Maritime Register of Shipping category ARC6, and is capable of continuously breaking ice that is thicker than 1m. It can operate on the Northern Sea Route during the extended summer months, and with assistance even longer. During the winter months the vessel can operate in sub-Arctic sea areas such as the Baltic Sea or Sakhalin in the Russian Far East.

Next-generation polar research vessel ordered

Cammell Laird | The British government said the British yard Cammell Laird was the preferred bidder for an order to build a polar research ship at a cost of about USD 307 million. The vessel will be able to break through ice and operate robotic submarines, and the first complete ship built by Cammell Laird since 1993. The yard fended off competition from rival bidders in Europe and Asia for the order. The contract, announced by British Minister of State for Universities and Science Jo Johnson, follows a twelve-month competitive tender. The contract will create 400 jobs at the yard, which is expected to start work on the contract next month and deliver the vessel ready for operation by 2019. It is being built for NERC, Britain’s Natural Environment Research Council.

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OVERVIEW

The global workboat market is on a roll, but that’s not readily apparent amid the diversity of this ship sector. Admittedly, the oil price crash is having a damaging impact on the offshore supply vessel (OSV) sector and experts are still divided on how long oil prices will stay down. But although this may have cut demand for latest-generation, high-end OSVs in the short run, there is ongoing demand for maintenance and other service vessels of many different types, writes freelance journalist Paul Bartlett.

"Lower for longer" was one school of thought on oil prices at a recent workboat exhibition and conference in Abu Dhabi. But this view was countered by others suggesting that widespread spending cuts for exploration and production (E&P), and associated job losses, would delay development of new offshore oil finds, which in any case now take three to five years to bring on stream.

According to Douglas-Westwood, a UK-based energy research and consultancy firm, E&P costs per barrel have risen steadily at an annual average of almost 11% since 2000. At about USD 5 per barrel then, they are now in excess of USD 20.

But new finds are vital to offset the depletion in total hydrocarbon reserves, which are currently falling by 8 to 10 million b/d, according to industry estimates. One expert has even suggested that oil could spike to USD 200/barrel within the next two years because US shale output and higher production from Gulf producers including Abu Dhabi, Iran, Iraq, Qatar and Saudi Arabia won’t be sufficient to make up the shortfall.

Demand for workboats

Advanced drilling technologies for the world’s energy frontiers, subsea construction, and enhanced oil recovery through well stimulation and intervention are some of the factors underpinning demand for workboats in the offshore sector. New sources of offshore oil in the so-called “four-D” areas – distant, deep, difficult and dangerous – require increasingly complex service boat logistics. Energy development off the East African coast, for example, will require significant fleets of workboats to service and maintain them.

Even in established offshore oil-producing regions, there is healthy demand. This is driving moves among designers to improve vessel efficiency and sustainability. The introduction of electrical power, recovering energy from waste heat, and the introduction of batteries are just some of the innovations currently high on the agendas of vessel designers, operators and machinery suppliers.

The construction of new offshore facilities, the decommissioning of ageing structures and the ongoing repair and maintenance of existing platforms generates an inelastic demand for service vessels of many types. In the North Sea, Allseas’ Pioneering Spirit, for example, has been hired not only to assist in the decommissioning of Shell’s Brent Delta platform, but also in the installation and hook-up of four offshore platforms at Statoil’s Johan Sverdrup oilfield late this decade.

The Norwegian state oil firm is spending some USD 15 billion on the field’s first development phase. A second phase will involve similar spending and boost output to a peak expected to exceed 650,000 b/d by the early 2020s. The field will be one of the North Sea’s five largest and will produce oil for decades.

Some workboat demand is region-specific. Ageing platforms and rigs in Arabian Gulf waters, for example, are generating a requirement for sophisticated self-propelled and self-elevating units, with large decks, onboard workshops and plenty of engineering capability. Modern accommodation units are also in short supply.

As regional oil majors Saudi Aramco and Abu Dhabi National Oil Company...
continue their quest to gain market share, the search for new energy supplies continues. Techniques recently developed in the North Sea to enhance the yields of offshore fields have not gone unnoticed. The recovery rates of offshore fields can be increased from a typical 30% to 60-70% by using the latest technologies, thereby prolonging the lives of fields and demand for the many workboats that service them.

Scaled-down versions of light well intervention vessels deployed in the North Sea, adapted for shallow and relatively benign water operation, are likely to be introduced in the Middle East within the next few years. Meanwhile, subsea construction, pipe and cable layers, and dynamically positioned rock installation vessels are all in steady demand.

However, it’s not just the hydrocarbon industry that is underpinning workboat demand. The offshore renewables sector, despite the oil price downturn, has created a whole new workboat arena, with fresh demand for large wind farm vessels capable of subsea construction, turbine installation, and service. Fast crew boats capable of ferrying highly paid engineering staff to offshore installations is another thriving micro-sector.

Norway’s Kleven Shipyard is building a purpose-designed deep-sea mining vessel for De Beers. There are relatively few of these sophisticated ship types so far, but sources believe there is significant scope for fleet growth in the deep-sea mining sector. This 150m-long vessel will be deployed off the coast of Namibia in water depths of up to 150m where undersea resources are abundant. It will work for up to three years at a time, with personnel arriving and leaving by helicopter or fast crew boat.

Port construction and expansion, and the development of new terminals for LNG, petrochemicals and SBM facilities offshore are also driving demand for new service vessels, particularly tugs and crew boats. The sustainability of such vessels – improved fuel consumption, reduced emissions, hybrid and even battery power – are all features that focus the minds of workboat designers today.

Ulstein’s S182 multi-purpose construction vessel

Ulstein tailors design to meet the market

Norway’s Ulstein Group is well known for its innovative designs and high-end offshore vessel construction. With its head office in Ulsteinvik on Norway’s west coast, the company is located at the heart of Norway’s leading offshore cluster, which is made up of 14 offshore construction yards, 13 ship design firms, 20 shipping companies and 169 equipment suppliers.

Recognising the pressure on capex as a result of the downturn, the company has adapted its strategy. In a recent speech, the company’s managing director in Asia, Gunnar Haug, explained the company’s thinking. The objective of the Netherlands-based design firm, Ulstein Design & Solutions BV, he said, had been to design a multi-purpose construction vessel with capabilities similar to the high-end units that the company traditionally builds, but with substantially lower capex and opex.

The result is the Ulstein S182 design, a multifunctional vessel platform that provides a basis for various offshore functions including construction, shallow-water installation, pipe- and cable-laying, dive support, accommodation and rock installation. The basic vessel, excluding mission equipment, is likely to cost around USD 45 million, little more than a third of the price of one of the company’s high-end units such as the Ulstein HX102, which costs about USD 125 million without mission equipment.

The dynamically positioned S182 has been specifically designed for shallow water operation and has an operational draught of just 5m. With DP2 and DP3 as options, it’s built to work autonomously in remote shallow waters and offshore areas, the company says, as well as regions such as the Arabian Gulf. It has two propulsion thrusters, two retractable thrusters, two bow thrusters and an endurance of 60 days.

The 10,000dwt vessel has a large and strong open work deck of 15,000m² and 2,000m² suitable for a 30m carousel, and a large cargo hold below deck. It has a length of just over 115m, a speed of nine knots and accommodation for 240 people in four-person cabins. An offshore crane of up to 400 tonnes can be installed on the side of the vessel, and a passageway below the main deck – running from the aft casings to the accommodation – ensures that personnel don’t have to cross the open work deck.

Haug explained that the vessel had been designed with the Southeast Asia, Middle East and African markets in mind. However, it will also be capable of working in

![Surface technology: OR 6000®](https://www.OR6000.de)
the North Sea, where Ulstein believes there will be healthy demand for cable layers in the years ahead.

Workboat sector switches on to electricity

Hybrid propulsion systems incorporating electrical power are catching on quickly among workboat operators. Many also see the benefits of electricity in providing power for other functions on board ship.

According to figures from Clarkson Research Services, a research outfit in London, electric propulsion has grown at an average of 12% a year over the last decade, three times faster than the world fleet. Once again, it is Norwegian ship operators who are pioneering the maritime electrification process.

Buoyed by the country’s innovative NOx Fund, which awards grants to projects that reduce harmful emissions, owners of OSVs, short-sea cargo ships, fishing vessels and ferries are among those embracing electrical power and testing the operation of lithium-ion batteries.

One of the best-known examples of innovative power packages incorporating electricity is the Eidesvik-owned OSV Viking Lady. It’s the continuing subject of a research project involving DNV GL, the Norwegian shipowner and power company Wärtsilä.

Its power system is probably the most advanced of any vessel; it incorporates a fuel cell, a hybrid main engine powered by LNG and electricity, and lithium-ion batteries that are charged during transit voyages for carbon- and emissions-free use in port.

Advances in marine electrical power are moving fast. Executives at ABB and Rolls-Royce are both of the opinion that electricity will become much more widely adopted, notably in the workboat sector, as efficiency gains continue to be made, Tier III emissions regulations enter force and sustainability generally climbs the agenda.

ABB launched a new range of electrical Azipods earlier this year. The Azipod D range, which has already won Innovation of the Year Award at the Electric & Hybrid Marine World Expo in Amsterdam, covers a power range from 1.6 MW to 7 MW and is available for both newbuilds and retrofits.
The power company claims that efficiency gains of 25% have been achieved in its latest models, as compared with earlier units. This is largely a result of a new hybrid cooling system, which yields a 45% efficiency improvement in the electric motor.

Jaakko Aho, who heads ABB’s thruster division, says that two 2-MW Azipod D thrusters would provide an 80m platform supply vessel with the same power as a similar-sized vessel equipped with two 2.5-MW thrusters of the earlier type.

Specifically on retrofits, Aho claims that the Azipod D is an ideal choice because of its simple interface, minimal steelwork and the possibility of installing the whole unit, with steering, underneath the ship. The units also save space and are easy to install.

The total power output of all Azipods now in operation — and those on order — now exceeds 4 GW, according to Aho. A 10% increase in efficiency would result in a substantial 400-MW power reduction, with commensurate emission reductions.

Meanwhile, rival Rolls-Royce launched its new permanent magnet (PM) thruster at Nor-Shipping earlier this year and has now installed the first such system on board a research vessel, the Gunnerus, for its main propulsion. Early tests revealed significant fuel savings in the range of 7% to 13% as compared with azimuth thrusters driven by conventional diesel-electric machinery. The Olympic Octopus, a multi-purpose anchor handler of Rolls-Royce UT 712 L design, already has a PM tunnel thruster on board. The vessel, owned by Norway’s Olympic Shipping, has notched up well over 4,000 running hours without a hitch.

The world’s largest vessel, also a workboat, is powered by Rolls-Royce thrusters. The 403,342gt DP3 Pioneering Spirit, which reputedly cost its Swiss-based owner Allseas about USD 3 billion, is a platform installation, decommissioning and pipeline laying vessel. It has no fewer than 12 UUC 455 Rolls-Royce thrusters, each with a power output of 5.5 MW. The thrusters are in addition to nine main engines, which produce total power of 94 MW.

Another Norwegian company, Ulmatec Pyro, is focused on using waste energy on board OSVs and other workboats to create electricity, which can then be used for a variety of purposes. Jan Petter Urke, the company’s managing director, explains that when he and his team started on the project in 2011, only 30% to 40% of energy was actually used efficiently on board most ships.

With the company’s new waste energy recovery system, between 60% and 75% can be used to provide power to heat or cool accommodation, produce fresh water, heat or wash cargo tanks, power ballast water treatment systems, de-ice or pre-heat engines. Typical fuel savings, he says, are about 5% a year.

**ABB orders high-end cable layer**

Norway’s Kleven Shipyards recently won a contract from ABB Power Systems for what the company describes as the world’s most advanced cable layer. The DP3 ship, 140m by 30m, is being custom-built to ABB specifications and will incorporate a range of ABB’s energy-saving technologies. It is due for delivery in 2017.

The ship will have an ABB onboard DC grid and power distribution system, using a single DC circuit for ship propulsion, thereby reducing power and fuel consumption by as much as 27%. It will also be equipped with roll-reduction tanks, and subsea operations will be executed and monitored by a remotely operated vehicle using cameras and sonar, avoiding the need for divers.

The vessel will also have an ABB integrated automation system with three Azipod propulsion units. It will be fully “wired up” so that operational data, collated from sensors, are sent ashore by satellite line, allowing shore-based personnel to work closely with seafarers as part of ABB’s Integrated Marine Operations system.

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What’s more, it will benefit from advanced advisory software for motions monitoring, forecasting and decision support.

Company executives believe the ship will be a “key differentiator” in its high-voltage cable business. “It will also improve operational efficiency and customer focus, supporting profitable growth,” said Claudio Facchin, president of ABB’s Power System division.

Sanmar goes from strength to strength

Turkey’s Sanmar Shipyards is notching up a string of deals for tugs to operate across the Middle East and in Australia. It’s winning the deals for heavy-weight terminal service companies including Svitzer and Smit Lamnalco against fierce competition from other shipyards in the tug-building sector.

Sanmar, which has built a new shipyard to cope with growing demand, has won several key orders this year. They include a contract with the Port of Fujairah for three 70-tonne bollard pull RÅparts 2400SX tugs with Caterpillar main engines coupled to Rolls-Royce Z-drives and Fi-Fi 1 class notation.

The tugs will provide essential services at the fast-developing port, oil storage hub and crude oil export terminal 70 miles from the Strait of Hormuz on the eastern seaboard of the United Arab Emirates. Two additional berths will be commissioned this year, and a new VLCC berth, currently under construction, will open in 2016.

Meanwhile, in another recent Mideast deal, Sanmar has delivered a series of vessels to the new Sheikh Subah Al Ahmad Al Subah LNG terminal in Aqaba, Jordan, where terminal services are provided by Smit Lamnalco. Altogether the shipbuilder is providing four 80-tonne bollard pull Terminal RAstar 2800 ASD tugs, two conventional twin-screw Rascal 1500 line-handling tugs, all designed by Robert Allan Ltd, and a pilot boat designed by Camarc Ltd of the UK. The first vessel, the Hashim 3, has been operating at the terminal since May.

Like the five Sanmar vessels, also built to a modified Robert Allan design and operating at the LNG terminal in the Port of Gladstone, Australia, the tugs are all equipped to operate in a Zone-2 LNG environment. They have gas-detection systems and a ventilation gas-tight damper control system to isolate the ship from gas leakage throughout the vessel. Smit Lamnalco is also the terminal service operator in the Port of Gladstone.

In another recent deal, Svitzer signed up for six 70-tonne bollard pull ASD vessels of the RAstar 2800-E Class type. The tugs, delivery of which will start in the last quarter of 2016, will be deployed in various terminal service contracts in Svitzer’s portfolio.

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Launch of sustainable marine biofuels programme

CONSORTIUM | Boskalis, a Dutch dredging and marine expert, and Finland’s Wärtsilä have announced their collaboration with GoodFuels Marine, the first marine biofuel company focused on the global commercial fleet. The consortium aims to pioneer development of sustainable “drop-in” marine biofuels for the shipping industry.

Drop-in biofuels are liquid hydrocarbons that are functionally equivalent to petroleum-derived fuels, meaning that they can be effectively “dropped into” existing infrastructure on board vessels, though minimal modifications may be necessary in some cases.

Netherlands-based GoodFuels Marine and its partners will spearhead a two-year pilot programme to accelerate the development of truly sustainable, scalable and affordable marine biofuels. Biofuels today aren’t part of the marine fuel mix that operators and owners can choose from.

The programme’s focus will be on delivering and analysing a sustainable feedstock, securing industry certification and preparing the building blocks for large-scale production. Additionally, the consortium will initiate a global scalability study involving leading shipowners, universities, NGOs, ports, biofuel companies and other industry stakeholders. The aim will be to identify tangible opportunities for scaling supply to the world’s commercial shipping fleet.

Dirk Kronemeijer, CEO of GoodFuels Marine, said: “We believe that the international shipping market is now ready and well placed to embrace truly sustainable, long-term alternative fuels that can meet all stringent technical, economical and sustainability standards, similar to the sustainable jet fuel market five years ago.”

The consortium will test several next-generation biofuels at the Wärtsilä laboratory in Vaasa, Finland, before sea trials are carried out on various vessels in Boskalis’s global fleet. With the objective of developing a fuel mix that is fully sustainable, the programme seeks to promote a lower carbon footprint for the maritime sector. The consortium believes that these biofuels will play a viable role in reducing emissions that no other fuel can currently achieve, without a capital-intensive fleet renewal or retrofitting.

In a joint statement, the CEO of the port of Rotterdam, Allard Castelein, and the CEO of the port of Amsterdam, Dertje Meijer, commented: “As ports with environmental excellence at our core, we embrace the vision of next-generation biofuels supporting a more sustainable future for global marine transport. In addition, we see marine biofuels as a potential building block to boost the bio-based production and economy in our respective ports.”

GoodFuels Marine, which has been developed by a team said to have a successful track record in commercialising sustainable biofuels for the aviation industry, has also created a “sustainability advisory board” consisting of leading NGOs and academics. This is to ensure that its products are 100% sustainable and that the company bases itself on the leading Roundtable on Sustainable Biomaterials (RSB) standards and principles. RSB is an independent and global multi-stakeholder coalition, headquartered in Geneva, that works to promote the sustainability of biomaterials.

Sea trials of next-generation biofuels will be carried out on several vessels of Boskalis’s fleet.
New test centre recovers waste energy

FREDERIKSHAVN | MAN Diesel & Turbo has opened a new test centre for diesel engines in Frederikshavn, Denmark. About 150 MAN business partners attended the recent inauguration ceremony, during which Prince Joachim of Denmark pressed the button to start a 16-cylinder MAN 16V32/44CR common-rail engine as the official commencement of operation. Commenting on the inauguration of the test centre, MAN Diesel & Turbo CEO Dr Uwe Lau- ber, who has been heading the company since the beginning of this year, said, “We now have one of Europe’s most advanced maritime test centres with, for example, an inclination test bench that can tilt a generator set weighing 200 metric tonnes to an angle of 25° while running. These inclination tests are particularly relevant for the offshore sector, which has stringent requirements with regard to reliability and performance in extreme conditions.” “Soon we will also start with the production of our brand-new MAN 175D high-speed engine, introduced to the public at the last SMM show in Hamburg, here at the Frederikshavn plant,” Dr Matthias Schlüpf, project manager of MAN 175D, added during the event. Pilot applications of MAN 175D engines, which will be offered with an output spectrum from 1,500 to 2,200 kW, will start in the early months of 2016 with first engine deliveries scheduled for 2017.

Heat recycling
Under the motto “Our testing warms you up,” MAN Diesel & Turbo also presented its heat recovery scheme for the town of Frederikshavn. The waste energy generated from the engine testing will be converted to hot water to heat approximately 200 households. This way, MAN Diesel & Turbo said, CO₂ emissions, excessive water consumption and energy waste will be avoided.

The engine is a 16-cylinder MAN 16V32/44CR common-rail engine. Genset output power is 9,600 kW and the electrical output from the generator (genset power at 100%) is about 9,400 kWe.

Photo: PPM News Service Maritim
ECOPELLER | The German propulsion and steering system specialist Schottel has developed what it says is a highly efficient thruster optimised for open sea and coastal operating conditions. Called the EcoPeller (SRE), it meets new international emission, safety and environmental regulations as well as demands for minimised operating costs, high overall efficiency, crew comfort, course-keeping stability and precise positioning in DP mode, the company said.

The new SRE combines proven Schottel quality and technology with the latest hydrodynamic insights from CFD simulations and model tests. As a result, Schottel said, the new EcoPeller offers top value for the overall efficiency and course-keeping stability of the ship and will thus enable future owners to achieve lower fuel consumption – not to mention low operating costs and low emissions.

The SRE is based on the Schottel SCD design principle: a vertical electric motor integrated into the Schottel Rudderpropeller. This eliminates the upper of the two angle gears as well as any necessary shaft lines. On board, the EcoPeller offers unbeatable comfort thanks to extremely low vibration and noise levels, the company said. Besides a plant-side, ready-for-installation assembly with a highly efficient electric motor from Schottel, the EcoPeller will optionally be available with additional electric motors in line with customer needs.

The EcoPeller will be available in mid-2016 in a variety of sizes for power ratings between 1,000 kW and approximately 5,000 kW, each as FP and CP variants.

Voith Propulsion Package for Offshore Vessels.

Consisting of two Voith Schneider Propeller (VSP) as main propulsion and two Voith Inline Thruster (VIT) as bow thruster, the Voith combination package ensures fast response times and increases the number of operational days of the vessel. The VSP is excellent in DP and reduces the roll of the vessel, while the VIT is compact and above all extremely silent running in DP.

www.voith.com/marine-technology
Medium-speed diesel engine line meets new emission limits

Caterpillar Marine is now offering Cat® C280 medium-speed diesel engines for US Environmental Protection Agency (EPA) Tier 4 and International Maritime Organization (IMO) Tier III service. The EPA Tier 4 standards have applied to all new US-flagged vessels since January 2014, and IMO III standards will apply to all new vessels entering IMO NOx Emission Control Areas (NECAs) starting in January 2016.

The C280 engines are available in eight-, twelve- and 16-cylinder models spanning a power range from 2300 - 5060 kW as main engines – conventional and diesel electric – and also as auxiliary generator sets. The latest models offer significant benefits over earlier units, according to Caterpillar Marine, a division of US-based Caterpillar Inc. As well as reduced emissions, they consume less fuel and have lower through-life owning and operating costs, it said.

Over three decades of continuous development, the C280 engine series has clocked up more than 45 million operating hours. Its reliability and durability, the manufacturer said, have found particular favour among operators of offshore supply vessels, coastal cargo ships, tugs, fishing vessels, inland waterway craft and workboats. All engines in the C280 range are now available worldwide through the Cat dealer network, which provides comprehensive support through their life cycle.

Nathan Kelly, Caterpillar Marine’s production definition engineer, said the introduction of the Tier 4 engine range was an important milestone because customers could now benefit from the latest NOx emission technology based on selective catalytic reduction (SCR). The choice of SCR over other NOx-reducing technologies, Kelly explained, was made based on the Caterpillar commitment to customers to offer solutions that provide the highest uptime and minimise overall total life-cycle cost. Furthermore, he said, an independent study undertaken by the International Council on Clean Transportation published in March 2014 highlights the benefits of emissions reduction technology and the wide range of companies that have adopted SCR as the most efficient solution for the marine industry.

“SCR was a clear choice for us,” Kelly remarked. “We have more than 160,000 Tier 4 Final and Interim engines in land-based operations using various NOx-reduction technologies. In marine applications, we specifically chose the best technology to fit the needs of our industry. We view SCR as the preferred option for the commercial marine industry.”

Outlining the key benefits, Kelly said: “The C280 is already renowned for its high uptime, reliability and durability, but for these Tier 4 engines our priority was to achieve the lowest life-cycle owning and operating cost. We have succeeded in this by improving engine fuel efficiency. Unlike previous emissions tiers, our Tier 4 engines can run at optimal fuel efficiency because the SCR system is in place to reduce the higher NOx output. Any concerns about diesel exhaust fluid (DEF) cost are more than offset by the improved fuel efficiency as a result of utilising the SCR technology.”

Ensuring maximum operating safety at all times is crucial, Kelly added. “Unlike some other NOx-reduction technologies, our engines operate without interruption even in the event of SCR failure or running out of DEF. There is no effect on engine operation.”

New cat fines test kit

Abrasive wear | Parker Kittiwake, a global provider of asset control and protection technology, has launched a cat fines test kit for early detection of catalytic (cat) fines. In minutes, the company says, this simple onboard test identifies the presence of abrasive silicon and aluminium catalytic fines, which can become embedded in engine components and cause abrasive wear, resulting in irreversible damage to a vessel’s fuel system if left undetected.

When fuel is stored for extended periods of time, cat fines – leftovers from the refining cracking process – settle out of the fuel and build up as sediment in storage tanks, Parker Kittiwake noted. If the tanks are not drained regularly, this sludge can enter the fuel system and cause substantial damage to fuel pumps, injectors, piston rings and liners. The quality of fuel brought on board is increasingly difficult to predict. Until now, the detection of cat fines in fuel oil was only possible by obtaining a fuel sample, which is then sent for laboratory analysis. The Parker Kittiwake cat fines test kit is said to provide shipowners with an accurate picture of the level of corrosive elements present almost instantly, potentially preventing critical damage before it occurs.

The cat fines test kit is a simple-to-use, chemical bottle test, which determines the level of cat fines present in a representative sample of fuel oil, allowing the operator to identify the ingress of abrasive and potentially damaging components in the fuel oil before it enters the system. The test kit can be used in conjunction with both laboratory testing and a range of other onboard condition-monitoring tools.
With a carrying capacity of up to 100 t, the JDN PROFI is exceptionally energy efficient and fast, features sensitive control, is particularly reliable and, of course, explosion protected. Made in Germany, engineered for extremes and perfect for ship building and repairs. www.jdngroup.com
Complex hull shapes need sophisticated assessment

**MARIN** The Dutch dredging company Van Oord asked the Maritime Research Institute Netherlands (MARIN) to perform a full assessment of the hull lines of its new hopper dredger. The process is described by MARIN’s Luigi Francesco Minerva and Klass Kooiker.

Win-gondola aft bodies have been successfully applied to hopper dredgers for many years. They are usually combined with a tunnel head box combination above the propeller. The tunnel conducts water to the propeller, while the head box supports the nozzle and the rudder. However, this results in a very complex shape and, consequently, complex flow characteristics.

Operational profile vital

Following Van Oord’s request for an assessment of the hull lines of its new hopper dredger, both wave-making resistance and viscous flow around the hull were analysed, taking into account the aforementioned operational profile of the ship. This emphasis on the operational profile during the design process is increasingly requested by shipowners. Realistically, a hull design can never be 100% suited to every condition a vessel sails in. So a careful compromise in close cooperation with the client must be made. This requires regular meetings in which the results of all calculations are put on the screen, and every benefit a hull form provides in a certain operational condition is weighed against possible drawbacks in other conditions. During this process, operational knowledge meets hydrodynamic knowledge, resulting in the best compromise. The Van Oord project is a good example of this approach.

The assessment and optimisation of the hull lines were conducted with the aid of a variety of MARIN’s programs. The potential-flow code RAPID, which has been used at MARIN for a long time, was deployed for the optimisation of the forebody. At the bow, the effects of viscosity are still limited, and the effect of bow variations on wave-making resistance can be quickly checked for the selected matrix of operational conditions.

Optimal bulbous bow

After the optimum bulbous bow was found in this way, the flow along the rest of the hull was examined using the viscous flow codes PARNASSOS and ReFRESCO. The PARNASSOS solver requires a structured calculation mesh,
the benefit of which is that the iteration process is fast. To enable the use of such a mesh, however, the hull geometry should not be too complex. The PARNASSOS tool was therefore used in the first stages of the aft body assessment, when the hull was not yet equipped with the tunnel head box combination. The flow characteristics obtained this way were used to align the tunnel head box combination with the flow.

In the next stage, when the aligned tunnel head box combination was fitted to the hull, the hull was examined again. But the geometry had become so complex that a viscous flow code, which is capable of solving unstructured meshes, had to be used. So MARIN’s code REFRESCO was applied in this stage. The calculated flow characteristics were examined with respect to flow separation and the generation of vortices in areas where they could negatively influence efficiency and vibrations. Similar to the aforementioned analysis, different loading and water depth conditions were examined in accordance with the selected matrix of operational conditions.

The innovative hull design passed the test with very good results in both deep and shallow water. At the time of this writing, the final validation by means of model tests was about to start. During this stage, the performance of the hull will again be investigated in deep and shallow water.

This article is an edited version of a text first published in MARIN’s report, August 2015, no. 115.
Refrigeration on the high seas

MARENUM Chillers used in the shipping industry must meet special requirements. Germany’s Cofely Refrigeration GmbH has developed the Marenum chiller, based on the proven Quantum chiller series, for use in the maritime sector. Marenum models are available with a cooling power of 250 kW and upwards and can be tailored to customer requirements, writes Daniel Keller, the company’s marine technical coordinator.

Shipping places high demands on the refrigeration supply since it has to function under extreme conditions. So Cofely Refrigeration has developed Marenum, a chiller that is particularly robust, safe, reliable and energy-efficient. It can be employed by both civilian and military ships. All models are distinguished by compact construction, low noise and vibrations, a seawater-resistant condenser and low maintenance requirements. Marenum is available in two different designs. The Marenum C model is suitable for use in civilian shipping – typically on ferries, freighters or yachts. For naval vessels, such as frigates and patrol ships, Cofely offers the Marenum N.

Robust, safe, low maintenance

The system technology is reduced to the main components necessary for refrigeration: compressor, condenser, expansion device and evaporator, including the corresponding measurement and control technology. This makes Marenum less susceptible to faults than conventional system technology with oil management. The frequency converter that is integrated into the compressor can be used to adjust the compressor speed to the varying refrigeration load requirements at various seawater temperatures. A redundant construction, with up to six compressors per chiller, decreases the risk of failure and enables a maximum refrigerating power of up to 2.5 MW (per chiller).

The intelligent control concept developed by Cofely can be used to activate and deactivate individual compressors and provides more efficiency. If there are multiple chillers on board, this concept can be transferred to all chillers by implementing the Cofely refrigeration manager. All Marenum models use oil-free radial turbo compressors mounted on magnetic bearings. This means there is no need for cost-intensive maintenance with respect to oil management for conventional screw compressors, reciprocating compressors and turbo compressors.

The Marenum system is complemented by comprehensive Cofely service. An extensive international service network ensures quick and competent support. Training courses on Marenum chillers for ship staff can be provided during commissioning or within the scope of test runs at the Cofely Refrigeration test rig.

High resistance to seawater

The Marenum has a specially engineered flooded evaporator with integrated gravity separator. This construction prevents the compressor from suctioning liquid coolant, even in rough seas. The copper, nickel and iron alloy used for Marenum’s tube sheets and high-performance finned tubes makes the condenser resistant to seawater. All other parts of the chiller that come into direct contact with seawater are made either of seawater-resistant rubber coating or high-grade austenites (1.4529/1.4547), depending on the customer’s requirements.

To keep the coolant level in the condenser constant, even in rough seas (roll and pitch), the expansion valve controller refers to the average value of measurements from two probes. An optionally available, dual-circuit design for both heat exchangers can be used to further increase the chiller’s security against failure. The chiller controller on the Marenum regulates the coolant pressure in the condenser using a seawater-resistant, three-way valve. Thus the chiller is guaranteed to operate fault-free at water temperatures ranging from -2°C to +36°C. The base frame of the compact and robust Marenum chillers is an elastic, low-oscillation construction built on vibration or shock absorbers to suit the ship’s specific acceleration characteristics. This reduces vibrations and impacts in rough seas. The vibrations of the chiller itself don’t
need to be offset, thanks to the low-vibration condenser technology mounted on magnetic bearings.

At the customer’s request, Cofely can also integrate the cold water and seawater pumps into the system concept of the Marenum. The pumps can either be integrated completely into the chiller base frame or simply activated via the chiller.

**Energy efficiency on board**

There is an option of limiting the chiller’s power consumption, for example if power supply constraints exist. Thanks to the high-performance finned tubes that are used, providing adequate heat transfer in the condenser and seawater resistance at the same time, the chiller runs with particularly high energy efficiency. The radial turbo compressor design is available for a mains frequency of 50 or 60 Hz. For this purpose, with a voltage supply of 400 V at 50 Hz or 440 V at 60 Hz, no transformer is required. The soft start-up function, which is integrated into the compressor, prevents current spikes when the chillers are started (start-up currents below 5 amperes are the result). Implementation of the latest electrical filter technology – made possible by innovative and compact measurement and control technology – means that Marenum can offset reactive current and reduce harmonics to a minimum.
Asia’s biggest international trade fair, Marintec China 2015, will take place from December 1st to 4th at the Shanghai New International Expo Centre. The organisers, the Shanghai Society of Naval Architects and Ocean Engineers (SSNAOE) and Hong Kong-based UBM Asia, expect the biennial event to break yet another record this year in regard to the number of visitors and exhibitors.

The 18th edition of Marintec, which the organisers call “bigger, better and more connected”, is expected to attract more than 2,000 exhibiting companies and 60,000 visitors from 23 countries. Since this is a significant increase (2013: 1,700 exhibiting companies and 57,886 visitors), the area of the show will cover some 80,000m², which is 10,000m² larger than two years ago.

In addition, the number of national and regional pavilions has grown to 17. The...
pavilions will showcase offerings from Austria, China, Denmark, Finland, Germany, Greece, Hong Kong SAR, Japan, South Korea, the Netherlands, Norway, Panama, Singapore, Sweden, Taiwan, the United States and the United Kingdom.

The shipping nations of Greece and Panama will have a pavilion at Marintec China for the first time. South Korea will also have a second pavilion, organised by Busan Marine Equipment.

Andre Vrijsen, area manager at the Dutch shipbuilding company Royal IHC, which was an exhibitor at the fair in 2013, said: “Marintec China gives us an idea of what is going on in China’s marine market. This will be important for our future development.”

**Senior Maritime Forum**

To be held concurrently with the trade exhibition is the Senior Maritime Forum 2015. Themed “Innovation Drives Development, the Green Agenda Guides the Future”, the international conference will be attended by senior Chinese government officials, corporate leaders and high-level executives. It will be held from November 30th to December 3rd at the Kerry Hotel Pudong in Shanghai.

**Research report on China’s shipbuilding industry**

In the run-up to this year’s show in Shanghai, Marintec China co-organiser UBM Asia, in conjunction with Seatrade Global Communications, completed a comprehensive study of the China shipyard, shipbuilding, and marine equipment industries. The findings of the study, which garnered over 800 respondents across 25 sectors of the shipbuilding industry, were analysed and compiled into a report titled “State of China Shipyard and Marine Equipment Industries”. The purpose of the study was to gain a better understanding of the current state of the maritime industry in Asia – specifically in China – and to provide key players and the community with insights useful for future decisions. The study looks at the major areas of shipbuilding, propulsion systems, electrical systems, auxiliary machinery, port technology and offshore activities. It examines current production and assessments of each area as well as planned investments and target markets. The 30+ page report is available free of charge to all pre-registered professionals at Marintec China 2015.

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New controllers for gas engines on ships

**M1** | With the Bachmann M1 controller and the Austrian automation specialist’s know-how, Germany’s AVAT Automation – a developer and manufacturer of engine controllers for large gas engines – has implemented marine-approved controllers for gas and dual-fuel engines. The considerable advances made in gas engines’ power and efficiency were possible only with further development of the controllers. Their increasing significance has led to the demand among engine and system builders for an open system that can be customised flexibly and brought to market more quickly. To this end AVAT, together with Bachmann electronic, is offering a new platform for engine controllers based on the M1. Special engine controller components in the same form factor have been added to the extensive Bachmann portfolio for this purpose. The first modules offer controllers for anti-knocking, speed, power and mixture control. A module is also available for analysing cylinder pressure signals so that cylinder-pressure-controlled motor operation can be implemented. All components are suitable for ambient temperatures between -20°C and +70°C and are designed to withstand typical engine vibrations, the companies said. Customers are given the required documentation and FMEAs for the marine classification. They are involved in the configuration of the system from the very beginning and are given a controller solution that is tailored to their particular engine and application. If required, the application can be made available as an OpenECS so that the engine manufacturers can change or expand functions themselves. As a certified system integrator (CSI), AVAT is fully utilising the experience that Bachmann has gained over many years in the development of highly available industrial controllers. The M1 is based on a system that combines the openness of a PC-based controller with the reliability of industrial hardware.
Launch of continuous emission monitoring system

MEA 3000 | The new continuous emission monitoring system (CEMS) MEA 3000 launched by Afriso Euro Index is in line with the current trend towards increased monitoring, analysis and control for more efficient overall vessel performance, the German manufacturer of measuring, control and monitoring devices said. Facilitating compliance with SOx emission limits in emission control areas (ECAs) that went into effect on January 1st 2015 under MARPOL Annex VI, the CEMS monitors CO₂ and SO₂ levels in exhaust gas – information that can also be used to optimise scrubber settings and the control system, Afriso said. This, it went on, is the only way that emission levels can be determined, and compliance with the limits documented, at any point during a voyage. Afriso said MEA 3000 had received a “confirmation of compliance” with MARPOL Annex VI and the IMO NOx Technical Code from the classification society DNV GL, adding that special attention had been paid to an experimentally and empirically proven minimum SO₂ wash out by the system so as to obtain precise measurements on an ongoing basis. Real-world experience shows that reliability and availability, along with measuring accuracy, are essential characteristics of a CEMS, Afriso noted. To attain maximum reliability and availability, it said, the system’s susceptibility to pollution and its maintenance requirements must be kept as low as possible – for which MEA 3000 has special features. Its probe is equipped with an extra-large filter, ensuring better distribution of dust and dirt particles and keeping the filter pores from being clogged for an extended period of time, Afriso pointed out. To exclude the possibility of filter clogging altogether, the system can be equipped with a dual-stage backwashing unit. In a first step, the unit cleans the filter with compressed air; then the dirt is blown back through the probe pipe into the exhaust gas channel. All of the elements integrated into the MEA 3000 system are designed so that they can be disassembled, cleaned or completely replaced by crew members after brief instruction, according to Afriso. This, it said, keeps the system’s downtime to a minimum and greatly reduces maintenance requirements.
Statements of compliance issued

SHIP RECYCLING | The classification society ClassNK has issued statements of compliance (SoC) to two ship recycling facilities in the Indian state of Gujarat, R. L. Kalthia Ship Breaking Pvt Ltd and Priya Blue Industries Pvt Ltd, verifying they are in line with the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (HKC).

Although the HKC has yet to enter into force, ClassNK said that Kalthia and Priya Blue had both carried out substantial improvements to their facilities in a bid towards safer and greener ship recycling as well as developed the ship recycling facility plans (SRFPs) required for a competent authority’s certification according to the HKC.

ClassNK, headquartered in Tokyo, reviewed the SRFPs prepared by Kalthia and Priya Blue, which comply with requirements of the HKC, and confirmed that their ship recycling processes follow their respective SRFPs. The classification society conducted on-site inspections before issuing the SoC. This marks the first time SoC have been issued to ship recycling facilities in South Asia, ClassNK said.

The SoC are issued based on purely technical verifications of the facilities by ClassNK, which has so far done the same for ship recycling facilities around the world.

Stepping into new markets

LIFEBOAT RELEASE SYSTEM | Recently developed straight and bent brackets for Vikings Nadiro’s SOLAS products have achieved global type approval through DNV GL, extending the company’s core capabilities beyond cargo to offshore and passenger segments while speeding up delivery times.

Nadiro’s range comprises three main lifeboat release and retrieval (LRRL) systems. Its DIB 32 product caters to smaller lifeboats and has been installed on numerous occasions since being released in the summer of 2014. One step up, Nadiro’s DIB 75, currently under development, is aimed at medium-sized craft, and will be ready for commercial release in January. Finally, for larger lifeboats, the company’s soon-to-be-released DIB 125 is now close to attaining DNV GL approval. The DIB 125 is expected to be both DNV GL- and USCG-approved, and ready to go to market by mid-November.

All three products will also be available in a single-point version, requiring only one instead of the conventional two sets of hooks, and enabling them to be used, for example, for rapid deployment rescue craft.

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New dive and ROV support boats

Tuco Marine of Denmark has presented its new dive and ROV support boats. The two new vessel designs complement Tuco’s range of ProZero workboats and daughter craft.

The boats are optimised to be working platforms both for underwater operation and surface work in support of divers and ROVs. Operations include underwater inspection, investigation, excavation, construction, repair and maintenance of machinery and structures, as well as the salvage of sunken property.

The 14m-long support boat features a spacious divers deck that can be covered by a large canopy to protect the crew working on deck from the weather, and that is sufficiently lit at night to enable 24/7 operation. The 15m version has the same external features, but offers the possibility of a closed dive control/ROV control room in the deckhouse.

Both versions can be delivered with inboard diesels and jet drives or a triple OXE diesel outboard solution, as the outboard solution provides extra deck space and space below the aft deck, where up to twelve air cylinders can be fitted, improving the stability of the vessels.

The main diving ladder is a central point of the spacious aft working deck on both versions. Its fibre-reinforced composite construction is significantly lighter than previous systems, Tuco Marine said.

For ROV operations, the decks are prepared for mounting double davits and A-frames.

Both vessel designs are based on the well-proven hulls and highly flexible modular design of Tuco Marine Group’s ProZero series, which offers customers a high level of customisation.

Lightweight stone wool solutions

Rockwool® Technical Insulation has introduced a range of lightweight stone wool fire boards suitable for maritime and offshore applications. The product range SeaRox FB 6000 has been tested and approved for main A-class-rated steel constructions, especially targeting passenger ships, naval ships, offshore modules and supply vessels. The SeaRox FB 6000 product range makes it possible to create solutions that are up to 40% lighter, while retaining all of the insulation benefits of genuine stone wool, Rockwool said.

These include the highest fire safety, excellent acoustic properties, the highest water repellency grade, the lowest water absorption and outstanding thermal insulation, it added.

The weight savings are said to significantly reduce energy consumption and emissions, resulting in substantial financial benefits. An further benefit, the company said, is that the weight savings also increase design flexibility, making it possible to place additional equipment on board.

The SeaRox FB 6000 range is subject to the requirements of the EUCEB (The European Certification Board for Mineral Wool Products) and certified by major classification societies.

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The minister for transport and infrastructure in the Australian state of New South Wales (NSW), Andrew Constance, announced recently that Incat Tasmania’s Hobart Shipyard had been awarded a contract to build six ferries to operate in Sydney’s inner harbour. He said the ferries would be “a major step forward in the NSW government’s plans to modernise and expand the ferry network”.

The new vessel exterior is a traditional design to look similar to the Sydney First Fleet vessels, Incat said, though the 35m, 400-passenger boats will have greater capacity than the current fleet. The interior will be more spacious, with comfortable inside seating, outdoor viewing areas, a large walk around deck and additional features for passengers including Wi-Fi access and real-time journey information, and charging stations for electronic devices.

The Sydney ferries will service commuter and tourist travel on the inner harbour routes from Watsons Bay in Sydney’s east to Cockatoo Island in the west, stopping at the new Barangaroo wharf.

Incat said its first task was to take the concept design to detailed construction drawings and vessel models, with construction of the first ferry to start early in 2016. The six will be delivered progressively from late 2016 and throughout 2017.

**INCAT**

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Consultancy tool predicts impact of fouling control coatings

INTERNATIONAL | AkzoNobel’s marine coatings brand International® has launched Intertrac Vision, which it calls the shipping industry’s first consultancy tool that provides accurate and transparent predictions on the fuel and CO₂ savings potential of fouling control coatings prior to application.

According to International, Intertrac Vision combines an understanding of total hull roughness (micro and macro) and roughness associated with biofouling. It uses studies carried out by computational fluid dynamics (CFD) on different hull forms to accurately predict the impact of fouling control coatings on the comparative powering requirements of a vessel.

The Intertrac Vision tool, which will be available as a free consultancy service for shipowners and operators, processes individual vessel parameters inputted during a consultation, and then uses multiple proprietary algorithms and models to provide an accurate and detailed assessment of the impact of each potential fouling control coating choice over the ship’s specified in-service period, International said.

Key outputs from Intertrac Vision include ships’ powering requirement, fuel oil consumption, fuel oil cost, CO₂ emission predictions and a full cost-benefit analysis when comparing different coatings and surface preparation options.

Michael Hindmarsh, project lead for Intertrac Vision, said:

“When selecting the most effective hull coating technology for a vessel, having an accurate understanding of the return on investment prior to purchasing is a key part of the decision-making process. Hull coatings play a key role in a vessel’s profitability and sustainability due to the fuel and CO₂ savings that can be delivered, and shipowners want tangible proof of the benefit prior to application. Through Intertrac Vision, we can bring a new level of transparency and choice to the industry, working with customers consultatively to ensure that the most effective and appropriate coatings solution is selected for each vessel within a fleet.”

Dr Barry Kidd, manager of hydrodynamics for AkzoNobel’s marine coatings business, added: “The original Intertrac system was the industry’s first tool to analyse where a vessel had historically traded, and uniquely overlaid the fouling challenges that it had been subjected to in those areas. While this promoted meaningful dialogue about fouling control coating performance, further research was needed to deliver scientific models that provide instant, definitive and transparent information that predicts comparative performance. Intertrac Vision delivers this, enabling shipowners and operators to make informed decisions regarding fouling control coating selection prior to application with a full, in-depth economic and environmental analysis.”

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Economiser can turn compliance into profit

ALFA LAVAL | In order to meet upcoming Tier III NOx limits in North American and US Caribbean waters, Sweden’s Alfa Laval is promoting the use of exhaust gas recirculation (EGR) on MAN B&W engines in combination with its new, pressurised EGR economiser.

“EGR provides Tier III NOx compliance with a very compact footprint, but compliance itself is only part of the full potential,” said John Pedersen, business manager for boilers, combustion and heaters at Alfa Laval. “Working closely with MAN Diesel & Turbo to optimise the EGR technology, we saw additional opportunities through our expertise in marine boilers. The result is the Alfa Laval Aalborg EGR-HPE economiser, which paves the way for extraordinary energy and fuel savings.”

Developed by Alfa Laval in close cooperation with MAN Diesel & Turbo, the Aalborg EGR-HPE is an economiser enclosed in a pressure casing. Placed in-line ahead of the pre-scrubber sprayers in the EGR circuit, it can be used for a number of advantages. If connected to a conventional waste heat recovery system, waste heat recovery becomes substantially more efficient – and is possible at significantly lower engine loads.

“By moving the breakpoint for waste heat recovery from a medium engine load down to a low load, the Aalborg EGR-HPE enables even slower steaming,” said Pedersen. “That means fuel savings that quickly pay back the economiser, offset the EGR investment and lower CO2 emissions on top of the NOx reduction.”

The source of all these benefits is the heat that would otherwise be lost during EGR, Alfa Laval noted. In the EGR process, about 30% of the exhaust gas is directed back into the engine, which reduces the combustion temperature and thereby the production of NOx. Since only the remaining 70% of the gas reaches the traditional exhaust gas boiler after the turbocharger, waste heat recovery is reduced by 30% as well. By installing the Aalborg EGR-HPE, that loss is turned into a gain, the company said. Placed in-line before the EGR pre-scrubber spray jets that cool the exhaust gas, the economiser has access to much higher temperatures than traditional exhaust gas boilers. The Aalborg EGR-HPE is integrated with conventional waste heat recovery after the turbocharger by means of its steam drum, which is shared by the traditional exhaust gas boiler. With the output of the traditional economiser feeding into the shared drum, the Aalborg EGR-HPE produces extremely high-quality steam with a temperature of just above 400°C, bringing the waste heat recovery system to a much higher level of efficiency.

“The difference in steam quality has a direct effect on the performance of the steam turbine,” said Pedersen. “Installation factors play a role, but a substantial increase in power generation can be expected.”

Even more importantly, using the Aalborg EGR-HPE in an integrated system allows waste heat recovery to occur at lower main engine loads than would be possible with a traditional waste heat recovery system in Tier III operation.

“The EGR economiser makes waste heat recovery beneficial at far lower engine loads, down to around 30%,”” said Pedersen. “This means that vessels can steam even slower, with huge fuel savings as a result. A vessel performing EGR and using the Aalborg EGR-HPE will be not only compliant with Tier III, but also substantially more fuel-efficient.”

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Ship efficiency moves centre stage

PROGRAMME | The maritime technology exhibition Europort will take place from November 3rd to 6th 2015 at the Ahoy Rotterdam venue in the Netherlands. Organisers of the event’s 37th edition expect 30,000 maritime professionals from 84 countries, 1,100 exhibitors and 16 country pavilions.

Ship efficiency will be a key theme this year, with a number of features added to the programme to stimulate debate on this vital issue for shipowners and operators, especially against the background of extreme fuel price volatility.

The Royal Institution of Naval Architects (RINA) will host the Energy Efficient Ships 2015 conference, a new addition to the exhibition and one of four conferences to take place during Europort. Addressing designers, builders, owners and operators, the conference papers will cover energy-efficient ship design and operation, the practical aspects of energy-saving devices, the integrated design of an asymmetric aftbody, and designing a propeller to maximise energy efficiency. There will also be papers highlighting the results of research on decreasing wind resistance of large container vessels and how to support the energy-efficient ship design process with energy flow simulation. The RINA conference will take place on the second day of the show.

Also new to the Europort programme is the Brazil Network Day (BND). The 9th edition of this event will take place on the opening day of Europort 2015. Organised twice a year since 2011, BND is a proactive initiative of the Embassy of Brazil in The Hague.

BND Rotterdam will include the participation of a large Brazilian trade delegation from the state of Rio de Janeiro, providing an update on business opportunities in Brazil for companies already doing – or aiming to do – business in the country, as well as an unrivalled networking environment. BND Rotterdam will be organised in cooperation with Rotterdam Partners, Ahoy, and in partnership with KPMG, Baker McKenzie, Intertrust, NeoGrid and KLM.

The other two conferences, already an integral part of the show, are the Mare Forum ship finance conference "Shipowners vs. Capital Providers" and the Central Dredging Association (CEDA) Dredging Days. The latter will cover best practices relative to maintenance and capital dredging in ports and access channels, and the management of sediments including the sediment balance of the broader port environment.

Another first at this year’s Europort will be “Masterclasses”, an initiative of Europort organiser Ahoy Rotterdam and Netherlands Maritime Technology. Four in number, each Masterclass highlights a different aspect of successful maritime operation. They are titled “Leadership through Design”, “Leadership through Technology”, "Leadership through Efficiency" and "Leadership through People".

Impressions from Europort 2013

Ship&Offshore | 2015 | Nº 8 33
ABB

A part of ABB’s advisory system, OCTOPUS will be on display in Rotterdam. ABB’s advisory system is a unique product portfolio for performance management in marine operations. It reduces fuel consumption and emissions, and increases availability and safety on a single vessel or on a whole fleet of vessels.

ABB is now looking to expand the system’s use to turbocharging. Engineers are currently working on a pilot project to find the optimal amount of sensors required. Tobias Spilker, who is involved in the project, said, “The existing infrastructure of OCTOPUS to transfer operational data can also be used to optimise the total cost of ownership of the turbocharger. The development teams are working on solutions that focus on the turbocharger efficiency and on the optimisation of service actions.”

www.abb.com

Aluland

A specialised supplier of semi-finished aluminium products to the marine industry worldwide, Aluland is presenting a new product group from its extensive portfolio: thermoplastic and thermostetting piping systems. To its thermostetting range the Dutch company recently added sea inlet strainers that it says have big advantages over metal versions: They are five times lighter, don’t corrode, are highly durable, experience less scaling and require less maintenance. Many standard types are available as well as customised types, and the cost of ownership is low, Aluland says.

The strainers contain thermoplastic baskets with a minimum R2T3 with 40% permeability. These filters are ten times lighter than metal versions. Highly resistant to seawater, they won’t have to be replaced in a year as is the case with stainless steel.

The strainers are made of L3-certified materials and have been approved by Lloyd’s Register.

Aluland supplies shipyards and the offshore industry with a range of high-quality products including aluminium plates and profiles, flanges and fittings, couplings, CuNiFer and bi-metal (aluminium-steel transition joints). It also offers options with regard to sawing, cutting, milling, forming and bending.

www.aluland.com
Aventics

A globally active manufacturer of pneumatic components and systems, Germany-based Aventics, a former subsidiary of Bosch Rexroth but now a stand-alone company, is showing fairgoers its Marex VCS (valve control system) and Marex OSIII ship control. It describes the former as having an excellent price/performance ratio and being more sustainable than hydraulic systems as well as extremely reliable. Easy to operate and maintain, the Marex VCS doesn’t require electricity and, in case of emergency, can be operated using a manual pump.

The Marex OSIII ship control is individually configurable and tailored to the customer’s propulsion and ship type. Aventics’ components and systems can be used universally. Thanks to the company’s experience and numerous parameters, Aventics says, any type of ship, propulsion and application can be combined. In addition to the Marex OSIII system, Aventics will have the 3D joystick at its stand for easy docking of customers’ boats.

BCA

Belgium-based BCA (Benelux Coating Applications) is showcasing the latest lightweight, electrostatic, low-pressure spray gun by France’s SAMES Technologies: the Nanogun-MV. Suitable for high or low paint flow rates, it combines flexibility and efficiency with easy maintenance, BCA says, adding that it is the only electrostatic gun that can spray under both high-current and high-voltage conditions. It guarantees optimal paint charge and efficient paint transportation to the parts, along with significant paint and air savings. The spray gun has been specially developed for spraying liquid-solvent-based lacquers under low pressure for use in the aerospace, automotive, agriculture, metallic furniture and wood industries.

Bolidt

The Dutch flooring and decking specialist Bolidt is showcasing its comprehensive range of synthetic decking solutions. It says 2015 has been a very good year, the company having completed numerous projects for Dutch shipowners and shipyards. Bolidt decking solutions have been selected for superyachts, naval vessels, fishing trawlers and ferries. One of the most innovative projects is the gas-electric hybrid ferry Texelstroom, the product of close partnerships among C-Job, Vripack and TESO. More than 10,000m² of Bolideck® will be fitted in total. The inner decks will be fitted with a special variant of Bolideck® FiftyFifty, giving the effect of wet and dry sand. Highly suitable for areas of intensive pedestrian traffic, Bolideck® FiftyFifty is a 2-3mm thick, seamless decking system based on two component viscous elastic synthetic resins. Other parts of the vessel will be fitted with Bolideck® 700, selected for its durability and anti-skid properties.

Meanwhile, Bolidt recently secured a contract with Parlevliet & Van der Plas for two newbuild trawlers. On the first, delivered earlier this year, Bolidt installed Bolideck® LT in the freezer storage area. This deck finishing system retains its elasticity even in operating temperatures as low as -30°C.

www.bolidt.com

www.ventics.com

www.bca.eu
Den Haan Rotterdam

Den Haan Rotterdam (DHR), a Dutch developer and manufacturer of navigation lights, searchlights and air horns, is introducing the DHR70N Polar navigation light, which has a built-in anti-icing solution designed for operating temperatures as low as -52°C. More than two years ago, DHR began research on anti-icing solutions for LED navigation lights, which don’t give off enough heat to prevent ice accumulation at sub-zero temperatures. When approached by the owner of newbuild LNG tankers used around the North Pole who wanted an anti-icing solution for conventional navigation lights, DHR took its existing DHR70N and developed the DHR70N Polar.

De Maas and Brinkmann & Niemeijer Motoren

De Maas, part of the Dutch B&N Group, and Brinkmann & Niemeijer (B&N) Motoren are exhibiting Doosan and JCB brands, focusing especially on Doosan marine engines and gensets. The two companies – manufacturers and customisers of products including industrial and marine gensets, pump sets, hydraulic power units, soundproof canopies and containers – distribute Doosan and JCB products in the Netherlands. Both supply equipment to various maritime markets. Doosan marine diesel engines range from 70 to 1,000 hp. Meeting the latest emission regulations, they are used for main propulsion as well as bow thruster applications. A Doosan 360hp marine engine will be shown at the stand. Diesel gensets ranging from 6 to 500 kVA will be exhibited. The smaller ones are by Mitsubishi, and those from 30 to 300 kVA by JCB or John Deere. Doosan marine auxiliary diesel engines are used for the higher outputs. The sets are available at 1,500/1,800rpm in single- and three-phase, and can be delivered in an open version on a skid frame and in a soundproofed version. Cooling can be via a built-on heat exchanger, radiator or keel cooling. Many options are available for the marine market, such as a 24-V electrical system, double-sheathed fuel lines, marine generators and control panels.

Dredge Yard

Netherlands-based Dredge Yard, a supplier of dredging and mining components, equipment and technologies, recently started production of Euro Dredger, which it describes as reliable, easy to maintain, affordable and – most importantly – highly productive. At Europort it’s showcasing the design of the dismountable Euro Dredger 450, which has a discharge pipe diameter of 450mm and is the first in a series of versatile cutter suction dredgers to be complemented in the near future by 350, 500 and 650 versions. The dredgers will have an inboard dredge pump, hydraulic-driven cutter head and wide range of options such as a spud carrier system, anchor booms, submerged dredge pump and dredge automation and control. Dredge Yard’s recent projects include the Eco-200 Dredger, designed to meet the need for a compact, economic and easy-to-transport dredger, and the Auger Dredger, similar to the Eco-200 Dredger but equipped with an auger head for sediment and sludge dredging. The company says visitors to its stand will be shown new dredging technologies and innovative, reliable, high-quality and cost-effective solutions for the transport of water, sand and slurry.
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**IMES GmbH**

A German specialist in combustion engine cylinder pressure and data acquisition systems, IMES GmbH is spotlighting its CMS Marine four-stroke portable, a multi-cylinder online combustion monitoring system for marine diesel engines. Designed as a portable box, CMS Marine can be rapidly installed on-site for acquisition of cylinder pressure data on engines in the field. Recorded data from up to 20 cylinders can be used to diagnose malfunctions or assist in setting and optimising engine operating parameters. At the centre of the efforts is cylinder balancing – the equalisation of output across all cylinders of an engine.

Well-balanced engines are subject to less wear and tear, reduce fuel consumption by 2% to 3% and can also reduce emissions of the greenhouse gas carbon dioxide by some 2%, IMES says.

Another product that IMES is presenting at Europort is its electronic pressure indicator EPM-XP, which now offers new, advanced software functions to automatically calculate compression pressure (Pcomp) and indicated power (Ipower) on four-stroke engines. It is also presenting its wide range of cylinder pressure sensor types HTT-04CA and CPS-01CA, which have received marine type approval from all major international classification societies.

**Hull Vane**

A first-time Europort exhibitor, Hull Vane BV is presenting the Hull Vane, a patented fuel-saving device for relatively fast displacement vessels. Launched in 2014, the Hull Vane looks like a hydrofoil fixed below the transom of a ship, but the working principles are different. It has the following four effects: The wing generates forward thrust out of the upward flow under the stern; the stern wave is reduced (and therefore the ship’s wave-making resistance); the vertical lift of the wing reduces the dynamic trim; when sailing in waves, the ship has reduced pitching, rolling and yawing motions.

The Hull Vane, which is also retrofittable, is suitable for naval and coastguard vessels, ferries, superyachts and the faster offshore supply vessels. Using CFD software, performance can be accurately predicted at an early stage, according to Netherlands-based Hull Vane BV. Available for review at its stand will be CFD reports showing fuel savings on a 169m ferry (6% at 20 knots), a 112m cargo vessel (5.2% at 14 knots) and a 108m offshore patrol vessel (15.3% at 17.5 knots and 12.5% of annual fuel consumption).

Representatives of Van Oossanen Fluid Dynamics, a sister company of Hull Vane BV, will be at the stand to explain the CFD computations.

**Heinen & Hopman**

Heinen & Hopman will be showcasing its containerised HVAC fan room capable of being completely prefabricated and tested before delivery, thereby reducing onboard installation time, the Dutch company said. A modified cargo or certified offshore container is used as the fan room’s base. The size of the container can range from 10ft to 40ft in high cube design, the choice depending on the space needed to fit all required equipment and the space available on board, it added. The containerised fan room design includes air-handling units with conditioned airflows up to 40,000 m³/hr. Cooling capacities are available up to 800 kW in either chilled-water or direct expansion design. Heating is normally done with electrical heaters. Energy-saving applications such as heat pump and heat recovery wheels can be easily integrated in the design, Heinen & Hopman noted.

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**Noris**

A manufacturer of sensors, signal processing and display devices, Nuremberg-headquartered Noris Group will present its comprehensive portfolio in Rotterdam.

One highlight will be the new N4 open automation platform with a powerful PLC in compliance with IEC61131 (CODESYS). It comes with especially rugged I/O components for use in engine rooms, hot swap functionality, integrated web server for service-friendly FTP access, and provides expandability via redundant CAN, Ethernet and MODBUS interfaces. The company will also present the remote control system Noristar 4 with its new CANbus control lever systems.

www.noris-group.com

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**Klüber Lubrication**

Under the motto “powerful, naturally”, Klüber Lubrication will be presenting its efficient and eco-compatible speciality lubricants for ships, offshore installations and other marine applications at Europort. The company’s focus will be on EALs (environmentally acceptable lubricants), which comply with the 2013 Vessel General Permit (VGP) requirements of the US Environmental Protection Agency (EPA) in terms of biodegradability, minimal toxicity and bio-accumulation. Among the products on display are:

- Klüberbio AG 39-602, a new, eco-compatible adhesive lubricant for open gears and steel cables in contact with water, with a base oil from 100% renewable resources;
- Stern tube oils of the Klüberbio RM 2 series. They extend the lifetime of both the seal and the oil due to their good resistance to oxidation and hydrolysis as well as compatibility with elastomer seals;
- The new, readily biodegradable, high-performance gear oils of the Klüberbio EG 2 series. They offer a high scuffing load capacity, providing reliable protection against fretting damage;
- The eco-compatible synthetic hydraulic fluids of the Klüberbio LR 9 series. They help hydraulic systems start easily even at low temperatures due to their good viscosity-temperature behaviour and low pour point. They can therefore be used even where temperatures fluctuate considerably.

www.klueber.com

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**Intertek**

A British provider of quality and safety services to a wide range of industries, Intertek is presenting its ShipCare marine industry testing and inspection solutions. Intertek ShipCare is said to help clients run their business more effectively and with less risk. Expertise and capabilities include bunker fuel quality testing, bunker quantity surveys, fuel advisory, lubricant testing and oil condition monitoring, cargo testing and inspection, tank calibration, marine fire foam testing, environmental and regulatory consultation, and laboratory analysis of water samples. ShipCare services are available at ports worldwide.

www.intertek.com

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Royal IHC

Shipbuilder Royal IHC will demonstrate its innovative approaches in the maritime industry at Europort. Its booth will feature an interactive wall that will entertain visitors with informative trivia relating to IHC’s product portfolio. Fairgoers will also be able to walk on and under the decks of virtual offshore and dredging vessels by means of VR (virtual reality) glasses to gain an impression of IHC’s advanced technology and design.

In addition, a number of impressive scale models, product samples and a dredging simulator will highlight the latest innovations available from Royal IHC for its specialist markets. As an example of IHC’s offshore industry expertise, one of the main attractions will be a model of a module handling system for riserless well intervention that has been ordered by Helix Well Ops. It will safely deploy subsea equipment from a vessel to temporarily gain access to offshore oil and gas wells.

IHC’s dredging equipment will be represented by the latest development in pump technology, the Curve®, which is now available for all of the company’s dredge pumps. A coloured pump impeller model will show how Curve® technology works for three different IHC pump executions.

Another exhibit at the IHC stand will be the DART (diver attendant recompression transportable) decompression chamber. It allows surface decompression and therapeutic treatment, with exceptional transport possibilities.

IHC will also showcase one of its advanced dredger simulators, which is completely compatible with TID’s (Training Institute for Dredging) expertise in providing training courses. Visitors will be able to experience the dredging and dumping processes of a backhoe dredger in a realistic environment with the aid of actual operating controls.

One of the focal points of IHC’s new strategy, “IHC 2020”, is services, and part of the stand will be reserved for a 5-tonne winch as an example of IHC’s rental fleet. There will also be information available on IHC’s latest training courses as well as the renovation and upgrade projects that the company manages on behalf of its customers. www.ihcmerwede.com

Simrad Navico

The HALO radar detects targets as close as 6m while delivering long-range performance up to 72 nautical miles.

A radar revolution plus an evolution in electronic chart display and information system (ECDIS) technology will be the focus for Simrad at Europort, as the electronics group confirms its commitment to innovate in the commercial maritime sector while delivering significant cost savings.

The Simrad HALO™ combines close- and long-range detection, precise target definition and low clutter, delivering the advantages of frequency modulated continuous wave Broadband 4G™ Radar with the pulse capability traditionally used over longer ranges in one package. Also new from Simrad are the MARIS ECDIS900 MK5 and MK15, as well as the modular, intuitive and easy-to-install E5024.

The ECDIS900 MK15 includes “all-in-one” flat-panel displays with integrated Windows PC, while its ECDIS900 MK5 counterpart includes a standard Windows PC and separate flat-panel monitor. Both feature an entirely new high-performance hardware platform plus updated software. Both Simrad MARIS ECDIS900 options feature integrated chart management, including Pay-As-You-Sail, distributed via MBA (MARIS Bridge Assistant), with ship and fleet monitoring performed through MCP (MARIS Customer Portal).

Meanwhile, the modular ES024 ECDIS system is easy to use and train on by design, with simple installation also prioritised in either single, dual, or triple ECDIS configurations. Designed for NAVTOR ENC’s including UKHO (for AVMC), Primar, IC-ENC and NOAA, the ES024 is compatible with Radar, AIS & ARPA overlay (Simrad Argus Radar).

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Victaulic

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Next-generation wind farm mothership for North Sea

**OPERATION AND MAINTENANCE** In response to the specific requirements for UK Round 3 wind farm maintenance operations far from shore, a group of maritime experts has developed a new mothership concept that challenges perceptions of the working and living environment on commercial vessels through the implementation of design-driven innovation. The following article is an abridged version of a paper by Professor Dario Boote, Frederico Galleggioni and Dr Tommaso Colaianni from the Department of Electrical, Electronic, Telecommunications Engineering and Naval Architecture at Genoa University, Italy; Dr Sean McCartan and Tim Thompson from the Department of Industrial Design at Coventry University, UK; Filippo Iliopulos from Knud E. Hansen AS, Denmark; Ian McFarlane and Daniel Rose from Romica Engineering Ltd, UK; Bob Verheijden from Academy Minerva, Groningen, the Netherlands; and Christopher Anderberg and Henrik Phalm from the Division of Maritime Human Factors and Navigation, Chalmers University, Sweden.

There are two significant factors to be taken into account regarding the utilisation of operation and maintenance (O&M) vessels. The weather conditions – more precisely wave height, wind speed and water currents – influence the operability of a vessel, personnel safety and accessibility of offshore structures. Secondly, the distance from the working area to the O&M port determines, in conjunction with the vessel’s transit speed, the required journey time and therefore the working time on-site [1]. It is estimated that wind parks will require more than 1,000 maintenance interventions during their lifetime, with more than 6,000 personnel transfers between offshore structures and crew transfer vessels (CTVs).

**Design-driven innovation**

The process of design-driven innovation is an exploratory research project that aims to create an entirely new market sector for a given product through changing the “design meaning” the user has for the product. It occurs before product development, as shown in Figure 1, and is not the fast, creative brainstorming sessions that are typical of concept generation but a design investigation similar to technological research [2]. In essence, it is the development of a design scenario through engaging with a range of interpreters in technology and cultural production. Knowledge is generated from immersion with the design discourse of the interpreter’s groups. The process can be structured or unstructured and is dependent upon the nature of the relationship of the client with the interpreters. The interaction between innovation of design meaning and technology innovation can transform the market within an industry and even create new market sectors. The two strategies are complementary, as technological and socio-cultural models are inextricably linked, evolving together in innovation cycles. The successful interaction between design-driven and technology-push innovation is called a technology epiphany, shown in Figure 2; it creates a market leader and in some cases a completely new market sector.

**Design concept**

The aim of the concept was to design a 130m offshore support vessel (OSV) able to comfortably accommodate up to 50 wind farm technicians, vessel crew and four wind farm service vessels (WFSVs). The objective was to engage in design-driven innovation to create a new market sector of vessel, the idea being to develop an OSV platform with the technical innovation of a launch recovery system that could be applied to a general OSV so that the vessel could be adaptable between offshore wind and oil and gas to provide less investment risk due to adaptability.
The innovation in design meaning was to engage the user in the emotional design of high-end, luxurious interior design experiences informed by the principles of environmental psychology of the workspace, the key objective of which is to create an optimised working environment supporting highly motivated individuals in a low-stress working and living environment and managing the relationship between the nature of these two distinctive functional spaces on the vessel. Having a stress-free living environment will help increase team morale and productivity. It will also be beneficial to the wind farm industry as it will help retain workers, who are expensive to train and difficult to replace.

This was achieved through an engagement in marine design as delineated by McCartan et al [5]. It involved a multi-disciplinary design team including marine designers, interior designers, superyacht designers, automotive designers, maritime human factor experts and naval architects. The objective of marine design is to place the user at the centre of the design process. To this end, a detailed analysis of the O&M activities and the development of a user scenario was based on the personas of land-based technicians who would have limited offshore experience as proposed by McCartan et al [6].

**Vessel specification and operation**

The WFSV mothership or SOV (service offshore vessel) will be designed to operate at the Dogger Bank wind farm in the North Sea. The purpose of the vessel will be to act as a safe haven for WFSVs operating at the wind farms far from shore. It will operate on a three-weeks-on, three-weeks-off basis and provide accommodation and interior design affordances through the application of environmental psychology including integrated IT to facilitate a TPS approach to O&M, for a team of 70 technicians and project managers who will not have had significant offshore experience. The vessel is to be designed to Lloyd’s Register SPS (special-purpose ships) regulations, which due to the number of special persons involved requires an implementation of the
13-36 PYC regulations for fire safety and means of escape. The vessel must be able to store, service and launch three to four WF-SVs in 2.5m Hs (significant wave height), as well as three to four cabin RIBs (rigid inflatable boats) in Hs 1.5m. These CTVs will be chartered to facilitate an optimised O&M strategy based on weather window and predicted maintenance scheduling.

**Exterior form development**

The exterior form has a structural glass roof feature acting as a collector panel for a light tunnel system, which distributes natural light within the areas of the ship devoid of natural views. Inspired by sculptural and superyacht forms, the exterior form was developed around the visual metaphor of a hand clasping a pebble. The hull is perceived as a visual form of strength that wraps itself around the pebble form of the accommodation module. The flowing sculptural form of the exterior, shown in Figure 3, seamlessly integrates the bridge level with the rest of the hull.

The exterior design process began in side profile, where the dynamic stance of the visual form was developed; the visual mass of the exterior was moved forward to help create the dynamic stance to make the vessel look as if it were moving when stationary. The design was refined through the use of line analysis to resolve relationships between lines and surfaces. Continuous horizontal windows in the fore section of the pebble connect it to the rear section, which has a very different open deck form.

The use of the flat architectural glass structure below the bridge gives it an imposing sense of scale from large architectural forms. The bulwark is horizontal towards the transom.

---

**Environmental Psychology**

Environmental psychology is an interdisciplinary field of research that addresses the relationship between humans and their surroundings. The term “environment” includes natural environments, social settings, built environments, learning environments and informational environments. The discipline is both value-oriented and problem-oriented, with the objective of solving complex environmental problems to achieve individual well-being within a larger society [3]. A critical tool for this approach is a model of human nature that predicts the environmental conditions under which humans will behave. This can help design, manage, protect and/or restore environments that enhance reasonable behaviour, predict the likely outcomes when these conditions are not met, and diagnose problem situations. The field explores a diverse range of issues including the following: the effect of environmental stress on human performance, the characteristics of restorative environments, human information processing, and promotion of durable conservation behaviour. Environmental psychology relies on interaction with other disciplines in the design field such as architecture, interior design, urban planning, industrial design and landscape architecture. [4]
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visual mass of the WFSVs balances the bow pebble form. The use of a colour break between the hull and the wrapped architecture structure with a surface form inspired by automotive styling and the pebble form emphasises the relationship between the two entities: the sense of one clasping the other.

**Structural design and propulsion**

The preliminary structural design and capacity plan were developed in parallel with the general arrangements and exterior form as an interactive process to address SOLAS regulations and the requirements of Lloyd’s Register and the SPS Code. This was based on the vessel returning to port every three weeks for resupply and crew change, at a design speed of 16 knots. The vessel supports a total crew of 80, with an A-frame crane to support the launch and recovery of four Mainprize M02 WFSVs and a boom crane to support the launch and recovery of four Albatross Marine Design cabin RIBs. The hull and tanks were spatially resolved using a 3D model in ModelMaker and analysed using Autohydro.

<table>
<thead>
<tr>
<th>Limit</th>
<th>Min/Max</th>
<th>Actual</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Area from 0.00 deg to MaxRA or Flood</td>
<td>&gt;0.0900 m-R</td>
<td>1.691</td>
<td>1.601</td>
</tr>
<tr>
<td>(2) Area from 0.00 deg to 30.00</td>
<td>&gt;0.0550 m-R</td>
<td>1.461</td>
<td>1.406</td>
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<tr>
<td>(3) Area from 30.00 deg to 40.00 or Flood</td>
<td>&gt;0.0300 m-R</td>
<td>0.841</td>
<td>0.811</td>
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<tr>
<td>(4) Righting Arm at 30.00 deg or MaxRA</td>
<td>&gt;0.200 m</td>
<td>4.878</td>
<td>4.678</td>
</tr>
<tr>
<td>(5) Angle from 0.00 deg to MaxRA</td>
<td>&gt;25.00 deg</td>
<td>32.70</td>
<td>7.70</td>
</tr>
<tr>
<td>(6) GM Upright</td>
<td>&gt;0.150 m</td>
<td>11.302</td>
<td>11.152</td>
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</table>

Table 2: Intact stability righting arm curve properties

<table>
<thead>
<tr>
<th>Limit</th>
<th>Min/Max</th>
<th>Actual</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Res. Ratio from Roll to Abs 50.00 deg or Flood</td>
<td>&gt;1.000</td>
<td>2.656</td>
<td>1.656</td>
</tr>
<tr>
<td>(2) Absolute Angle at Equilibrium</td>
<td>&lt;16.00 deg</td>
<td>0.63</td>
<td>15.37</td>
</tr>
</tbody>
</table>

Table 3: Intact stability weather criterion
The weight calculation included the hull weight and local weights, with the former including shell plating, longitudinal bottom beams, longitudinal deck beams, transversal bottom beams, transversal side beams, transversal deck beams, bow and aft structures and bulkheads. The Lloyd’s Register method for weight calculation was used. It included hull weight distribution and the following local weights: forecastle, poop, superstructure, equipment at ends, cargo gear, propulsors, tanks and machinery space. The lightship weight distribution is shown in Figure 4, with the preliminary scantling in Figure 5.

The following seven loading conditions were examined: ballast departure, ballast arrival, full-load departure, full-load arrival, full-load mid-voyage, full-load mid-voyage and first launch of M02 vessel, full-load mid-voyage and fourth launch of M02 vessel. The design was developed with the following constraints:

- the ship must not be trim by bow;
- the difference between the immersions of bow and stern should be less than 1% of the length of the ship (1.29m);
- the immersion at the stern must be greater than 4m to ensure complete immersion of the propellers.

The still-water bending moment and shear force calculations are shown in Figure 6 and Table 1, from which the structural scantlings were calculated using the Lloyd’s Register rules calculator. The structural plans are shown in Figure 7.

The intact stability righting arm curve is shown in Figure 8, with values in Table 2. The intact stability weather criterion is shown in Table 3.

Probabilistic damage stability:

\[
\begin{align*}
\text{d} & = 9.128 \text{m} \\
\text{d} & = 3.992 \text{m} \\
\text{d}_P & = 7.073 \text{m} \\
\text{A}_E & = 0.5150 \text{m} \\
\text{A}_I & = 0.7835 \text{m} \\
\text{A}_P & = 0.7086 \text{m} \\
0.9R & = 0.50517 \\
A & = 0.4A_E + 0.4A_I + 0.2A_P = 0.63714 > 0.5613 = R
\end{align*}
\]

Holtrop’s power prediction method was used to estimate the power requirement as shown in Table 4 and Figure 9. To

\[
\begin{array}{|c|c|c|c|}
\hline
V \text{ [knots]} & R_{\text{tot}} \text{ [kN]} & R_{\text{tot S.M.}} \text{ [kN]} & Pe \text{ S.M.} \text{ [kW]} \\
\hline
6.00 & 68.12 & 74.93 & 231.27 \\
8.00 & 115.36 & 126.90 & 522.21 \\
10.00 & 173.47 & 190.82 & 981.56 \\
12.00 & 245.76 & 270.34 & 1668.75 \\
14.00 & 343.65 & 378.01 & 2722.30 \\
16.00 & 491.14 & 540.26 & 4446.54 \\
18.00 & 711.19 & 782.31 & 7243.58 \\
20.00 & 1107.57 & 1218.33 & 12534.19 \\
22.00 & 1674.61 & 1842.07 & 20846.34 \\
24.00 & 2109.57 & 2320.53 & 28648.29 \\
\hline
\end{array}
\]

Table 4: Holtrop’s power prediction

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Navigation [kW]} & \text{Operation [kW]} & \text{Emergency [kW]} \\
\hline
\text{Base Load} & 7919.16 & 1243.47 & 285.17 \\
\text{Max Load} & 9746.31 & 4433.69 & 386.61 \\
\hline
\end{array}
\]

Table 5: Preliminary electric load analysis

**Example 7: Offshore**

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achieve the required hull power requirement for the hull speed of 16 knots, a pod propulsion system was selected, namely two ABB Azipod CO1250. The preliminary electrical load analysis, shown in Table 5, supported the selection of four 3300 kW generators as prime movers for the vessel (Caterpillar C280-12).

**Interior design**
The concept of the restaurant with an integrated lounge is a Scandinavian minimalist interior, with the use of cream and light wooden floors. The layout is shown in Figure 10. There are four distinctive types of areas; in the distance is a serviced dining area for 40 people with integrated technology – the tables allow the user to interact with a menu and place an order. A partition segregates this from the communal, informal lounge seating and individual loungers in the middle ground. The individual loungers have reed features to make them isolated from each other and the space. The communal informal lounge sofas have a recessed space and a table and overhead lighting identifying them as separate spaces and adding to the mood of the interior space.

**Technician’s Room**
The technician’s room concept, shown in Figure 11, uses a smart wall to simulate views of nature as well as interactive media content. The minimalist design and the use of light wood and lighting make it appear spacious. The use of a Murphy bed in the design enhances the design meaning, making it feel like a small apartment luxury lounge by enhancing the sense of space when the bed is stored.

The meeting room concept is shown in Figure 12, where the acoustic absorbers on the ceiling have the smart wall as a focal point. The shape of the tables facilitates the viewing angles from all the chairs to ensure a clear view of the smart wall for all users. The use of an industrial-style surface pattern provides sensory variability for the user. The continuous horizontal window provides views of the seascape. The integrated tablet workstation technology at each seat, combined with individual viewing screens, provides the capability to work in small groups and individually, with the transition between the two modes of working facilitated by customised social media tools.

The proposed changing room layout is shown in Figure 13.

**Cabin RIB lifting procedure**
There are four cabin RIBs stored on a longitudinal track system on both sides of the vessel. How a boom crane on the centreline can load them on either side using the lifting frame and straps is shown in Figure 14. Once one cabin RIB is launched, as shown in Figure 15, the next vessel on the same side can be moved into loading position through the use of a motorised storage frame. At the same time, the boom crane lifts the empty storage frame over it. This enables the footprint of the cabin RIB storage area to be minimised, potentially reducing OSV costs.

**Conclusions**
Changes in the passenger regulations of CTVs such as the German flag’s recent shift from twelve technicians to 24 special persons, combined with innovations in crew transfer to turbine technology, could result in a paradigm shift in O&M strategy business models. On this basis, for owners to maximise return on a vessel as an asset, the mothership must be a highly adaptable platform that can be readily and cost effectively reconfigured for a range of CTV...
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types and deployment solutions. The track storage systems presented in this paper facilitate instant reconfiguration of CTV storage capability, as only the storage frames would need to be changed and new vessels loaded when in port. This configurational flexibility would offer a significant opportunity for vessel and hence operating cost optimisation within an O&M strategy. Given the significant knowledge-work nature of technicians’ role in O&M activities in the offshore wind sector, environmental psychology offers a significant opportunity for the transfer of innovation from the built environment to the commercial marine sector.

Acknowledgements
The authors wish to thank Captain Bob Mainprize of Mainprize Offshore Ltd for his permission to use the M02 wind farm support vessel in this project and for the significant technical discussion and user perspective he contributed to the design-driven innovation process. The authors gratefully acknowledge the grant support received to carry out the work presented in this paper as an integral part of the Leonardo TOI-funded project EBDIG-WFSV, funded under the EU Lifelong Learning Programme, grant number: UK/13/LLP-LdV/TOI-621. The content of the publication is the sole responsibility of the authors; the European Commission is not liable for any use that may be made of the information. The initial exterior concept was developed by Matt Bishop and the detailed interior concepts by Dastinas Steponenas, Yeo Kim and Zhivko Stoyanov during their professional internship with EBDIG-IRC. All are boat design students in the Department of Industrial Design at Coventry University.

References

MAIN PARTICULARS OF HULL
The mothership is a 131m OSV equipped for the deployment of four WFSVs and four cabin RBs. The main particulars:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
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<tr>
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</tr>
<tr>
<td>Beam</td>
<td>32m</td>
</tr>
<tr>
<td>Moulded draught</td>
<td>5.70m</td>
</tr>
<tr>
<td>Depth</td>
<td>12.00m</td>
</tr>
</tbody>
</table>

Figure 14: Loading of cabin RIB
Figure 15: Launching of cabin RIB
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A functional method for optimisation of a tension-leg offshore platform orientation

ISD  Minimising risk to personnel and assets in the oil and gas industry is of paramount importance. The following article by Gerard Reynolds and Andrew Staszak from Atkins, a global design, engineering and project management consultancy, discusses how the layout of an offshore platform can have a significant impact on developing a better and more informed design, in keeping with inherently safe design (ISD) principles.

Technical safety in the oil and gas industry is of paramount importance. With most tension-leg platforms (TLPs) being geographically remote, costing upwards of USD 3.5 billion, containing a multitude of process and operational hazards, and crowding personnel on board, it is crucial to minimise the risks to people and assets. This can be achieved through the process of inherently safe design (ISD), in which technical safety has direct influence on the design, from concept through to commissioning. The platform orientation is one design aspect that can play a significant role in the ISD process, limiting the adverse effects should an incident occur. Traditionally, the platform orientation has been determined by engineering judgment, heavily weighted by past experiences. While this approach initially appears to be time- and cost-effective, it has the potential to lead to a non-ideal design solution that could cause safety and operational issues to go unaddressed and increased costs in later design stages.

Optimisation parameters
The parameters considered for the optimisation study were as follows:

- The natural ventilation (wind), which can reduce the potential accumulation of toxic and flammable gases as well as provide indications of potential vapour cloud explosion consequences.
- The helideck impairment, which can impact helicopter operations due to hot turbine exhaust gases, affecting both general operations and potential emergency operations.
- The wind chill, which can affect the ability of personnel to work on the platform. This is particularly important in cold climates, extreme weather areas where working conditions can influence the number of personnel required for operation.
- The lifeboat drift-off direction, which can impact the safety of the crew in an emergency.
- The hydrodynamic drag, which can affect tendon fatigue life, hull integrity and structural design requirements.

Natural ventilation (wind)
Guidance for ventilation rates is contained in the Institute of Petroleum (IP) 15 document. In the event of an unintended hydrocarbon release, higher ventilation rates typically translate into the formation of smaller flammable gas clouds. This parameter is therefore intended to be maximised.

Exhaust
The Civil Aviation Protocol (CAP) 437 dictates that restrictions be put in place for the helicopter operations if there is a temperature increase of 2°C above ambient within the operational zone above the helideck. Temperature rise is used to
define potential impairment to operations; in some cases this may limit operations altogether or require adjustments to payload weight, approach paths, etc. For many offshore facilities, particularly in extreme weather areas, helicopters are used as the primary means of transportation and evacuation during an emergency. Thus it is imperative that the helideck remain available in as many expected weather conditions as possible. Additionally, platforms look to minimise exhaust impacts on drilling, crane, and elevated deck operations. The helideck impairment from exhaust fumes is therefore intended to be minimised.

Wind chill

Wind chill is quantified by the perceived decrease in temperature felt by the body on exposed skin and is regulated by NOR-SOK S-002. Wind chill can impact the number of personnel required to operate a facility. In some cases, environmental effects such as wind chill have been known to increase the For a given hydrocarbon leak rate, increasing the ventilation rates aids in dispersing the flammable gas cloud, typically producing smaller explosions in case of ignition and less probability of fatality and damage to the structure.

The offshore platform is powered by burning some of the gases it produces. The exhaust outlets need to be positioned in such a way that the exhaust fumes minimise potential impairment to the helideck operational zone throughout the year.

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potential for operator error. In order to provide personnel with acceptable working conditions and maximise safety, wind chill effects are intended to be minimised. It is important to note that this can be counter to increasing ventilation for the reduction of flammable clouds during an unintended release of hydrocarbons. One intent of the optimisation approach is to find a balance between these two potentially competing goals.

**Lifeboat drift-off**

If a lifeboat is deployed during an emergency, it is imperative to maximise the potential survival of the craft by limiting exposure to potential hazards. A lifeboat deployment may also suffer from loss of power and thus be left to environmental effects to reach safety. To maximise the potential for survival, the lifeboat should drift safely away from the platform, assisted by the current. Adverse drift-off, the length of time to reach a safe area, and potential drift back into the facility are intended to be minimised.

**Tendon stress**

TLP platforms are typically used in water depths of up to 7,000ft. To be cost-efficient and comply with the American Petroleum Institute (API) Recommended Practice (RP) 2T, the stress in the tendons resulting from maintaining the platform in place despite wave impact and drag loading is a significant cost factor. Here the platform depth is compared with the height of the Burj Khalifa in Dubai, the tallest building in the world.
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In the oil and gas industry, however, decisions relating to the platform orientation are still typically made solely based on previous experience and qualitative judgment, which can lead to unintentional biases. This study aims at improving the accuracy of experts’ predictions through the use of numerical tools in order to meet the following design objectives:

- maximise ventilation,
- minimise helideck impairment from exhaust,
- minimise wind chill effects,
- minimise tendon stress,
- minimise adverse lifeboat drift-off.

Of course, using formal models doesn’t come without limitations. There are a few challenges associated with using CFD to resolve issues related to offshore platforms:

- Firstly, from a technical point of view, offshore platforms are very large and have extremely complex geometries. This makes it difficult, if not impossible, to explicitly resolve all objects within the available time frame.
- Secondly, from a project management point of view, projects are strongly schedule-driven: Stakeholders want their platform to start running as early as possible since each day of delay will cost upwards of USD 10 million in deferred revenue.
- In addition, the platform orientation is one of the first design aspects to be decided. However, in very early design stages, information is scarce. Many uncertainties need to be dealt with regarding the location of the equipment, etc.
- Finally, the budget allocation for health and safety is usually about 1% of the total project cost, greatly limiting the amount of influence technical safety bears on the final design.

The physics parameters used in STAR-CCM+ to represent the exhaust are as follows:

- steady-state,
- two-layer realisable k-epsilon turbulence model,
- segregated multi-component gas model,
- gravity model to deal with the buoyancy-driven exhaust flow.

The mesh parameters were set as follows:

- large-scale objects are explicitly resolved;
- small-scale objects are represented by sub-grid drag terms;
- two to five million hexahedral cells;
- locally refined on platform and helideck;
- refined exhaust outlets.

Methodology

The methodology is summarised below:

Step 1: Simulate wind from 16 directions and two speeds

Step 2: Calculate helideck impairment from exhaust for each scenario

Step 3: Calculate mean air speed through the platform

Step 4: Calculate wind chill on the platform

Step 5: Determine lifeboat drift collision probability

Step 6: Calculate drag loading on hull as a surrogate for tendon stress

Step 7: Combine all results using annual wind and current probability distributions
Results

The cost functions for each individual design objective were calculated and are illustrated above. The figure shows the linearly weighted cost function for the combined objectives.

The combined cost function shows that the optimum orientation of the platform, once all objectives are taken into account, is for its north to face true east-southeast. This result does not coincide with any of the ideal orientations found for the individual design objectives, but is the best compromise among all of these objectives.

Conclusion and future considerations

The optimum orientation of the platform, with platform north facing true east-southeast, was obtained using simulation tools based on five design objectives: ventilation, exhaust, wind chill, lifeboat drift-off and tendon stress. The approach taken in this case study considers an early stage of design, with parameters covering both safety and operational issues. As the design progresses, the number of parameters considered is expected to change, as will their weighted contribution. The idea is that the orientation can be further optimised as the design process progresses, or in some cases completely alter the selection based on safety and operational prioritisations. If a proper balance of previous experience, qualitative judgment, and the use of formal models such as CFD are deployed, this function method can be used to achieve an ISD. Further work could involve optimising the facility layout based on turbine stack design and positioning, helideck positioning, module placement, flare tower design, etc.
Installation of natural gas production platform in Alaska

**COOK INLET** | Hamburg-based HeavyLift@Sea GmbH has completed installation of the first new offshore natural gas production platform in Alaska’s Cook Inlet since 2000, it was assigned by Deutsche Oel & Gas AG.

The project involved installing a monopod platform, laying a subsea pipeline over a distance of 24km and accomplishing the horizontal directional drilling (HDD) to connect the onshore facility to the pipeline on the seabed. The Kitchen Lights Unit (KLU) field, at 337km², is the biggest development region in Cook Inlet. Very high tidal currents up to 6 knots, a massive tidal range and very limited visibility below water made the Cook Inlet a very challenging environment for this offshore operation.

Furthermore, due to the hard winters there, the time window for installation was limited to five months during summer. One of the biggest and most challenging milestones in this project was installation of the production platform, HeavyLift@Sea noted. For this task the heavy-lift ship *Svenja* from SAL Heavy Lift GmbH was specially outfitted with living quarters and mooring winches and anchored at the well position. The monopod was manufactured in Texas, USA, and towed to Alaska by an offshore tugboat, where it was lifted onto the heavy-lift vessel for additional preparation work. After the king pile, the guiding pile was driven into the seabed, the monopod was lifted by the two 1,000-tonne SWL ship cranes and lowered along the king pile onto the seabed. After installation of the piles to secure the platform, the topsides and helicopter deck were mounted.

In the meantime, the 24km subsea pipeline, with a diameter of 10 inches (25.4cm), was laid starting at the well position. A pipeline barge was constructed especially for this job. In order to move forward during laying, the barge had to pull itself forward in its eight point mooring spread. Two anchor handling tugboats moved anchors in each tidal window to prevent the barge from running out of its spread. About 900m of the pipeline have to cross the shore from the seabed to the onshore facility, which is located on a cliff about 75m above the seabed. For this horizontal directional segment, a 12 inches (30.5cm) pilot hole was drilled from the entry point on top of the cliff to the exit point on the seabed. A 24 inches (61cm) reamer was inserted into the pilot hole to widen the hole, directly followed by a 16 inches (40.6cm) washover casing. The production pipe was installed through the casing and pulled into place by a jacket platform for connection to the subsea pipeline.

**“Tough times ahead” for offshore energy insurance**

**IUMI** | The chairman of the offshore energy committee of the International Union of Marine Insurance (IUMI) reported continuous growth in the sector at IUMI’s annual conference in Berlin in September. Simon Williams put 2015 capacity at about USD 7 billion, cautioning that USD 5.5 billion was more realistic, however.

“Although 2014 appears to be delivering another good result for insurers and reinsurers, it’s too early to say if the year will be profitable,” he said.

Williams noted that the first six months of 2015 had already brought the largest number of losses since 2011, which could significantly impact 2014 profits.

“Our sector has already racked up more than USD 2 billion in a series of losses, including incidents in Mexico, the Falklands and Brazil. The 2014 underwriting year still has a way to go”, he said, adding that the rapid drop in oil prices was fuelling market pessimism.

“Low commodity prices are impacting risk management budgets, reducing rig day rates, (prompting) less drilling activity and a shelving or postponement of construction projects. Clients are focusing on budgets and looking hard at existing limits and coverage. This will be detrimental to our business going forward.”

On a more positive note, the Hamburg-based IUMI reported that current oil reserves were depleting at around 5% per year and so drilling and exploration was likely to be reinvigorated before the end of the decade.

“Although the true result for 2014 is yet to be determined, there will be some tough times ahead for the energy insurance market,” Williams said, “but I do see some light at the end of the tunnel when offshore activity gets under way again.”
The Buyer’s Guide serves as market review and source of supply listing. Clearly arranged according to references, you find the offers of international shipbuilding and supporting industry in the following 17 columns.

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1.06 Repairs + Conversions

2 Propulsion plants

2.01 Engines

2.02 Gears

2.03 Couplings + Brakes

2.04 Shaft + Shaft Systems

2.05 Propellers

2.06 Rudders + Rudder Systems

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Fax: +49 (0) 2628 / 6 13 00
email: info@schottel.de • www.schottel.de

Controllable-pitch propeller systems, Shaft lines

2.05 Propellers

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D-88212 Ravensburg
Phone: +49(0)751 29511 0
Fax: +49(0)751 29511 079

cpp@andritz.com www.escherwysspropellers.com

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2.06 Rudders + Rudder Systems

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Voith Schneider Propeller - Voith Inline Thruster, Voith Inline Propulsor

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winfo@gea.com
www.gea.com

Treatment plants for fuel and lube oil

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e-mail: info@is-service.de • www.is-service.de

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4.02 COATINGS

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E-mail: separation@mahle.com
Internet: www.mahle.com

Fuel treatment systems Filter/water separators

4.05 ANODIC PROTECTION

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5 Ships’ equipment

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www.freudenberg-filter.com

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www.dvz-group.de

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**5.16 Other Marine Equipment**

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www.sauercompressors.com

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8.04 Level measurement systems

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8.12 Automation equipment

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10 Ship’s operation systems

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11 Deck equipment

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12 Construction + consulting

12.01 CONSULTING ENGINEERS

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The classification society DNV GL and 25 partners from the Norwegian maritime industry along with Norwegian authorities have presented the five pilot projects that will be pursued as part of Norway’s Green Coastal Shipping Programme. The programme aims to encourage the research and implementation of “green” technology concepts in the country’s shipping sector, and the pilot projects include several different ship types and infrastructure with an emphasis on alternative fuel concepts.

“When we launched the Green Coastal Shipping Programme, we said we wanted to make Norway a world showcase for green coastal shipping. With these five pioneering pilot projects we are well on our way,” said the programme’s director, Narve Mjøs, who is director of Battery Services & Projects at DNV GL.

CargoFerry plug-in hybrid

The first pilot project, CargoFerry Plug-in Hybrid, aims to develop a cost-effective and profitable short-sea container ship that is powered by a plug-in hybrid LNG/battery propulsion system. It is a short-sea container ship concept with a zero-emission solution during port sailing and operations. After developing the technical concept, the project partners will calculate the vessel’s environmental footprint and carry out a cost/benefit analysis. The shipping company Nor Lines will take the lead on this project.

Next-generation green shuttle tanker

Teekay Tankers will lead the second pilot project, which will investigate technical solutions for utilising batteries and VOCs (volatile organic compounds) in a shuttle tanker. Battery technology has not yet been used on this vessel type and the project will explore how it could potentially help to optimise operations and reduce the need for installed power. The project partners will also look at the possible use of batteries as a “spinning reserve”. After assessing the economic and regulatory feasibility of battery-powered shuttle tankers, the project will review new technological solutions for utilising VOCs produced on board. VOCs are obtained by capturing and condensing the recoverable gases produced during offshore loading. Using the liquid VOCs for onboard power generation could reduce total fuel consumption and the environmental impact of the vessel. VOCs are generated during offshore loading and are an energy source that could potentially offer an environmental benefit in addition to reducing the total demand for fuel.

Conversion of cargo carrier into battery-hybrid LNG carrier

This project aims to develop a cost-efficient LNG distribution concept with a hybrid LNG/battery propulsion solution and zero-emission port operations. Converting an existing vessel may provide a cost-effective option for small LNG carriers. The project owners Øytank Bunkerservice and the Norwegian Gas Association will lead the way in developing the technical concept, calculating the environmental footprint and carrying out a cost/benefit analysis.

Pioneering green port project

The fifth pilot project has the objective of developing a low-energy-consumption port with a minimal carbon footprint. Some of the technologies being employed to achieve this include electric heavy-duty vehicles and cranes. The green port will also be equipped with smart gates, offer cold ironing services and charging stations for plug-in hybrid ships. Risavika Harbour in Stavanger will take the lead in the green port project, developing the technical concept, undertaking a cost/benefit analysis, calculating the environmental footprint and presenting a plan for further development of the concept.
European Union regulation on monitoring, reporting and verification of CO₂ emissions

EU REGULATION 2015/757  The European Commission (EC) is taking the next step towards reducing greenhouse gas (GHG) emissions in the European Union (EU) by having added shipping emissions to the climate and energy package that it adopted in 2009. The implications for shipowners and operators are described by Torsten Mundt, principal engineer of Environmental Research & Development at DNV GL - Maritime in Hamburg.


The regulation requires shipowners and operators to annually monitor, report and verify CO₂ emissions for vessels equal to or larger than 5,000gt calling at any EU port. Data collection takes place on a per-voyage basis and starts on January 1st 2018. The reported CO₂ emissions, together with additional data (e.g., cargo, energy efficiency parameters), are to be verified by independent verifiers and sent to a central database, presumably managed by the European Maritime Safety Agency (EMSA). The aggregated ship emission and efficiency data will be published by the EC by June 30th 2019 and then every consecutive year.

Although the regulation itself has entered into force, the “implementing regulations” are still outstanding. They will provide the detailed description of the relevant processes, steps and guidelines and are to be finalised by the end of 2016. Industry is providing input for this process under the European Sustainable Shipping Forum (ESSF) [2] umbrella with the classification society DNV GL actively participating. ESSF recommendations are due by mid-2016.

Ambitions to reduce GHG

Since approximately 2008 the maritime industry has been facing strong pressure from policymakers – both at EU and International Maritime Organization (IMO) level – to reduce its CO₂ footprint. The maritime industry is expected to contribute its share to the overall commitment to limit global warming to 2°C.

The EU agreed on an EU-wide target of at least a 40% domestic reduction in GHG by 2030 compared with 1990 levels. Initially the EU sought to include shipping in its regional EU Emission Trading Scheme (ETS). However, in June 2013 the EU set out a revised strategy for integrating maritime emissions into the EU’s policy for reducing its domestic GHG emissions. This new strategy recommends as a first step [3] only introducing a monitoring, reporting and verification (MRV) scheme for shipping. This will provide the EU with more reliable data on ships’ fuel consumption and energy efficiency. According to EU estimates, merely implementing an MRV scheme is expected to reduce CO₂ emissions by about 2% as it will increase ship operators’ focus on their fuel consumption. The EU argues that this will offset the MRV implementation costs for the shipping industry.

At IMO level, market-based measures have been discussed for many years, but the discussion has stalled due to the difference between the working principles of the IMO (no more favourable treatment of any country) and the United Nations Framework Convention on Climate Change (UNFCCC) principle of “common but differentiated responsibilities” invoked by less and least-developed countries.

However, the IMO introduced the Energy Efficiency Design Index (EEDI) as a

Figure 1: EU-MRV regulation timeline beginning in 2018
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technical measure for newbuild vessels and the first global mandatory GHG reduction measure for an entire industry sector. Guided by this idea, the IMO – being a technical body – has recently readdressed the energy efficiency of the operating fleet. As part of its further technical and operational measures to enhance the energy efficiency of international shipping, the IMO is now working on a data collection system to monitor and report ships’ CO₂ emissions electronically to a central database. One could say that this covers the work for a “global MRV system”.

During the 68th and most recent Marine Environment Protection Committee (MEPC) session, the parties agreed on certain main principles of such a system. An additional Intersessional Meeting (IEE-WG 1) was held from September 9th to 11th 2015. The aim of this meeting was to reach further agreements on advancing the scheme and to send a report to the 69th session of the MEPC in spring 2016, but the outcome was rather sobering.

**EU-MRV regulation**

The European Parliament and the Council of the European Union have adopted a regulation for the international maritime shipping sector. The EU-MRV regulation entered into force on July 1st 2015 and will become fully effective on January 1st 2018.

**MRV applicability**

The EU-MRV regulation applies to merchant ships of 5,000gt or above. Starting on January 1st 2018 shipowners and operators (defined as “companies”) will have to monitor the CO₂ emissions of their vessels per voyage, for all voyages conducted into, between and out of EU ports. Further, the monitored emissions shall be reported to the EC, which will make reported and verified emissions and related data on energy efficiency publicly available for the first monitoring period on June 30th 2019. The timeline for implementing the EU-MRV regulation from 2018 onwards is shown in Figure 1. After that, reporting will take place every year.

**Fuel monitoring**

The actual fuel consumption for each voyage shall be determined and calculated using one of the following methods:

- bunker fuel delivery note and periodic stocktakes of fuel tanks;
- bunker fuel tank monitoring on board;
- flow meters for applicable combustion processes;
- direct CO₂ emissions measurements.

Any combination of these methods, once assessed by the verifier, may be used if it enhances the overall accuracy of the measurement.

The monitoring (and reporting) needs a resolution by a system that captures each voyage. A voyage is defined as any movement of a ship that originates from, or terminates in, a port of call (EU port) and that serves the purpose of transporting passengers or cargo for commercial purposes.

Monitoring and reporting shall be complete and cover CO₂ emissions from all combustion of fuels while the ships are at sea and at berth. Appropriate measures shall be applied to avoid any data gaps within the reporting period (defined as one calendar year), and it shall be ensured that any sources of inaccuracies are reduced.

Further, “reporting data” include the transport work and “energy efficiency” of ships, which should allow the EC to analyse emission trends by assessing a ship’s performance. So some of this additional information needs to be recorded for each voyage and must be correctly assigned.

A first step for shipowners and operators to comply with the EU-MRV regulation is to prepare a monitoring plan for each of their ships that falls under the jurisdiction of the regulation. If ship operators intend to arrive at or depart from a port within the EU in 2018 with their ships (≥5,000gt), they are required to fulfil all upcoming obligations of the EU-MRV regulation.

Although the content of the monitoring plan is predefined by the EU-MRV regulation, final

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**Figure 2: Timeline for ESSF subgroup sessions on MRV**
Companies may also monitor information relating to the ship’s ice class and to navigation through ice, where applicable.

The regulation includes an addition to minimise the administrative burden and allows exemption from per-voyage monitoring in the following cases:
> all of the ship’s voyages during the reporting period either start from or end at a port under the jurisdiction of a member state and
> the ship, according to its schedule, performs more than 300 voyages during the reporting period.

But this exemption does not exclude companies from monitoring aggregated data on an annual basis. Under Article 10 (monitoring on an annual basis), the following parameters shall be monitored:
> amount and emission factor for each type of fuel consumed in total;
> total aggregated CO₂ emitted within the scope of this regulation;
> aggregated CO₂ emissions from all voyages between ports under a member state’s jurisdiction;
> aggregated CO₂ emissions from all voyages that departed from ports under a member state’s jurisdiction;
> aggregated CO₂ emissions from all voyages to ports under a member state’s jurisdiction;
> CO₂ emissions that occurred within ports under a member state’s jurisdiction at berth;
> total distance travelled;
> total time spent at sea;
> total transport work;
> average energy efficiency.

It is important to note that one of the key outstanding difficulties in the ongoing work pertains to the calculation of average energy efficiency. The calculation methodology has not been finalised, in particular when it comes to precise definitions of the parameters feeding into the calculation. This is further complicated by said parameters (e.g., cargo, time at sea, distance sailed) most likely ending up defined differently for different ship types. Furthermore, due to external factors imposing on actual voyage energy efficiency (weather, currents, charterer requirements), it will be challenging for the EC to ensure that the published per-ship energy efficiency data actually allow for fair comparison between ships and also across different ship types able to carry identical cargo.

**Reporting and publication of data**
The first reporting period is from January 1st 2018 until December 31st 2018. Subsequently, from 2019 onwards, companies will have to submit an emissions report concerning the CO₂ emissions, average efficiency and other relevant information for the entire reporting period for each ship under their responsibility to the EC and to the authorities of the flag states concerned by April 30th of each year. The data will also have to be submitted to a central database, presumably hosted by EMSA, and to the flag state authority of the ship concerned by April 30th 2019.

Regarding the technical efficiency of the ship, it should be noted that the EEDI or the Estimated Index Value (EIV) needs to be included in the report. The emission report will require verification by an accredited verifier. The verifier is required to compile a verification report and issue a document of compliance that shall be kept on board thereafter. The reporting shall be done by
automated systems, including pre-formatted electronic templates (to be developed).

By June 30th 2019, the EU will make publicly available the data of each vessel falling under the EU-MRV regulation [4]. The individual ship-related publication will contain aggregated (or average data per voyage on the annual basis of all voyages) information, such as the ship’s identity, the annual average fuel consumption, the average CO₂ emissions per distance travelled and the cargo carried. The monitoring method used, as well as the identity of the verifier and possible further voluntary data, are also to be included.

Additionally, in June 2019, the “EC shall publish an annual report on CO₂ emissions and other relevant information from maritime transport, including aggregated and explained results, with the aim of informing the public and allowing an assessment of the CO₂ emissions and the energy efficiency of maritime transport per size, type of ships, activity, or any other category deemed relevant” [5].

Regarding the confidentiality of the data to be published, the EC has included a special paragraph providing the opportunity for companies (shipowners/operators) to deviate from the disclosure of a category of aggregated data upon request if – exceptionally – the protection of commercial, sensitive data/interests is affected. Paragraph 3 under Article 21 reads as follows:

“Where, due to specific circumstances, disclosure of a category of aggregated data under paragraph [sic] 2, which does not relate to CO₂ emissions, would exceptionally undermine the protection of commercial interests deserving protection as a legitimate economic interest overriding the public interest in disclosure pursuant to Regulation (EC) No 1367/2006 of the European Parliament and of the Council (1), a different level of aggregation of that specific data shall be applied, at the request of the company, so as to protect such interests. Where application of a different level of aggregation is not possible, the Commission [sic] shall not make those data publicly available.”

Verification

Chapter III of the regulation contains the scope of verification activities and the general obligations and principles for verifiers.

However, although the articles just touch on general aspects, such as that verifiers shall assess the conformity of the monitoring plan and perform verification on the data itself, detailed content and process steps are missing. The generic setup of the verification and accreditation chapter of the regulation seems to be based on the EU ETs system for aviation. This creates a challenge in that the system may end up with a less-than-optimum fit for the specifics of the maritime industry.

The EC will introduce these detailed steps for verification and accreditation of verifiers through implementing acts. The details of the regulation are currently being worked out under the ESSF framework with industry stakeholder consultation. In June, the ESSF formally established at its plenary meeting two further subgroups dealing with the EU-MRV regulation. One subgroup is working on monitoring and reporting, and a second ESSF MRV subgroup is working on the implementing act for accreditation and verification.

Figure 2 demonstrates the very tight schedule of the ESSF MRV subgroups.

The EC will be publishing the required implementing acts by the end of 2016. Potential verifiers will therefore need to move quickly in 2017 if they are going to be able to receive monitoring plans from clients by the end of August as mandated by the regulation.

As of today, it is merely clear that verifiers will ensure that monitoring plans and emission reports are “correct and in compliance with the requirements” (to assess the reliability, credibility and accuracy of the monitoring systems and of the reported data). The verifiers should “check data credibility” by comparing reported data with “estimated data based on ship tracking data” and shall also identify “potential risks” in that regard. The upcoming ESSF working meetings will hopefully shed more light on how this comparison by ship tracking data is meant, presumably by comparing automatic identification system (AIS) tracking data with ship log entries, and on how – in the EC’s view – this should be taken into account for verification purposes.

Furthermore, it is clear that a “document of compliance” is issued by the verifier should be kept on board to demonstrate compliance with the MRV obligations and that the verifier shall inform the commission as well as the flag state about the issuance of the statement.

Regarding the enforcement of the regulation, the EU member states are required to set up a system for penalties and establish an effective exchange of information.

Finally, for ships that have failed to comply with the monitoring and reporting requirements for two or more consecutive reporting periods, and where other enforcement measures have failed to ensure compliance, the competent authority of the member state of the port of entry may issue an expulsion order that shall be notified to the EU, EMSA, the other member states and the flag state concerned. As a result of the issuance of such an expulsion order, every member state shall refuse entry of this ship into any of its ports until the company fulfills its monitoring and reporting duties.

Outlook

The upcoming monitoring and reporting scheme requires careful attention. Shipping companies should ask themselves whether the reporting demands of the EU-MRV regulation (e.g., for sea, time spent at harbour, differentiation between EU and non-EU ports, icy sailing conditions, etc) can be fulfilled by the system a ship operator has in place, or even whether such an electronic reporting system exists.

Additional challenges could be posed by the yet unknown process steps for verification. In other words, the essential question is how the per-voyage data will be handed to the verifier for efficient performance of the verifying tasks.

Verifiers may also note that the detailed accreditation processes and their application is unclear, and that the national accreditation bodies responsible for accrediting verifiers will need to be trained and updated and ensure there is a level playing field across all EU member states.

It will be difficult to accommodate all these requirements in a manner that is both simple and practical. Hopefully the call for a “minimised administrative burden” will not be lost during the upcoming development of the implementing acts.

DNV GL is actively participating in the MRV subgroup sessions. Through its involvement and extensive knowledge, the classification society is working to promote a practical MRV solution that is flag-neutral, technically sound, and accommodates the specific needs of the shipping industry.

References

[2] The ESSF was originally founded for the implementation of the EU Sulphur Directive (2012/33/EU).

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PASSENGER VESSELS | The Finnish maritime software company NAPA has launched a data-led package of monitoring, analytic and predictive solutions meant to increase the safety of passenger vessels and save lives in emergencies. Called NAPA Safety Solutions, it harnesses the power of the volume and variety of data being collected and processed aboard vessels, NAPA said.

NAPA Safety Solutions is a collection of functions and services for both the proactive safety management of everyday operations and an advanced system to support the vital decisions taken in the first few hours of an emergency.

Developed to integrate the wide range of technical safety systems on board modern passenger ships, NAPA Safety Solutions include functions for planning, logging, monitoring and analysing stability and safety data. The system provides masters with easy-to-use, meaningful tools that give them the information they need to ensure the safe day-to-day running of the ship, NAPA said. This includes functions for load planning, operational data logging and safety level monitoring. It also displays a simple “traffic light” vulnerability meter based on key indicators such as watertight door status, navigational status and stability condition.

The system’s true value, according to NAPA, lies in the first critical minutes and hours of an emergency, when it provides essential information and predictive analysis to help the master make confident and informed life-or-death decisions.

Kevin Douglas, vice president of Marine Newbuilding & Fleet Design at Royal Caribbean Cruises Ltd, commented: “At Royal Caribbean, our mantra is continuous improvement. NAPA Safety Solutions allows us to upgrade our onboard safety and security software so that we can provide our guests and crew with the highest level of safety.”

NAPA President Juha Heikinheimo said: “Safety in the shipping industry has improved significantly in recent years and yet the news media provide regular reminders that we could be doing better. NAPA was working on the European Union’s Floodstand project (integrated flooding control and standard for stability and crises management) to create algorithms and highly accurate flooding prediction models when the Costa Concordia incident occurred. Understanding the power of data and analysis to transform our understanding and ensure informed decision-making, we redoubled our efforts to create a comprehensive safety solution for passenger vessels.”

The first few hours after a vessel begins taking on water are the most critical, especially in cases when the ship itself is eventually lost. In some notable recent incidents involving total loss of passenger vessels, it has been found that lives could have been saved if the masters had had better awareness of the extent of the damage to their ship and better predictive tools in use for assessing the survivability of the persons on board, NAPA said.

NAPA Safety Solutions aim to deliver an effective response during these first critical hours. The system sounds the alarm and – using NAPA’s extensive in-house research and algorithms developed in the EU Floodstand project – begins calculating predictions the moment flooding is detected by the sensors. It accurately predicts if and when the vessel will overturn or sink and, for example, the point at which list will render the lifeboats inoperable, according to NAPA. It said the fast availability of this reliable information removed the need for guesswork and empowered masters to make confident decisions as soon as possible in an emergency, supporting the crew in saving lives at the earliest opportunity.
Southeast Asian petro-piracy insurance cover

**SEACURUS** | Specialist marine insurance intermediary Seacurus says it has developed a petro-piracy endorsement that can be added to existing kidnap and ransom (K&R) insurance cover in response to the evolving threats to ships, their cargoes and crews when transiting the South China Sea, Malacca Straits, Indonesian archipelago and Gulf of Guinea.

According to recent figures published by the International Maritime Bureau, Seacurus said, Southeast Asia accounted for three-quarters of global maritime piracy last year after a surge in tanker hijackings helped to fuel a 22% jump in armed robbery and pirate attacks on ships in the region. There were 183 actual and attempted incidents of piracy and robbery involving ships in Southeast Asian waters last year, compared with 150 in 2013. In the Gulf of Guinea, meanwhile, cargo theft is likely to remain on the agenda of Nigeria-based criminal gangs throughout 2015.

Denis Nifontov, head of Marine K&R at England-based Seacurus, said, “The modus operandi of Southeast Asian and Gulf of Guinea criminal gangs differs from the Somali piracy model. Ships’ crews are regularly exposed to life-threatening situations as criminals take control of and ransack vessels, stealing valuable petro-chemical cargoes for commercial gain.”

The new cover from Seacurus recognises the need to protect crews against potential kidnappings, and ship and cargo owners against the risk of business interruption and property theft. In addition to the benefits of a USD 1 million marine K&R policy, the cover includes as standard such additional benefits as loss of hire (USD 500,000), loss or theft of cargo (USD 500,000), loss of bunkers (USD 250,000), and loss or theft of money (USD 50,000) – all within an aggregate policy limit of USD 5 million.

Nifontov said, “Given that, by its very nature, criminal activity is unpredictable, Seacurus believes that, for a small additional voyage cost, cover can be arranged to give all parties to the maritime adventure peace of mind that their interests are insured. Shipowners, charterers and cargo interests (who can be added to the policy as co-insureds to cover their own interests in the voyage), can buy USD 5 million of cover for a seven-day voyage for a typical premium cost of USD 1,250, subject to an assessment of the usual underwriting information. In this way, all parties can protect their standard marine insurances and insurance records from the potential for costly claims, while negating the need for costly and time-consuming recovery actions and general average settlements.”

UR for large container ships further improve safety

**IACS** | The International Association of Classifications Societies (IACS) has adopted new unified requirements (URs) that will further improve the safety of large container ships by enhancing consistency among existing class society provisions. Amalgamated within a single new unified requirement (UR S11A) are three new safety measures that provide a robust, timely and complete response to the findings of the investigation by Japan’s Ministry of Land, Infrastructure, Transport and Tourism (MLIT) issued in March 2015 and subsequent papers to the IMO. UR S11A is further complemented by an additional unified requirement (UR S34), which deals with minimum loading conditions to be analysed.

IACS had welcomed the publication of the casualty investigation report into the MOL Comfort incident by Japan’s MLIT in March and thanked Japan and Bahamas for presenting the results to the IMO. IACS said it firmly believed that proper casualty investigation and subsequent information sharing was a key element to achieving continuous improvement in safety standards.

In anticipation of these developments, IACS established at the beginning of 2014 an expert group on structural safety of container ships, which carried out a post-MOL Comfort review of available information that also took into account a number of past casualties. This work has resulted in the development of UR S11A, which is a longitudinal strength standard for container ships that explicitly addresses the three issues requested of both individual classification societies and IACS by the authors of the MLIT investigation report. They are as follows:

- Biaxial stresses that would be induced by lateral loading, i.e., external pressure on the bottom shell: IACS members have for many years addressed these bi-axial stresses in their individual rules and procedures. The effect of the lateral loads that induce biaxial stresses of bottom shell plates should be considered in the requirements of the hull girders ultimate strength and this will now be recognised in the new IACS Longitudinal Strength Standard for Container Ships, known as UR S11A, which will enter into force on July 1st 2016.
- The whipping effect on container ships: Although this phenomenon continues to be the subject of research, the effects are becoming better understood and some individual IACS members have developed specific rule requirements in this regard. The development of an IACS UR for the whipping component of hull girder loading will take time, however; in the interim IACS has introduced a functional requirement into the new UR S11A, which requires IACS members to take into account whipping in accordance with their individual procedures. Entry into force is again July 1st 2016.
- A revised wave bending magnitude and longitudinal distribution has been included in the development of the new UR S11A. Additionally, UR S34 will set consistent requirements among IACS members by defining the unified minimum load cases used while performing strength assessment of container ships by finite element (FE) analysis. S34 is applicable to container ships only and will apply from July 1st 2016 and requires a global (full ship) analysis for ships with a length ≥ 290m, and a cargo hold analysis for ships with a length ≥ 150m.
Cyber attacks on the rise

GLOBAL SHIPPING | Piracy remains a significant concern to global shipping, but increasing cyber attacks pose a new, invisible and now greater threat.

During London International Shipping Week in September, ESC Global Security’s (ESCGC) head of cyber security, Joseph Carson, presented a paper urging the industry to address the risk of a maritime cyber attack, which, he says, could leave ships losing the ability to navigate or, in the worst case, be controlled by third parties for illicit purposes.

“New technologies, increasing automation and the inevitability of the autonomous ship will make shipping more efficient, but such developments come with serious cyber threats,” he warned. “Critical systems could be prevented from functioning, resulting in collision, pollution and environmental damage, and possibly the ship being redirected. Ship and cargo hijacking is a possibility. Certainly, the advancement in broadband technologies and the move towards ‘big data’ will leave the maritime industry vulnerable to cyber crime unless it develops a better awareness of ICT security and adopts security best practice.”

The piracy concerns have not diminished and continue to pose serious problems for the shipping and energy sectors. Yet the greater threat as we move towards the second part of the decade is cyber attacks from increasingly sophisticated and determined criminals and terrorists. With more ships connected to computer networks, it exposes owners and operators to a wider variety of potential hacking attacks. The maritime media is awash with stories of floating oil rigs either shut down because hackers tilted it or those nearly disabled by computer malware.

As one of the world’s leading independent security consultants, Tallinn-based ESCGC is acutely aware that security in the maritime world is not confined to physical assets. “Ship safety and security should remain the number one priority, but we must accept that nothing is impossible when it comes to maritime risks,” said the company’s president, Jaanus Rahumagi.

Earlier this year, Carson highlighted the potential for a serious technology attack in the maritime industry. “There is the potential for a major cyber attack in the maritime industry to significantly disrupt food and energy supplies given that shipping transports 90% of the world’s global trade. Certainly there is the possibility for AIS, GNSS, ENC chart display and information system (AIS), and the electronic chart display and information system (ECDIS) charts to disappear from bridge screens or be modified, but the issue today is that most adversaries want to obtain data for financial gain or criminal activities.”

Somali pirates have been selecting targets by viewing online navigation data, a concern that has prompted some vessels to either turn off their navigational devices or attempt to create a false data trail to deter pirates. The debate is no longer about whether there is cyber crime, but rather the extent of the industry’s exposure to it. In many people’s eyes – and particularly those in the insurance industry – this is an uninsured time bomb. Globally, current estimates suggest cyber attacks against oil and gas infrastructure will cost energy companies close to USD 1.9 billion by 2018. This prompted the British government to suggest that cyber attacks already cost UK oil and gas companies around GBP 400 million (USD 672 million) a year.

“The biggest risk is from human operators not understanding how to deal with or identify a possible security breach. Almost 70% of malware is manually shared through social media, so awareness and continuous training can have a tangible impact,” Carson said.

As far as the maritime industry is concerned, the number of attacks may seem to be low, but this may be due to a reluctance to admit them for fear of alarming investors, regulators or insurers. But the truth is that these attacks – both the physical and IT-related ones – can have significant and disastrous effects on the maritime industry. If researchers are correct in saying they have discovered significant holes in the three key technologies sailors use to navigate – GPS, the marine automatic identification system (AIS), and the electronic chart display and information system (ECDIS) – then the consequences may not only be financial.

Global threats to shipping “far from eradicated”

MAST | The need to regulate and police the maritime domain to tackle global threats is as pressing as ever, according to Phil Cable, CEO of UK-headquartered Maritime Asset Security and Training (MAST) Ltd.

Speaking at the Maritime Law Association of Australia and New Zealand (MLAANZ) Conference 2015 in Perth, Australia, in September, Cable said: “The global threats faced by the maritime environment, whether it be terrorist, pirate, illegal fishing, human trafficking or narcotics smuggling, stem from lack of law and order. The reason for this is that many states lack the organisation, finance or will to police and manage their territorial waters or economic zone, or they are, like Yemen, Libya or Somalia, failed or near-failed states, thus creating a permissive environment for criminality.”

He added: “While the Indian Ocean can now be considered one of the safest oceans on the planet, the threat of piracy has not been eliminated. It is international navies on patrol, Best Management Practices 4 (BMP4) and armed guards that are preventing a return to piracy by Somalis. This, combined with a recent spate of attacks in Southeast Asia, the Gulf of Guinea and increased people-trafficking out of Libya, and between Yemen and the Horn of Africa, suggests that global threats to shipping are far from eradicated.”

Phil Cable explained that there were two main types of threats to shipping in Southeast Asia: violent boardings/robberies and more sophisticated attacks whereby a vessel’s cargo is stolen. The threat in the Gulf of Guinea is domi ned by boardings with the purpose of kidnapping crew members for ransom.

He said: “One of the main challenges to address these threats is the lack of regional cooperation, creating a plethora of legal and jurisdictional requirements as well as the lack of acceptance that public-private partnerships are the key to develop a sustainable force capable of regulating and policing the maritime flank. Maritime crime is a problem that needs engagement from all players – government, law enforcement, the shipping industry and its associates, which include the security industry.”
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**ENIRAM |** Helsinki-based Eniram Ltd has announced the release of Eniram Speed™ 3.0, an upgrade of Eniram Speed™ 2.0, and Eniram Performance™ 3.0, an upgrade specific to the cruise vessel market. The new Speed version brings enhancements to the existing offering and is aimed at further reducing fuel consumption and emissions for shipowners and operators. Speed 3.0™ takes into account factors such as the prevailing sea state in computing and recommending best speed profile to consume the least amount of energy and thus save fuel. The system also considers the prevailing weather, weather forecasts, required engine loads, squat, speed restrictions and ECAs. It includes new features such as combined sea current and tides, map-assisted route setup, map-assisted USB route uploading and Furuno FMD ECDIS support. Real weather forecasts are now also supported for cruise vessels. The key benefits and new features of Speed 3.0™, Eniram said, are route optimisation based on high-resolution weather and combined sea current and tidal data. The accurate forecast minimises the need for adjustment and thus enhances usability and improves speed recommendations. With the map-assisted route setup, officers can now visually see the route that they have uploaded on a map. Officers can interact directly with the map to quickly insert the few parameters they need for setup, saving them time. “Thanks to these new enhancements, ship operators will be able to better plan, operate and maintain timely voyages at the lowest possible fuel consumption,” commented Jussi Pyörrö, vice president of technology at Eniram. “Using Speed 3.0 means there is less to configure and savings are achieved easier. On average, operators can expect savings between 2 to 6%.” The other upgrade released by the company, Eniram Performance™, was described as a robust decision-support tool that offers real-time operational guidance to optimise a vessel’s overall energy management in order to save fuel. The system predicts required energy and fuel consumption, taking into consideration a wide range of variables such as wind and currents for each specific voyage. Of particular importance is the key performance indicator (KPI) screen, which works like an electronic scorecard, showing traffic light values against commonly agreed targets. The KPI screen starts with a high-level KPI, namely total fuel consumption of the vessel, which is then broken down into specific energy consumers such as propulsion and service power. Service power, for instance, is further broken down into hotel, machinery and HVAC.

Eniram Speed™ 3.0 is an upgrade of Eniram Speed™ 2.0

Torque meter able to provide dynamic data

**SMARTPOWER |** BMT SMART Ltd (BMT), a subsidiary of the London-based design, engineering and risk management consultancy BMT Group, has announced the launch of its “highly accurate and cost-effective” SMARTPOWER Torque Meter as part of its fleet vessel performance management (FVPM) suite of products. BMT’s SMARTPOWER Torque Meter is a dedicated measurement tool specifically designed for the maritime sector to provide a highly accurate digital output for torque, speed, power, running hours and total energy. In addition, the company said, the system can provide thrust and dynamic data, which BMT SMART software can utilise to analyse the condition of the main engine, propeller and gearbox. The system has been developed in partnership with Datum Electronics Ltd, a UK torque and shaft power measurement specialist with over 25 years of experience working across different industries, including navies, in the development of torsion measurement equipment. Sebastian Sjöberg, sales and business development manager at BMT SMART, said: “Torque meters are a key part of vessel performance management. However, the majority of products that are currently available on the market can only provide average data. SMARTPOWER can provide dynamic data, which enables us to take condition monitoring to a completely new level.” “A torque meter is the key building block of performance management on board,” added Peter Mantel, managing director of BMT SMART. “We are committed to working closely with owners to manage the performance of their vessels right throughout their life cycle. With the support of our global network of service partners, we can provide customers with local expertise and knowledge allowing for quick and easy installation and ongoing support.”
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Super-light VSAT antenna systems unveiled

KA-BAND | Cobham Satcom unveiled a new generation of 60cm Ka-band VSAT antenna systems at the Monaco Yacht Show. The all-new Sailor 60 GX and Sailor 600 VSAT Ka are based on a super-light, high-performance Ka-band VSAT platform designed to deliver best-in-class performance on new Inmarsat Global Xpress® and Telenor THOR 7 high-throughput satellite (HTS) services, Cobham Satcom said. Sharing the same advanced design and lightweight carbon-fibre composites/aluminium construction, the Sailor 60 GX and Sailor 600 VSAT Ka weigh 37kg. While being the lightest antennas in the 60cm VSAT class, both retain the performance and reliability of larger Sailor VSAT and GX antennas. For yachts, fishing vessels, short-sea shipping and ships with space restrictions, Sailor 600 VSAT Ka and THOR 7, and the combination of Sailor 60 GX, Sailor FleetBroadband and Inmarsat Fleet Xpress are said to meet the demand from owners, guests and crew for maritime Internet closer to that experienced on land. Joining the Cobham Satcom VSAT antenna portfolio, which includes 100cm-class antenna systems for new Inmarsat and Telenor Ka band HTS services, the smaller, lighter Sailor 60 GX and Sailor 600 VSAT Ka are easily lifted or carried onto a yacht and installed without taking up too much space. This can reduce installation costs significantly, and the use of modern, lightweight materials does not affect performance. The Sailor 60 GX and Sailor 600 VSAT Ka also offer other significant installation benefits, especially for smaller craft, which can now operate smarter through harnessing the power of HTS VSAT services. The optimal size/performance balance of Cobham Satcom’s new antennas is possible because HTS services use spot beams instead of wide beams, so with advanced engineering and software design, they can operate anywhere in the satellite footprint and provide a strong link to the satellite, Cobham Satcom said. Installation of both new antenna systems is easy, thanks to a wealth of features and details unique to the Sailor VSAT technology platform, including a single cable between antenna and below-deck equipment for RF, power and data, and automatic azimuth calibration and automatic cable calibration for “one-touch commissioning.” Additionally, the use of dynamic motor brakes inside the antennas removes the requirement for mechanical brake straps, ensuring antenna balance in no-power situations at sea or during transport.

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