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 Editor in Chief
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Ship intelligence and the human factor

There is no longer any doubt that digitalisation will shape and transform the shipping sector dramatically over the next few years. Real-time tracking of cargo on the high seas and cloud-based data on ship operation and component performance are already having an impact today.

Characterised by rapid change, digitalisation is driven by technology, requiring new mind sets, skill sets, regulatory and classification relationships in order to maximise safety and efficiency while minimising the environmental footprint. The terms “autonomous shipping” and “unmanned vessels” increasingly dominate the headlines and discussions on the conference circuit.

And indeed, impressive improvements can be observed nowadays. For instance, the container vessel *Yara Birkeland*, which will be delivered at the end of 2018, is expected to be fully autonomous by 2020, plying a 37-nm route in southern Norway. Experts agree that autonomy will develop gradually but within the next three years, it is likely that some ferries operating in local waters such as Norwegian fjords, for example, will incorporate varying degrees of autonomy even though human beings are still likely to be found on board, at least in most cases. However, by 2025, Rolls-Royce specialists expect that some ships will be controlled remotely in coastal waters. And from 2030, experts believe that other types of remotely controlled vessels could well be in operation.

The role of human beings in this process is still a controversial issue. As well as the fear that the human workforce will be largely replaced by intelligent robots, the idea that ships may be crossing the world's oceans without crew is even more polarising.

Yet the number of those who believe that ships will be controlled from land in the foreseeable future is rising. No matter what arguments are backed by advocates or adversaries of the unmanned ship, the technical requirements are in place and the development of the corresponding systems has already begun. Every company is well advised to face the challenges that arise from it and to grasp this as an opportunity.

Against this background, the upcoming Europort 2017, to be held in Rotterdam from November 7th to 10th, will also reflect these topics. According to the organisers, shipping's data revolution, its environmental responsibilities and its continuing reliance on 'the human factor' will be the centre of attention.

Of course, this important, well established maritime technology exhibition is a focus of this edition of Ship&Offshore. Please find a comprehensive overview of the event as well as some selected exhibitor previews starting on page 28.

We address the subjects of digitalisation and autonomous navigation in several more articles, notably in the Ship Operation and Offshore & Marine Technology sections. A related topic can also be found in the Shipbuilding & Equipment part of this magazine. The article on page 12 deals with the possible applications of 2D, 3D and virtual reality in ship design.



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10



39

Shipbuilding & Equipment

- Spotlight USA**
- 10 Grants aim at strengthening competitiveness
 - 11 Tier 4-compliant engines for San Francisco Bay ferries
- Digitalisation**
- 12 2D, 3D and virtual reality: creating the natural way to work
- Automation, Measurement & Control Technology**
- 18 Engine data collection and monitoring platform unveiled
 - 19 Bureau Veritas joins RECOMMS for drone development
- Corrosion Protection: Ships' Paint & Surface Technology**
- 20 Mobdock shapes up for tricky hulls

Shipbuilding & Equipment

- Green Ship Technology**
- 22 New controllable pitch propeller receives environmental award
 - 23 New grease separation systems offer more for less
 - 24 Electrically assisted charging to raise engine performance
 - 25 Engine-retrofit commitment aims to move world fleet towards clean technology
 - 25 End-to-end lubrication solutions for marine industry
- Industry News**
- 26 New fast rescue boat offers good all-round performance
 - 26 New generation of torque metres
 - 27 Cyber enabled components – assurance now available
 - 27 ClassNK sets out R&D priorities

Offshore & Marine Technology

- Industry News**
- 38 First USV-supported cable route survey
 - 39 North Sea semi-submersible undergoes drone survey
 - 40 *North Sea One* wind farm logistics successfully completed
 - 40 Hybrid energy storage replaces generator



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In Focus: EUROPORT 2017

- 28 Maximising vessel performance
- 30 Exhibitor Previews

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Stand P115

Ship&Offshore Schiff&Hafen



50

Ship Operation

- Navigation & Communication
- 50 Finnish initiative transforms Arctic communications
- 52 "Unified threat management" service tackles maritime cyber risks
- 52 Marlink upgrades Sealink C-band service
- 52 Reporting platform to be launched

Industry News

- 54 Consortium to accelerate electric ferry development

Regulars

- 3 Comment
- 6 News & Facts
- 41 Buyer's Guide
- 55 Imprint

30
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The new portfolio of Wärtsilä HYTug designs focuses on environmental sustainability

New range of hybrid tug designs

Wärtsilä | A new series of tug designs has been launched by Wärtsilä, aimed specifically at providing more eco-friendly operation in coastal waters and harbours. Launched recently at the Asian Tug Technology and Salvage conference in Singapore, the Wärtsilä HYTug designs offer a range of propulsion options based on hybrid arrangements. They include diesel mechanical hybrids and diesel electric hybrids over a bollard pull range from 40 to 90 tonnes.

The use of batteries to supplement power requirements means that main engines can be smaller, cutting fuel consumption and emis-

sions, and requiring less maintenance. The designs have also been optimised for low hull resistance, high towing and escort performance, good seakeeping and crew comfort.

Riku-Pekka Hägg, VP Ship Design, commented: "We believe that new tugs will in future rely more and more on battery and hybrid propulsion which very well complements today's operational requirements."

The development work has been carried out in close cooperation with the classification societies ABS, BV and Lloyd's Register and the designs have received Approval-in-Principle (AiP) certification.

Rule for FSRU classification needs

Bureau Veritas | The classification society Bureau Veritas (BV) has issued a new rule (NR645) in recognition of the different operating profiles in which floating storage and regasification units (FSRUs) are now deployed. These vary from floating facilities that may well remain in the same place for many years, to FSRUs deployed for much shorter periods which may also trade as LNG carriers. The classification society notes that demand for LNG as a clean and cost-competitive energy source is underpinning a requirement for more FSRUs deployed across an increasingly diverse range of projects.

The rule has been published following consultation with the classification society's FSRU clients and tackles the different functions of FSRUs whilst maintaining a unified approach to safety and design.



Coralius' first ship-to-ship bunkering of the 144m-long oil and chemical tanker *Fure West* in the North Sea

Coralius completes maiden voyage

LNG bunker vessel | The 5,800m³ *Coralius*, delivered by Royal Bodewes in the Netherlands and the first LNG bunker vessel to be built in Europe, recently completed its maiden voyage and has now entered a long-term charter with Norway's Skangas. The vessel shipped LNG from the Skangas production facility in

Risavika, Stavanger, to the company's terminal in Øra, Fredrikstad where the energy firm has a number of industrial customers. Whilst on its way from the Netherlands, the *Coralius* called in at the Donsø Shipping Meet in Sweden where more than 1,000 visitors looked over the new ship.

TSHD begins operations

Tommy Norton | The Damen trailing suction hopper dredger (TSHD) 650 *Tommy Norton*, built at Damen Shipyards Yichang, has been delivered to its Australian owner, Gippsland Ports. The TSHD has now started work to deliver safe and reliable ocean access for commercial ships, oil and gas suppliers and commercial fishing vessels that

cross the entrance bar to the Gippsland Lakes area. The maintenance dredging also helps reduce the risk of flooding to local communities. Capable of dredging to depths of 15m, the vessel has been built with bottom doors to enable self-emptying and can alternate between a bow connection and rainbow expulsion for beach reclamation work.



The *Tommy Norton* is 60m long

New vessel for Viking River Cruises

Order | Swiss shipping company Viking River Cruises said it has placed an order with German yard Neptun for seven new river cruise ships for delivery in 2019. The order involves six additional Viking Longships, which will sail on the company's most popular cruises on the Rhine, Main and Danube rivers, and one additional vessel based on the Longships but specifically designed for Portugal's Douro river. Accommodating 190 passengers in 95 cabins, the Viking Longships will be about 135m long, 11.45m wide and have a draught of 1.6m. The diesel-electric vessels will have a patented layout that allows for two very large Explorer



The Viking Longship class is built by Neptun Werft

Suites and seven two-room Veranda Suites. There are 31 cabins for crew members. Passenger cabins include comfortable amenities such as hotel-style beds, heated bathroom floors and mini fridges. Addi-

tionally, all Viking Longships have sustainability upgrades, such as onboard solar panels and organic herb gardens, and energy-efficient hybrid engines that also reduce vibrations for a quiet ride.

Heavy-lift company adds vessels

Module carriers | Spliethoff Group subsidiary BigLift Shipping, established in 1973, is undergoing further fleet diversification with the addition of two heavy-lift module carriers previously operated in a joint venture between BigLift and Rolldock Shipping. From January 2018, the MC-class *BigLift Barentz* and the *BigLift Baffin* will join the company's 14-strong fleet of heavy lift vessels. Next year will also see the commissioning of a third Happy S-class vessel. It will join the *Happy Sky* and the *Happy Star*, each with a pair of 900-tonne cranes which can be combined to give a lifting capacity of 1,800 tonnes.

The two identical module carriers, under Lloyd's Register class with Finnish Swedish 1A ice notation, have large, strong, flush decks of 125m by 42m, enabling the lifting and shipping of a wide range of RoRo consignments and large modular shipments.



From left: Colin Au (Genting Hong Kong), Gustaf Grönberg (Genting Cruise Lines), Tan Sri Lim Kok Thay (Genting Hong Kong), Lauren Barfield (SSC Palmberg Schwerin), Economics Minister Harry Glawe and Tom Wolber (Crystal Cruises)

Crystal Mahler christened and delivered

Crystal Cruises | *Crystal Mahler*, the second in a series of four Rhine-class luxury river cruise vessels, has been delivered to Crystal River Cruises at MV Werften's Wismar shipbuilding facility. Just a few weeks after *Crystal Bach*, the first ship in the series, was handed over, the *Crystal Mahler* is entering service to provide up to 110 passengers, accommodated in 55 all-balcony suites, with unrivalled luxury as they cruise Europe's rivers including the Rhine,

Main, and Danube. The four 135m-long vessels have been purpose-designed for river cruising, incorporating all of the latest navigational safety features and azimuth propulsion for maximum manoeuvrability. The *Crystal Mahler's* 68-strong crew complement will ensure the award-winning Crystal Cruises service as found on other ships in the fleet.

MV Werften has another seven ships on order, extending its order book until 2021.

> IN BRIEF

MBO | Aktis Hydraulics BV, a Dutch subsidiary of BMT Ship & Coastal Dynamics Ltd, has completed a successful management buy-out (MBO) and will now operate independently. However, the two companies will continue to work closely together, with BMT providing a range of specialised services.

Communication service | French luxury cruise specialist Ponant has extended its Sealink multi-band communication services contract with Marlink, securing increased Internet speeds for guests and vessel operations on its five-strong fleet of high-end luxury yacht/cruise ships in addition to four planned newbuilds.

Change in management | Dr Hubert Lienhard, president and CEO of Voith Management GmbH, is to stand down at the end of March 2018, having completed his second term in office. He will be succeeded by Stephan Schaller, currently head of the global motorcycle division of BMW Group and a member of the Voith Shareholders' Committee. The change will take place on April 1st, 2018, when Lienhard will take Schaller's current seat on the Shareholders' Committee.

New office | Following more than three years of operation with a virtual head office, Cargotec subsidiary MacGregor now has new headquarters in Singapore. Reflecting a strategy of strengthening its presence in key Asian markets, both the company's president, Michel van Roozendaal, and its VP Finance, Jani Oksanen, are now based there.

System supplies | Norway's Brunvoll has secured new contracts for system supplies. The contracts that cover propulsion, manoeuvring, and control systems are with MAN D&T SE, Germany, and Karstensens Skibsværft AS, Denmark, for a pelagic trawler for the shipowner Charisma Fishing Co. Ltd, Shetland, and with Aas Mek. Verksted AS, Norway for a live fish carrier for the shipowner Sølvsø AS, Norway. The deliveries from Brunvoll will take place during 2018.

Saga declares option for second ship



Illustration of the new cruise vessel

Meyer Werft | Saga Cruises has declared an option for a second cruise vessel at Meyer Werft. The 58,250gt *Spirit of Adventure*, with a length of

236m, is due for delivery in summer 2020 and will be a sister to the *Spirit of Discovery*, to be commissioned in July 2019. The external design of the

ships will be similar, and both will have capacity for less than 1,000 passengers in all-balcony cabins.

Commenting on the new order, Robin Shaw, Saga Cruises chief executive, said: "Our loyal customers have played a key role in the design process for our first new build ship, *Spirit of Discovery*. To date, almost 7,000 passengers who had pre-registered to sail on her have already gone on to book one of our new itineraries. This is a phenomenal conversion of over 80%. I am absolutely delighted that we are today confirming that we have now agreed to build a second new ship, *Spirit of Adventure*, for delivery in summer 2020."

Accelerating intelligent vessels

DAC | The technology group Wärtsilä has opened the first of four Digital Acceleration Centres (DAC) to speed up innovation and joint creation with customers on a range of new business models and solutions, including the industry's most advanced intelligent vessel. The first DAC was opened in Helsinki, Finland; the second one will open in December in Singapore and two further DACs, one in Central Europe and one in North America, are anticipated during 2018. In addition, "pop-up" DACs will be tested with customers around the globe.

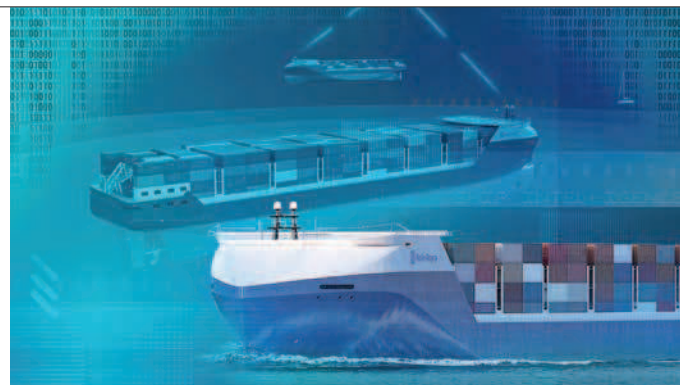
Opening DACs is an integral part of Wärtsilä's digital transformation strategy.

German flag on six ships

Harren & Partner | SAL Heavy Lift GmbH, part of the Harren & Partner Group, has begun the process of reflagging six of its vessels to the German flag. The first vessel to raise the German flag was the *Svenja* on September 22nd and the five other vessels having their flags changed are the *Trina*, *Anne-Sofie*, *Regina*, *Maria* and *Wiebke*.

"It was a logical consequence," declared Toshio Yamazaki, SAL

Heavy Lift CEO. "A German family owned business with German built vessels operated by many German officers and now provided by all the advantages of a German flag." Sebastian Westphal, the company's corporate director Ship Management added: "In view of the many benefits of the German flag, we decided to initiate the reflagging process. I know our crew on board is proud to hoist the German flag."



Rolls-Royce aims to develop the next stage of ship autonomy

The next stage of ship autonomy

Agreement | Rolls-Royce is to work with Google's Cloud Machine Learning Engine as it develops the intelligent awareness systems required in ship autonomy. Signed recently at the Google Cloud Summit in Sweden, the agreement allows Rolls-Royce to use Google's engine to develop the company's artificial intelligence-based classification system for detecting, identifying and tracking the objects that a vessel can encounter at sea.

Karno Tenovuo, senior vice president of Ship Intelligence at

Rolls-Royce, explained: "While intelligent awareness systems will help to facilitate an autonomous future, they can benefit maritime business right now, making vessels and their crews safer and more efficient." Machine learning is a set of algorithms and tools that mimic human learning by analysing data sets to solve specific problems by identifying patterns. The bigger the data sets, the more complex the patterns recognised by the model and thus the more accurate the predictions.



The *Svenja* is the first vessel that was reflagged

First in a new series of anchor handlers delivered in Brazil

Bossa Nova | The naming ceremony of the *Bossa Nova*, a Havyard 843 anchor handling tug supply (AHTS) ship design specially adapted for operation in the deep waters offshore Brazil, marks the first delivery in a six-ship series to Grupo CBO, a Brazilian shipyard owner and offshore vessel operator, which holds contracts for the vessels with state oil company Petrobras. The *Bossa Nova* was named at the Oceana Shipyard in Itajai and then embarked on a voyage to Rio Janeiro for final tests. Its godmother was Joyce Moreno, a Brazilian singer and songwriter.

The deep waters off Brazil require offshore vessels to have more equipment, such as buoys and anchors, than is usual in the North Sea. Therefore vessels working in Brazil require a wider beam, and the new Havyard 843 AHTS class has been specially adapted for Brazilian conditions. Features include more space on deck for equipment, and a big side-by-side winch enabling safe and efficient towing and other anchor-handling services for mobile installations. The contract was entered into by Havyard Design & Solutions which was responsible



The AHTS vessel *Bossa Nova* was recently named

for the ships' design and the logistics associated with the equipment packages. Equipment and services were provided from other companies and

divisions within the Havyard Group including Control Systems AS, Norwegian IAS, Concept Bridge and Norwegian Control Systems.

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Miami Seaport

Grants aim at strengthening competitiveness

SHIPYARDS Despite the fact that controversy over the Jones Act continues, both US and European companies show some interest in projects on both sides of the Atlantic, so we still like to keep an eye on the US maritime industries with a number of interesting developments reported over the past few weeks. For example, a recent award programme aims to help small shipyards in the United States to strengthen their competitiveness.

In September, the US Department of Transportation's Maritime Administration (MARAD) awarded USD 9.8 million to 18 small shipyards through its Small Shipyard Grant Programme. These investments support industrial modernisation that will increase productivity and allow the country's small shipyards to compete

more effectively in the global marketplace. "Small shipyards play a significant role in our country's maritime sector, which contributes to our economy, security, and infrastructure," said US Transportation Secretary Elaine L. Chao. "In addition, these grants will support local communities by creating jobs for working families."

Small shipyard facilities vary in size, from family-owned businesses employing a few dozen workers, to multifaceted establishments with hundreds of employees. The grants, which were primarily available to US shipyards with less than 600 production employees, are generally less than USD 1 million each, but can make a huge difference to a shipyard's bottom line.

Since 2008, MARAD's Small Shipyard Grant Programme has awarded USD 174 million to 169 small shipyards, helping them to modernise operations, improve efficiency and boost productivity with employee training and new technologies. Including direct, indirect, and induced impacts, total economic activity associated with

American shipyards is nearly 400,000 jobs, USD 25.1 billion of labour income, and USD 37.3 billion in GDP.

US office opened

Meanwhile, e-navigation specialist Navtor has set its sights on the US shipping market with a new office opening in Seattle. The Norwegian business, which has built a global network of facilities since forming in 2011, has, until now, serviced the territory from its Egersund headquarters. However, growing demand in America for the firm's innovative product portfolio has prompted the team to establish Navtor USA Inc.

Navtor launched its acclaimed ENC service to market in 2012 and, since then, has built a global client base on the back of its mission to make life simpler for navigators, and safer, more efficient and profitable for shipowners and operators. This latest move comes just six months after Navtor opened the doors to its first UK office.

"There is a growing global understanding of the benefits of our products, and e-navigation in general," said Navtor CEO Tor Svanes. "US shipowners and operators have been very receptive to the way we can enhance operations, slash onboard administration duties and deliver real benefits in efficiency, giving them a competitive advantage in an ever-tighter marketplace."

"We've already established a leading position in Europe and a strong market share in Asia. We see that same pattern developing in the US, where we've been making significant inroads in the cruise segment by demonstrating the true potential of seamless, safe and accountable e-navigation. It's now time for the next phase – capitalising on that while building a truly global presence for Navtor."

The new office opened this month in Seattle's thriving central business district. City native Todd Allen, who has worked as US area sales manager for Navtor from Nor-

way since 2016, will drive the growth. Aside from establishing operations, he will push proprietary products including NavStation, the world's first digital chart table, and NavBox, which automatically downloads, distributes and updates all vessel navigational charts and publications.

"Working from our head office I witnessed increasing demand for Navtor's solutions here in the US," Allen commented. "It is an advanced market and open to innovations – especially those that deliver tangible benefits in terms of safety, compliance, efficiency and overall business performance."

"We are primed to take advantage of the massive potential we see here, and look forward to helping our clients plot the optimal course forward for their future operations."

Ballast water treatment in the Antarctic

On an even more international level, US-based company Trojan has announced

that Damen Shipyards of the Netherlands has selected its Marinex ballast water treatment (BWT) system for the Government of Australia's next-generation Antarctic Supply and Research Vessel (ASRV).

The system being installed is a skid-mounted Trojan Marinex BWT 250, capable of treating 250m³/h and water of all qualities.

Because of the sensitive nature of the environment in which it will be operating, the ASRV needed a ballast water treatment system with specific operational capabilities.

Low power draw and efficient operation in extremely cold waters were among the deciding factors in the system selection process, Trojan said.

In 2016, US shipyards delivered a total of 227 vessels, the majority of which were tugs and towboats (110). As of June 2017, 80 deliveries were reported.

Tier 4-compliant engines for San Francisco Bay ferries

MTU | Rolls-Royce has won a contract from the San Francisco Bay Area Water Emergency Transportation Authority (WETA) to supply six EPA Tier-4 compliant engines built by its German subsidiary MTU for installation on three new catamaran ferries to be built by the Dakota Creek Industries Shipyard. Each MTU engine will deliver 2,650 kW at 1,800 rpm, giving the 44m-long ferries a top speed of 34 knots. The first of the three vessels is expected to be delivered before the end of 2018. In addition to the six 16V 4000 engines, the German company will also provide six

MTU-built selective catalytic reduction (SCR) systems and six ZF gearboxes. The vessels will also be equipped with MTU BlueVision automation systems.

The contract is part of a major strategic expansion of the WETA fleet which is projected to grow from 14 high-speed catamarans operating in the Bay Area today, linking nine terminals, to a fleet of 44 vessels running between 16 terminals by 2035. This dramatic expansion is aimed at relieving traffic congestion on Bay Area bridges whilst also adding capacity to meet rapidly rising ferry transport demand.



WETA's ferry *Mare Island* in San Francisco harbour

2D, 3D and virtual reality: creating the natural way to work

SHIP DESIGN Working in an interactive 3D environment is more intuitive than interpreting 2D drawings but the workflow to support 3D and virtual reality (VR) must be cost-effective and natural to be adopted easily. Using case studies from shipyards around the world as well as ongoing research, the following text by Mark Waldie and Denis Morais from SSI in Canada, a developer of autodesk-based solutions for the shipbuilding and offshore industries, and Nick Danese from NDAR in France, is based on a presentation held at the Go-3D conference in Rostock earlier this year. The article explains the importance of creating associative linkages supporting both legacy 2D workflows and technologies such as product lifecycle management and virtual reality.

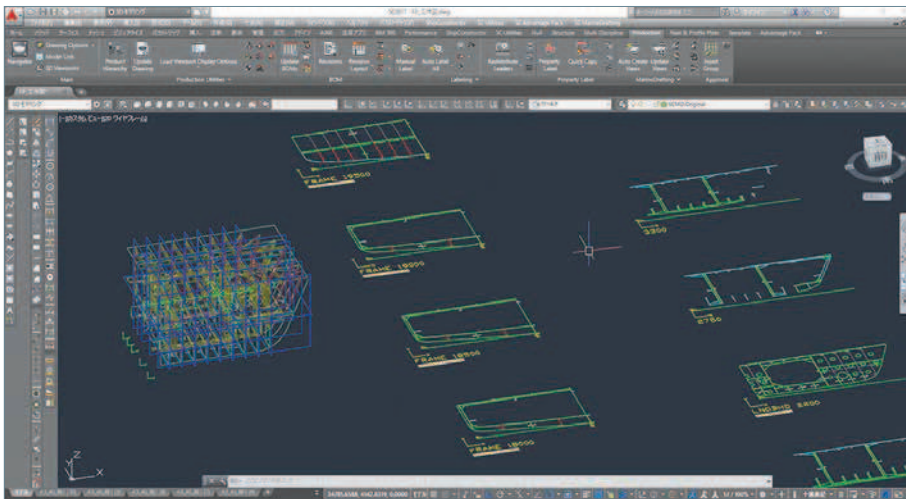


Figure 1: From 3D modelling data to 2D drawings at Inamasu Shipyard, Japan

Traditionally, 2D drawings provided the principal means of communicating in shipbuilding. And still today, they are the main method of communicating with workshops, classification societies and many other components of shipbuilding organisations. There is a wealth of information that can be transmitted in these drawings if people have the expertise to understand all the sophisticated marine-specific symbology. However, an interactive 3D visualisation could communicate the same information more efficiently and effectively to people with less specialised knowledge.

As the shipbuilding workforce ages and retires, the need to train new employees cost effectively is becoming particularly acute. But even within an organisation that believes 2D is sufficient, there are many scenarios where current processes could be improved. 3D representations open up new ways of doing things that many players had never considered before. Using ex-

amples from SSI's clients who utilise SSI's autodesk-based ShipConstructor CAD/CAM software and SSI's EnterprisePlatform for leveraging engineering information, the article shows how the use of 3D has transformed various ship design and shipbuilding companies and how more improvements can be derived from 3D.

T.R.I.C.K.S. to naturally adopting 3D

To implement 3D successfully, there are several things to consider. To help remember them, the acronym: T.R.I.C.K.S. can be used:

- › **T** Two dimensional drawings still required
- › **R** Different representations of data are needed
- › **I** Information must go with the picture
- › **C** Connection to underlying product model needed
- › **K** Keeping up to date is necessary
- › **S** Simplicity (and scalability) is a virtue

T – Two dimensional drawings still required

After promoting the use of 3D, it may seem strange to remind everyone of why 2D is still needed. Classification societies and workshops require drawings in 2D and they have difficulty reading a wide variety of different computer formats for 3D models. Also, a 2D drawing with appropriate symbols is a historical and practical standard, clear to everyone in the industry. In sophisticated shipbuilding markets such as Japan for example, there is great reluctance to discard that benefit.

Therefore, the solution is to have both 2D and 3D but not to waste time by constantly recreating work. Instead, it is recommended to model in 3D and then let the CAD software generate the 2D AutoCAD DWG drawings in the desired standard format using the Marine-Drafting tool-set. Sophisticated software should make this possible with just a few clicks. What's more, the single 3D model is the source of all the 2D drawings and all of the other information relating to the entire enterprise.

Inamasu Shipyard in Japan has put this into action. The marine drafting method ensures that the 2D drawings accurately reflect the 3D model that will continue on for detail design and engineering. It also allows the model (complete with outfitting) to be visualised early in the process and entirely in 3D. This is helpful because in 3D it is easier to identify and correct costly errors in design before they get to the shop floor. Knowledge and expertise from experienced designers is also captured in the form of rules and templates, which are used to generate 2D drawings from the 3D model automatically. ›

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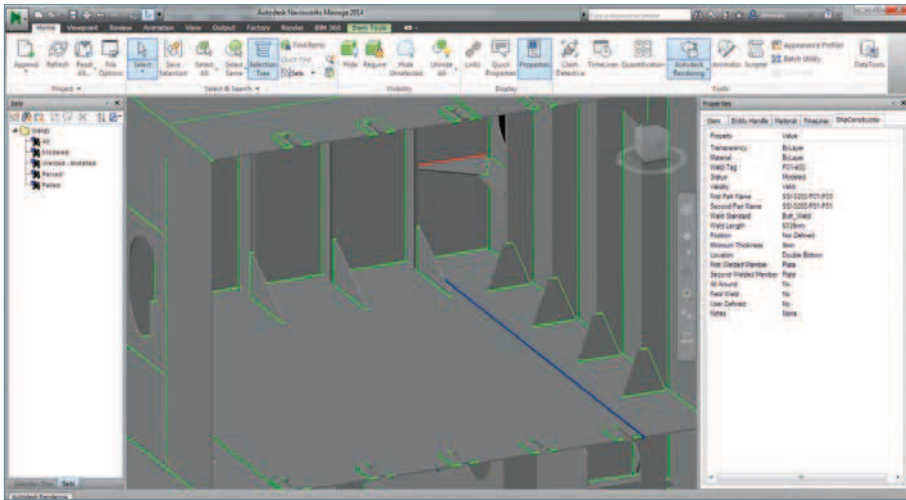


Figure 2: Weld Status report using 3D graphics instead of text columns. Weld Status is shown using colours at Estaleiro Atlântico Sul

R – Different representations of data are needed

Everyone looking at design and engineering information needs it in a different context. A planner, a purchaser and a production worker all require different representations of the same data. They use different computer programs and production machines, so things need to be in the right format for them to use the information.

At the heart of everything should be a complete virtual model of the ship, which contains information from all relevant disciplines, including hull/structure design and engineering, outfitting, assembly sequencing, and production.

Figure 2 is an example of a 3D representation of data being used at Estaleiro

Atlântico Sul (EAS), the largest shipyard in the southern hemisphere. EAS works on offshore oil platforms and tankers, so it is necessary to adopt rigorous procedures for checking the status of welds (modelled, welded, verification pass, verification failed etc.). Sometimes a report is generated from the underlying product model that shows columns of text. Other times, a 3D visual style is used, which shows different weld statuses by colour, i.e., a different representation of the same data.

I – Information must go with the picture

To be most useful, the underlying attribute information from a 3D product model

must be associated and readily available from the visuals. The product model is not the 3D model per se. It is also the “model” stored within a single database including the complete 3D model, attribute information for each part and assembly, the assembly sequence for the project, the industry-specific rules, standards used in the product model’s composition and the associative relationships between all standards, geometry, parts and assemblies within the model, etc. If analogous terminology from the construction industry where they talk about a BIM (Building Information Model) is used, what we are talking about here is a MIM or Marine Information Model.

When interacting with a view of the MIM, one accesses the associated information, not just looks at a picture. To work with enterprise resource planning (ERP), material requirements planning (MRP), product lifecycle management (PLM) and other powerful programs for increasing the efficiency of business, all this information is required. And even more data and systems are linked to build a “digital twin” of a physical ship, providing even more benefit in design, testing, simulation and analysis throughout a vessel’s lifecycle. But in order to perform these analyses, all the data needs to be available.

C – Connection to underlying product model

All the data is connected to the underlying model; it is associatively linked. By contrast, if information has to be created just to transfer data from one program to another, there is inefficiency and an increased risk of error. As the underlying product model changes, associated drawings and information in other systems are updated automatically.

Figure 4 is an example of a company (Bollinger Shipyards in the USA) that has increased efficiency by connecting its Wolf Robotics Automated Welding Machines to the underlying engineering data in the MIM.

At first glance, people outside of the shipbuilding industry do not realise the significance of this because robotic welding has been carried out for years in other industries. However, in other industries, robotic welding is used on an assembly line in situations that repeat the same automatic welding path for many parts. Within the shipbuilding industry virtually every single panel welded is unique. That



Figure 3: A marine information model (MIM) stores vast amount of data in a single database including the 3D model of the vessel

means that the robot cannot just be programmed once and repeat a process; very complex scenarios of producing different welds need to be supported, using different paths, generating totally different physical structures. To do this efficiently, varying instructions flow seamlessly from the underlying MIM to the robots, which is what happens at Bollinger Shipyard.

K – Keeping up to date is necessary

The connection to an underlying product model is particularly important because in shipbuilding – more so than perhaps in any other manufacturing scenario – change is constant. Unfortunately, most software systems are overwhelmed by this. In shipbuilding, production work continuously overlaps with detailed design and production engineering and there are continuous engineering change orders. Keeping up to date with these changes and making sure that there is a good system for approving and disseminating the correct information is essential throughout the entire process. For example, the computer numeri-



Figure 4: Computer-aided robotic welding (CAR-W) demonstrates the value of connection to underlying product model at Bollinger Shipyards

cal control (CNC) information has to be synchronised with nest information for CNC cutting. A “synchronised shipyard” is needed.

This is why a shipbuilding PLM system is helpful. It should be flexible

enough to handle change rapidly and effectively, and be tightly integrated with a CAD/CAM system.

An example of an organisation that has implemented this kind of solution is Ingalls Shipyard, a major builder of US Navy



Images for illustrative purpose only.



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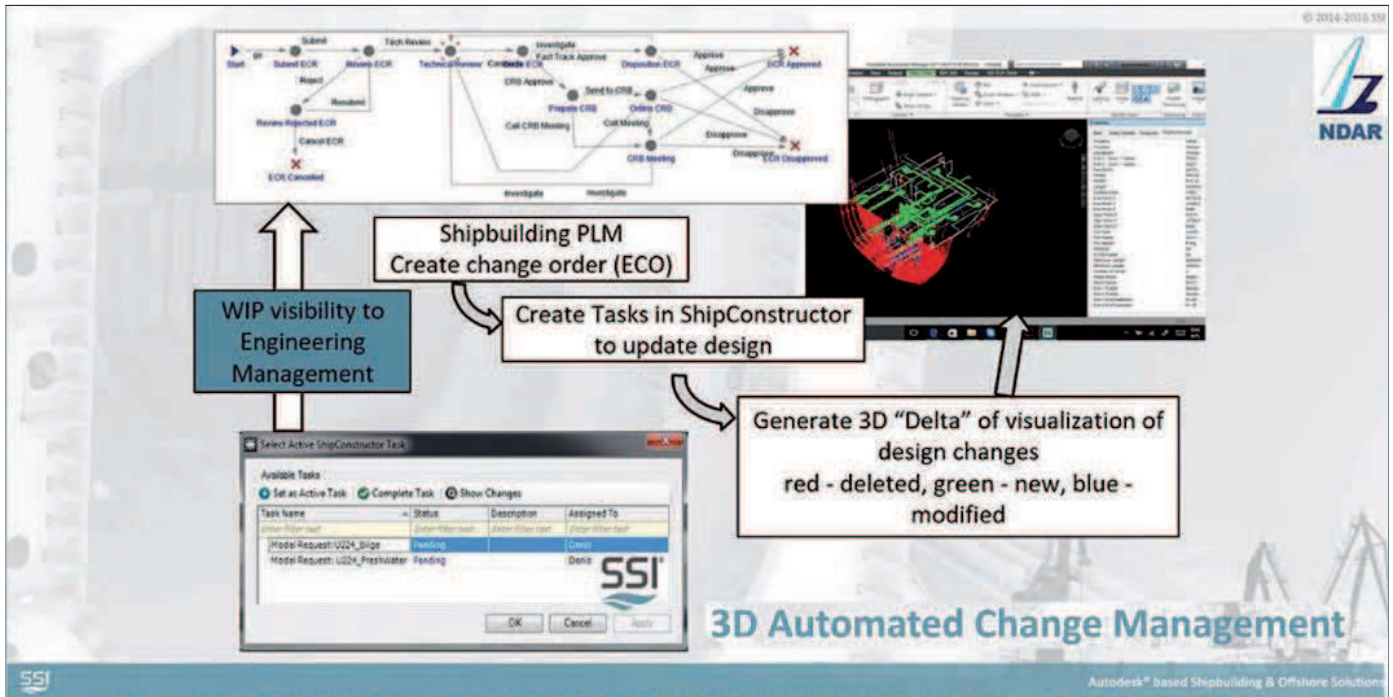


Figure 5: Change Management using Aras PLM system integrated with 3D CAD from SSI's ShipConstructor at Ingalls Shipyard which builds US Navy vessels

vessels. Ingalls can visualise engineering data in 3D within the same interface, and edit and plan with a PLM system. The shipyard configures the system to identify visually how the design has changed over time. Planners have exactly the information they need.

S – Simplicity (and scalability) is a virtue

The key to adopting 3D technology and techniques is to keep things simple and natural. Part of the simplicity involves making sure that when adopting anything new, simple small steps forward are taken. Systems must be scalable. One must be able to implement new computer systems and technology bit by bit and derive a clear return on investment at each small step of the way.

And getting back to the original point about being natural, simplicity also refers to the fact that new ways of doing things should be easy. This is the approach that

should be taken with regard to emerging technologies such as virtual reality (VR) and augmented reality (AR). Virtual reality enables processes that were difficult until now, such as ergonomic and ingress/egress analysis without the need for physical prototypes. It is well known that one of the big difficulties in shipbuilding is transferring data from the CAD model into virtual reality, also due to the fact that the product model is always changing.

Conversion to VR should be a relatively seamless process. Ideally it should only take a few clicks and a few minutes to set up. Furthermore, as stated in previous sections, a connection back to the underlying model is needed to access its valuable attribute information easily, and also to have any customisations completed in VR software (e.g., making door handles turn in the VR environment) persist if the underlying CAD model changes.

But before even getting to the stage of integrating CAD with a more costly and powerful VR system such as software by Virtualis, it is important to experiment with an inexpensive integration solution such as Oculus Rift and the Unity Gaming Engine. This is a simple, scalable approach.

Conclusion

Working in 3D is the natural and effective way to work. There are several things to keep in mind when implementing 3D technology. Support for 2D is still necessary. Data has to be in the right representation. Information must go with the pictures. There must be a connection to the product model. Keeping up to date is vital in the ever-changing world of ship construction and all along the way, effective and productive simple steps move the company forward and add value immediately. Those are the T.R.I.C.K.S to implementing 2D, 3D and VR systems in a natural and powerful way.



Figure 6: Integration of ShipConstructor and VR via Oculus Rift and Unity Gaming Engine is an inexpensive and simple way to experiment with virtual reality

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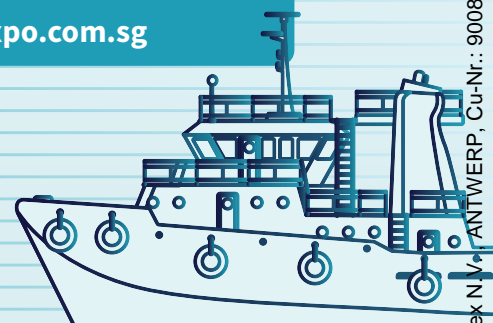
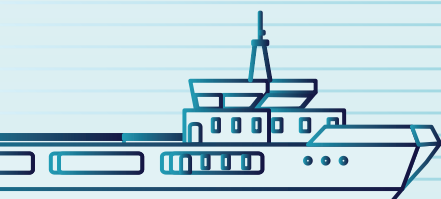
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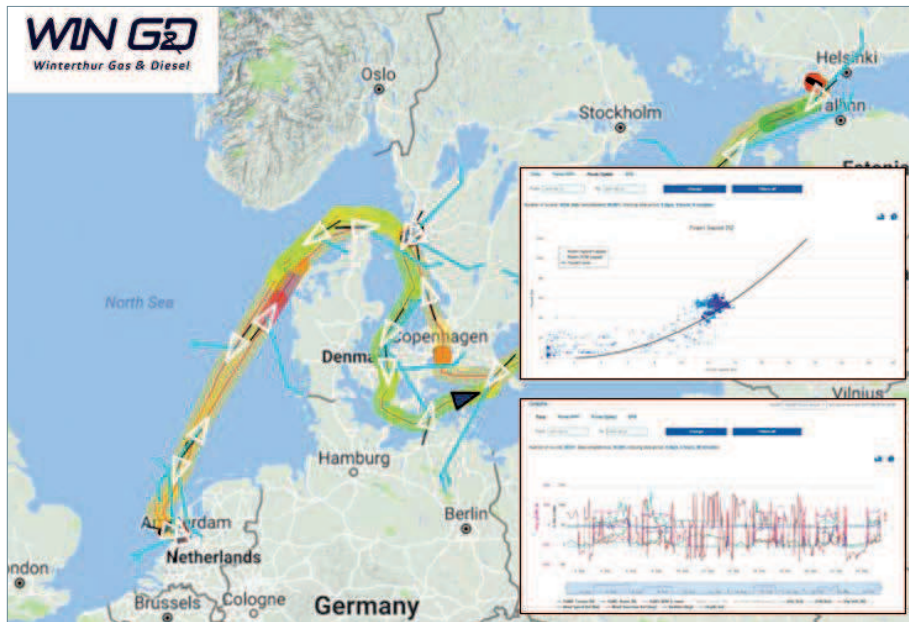
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Engine data collection and monitoring platform unveiled



The new platform enables remote data collecting and monitoring

DCM | The first version of a new data collection and monitoring (DCM) platform has been released by Winterthur Gas & Diesel (WinGD) and Enamor, a Gdynia-based marine automation, navigation and communication company. The move follows a collaboration agreement between the companies signed earlier this year. The platform

has been designed to operate with WinGD engines and ship-specific software including the advanced diagnostics system which the engine builder is developing with Propulsion Analytics of Piraeus.

“The collaboration with Enamor is the next step in our plan to lead innovation in the field of shipping digitalisation,”

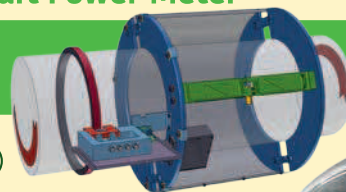
explained Dominik Schneider, VP of Research & Development at WinGD. “The DCM platform will provide engine owners and operators with an advanced tool aboard ships that collects, stores, visualises and post-processes all engine data, as well as relevant ship information and other machinery data.”

“This platform will allow us to fully leverage the capabilities of the WinGD Engine Diagnostic System (EDS) developed with Propulsion Analytics and provide maximum benefits for our customers,” Schneider continued. “The combination of EDS and DCM enables WinGD to offer not only insights into operational parameters of vessel, main engine, and other vital ship systems, but also analytical tools for the ship’s crew and personnel ashore. It will also offer WinGD, as an engine developer, key insights – of the sort that have not been available thus far – for the further improvement of our products and services.”

The shipboard data will be transmitted securely between ship and shore where it will be analysed by shipping companies’ technical personnel as well as experts from WinGD. This is likely to provide scope to raise engine efficiency whilst also providing valuable data for input into future product development.

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Bureau Veritas joins RECOMMS for drone development

REMOTE INSPECTION | Classification society Bureau Veritas (BV) has announced its participation in a joint industry project, RECOMMS, which aims to develop a sturdy, stable and reliable drone capable of following programmable flight paths, either pre-determined by 3D imagery, or flown by a pilot using 3D simulator ship-specific tracking programmes developed in tandem with the drone design. Existing partners in RECOMMS, which stands for Remote Evaluation of Coatings/Corrosion on Offshore Machinery and Marine Structures/Ships, include Akzo Nobel, Barrier Group, Drone Ops, Hempel Paints, Marine Technical Limits, and an unnamed oil major. The project is headed by UK-based coatings consultancy firm, Safinah Ltd.

The first phase will involve the development of a drone capable of carrying a high-definition camera, lighting, and batteries with sufficient strength, durability and longevity to perform structural and coating inspections within a ballast tank, for example, and to provide clear images that compare favourably with a close-up inspection.

Significant savings could be generated from these remote inspections. Based on Chinese drydocking costs for ships

of ten years or more, it is estimated that eliminating the need for staging at class renewal surveys could save about USD 90,000 for a VLCC and USD 45,000 for a Capesize bulk carrier.

BV's technical director, Marine & Offshore, Jean-François Segretain commented: "While a lot of work has been done with drones, nothing yet released has led to drones meeting specific requirements for marine classification close-up surveys. This project addresses the specific needs of our survey requirements and other inspections. The end goal is to be able to survey cargo spaces, ballast tanks, and confined spaces remotely and effectively. If we can do this with drones, we can help reduce risks to our surveyors and ship crews."

A second phase of the project will examine the scope for the inspection of open space marine structures such as offshore wind turbine blades. Drones for this purpose are likely to have a payload carrying capacity sufficient for sensing equipment to gauge paint and coating application analysis and steel thickness measurement. Manufacturers of such equipment are already being encouraged to join the project and to develop specialised sensing equipment suitable for installation on the drone.



RECOMMS drone pilot training – navigating a wing tank hopper compartment

Image: Marine Technical Limits



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Mobdock shapes up for tricky hulls

UNDERWATER REPAIR | Antwerp-headquartered Hydrex, renowned for providing drydock-like conditions for repairing ships and offshore units as well as supplying hard non-toxic coatings, has provided details of a number of recent hull repair and shell plate projects in Europe and the United States. Using its patented mobdock (mobile mini drydock) concept, Hydrex divers and technicians can perform permanent repairs to all underwater areas of the ship, as well as steel work or crack repairs in drydock-like conditions while vessels remains afloat. This helps owners to extend their vessels' dry-dock intervals and eliminates the loss of time and production caused by drydocking.

Damage to flat bottom plates

A 115m-long liquefied petroleum gas carrier had just left the drydock in the Port of Santander, Spain, when damage to the flat bottom was discovered, but since returning to drydock was not an option due to unavailability and cost, Hydrex was contacted to carry out the repair. The vessel's shape, however, necessitated the design of a bespoke mobdock so technicians could carry out the repair underwater in dry dock-like conditions while the ship was berthed alongside at the repair yard.

Once divers had discovered the extent of the damage, which required a 400x300m insert, they began to tailor-make a mobdock on site to fit the rounded shape of the hull. The mobdock was constructed at the yard for installation by the Hydrex team. Shipyard personnel were then able to undertake the repair in the best possible conditions, keeping the vessel on hire and on schedule without having to wait for a drydock space to become available. A tailored mobdock was also constructed in Palm Beach, USA, to facilitate the repair of a section of hull affected by corrosion. The damaged area was the aft starboard side shell plating by way of the bilge so it was imperative that the mobdock could sit perfectly over the rounded shape of the hull.

After the modified mobdock was installed, the frame covering the damage was removed. This allowed the diver/technician team from the Hydrex facility in Tampa, Florida, to cut away the damage and the surrounding area. A new insert plate was then positioned and welded following class-approved procedure.

"This is the real beauty of the mobdock concept," said Dave Bleyenbergh, Hydrex production executive. "We can modify or build custom-made solutions on site to suit any shaped hull or appendage in very little time. This way most repair projects can be carried out under water, in dry conditions.

"Of course, there are occasions where damage does not allow a permanent repair, but we can install temporary doubler plates over the damaged areas, allowing vessels to keep sailing until their next scheduled dry-dock. This was the solution offered to the operator of an offshore supply vessel recently, when a small hole was discovered in the hull on the starboard side of the flat bottom. A minor patch repair like this can easily be carried out in less than a day without any interference to a ship's schedule."

Hull repairs to a 198m-long general cargo ship berthed close to the Hydrex facility in Antwerp was, however, a lot less straightforward, according to Hydrex.

A detailed inspection of the vessel revealed corrosion damage in the flat bottom but shell plating around the damage was in poor condition and too thin to accommodate the welding of an insert plate. Instead, four large doubler plates were inserted on the inside of the hull to cover the damage and other areas at risk.

"The 1,255 x 400mm plates were cut to size at Hydrex headquarters' fast response centre and then fitted and secured by our divers/technicians. To prevent any further leaks, additional welding work was carried out to the rest of the area before

detailed thickness measurements were taken to make sure the vessel could sail safely until the next drydock visit," said Bleyenbergh.

The future of hull cleaning

Hydrex is not only active in the area of underwater repairs but has also developed several non-toxic hard coatings (Ecospeed, Ecoshield and Ecolock) that can stay on during the life-time of vessels and offshore structures with the hull only needing to be cleaned regularly. Boud van Rompany, founder and CEO of Hydrex, has a clear vision for the users of his products and the impact on the European market. Among other things, he sees a resurrection of repair yards in Europe. "If you don't have to paint your ship regularly, you can dry-dock in North-West Europe, instead of going to cheaper Asian yards."

Looking into the crystal ball, van Rompany can think of two developments Hydrex aims to follow up in the future. While hull cleaning today is still mostly carried out by specially trained divers, he sees the biggest potential for automated operation of remotely controlled / autonomous cleaning equipment.

Another idea, he said, is to facilitate the cleaning process which may still be a stumbling block for owners, since it needs to be undertaken regularly.

However, van Rompany argues that the time and money spent on cleaning is returned by the fuel savings that can be achieved from a smoother hull. The Hydrex founder knows that it is all still up in the air but he gives food for thought for hull cleaning systems in ports that would work just like a car wash facility with ships having to pass a dedicated area of brushes (which needs to be height-adjustable to allow for different draughts) on their way in and out. Another big advantage would then also be the elimination of the transport of invasive species that are stuck to the hull.

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New controllable pitch propeller receives environmental award

PCP | The German manufacturer of propellers and shaft systems Otto Piening GmbH has won the "Environmental Award of the Economy 2017" for the Piening Controllable Propeller (PCP). The award is given by the Study and Funding Society of the Schleswig-Holstein Economy Association in Rendsburg. The special feature of the PCP is that its blades are driven not by hydraulic oil, but purely by water pressure. "This has made a great contribution to 'green shipping,'" said Piening's managing director Mathias Pein, "because if a seal fails in conventional controllable pitch propeller systems, oil will leak and contaminate the seas and rivers. With our solution, this cannot happen."

In addition to its high eco-friendliness, the new propeller has even more attributes, said Pein: "Our development goals also included the reduction of noise and vibration and lower operating and maintenance costs." Two years of development went into the PCP, which

Piening offers in four- and five-blade versions. "The ideal field of application is in ships with above-average drive performance, such as mega-yachts, naval vessels, and research ships," he said.

Mid-2016, the classification society DNV GL certified the PCP as complying with its specifications as the world's first controllable pitch propeller to use water as a hydraulic fluid. Under the strict eyes of the classification society's experts, the prototype had to complete over two million controllable pitch cycles under full load.

High environmental protection, low operating costs

The PCP also offers a considerable benefit in maintenance over conventional systems, said the head of Piening: "Reconditioning the hubs is not required, you only have to replace components. You no longer need to remove the hub completely to undertake service works. And



Water as a lubricant: The chairman of the Study and Funding Society Uli Wachholtz (centre) handed over the environmental award for the development of the new PCP propeller to Pierre Adam (left) and Mathias Pein from Piening

Photo: Jan Köhler-Kaeß, Flintbek

after all, that is what is most important in the shipping industry: the costs for reconditioning will be decreased, which in turn lowers dock times, dock costs and downtime. You also no longer have to buy expensive oil, you can just use water as the hydraulic medium. This gives an amazing benefit to custom-

ers and the highlight is to do something for the environment while saving money."

What's more, the jury of the award was convinced by the fact that the cost of indirect environmental pollution worldwide – caused by hydraulic oil today – can be avoided by using water hydraulics, Pein added.

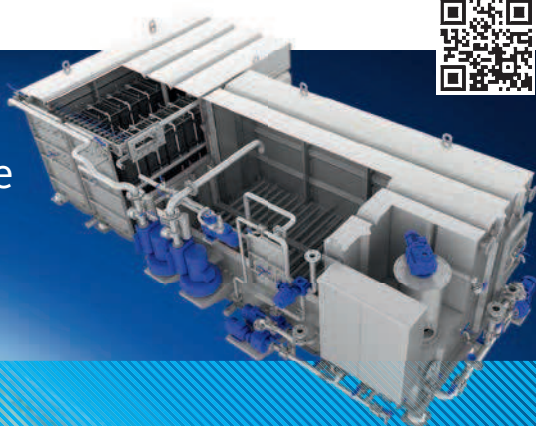
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New grease separation systems offer more for less

STANDARDISATION | Wastewater treatment specialist, ACO Marine, a subsidiary of Germany-headquartered ACO Group, has introduced a new range of grease separators suitable for all ship types, with treatment capacities ranging from one to 25 litres per second. The Lipator and Lipatomat grease separators, benefiting from the development of a new pneumatic valve, the use of composite materials, and the standardisation of components, now enable waste fats, oils and greases from ships' galleys to be treated at the same cost as a traditional grease trap system and up to 50% less than existing grease separation units. The handling of waste grease is a major issue for ship operators because unless treatment systems are cleaned regularly, congealed fat blocks pipes, damages coatings, and impairs the efficient operation of treatment systems. In a worst case, waste water units may stop working completely, resulting in waste water failing to meet discharge standards in port. The issue is further complicated by the fact that black water (sewage) discharge is heavily regulated, but grey water discharge from

galleys, showers and laundries is not. Grey water discharge standards are laid down locally. ACO Marine managing director, Mark Beavis, explained. "Given grey water often contains a mixture of galley grease, oils and fats, biological pollutants such as urine and blood, nano-plastics from shampoos and soaps, along with an increasingly wider range of other unpleasant substances, this wastewater stream is the most difficult to treat. Effective separation has to be carried out before this stream can be properly treated.

"We have modified the Lipator and Lipatomat products by bringing production completely in-house, reducing and standardising components, and installing a new pneumatic valve to enhance operational performance," Beavis continued. "On installations where local working air is unavailable, a unit-mounted micro-compressor is provided. These developments have allowed us to pass on to our customers the savings we have achieved in production and procurement, resulting in cost-effective grease separation solutions without impacting treatment efficiency."



The ACO Lipatomat is available as a composite version (left) or manufactured from stainless steel (right)

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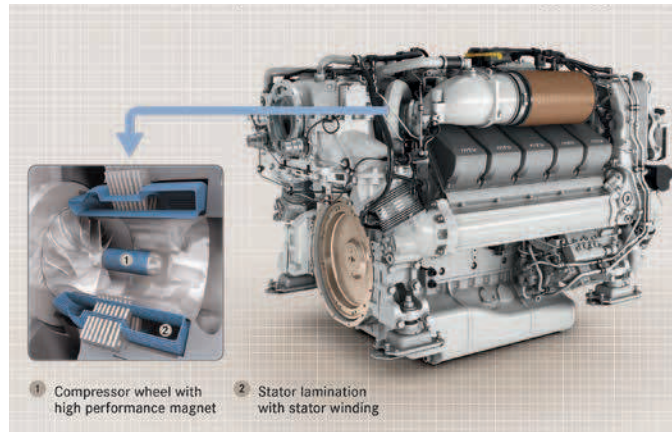
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Electrically assisted charging to raise engine performance

G+L INNOTECH | Rights to use a new technology to improve engine performance have been acquired by Rolls-Royce. Electrically assisted charging, developed by G+L innotec of Laupheim, Germany, will enable engines in the power range above 450 kW to have a faster acceleration and load response capability. MTU, Rolls-Royce's German subsidiary, will now work closely with G+L innotec, which already holds patents over the system, to prepare the new products for series production, likely from 2021.

Dr Johannes Kech, director of Development Turbocharging & Fluid Systems at MTU, described electrically assisted charging as a milestone on the way to hybridising of the engine. "Using this technology, it will be possible for us to develop agile, low-consumption engines," he said.

The system comprises an electric drive combined with a traditional turbocharger, de-



Electrically assisted turbocharging

veloped and manufactured by MTU, enabling the turbocharger to be accelerated electrically thereby building up the charge pressure more quickly. This will be particularly useful in circumstances where the turbocharger, operating on its own, would not provide the required charge pressure quickly enough. In addition to faster engine acceleration and improved load response, the new technology

will also lead to reduced fuel consumption and lower emissions.

MTU has already equipped turbochargers with the electric drive to complete successful tests of the system. In addition to marine engines, electrically assisted charging will also raise the efficiency of land vehicles and emergency gensets. Suitable for diesel and gas engines, it will enable gen-

sets, for example, to deliver their full power output more quickly than has previously been the case.

The companies have explained the operating principle of the G+L innotec system. To provide the turbocharger with electrical assistance, a permanent magnet is installed upstream of the compressor wheel and the electrical winding is integrated into the casing of the compressor. Through this arrangement, the air drawn in by the compressor is not obstructed and, at the same time, the electrical components are cooled by the air.

The key feature of the system is the large gap between the magnet and the winding which, the companies reveal, requires specially designed power electronics. The technology has been developed to ensure that there is no aerodynamic impact on the charger and also that existing chargers can be easily adapted to make use of the new electric drive.



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INTERNATIONAL OCEAN CONFERENCE |

Malta set the scene for the invitation-only "Our Ocean 2017 Conference" in October that brought together statesmen, government ministers and industry leaders from around the world to look to the future and deliver high-level commitments to preserve the world's oceans.

Hosted by the European Union's Karmenu Vella – EU Commissioner for the Environment, Maritime Affairs and Fisheries – areas of action during the conference included the topics of climate change, marine pollution, sustainable fisheries, sustainable blue economies, marine protection areas and maritime security.

Wayne Jones, chief sales officer of MAN Diesel & Turbo, spoke from the floor of the conference and said: "We clearly recognise that our interests are best served by ensuring that the world's oceans remain in robust,

good health. MAN Diesel & Turbo believes that it is time for what we call a 'Maritime Energy Transition' to find clean solutions for seaborne trade and transportation.

"Just recently, my company set a new benchmark with the world's first conversion of a container ship from conventional fuel to gas operation. In order to encourage more shipowners to follow this example, MAN Diesel & Turbo is pledging a EUR 2 million discount for ten such LNG retrofits to convert existing HFO engines to modern, clean, efficient gas engines. In doing so, we hope to play our part in moving the world's fleet towards the clean technology our industry and our oceans deserve."

Since 2014, the conference has brought about 250 concrete actions across the world, committing over EUR 8.2 billion (USD 9.2 billion) from public funds and

designating 9.9 million km² as new marine protected areas.

The Maritime Energy Transition

The term 'Maritime Energy Transition' stems from the German expression 'Energiewende' and encapsulates MAN Diesel & Turbo's call to action to reduce emissions and establish natural gas as the fuel of choice in global shipping. It promotes a global 'turn to gas' driven by the IMO and a common approach by the shipping industry and politicians to invest in infrastructure development and retrofits.

The company launched this initiative in 2016 in the light of the historical Paris Agreement, convinced that the shipping industry also needed to contribute. The initiative has since found a broad line of supporters in the maritime sphere and in German politics.

End-to-end lubrication solutions for marine industry

MOBIL SERVSM | ExxonMobil has launched Mobil ServSM, a new global services brand to help marine operators optimise maintenance programmes, vessel reliability and operating costs. Under the new brand, ExxonMobil is set to roll out a range of next-generation services for the marine industry.

The combination of Mobil Serv and ExxonMobil's portfolio of world-class lubricants will provide an end-to-end solution for marine operators, the company said.

The launch is said to highlight ExxonMobil's commitment to helping customers gain critical insights and achieve efficiencies. Some of the services under the Mobil Serv brand will leverage

the power of cloud computing and big data to provide customers with a platform that delivers value through information and trend analysis.

"The industry is facing a number of challenges, and Mobil Serv can help our customers respond," said Iain White, global marketing manager at ExxonMobil Marine. "Many of our next-generation services build on new technology with an easy-to-use platform that will enable operators to gain deeper insights and help drive crucial efficiencies within their business."

Services in the Mobil Serv brand will include Mobil ServSM lubricant analysis, which will replace SignumSM oil analysis.



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New fast rescue boat offers good all-round performance



INNOVATIVE DESIGN | The FSRQ 630 fast rescue boat is the first new product to be launched since the merger of Harding Safety and Palfinger Marine last year, combining the expertise of the life-saving systems specialist and the design flair of Palfinger's boat division. The GRP hull is based on former Harding's bestselling fast rescue boat with a deep V-shaped design ensuring good performance at speed and in rough seas. The streamlined and aft-angled console reflects well-proven designs from Palfinger Marine's range of rigid console boats.

"The joint development has resulted in a boat with innovative design and excellent capabilities, ensuring great stability and optimal working conditions," commented Trond Paulsen, Palfinger Marine's sales director for Lifesaving Equipment. "By pairing the renowned

Palfinger Marine quality with a highly competitive pricing, we truly believe the market will embrace our new product."

The 6.63m-long rescue boat is available with single water jets ranging from 144 hp to 258 hp, giving speeds from 23 knots to 34 knots for up to 15 persons. Ease of maintenance has been a key design feature and the entire console can be removed in a single lift enabling engine replacement in just two hours.

The rescue boat is suitable for a wide range of operations including offshore, merchant and passenger vessels, search and rescue, raft assistance, towing, diving support, crew transport and other workboat functions. It is designed and manufactured in compliance with the latest SOLAS and Norwegian Maritime Authority (NMA) regulations.

New generation of torque metres

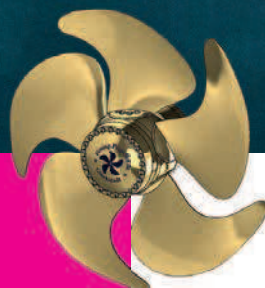
VDTM | Germany's Virides Solutions has launched a new generation of torque meters. The VDTM (Virides dynamic torque meter) is available in different versions, with a measuring distance of 250mm or 500mm on the shaft and a shaft diameter of up to 1,100mm. It will be delivered already set up for simple installation on board.

According to Virides, the unit is characterised by:

- › an extreme high sampling frequency of 1kHz;
- › highest accuracy;
- › the possibility to connect three flow metres (mass-flow or volume-flow metre);
- › the possibility to connect three temperature sensors (PT100);
- › potential zero signal in- and outputs;
- › fuel totalisator and permanent data storage for three channels (HFO, LSFO, MGO);
- › permanent display of the specific fuel oil consumption (SFOC g/kWh);
- › contactless energy transfer;
- › data transfer by bluetooth technology;
- › no extra monitors in the ECR;
- › software that can be displayed on all computers in the ship LAN;
- › independence from influences of the sea to the hull;
- › the ability to be used as engine controller also available as redundancy type;
- › several output signals for other systems.

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Cyber enabled components – assurance now available

TYPE APPROVAL | Ship designers, builders and component manufacturers will be amongst those to benefit from what is claimed to be the first ever marine type approval system for cyber enabled components. Classification society Lloyd's Register (LR) has launched the new assurance system which, it says, defines a critical point in the evolution of smart technology implementation within the marine and offshore industries.

The type approval arrangements will assure supply chain quality, appropriate resilience within the challenging marine environment, as well as the safe operation of a cyber enabled system, including its security.

Luis Benito, LR Marine & Offshore's director, Innovation Strategy and Research, explained some of the background. "Type approval will work together with LR's cyber enabled ShipRight document, providing type approved components to use in cyber systems, such as predictive maintenance and performance optimisation.

Together this offers the complete cyber solution for the future, from components to systems to functions," he said.

The classification society has introduced a range of cyber related services over the last two years including the ShipRight procedure. This sets out LR's framework for accepting cyber technology at varying levels of autonomy – from ships with the most basic decision support tools to vessels that are fully autonomous.

Earlier this year, the classification society introduced a new set of cyber security services designed to assist clients in assessing how cyber secure they are today and what level of security they want to achieve in the future. The services include cyber security gap analysis and other measures of preparedness so that owners and operators can compare their systems with the US Coast Guard Strategy on cyber security, forthcoming regulations from the IMO, and best practices already established in other industry sectors, including naval.

ClassNK sets out R&D priorities

INNOVATION | The classification society ClassNK has revealed an R&D roadmap in which it sets out its key aims and objectives in research projects over the next five years. The society's research activities will be broadly divided into two: core technologies will relate to the design and construction of ships themselves, exploring how the development of human resources can contribute maritime and engineering technology, while detailed analysis of damage information will be used to research damage prevention initiatives.

Core technologies will include research into ship structures and motions; materials, with a focus on fatigue strength and corrosion prediction; IT, covering communications, electronics, artificial intelligence, image processing and data analysis; and energy and the environment, including renewables. The classification society's R&D plans come at an important time as maritime maintenance management undergoes a digital

transformation. Planned and predictive maintenance, remote monitoring, sensing, digital twins and drone surveys are just some of the recent developments which have far-reaching implications for the classification sector.

In the medium term, ClassNK will undertake R&D projects in four focus areas – rule development; survey technology innovation; marine environmental protection; and revolutionary technology development. The classification society explains that under these four headings, it aims to develop improved technical rules in terms of rationality and transparency, revolutionise survey processes with the development of robotic instruments for surveys, investigate and research developing environmental regulations through its global network, and develop maritime technology innovation through digitalisation.

ClassNK will collaborate with universities, research institutions and the industry to execute the R&D Roadmap.

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Maximising vessel performance

EUROPORT 2017 The maritime technology exhibition Europort will take place from November 7th to 10th 2017 at the Ahoy Rotterdam venue in the Netherlands. Around 1,100 exhibitors from 45 countries and 30,000 visitors are expected for the 38th staging of the event. The scope of Europort includes ocean shipping, offshore vessels, inland navigation, dredging, fishing vessels, workboats, naval ships, construction vessels and mega-yachts.



Shipping's data revolution, its environmental responsibilities and its continuing reliance on 'the human factor' will be the focus of attention. "Each of these themes is very different, but all three come together to drive forward the event's overarching aim – to help maximise vessel performance – and as such will have an increasingly important role in shaping the world of shipping and shipbuilding over the months and years ahead. We have selected these three very current themes to ensure that attending Europort will be a hugely rewarding and valuable experience, with benefits extending well into the future for those visiting and exhibiting," said exhibition manager Raymond Siliakus.

AMVER awards

In a notable first for Europort, this year's event will host the US Coast Guard's Automated Mutual Assistance Vessel Rescue (AMVER) awards, marking Rotterdam's debut as a venue for the prestigious ceremony. The 2017 awards ceremony will be held during the afternoon of Tuesday 7th November at the port city's Rotterdam Ahoy venue, to recognise the contribution of companies from the Netherlands that have made their vessels available for search and rescue around the world.

Benjamin M. Strong, director of AMVER Maritime Relations at the US Coast Guard, said: "Rotterdam is a major port and presenting AMVER awards to our Dutch partners at Europort just makes sense. This is the premier event at which to recognise the good work by Dutch shipping companies and their crews."

Currently there are 165 vessels managed by 31 Dutch companies that have earned AMVER awards, which are presented to vessels that have been available for search and rescue efforts in the previous calendar year. These ships voluntarily report

their positions to the US Coast Guard and if needed they are diverted to assist in search and rescue cases anywhere in the world.

"The awards are a critical part of the AMVER programme. Not every ship will make a rescue, but every ship is prepared and has taken an extra step by reporting to the Coast Guard. Through the awards we can recognise the cost to shipping in terms of staff hours, lost port calls and fuel, if these ships are asked to respond. Moreover, seafarers understand the dangers of the sea, and are willing to assist at almost any cost, and we want to make sure we properly and publicly recognise these efforts," Strong added.

International matchmaking event

MariMatch 2017, organised by Enterprise Europe Network, will be another highlight of Europort 2017. The international 'matchmaking' event is aimed at maritime organisations looking for new business opportunities or research partners.

Another novelty will be the Start-Up Plaza where ten young companies will exhibit their innovative products or services for the maritime industry.

Masterclasses

Every show day, one Masterclass, a joint initiative of Rotterdam Ahoy and Netherlands Maritime Technology, will cover a different industry topic. Leading professionals and experts in their fields will share knowledge and experiences, providing insight into latest technologies and likely future developments.

Each Europort Masterclass consists of a plenary programme with four speakers, followed by a networking opportunity. In total, four Masterclasses will be held, see box.

Masterclass: How the Internet of Things and blockchain can improve supply chain efficiency

Date: Tuesday, November 7th
Time: 14.00 - 17.30

The Internet of Things (IoT) and blockchain are emerging new logistics technologies that will become mainstream within the next five to ten years, according to research organisation, Gartner. Most people are familiar with IoT for smart applications in the living room, but less is known about the tremendous improvements IoT can lead to within the supply chain. Blockchain technology makes it possible to accumulate generated data in a decentralised database and create a distributed ledger that keeps records of digital transactions. Data in the blockchain is unchangeable and digitally recorded in packages (called blocks). This technology will have a major impact on supply chains, potentially reducing delays and rendering obsolete the role of intermediaries.

Masterclass: How energy management can save costs and support MRV compliance

Date: Wednesday, November 8th
Time: 10.00 - 13.30

The energy efficiency of vessels of all types is a concern for shipping companies and fleet managers, saving costs and limiting emissions. An insight into the optimum use of energy can help shipping companies perform better using the same amount of fuel. In this way, energy management can contribute to achieving a profitable and sustainable business model. There are other reasons for gaining an insight into fuel use and emissions. CO₂ emissions from maritime transport, for example, are subject to new regulations from both the European Commission and the International Maritime Organization (IMO).

Masterclass: How big data can improve operational performance

Date: Thursday, November 9th
Time: 10.00 - 13.30

Big data is, without doubt, a game changer. The data revolution has found its way into the shipping sector and, increasingly, shipboard systems are equipped with an IP address and sensors, so that data regarding the performance of each specific component can be transferred ashore. This makes it possible to generate real-time information on various aspects, such as the status of operations, the performance of equipment and any necessary maintenance.

Shipping companies, fleet managers and maritime suppliers are expected to have a vision as to the data they want to generate. Having such a vision will help them achieve better cost efficiency and lower the overall total cost of ownership.

Masterclass: How HR can make your organisation future-proof

Date: Friday, November 10th
Time: 10.00 - 13.30

A business relies on having a highly skilled workforce to innovate and operate in tough and rapidly evolving market conditions. This means companies must adapt and change - and it is having the right people that makes this possible. It is, therefore, critical that companies attract and retain young talent and high-performing employees. Human Resource (HR) management can make a significant contribution, not only by using social science techniques, but also by leveraging HR data, analytics, and predictive models.

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Alfra

Stand 6017

Alfra Germany is further expanding its portfolio of Alfra Magnetic Systems by adding new versions for pipes and round steel surfaces, which will be on display in Rotterdam.

The patented permanent magnets from the supplier of tools and machines for the metal- and steel-working industry are extremely light, easy to handle, and flexible to use. All Alfra per-

manent magnet systems feature a unique ratio of empty weight to break-away force, higher than any other competing product in the market and starting from just 1mm material thickness.

Different models for lifting, moving, positioning, aligning, shaping, transporting and many more applications are available with approved break-away forces from 50 kg to 500 kg.

All permanent magnets for lifting applications include a safety ratio of 1:3.

Alfra permanent magnet systems can easily be operated with one hand and have a hardened steel bottom with TiN coating. This is permanently durable and optimally protected due to its finish, which makes dirt or adherent metal shavings easy to remove. The

general regrinding and maintenance of the bottom plate is not applicable.

The TML series is additionally equipped with a safety anchor point that allows swivelling through 360 degrees. It ensures smooth load lifting by automatically following the optimal line of force and being able to withstand strain under full load in any position. www.alfra.de

Alphatron Marine & JRC

Stand 3405

Alphatron Marine and JRC will exhibit a variety of their latest integrated solutions and high-quality navigational and communication equipment for all types of ships.

On display will be the new 5-inch touchscreen-controlled VHF radio featuring a uniform, cor-

porate design with manual-free operation. The next generation JMR-5400 radar with 19-inch or 26-inch screens featuring a new keyboard design and a vibrant and trusted user interface that takes full advantage of its processing technology will also be on show.

The companies will present the

new adaptive autopilot, which features a 5-inch touch display with hard- and software based on their uniform product philosophy, creating a consistent bridge and operational approach. The advanced track-steering technology contributes to safe and efficient operation, defined by its

simplicity in usage.

Last but not least, the new MFD 3900, a multifunctional navigation system starting from a non-type approved 8-inch ECS only up to a 15-inch full multifunction type-approved radar, ECS and conning system will be exhibited. www.alphatronmarine.com



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EUROPORT
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Stand no. 5209

Bakker Slidrecht

Stand 1204



The ABB ACS 880 with active filter solution

Visitors to the stand of Bakker Slidrecht and other Pon companies will be given the opportunity to discover the water-cooled low-voltage drive system ABB ACS 880 including

its active filter solution.

This new ABB model has a very high power density and is maintenance friendly as components can be changed easily. Moreover, the drive system is

already compliant with future regulations.

As the ABB ACS 600 water-cooled drive system is becoming obsolete, obtaining spare parts for this system will become hard and costly. Therefore, Bakker Slidrecht has created a plug-and-play retrofit kit. Installing the retrofit kit for an 1,800-kW drive system takes approximately one week. Key element of the retrofit kit is the ACS 880 water-cooled module. This element will be installed in the existing cabinet using a mechanical kit that fits the exact cabinet dimensions. The existing cabling in the cabinet will be connected to the new ACS 880 module to save time and cost. The retrofit

focuses on the drive cabinets, minimising disturbance to other parts of the vessel.

The use of power electronics on board vessels and within other electrical installations causes undesired harmonic distortion, such as extra heating of generators and nuisance tripping. Ultimately, this results in higher operational costs due to energy losses and shorter lifetime of equipment, the company notes.

Therefore, Bakker Slidrecht will also showcase its active filter solutions that can be integrated in its low-harmonic drive system. These are said to be capable of reducing harmonic distortions very effectively.

www.bakkerslidrecht.com

Dellner Brakes

Stand 1719

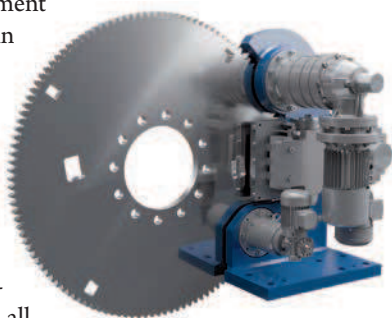
Dellner Brakes AB, one of the world's most innovative manufacturers of technologically advanced industrial and marine braking systems, will be exhibiting the world's first fully automated, electrical 'stopping, turning, locking' (eSTL) braking system at the Europort exhibition in Rotterdam.

The Dellner eSTL system (patent pending) is compact and needs no additional piping, making it quick, easy and cost-effective to install – especially where space is at a premium. It is simple to use, hard wearing and easy to maintain, and it is said to be perfect for applications where a clean environment is paramount or for use in green shipping zones.

The system is available in a range of standard sizes and can also be customised for specific applications. The modular 'stopping, turning, locking' system allows customers to choose one, two or all three functions to create a be-

spoke solution for their needs. The system is fully automated but it can also be operated from an optional remote hand-held control, giving operators the freedom to inspect the system during maintenance and testing. The standard range offers stopping torque of up to 900 kNm, turning torque of up to 600 kNm and locking torque of up to 1,650 kNm. Higher torques are also available on the customised eSTL systems that can be scaled up and adapted for specific applications.

www.dellner-brakes.com/press-eSTL



The electrical STL braking system



The VR presentation will be available to visitors at the DNV GL booth

DNV GL

Stand 1122

The classification society DNV GL will put digitalisation and advanced technology solutions to keep ships safe and help its customers enhance the efficiency of their assets in the spotlight of its presence at this year's Europort. DNV GL has developed a virtual reality (VR) presentation, which shows how the company is pushing ahead with a digital transformation to improve the quality and efficiency of its services, as well as the emerging solutions that will take class into the future.

The VR experience takes viewers on a tour of the *Shanghai Express*, a modern container ship, to demonstrate how ad-

vanced sensor technology, powerful satellite connections, and the digital data being created and transmitted from vessels will open up a new range of possibilities for shipping. The presentation shows how ship data could be combined with survey results and a 3D model of the ship to build a digital twin – a digital copy of a vessel, modelled exactly to represent its properties. It also shows how this digital twin could be used to optimise the design, test how the networks on board respond to cyber attacks and even identify when equipment needs maintenance.

www.dnvgl.com

DVV Media Group GmbH

Stand P115

Along with its popular technical magazines Schiff&Hafen and Ship&Offshore, the Hamburg-based publishing house DVV Media will present its comprehensive range of maritime publications.

For more than 60 years, the German magazine Schiff&Hafen has been providing its readers with relevant and reliable information on shipbuilding technology and shipping as well as offshore and marine technology.

Its international English-language sister publication, Ship&Offshore, which has successfully established itself in the market, focuses on current trends and innovations in the global maritime sector. In-depth technical articles on conventional and specialised shipbuilding, the shipping industry and offshore engineering technology are

complemented by the latest news on orders and deliveries. Ship&Offshore is supplemented each year by at least four international periodicals, spotlighting specific maritime markets in countries such as China and Russia, issued in the national language. New Ships is another exclusive information service, reporting briefly and accurately on the most important developments in the global shipbuilding industry.

A new product on display will be the knowledge base Maritime Archives; a database with easy search functions providing its users with detailed and very precise information on the topics of their choice in the shortest possible time.

www.schiffundhafen.de
www.shipandoffshore.net

German Dry Docks Group

Stand 8503

The German Dry Docks Group will showcase its combined technical maritime expertise in Rotterdam. The shipyards Bredo and German Dry Docks specialise in docking, repair, maintenance and conversion of ships of all types.

MWB Marine Services is the special-

ist for propulsion systems, engines and components. MWB Power is an expert for governors, cogeneration plants and LED. German Ship Repair and Rotterdam Ship Repair are the ideal contact partners for mobile 24-hour service for port and travel repairs.

www.germandrydocks.com

Hempel

Stand 3403



Hempaguard X7 contains 95% less biocide than traditional antifouling

Global paints and coatings manufacturer Hempel will display its Hempaguard fouling defence coating in Rotterdam, which it says, delivers fuel savings of up to 6% compared with best-in-class antifouling over the entire service interval.

When fouling organisms such as algae and barnacles attach to a vessel's hull, they create extra drag requiring more fuel to propel the vessel, significantly increasing fuel costs and CO₂ emissions, Hempel notes. By investing in a high-performance hull coating such as Hempaguard that delivers advanced protection against fouling, a ship's movement through the water is streamlined and drag is reduced.

Hempaguard is the only hull coating to combine the low surface friction of silicone with efficient fouling preventing biocides in a single coat – this is Hempel's innovative Actiguard technology. Unlike other hull coatings that are usually specified according to the vessel's speed and activity level, Hempaguard coatings retain effectiveness when switching between slow and fast steaming – so a vessel can change sailing routes and trading patterns without losing performance. What's more, it also remains effective in waters of varying temperatures and during idle periods of up to 120 days.

www.hempel.com

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www.hempel.com

Imes GmbH

Stand 5209

Germany's Imes GmbH, a leading specialist of combustion pressure sensors and electronic engine indicating systems, will launch EPM-XP^{plus}, a further development of its electronic indicator EPM-XP, at this year's Europort.

EPM-XP, a battery-powered hand-held electronic device for periodic monitoring of cylinder pressure on two- and four-stroke diesel engines, has been available since 2008 and was the first electronic indicator to offer automatic P-comp calculation without TDC pick-up, due to specifically developed mathematical algorithms. It is characterised by its high accuracy, reliability, longevity and cost effectiveness.

Like the EPM-XP, EPM-XP^{plus} can record cylinder pressure values on a maximum of 20 cylinders on two-stroke engines operating at speeds of 40 to 300 rpm, and on four-stroke medium- and high-speed diesels with rated speeds from 200 to 1500 rpm. Recorded data can be downloaded immediately to a PC or notebook via USB connection. It can be simply processed by Imes' visualisation software.

EPM-XP^{plus} is not only an electronic indicator but also an engine analyser, as it offers advanced features that provide more important measurement data for the engine operator with optimised data processing.

In addition to a higher battery capacity for up to ten operating hours, EPM-XP^{plus} offers the possibility of online measurements for up to one hour with direct data transfer to a PC via USB or WiFi.

This means that the engine operator receives actual engine performance data that are directly evaluated by Imes' visualisation software or by Imes' performance evaluation software. This provides a quick overview about actual engine status and enables the operator to identify and rectify any maladjustment.

A future feature will be an additional vibration sensor, which is still in preparation, for vibration analysis to diagnose abnormal combustion and valve leakage. This complex diagnosis of cylinder pressure and vibration measurements is very important with regard to engine performance, maintenance, efficiency, cost savings and environment.

www.imes.de



The EPM-XP^{plus}

C.u.W. Keller GmbH & Co KG

Stand 7405

Germany's Keller will be presenting its gearboxes for various marine applications, such as propulsion, generators, winches, cutters and dredging gearboxes. Tailor-made products can furthermore be fitted to the demands of Navy and offshore vessels.

Keller is specialised in machining and manufacturing gears with diameter sizes of up to 4,500mm – as well as any other kind of tooth components.

Last year's intensive investments led to a modern machine park which offers first-class manufacturing capabilities of gears, pinion shafts, etc.

Close cooperation with different research institutes gives Keller access to the latest state-of-the-art drive technology while permanent training of its employees ensure continuous improvement of its technical knowledge.

www.keller-getriebe.de



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Kelvion

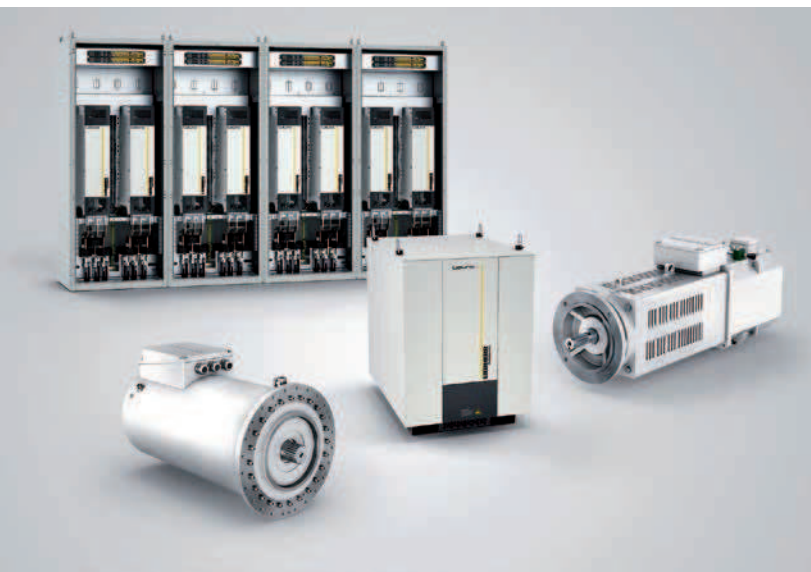
Stand 1426

Kelvion, a manufacturer of industrial heat exchangers for a diversified range of market segments, will present its extensive product portfolio in Rotterdam. With plate heat exchangers, shell and tube heat exchangers, finned-tube heat exchangers, modular cooling towers, and refrigeration heat exchangers, the company is a specialist in providing customer-specific products and services and serves its clients through a global sales and production network.

www.kelvion.com



Kelvion's booth at Europort



Liebherr Components will present its portfolio in Rotterdam

Liebherr Components

Stand 1105

Liebherr Components division is a specialist in the development and production of high-performing components for mechanical, hydraulic and electrical drive system and control technology. All products, which will be on show in Rotterdam, feature outstanding quality and sturdy design.

As a powerful partner of the maritime industry, Liebherr has been developing electric machines and control technology, gearboxes, winches, slewing bearings

and hydraulic components for many years. These have been successfully used in a wide range of maritime applications including off-shore winches, ship, off-shore and container cranes, propulsion systems and special equipment for units such as pipe-laying ships and jack-up platforms.

In cooperation with Sandfirden Technics, Liebherr also develops complete solutions for hybrid ship propulsion systems.

www.liebherr.com

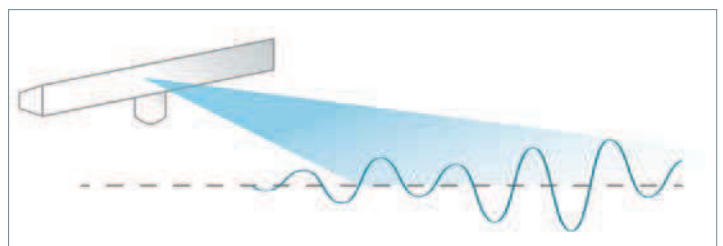
Next Ocean

Stand 6120

Next Ocean's wave prediction system, which will be on display in Rotterdam, predicts the actual time traces of waves approaching a ship and the resulting ship motion response. Using the ship's navigational X-band radar, this can be done on board in real time.

The system is currently undergoing operational tests in the North Sea. Test results are expected by the end of 2017. The Next Ocean wave prediction system is targeted for market entry in 2018.

www.nextocean.nl



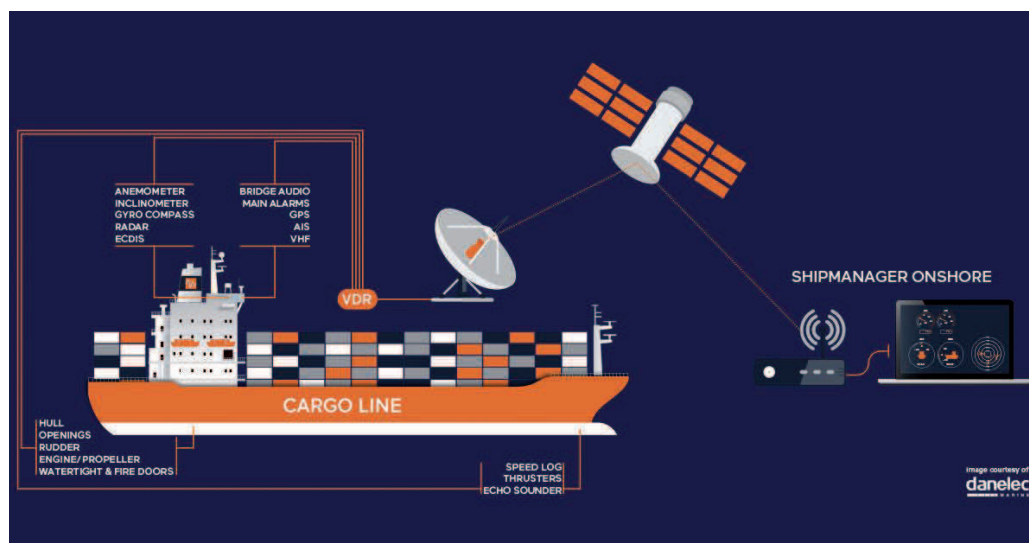
Predicting ship motion responses

Radio Holland

Stand 1124

Radio Holland and RH Marine, both part of RH Marine Group, will showcase their solutions for smarter business, IT on board, connectivity and remote monitoring at this year's Europort show.

For the Australia Antarctic Supply Research vessel built by Damen, Radio Holland will deliver comprehensive IT infrastructure consisting of central IT cabinets and various switching cabinets located at strategic positions on the vessel. This three-year newbuild project is a good example of how Radio Holland provides various solutions for demanding and complex IT configurations and functionality, which will be showcased at RH's booth.



Radio Holland delivers comprehensive IT solutions

Radio Holland will show innovative navigation and communication solutions, including the latest Furuno equipment and Voyager Bridge system and Cobham VSAT equipment. RH has concluded service agreements with

shipowners all over the world, offering peace of mind and reducing cost of ownership for the owner. A variety of service agreement formats match specific customer requirements, such as outsourcing equipment maintenance,

planning mandatory inspections, annual equipment health checks, compliance of GMDSS equipment and remote monitoring. Service agreement options and examples will also be shown at Europort. www.rhmarinegroup.com

Schottel

Stand 1403

Schottel will launch its versatile Y-Hybrid feature for azimuth thrusters at this year's show. This, the company claims, transforms conventional Schottel Z-drives into versatile azimuth thrusters enabling unlimited vessel design and operation opportunities. Y-Hybrid gives designers full freedom in terms of the propulsion system layout. It comes as a straightfor-

ward option as it causes no noticeable changes to the standard vessel design. With Schottel's new feature, there are no restrictions with respect to power size or source, nor to geometrical arrangements for the hybrid power intake, the German company said.

With Y-Hybrid, the size of the large main propulsion diesel engine can be reduced to a smaller and cheaper engine, e.g., common V16 engines can be replaced with V12 engines. In this case, the power difference is substituted by larger gensets and electric motors for the thruster's hybrid power intake. For vessels that have to operate in emission control areas (ECAs), the Y-Hybrid solution is a simple opportunity to regulate emissions. In combination with a battery, a Y-Hybrid thruster is also suitable to meet zero-emission requirements.

www.schottel.de



The Y-Hybrid feature will be available as an option for all Schottel Z-drives larger than 500 kW by the end of 2018

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Steinbach Ingenieurtechnik

Stand 7210

Steinbach Ingenieurtechnik (SI-Technik) is the exclusive representative of Norway's Brunvoll and the ballast water

management (BWM) supplier MMC Green Technology AS in Germany, Belgium, the Netherlands and Luxembourg.

The former has recently acquired Scana Volda and Scana Mar-El, expanding Brunvoll's portfolio and making the

company a single-source supplier for the full scope of maritime propulsion systems with associated control systems. The entire product range will be on display in Rotterdam. Meanwhile, MMC Green Technology has won several contracts for its compact BWM system.

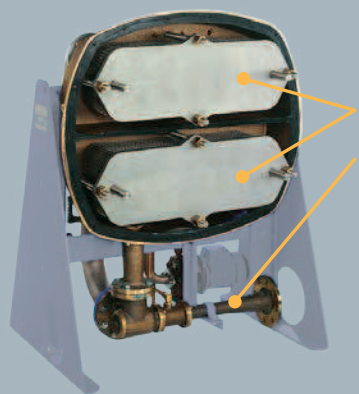
One of the last retrofit projects was delivered as a turnkey solution. There was no need for docking and the project was successfully completed as the ship lay alongside. The vessel will soon be trading in US waters and MMC is currently running tests for USCG and revised IMO G8 type approvals. The company is aiming to achieve these approvals within the next year.

www.si-technik.de



MMC's ballast water treatment system will be on display in Rotterdam

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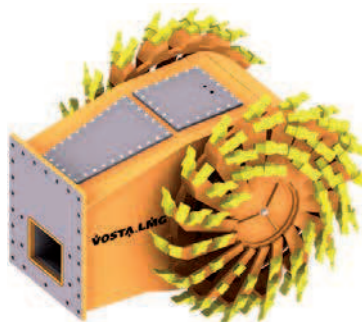
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Vosta LMG

Stand 4017



Vosta Cutting Wheel

Vosta LMG Dredging Technology will present its latest products at this year's Eurport. On display will be the Dutch company's newest developments in engineering solutions, automation and dredging equipment including cutting and coupling systems.

www.vostalmg.com

Wiska Hoppmann GmbH

Stand 2112

Germany's Wiska will be exhibiting its maritime lighting, reefer container sockets and CCTV camera surveillance products. Among the solutions on display will be the new LED Floodlight 5000, said to be the first flood-

light that both conducts heat and resists corrosion thanks to a special plastic module.

With Varitain® PushIn Advance, Wiska is presenting its latest generation of reefer container sockets. One of its features is an



LED Floodlight 5000: Heat-conductive and non-corrosive plastic modules, sheltered in a stainless steel casing result in an innovative floodlight design

easily accessible power terminal that has been relocated to the outside and thus offers maximum ease of installation. This means the casing lid remains closed, minimising the risk of damage during installation.

What's more, by moving the power port to the outside, the product is now 40% smaller.

With its LED Ex Luminaire 4200, developed from the successful watertight luminaire 4000, Wiska supplies a rugged solution for the extreme challenges presented by maritime and offshore sectors. The LED Ex Luminaire 4200 is both reliable and maintenance-free because it does not use a driver that is likely to fail and it has been reduced to only a few key components.

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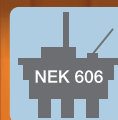
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First USV-supported cable route survey

BERING SEA | UK-based ASV Global, a supplier of unmanned and autonomous marine systems, and survey company TerraSond have completed the first ever seabed cable route survey supported by an unmanned surface vehicle (USV). The survey route included various water depths and strong currents, while facing difficult wind and sea conditions in the Bering Sea offshore Alaska. The project was mobilised immediately following a 9,000km nautical charting survey by TerraSond, of which 4,750km (53%) was executed by an ASV Global C-Worker 5 autonomous surface vehicle (ASV). The cable route survey required a new payload including a hull-mounted multibeam sonar, a sub-bottom profiler, and a towed sidescan sonar with 250m of armoured sonar cable. The payload swap on the ASV was integrated, calibrated, and demonstrated in the field in less than 48 hours. A total of 1,220km of cable route survey lines was then successfully executed by the ASV C-Worker 5 system.

Throughout the operation the C-Worker 5 was remotely monitored using ASV Global's ASView™ control system from a station on TerraSond's mother ship. ASView™ used exported .dxf survey lines

from the TerraSond survey planning system to execute an accurate survey autonomously with minimal human intervention.

ASV Global has supported TerraSond for three consecutive years refining the use of autonomous systems in hydrographic survey applications. This year's deployments follow on from a 2016 charting survey completed in the Bering Sea, off Alaska, where ASV Global and TerraSond marked an industry first by completing a 9,578km hydrographic survey, 4,213km of which were completed unmanned. Combined, these operations result in over 10,000km in unmanned survey lines.

Tom Newman, president of TerraSond, said, "We continue to be impressed after several projects with ASV's C-Worker 5 in a variety of missions. Together with ASV we have performed the first use in charting, first use in the Arctic, first use for a cable route survey and first to accumulate over 10,000km in use. ASV's team has risen to each challenge and the system has proved to be a reliable and cost effective force multiplier, often doubling our production, operating in areas unsafe for a larger vessel and allowing multi-tasking on projects."



The ASV Global C-Worker 5 autonomous surface vehicle



DNV GL has carried out its first offshore drone survey on board the tender support vessel *Safe Scandinavia*
Photo: DNV GL

North Sea semi-submersible undergoes drone survey

REMOTE INSPECTION | The semi-submersible tender support vessel (TSV) *Safe Scandinavia*, owned and operated by Prosafe, was surveyed by camera-equipped drones recently in DNV GL's first remote offshore survey. The classification society's drone pilots were focusing on the vessel's fairleads and their connection to its two columns as part of the intermediate survey.

"This was a great opportunity for us to demonstrate our drones' ability to check the condition of remote external components in challenging offshore conditions," said Cezary Galinski, the classification society's project manager in Poland.

"The inspection only required the semi-submersible to de-ballast, then we flew the drone approximately 25m below the main deck to check the condition of the fairleads and their connections to the columns that hold up the TSV. With wind speeds of approximately 15 knots, this went very well and the survey showed that the fairleads and their connections were in a good condition."

Ian Young, chief operating officer at Prosafe, was pleased with the outcome. "Normally, this kind of operation would cause disruption to our client for several days," he said. "The drone survey took only a few hours and was just as effective."

DNV GL has carried out a number of drone surveys on ships and offshore units, inspecting many areas including tanks and cargo holds, and external structures such as jack-up legs. Surveys of these spaces is often costly and time-consuming, and potentially dangerous for surveyors. The use of drones saves time, reduces the costs of staging, and improves surveyor safety.

The classification society now has a network of trained drone pilots based in Gdynia, Piraeus, Singapore, Houston and Shanghai, and drone survey inspections can be arranged from any of these hubs. DNV GL is now developing new guidelines and rules on remote inspection procedures.

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North Sea One wind farm logistics successfully completed



Project management and logistics for the *North Sea One* wind farm have been completed

BUSS OFFSHORE | Hamburg-based Buss Offshore Solutions has recently completed the successful project management and logistics relating to the *North Sea One* wind farm from its Orange Blue Terminal operating base in the port of Eemshaven. This is the eleventh such

project to have been handled by the logistics consultancy, either at one of its own terminals or at a customer's site.

The *North Sea One* wind farm comprises 54 wind turbines consisting of 378 components, and Buss Offshore Solutions oversaw the planning and coordination of all services required at the terminal, as well as preparing the area, transport, storage and pre-assembly of the complete towers and rotors on site, and delivery of components to the quayside.

"The storage of the 61.5m-long rotor blades, the up to 118-tonne tower sections and the 350-tonne nacelles alone is a logistical challenge," commented Martin Schulz, managing director of Buss Offshore Solutions. "The biggest challenge, however, is managing everyone involved so a project of this size can be implemented smoothly and on schedule. In addition to our Buss Offshore Solutions and the Orange Blue Terminal staff, easily another 30 staff or so were also working on the *North Sea One* wind farm, at the terminal, or elsewhere over the last nine months."

The company has already begun a similar follow-up project for the *Merkur* wind farm from its Orange Blue Terminal.

Hybrid energy storage replaces generator

VIKING PRINCESS | The Norwegian offshore supply vessel *Viking Princess* is the first vessel on which batteries reduce the number of generators aboard the ship. The new energy storage solution will improve engine efficiency, generate fuel savings and reduce greenhouse gas emissions. *Viking Princess* completed sea trials and the system was handed over to customer Eidesvik Offshore early in October.

There is significant potential to save fuel through improved engine efficiency, as the operating profile of supply vessels is highly variable. When using the Wärtsilä installed energy storage system on board *Viking Princess*, the fuel saving potential can be up to 30% in various operations and the CO₂ emissions can be reduced by up to approximately 13-18% per year, depending on operational conditions and requirements, Wärtsilä said.

Furthermore, the hybrid solution is said to provide a more optimal load on the engines, while the intervals between engine maintenance can be extended.

Viking Princess now runs on a combination of a battery pack for energy storage and three LNG-fuelled Wärtsilä engines.

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Ship&Offshore Buyer's Guide

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.

1	Shipyards	Page II	10	Ship's operation systems	Page VII
2	Propulsion plants	Page II	11	Deck equipment	Page VII
3	Engine components	Page III	12	Construction + consulting	Page VII
4	Corrosion protection	Page IV	13	Cargo handling technology	
5	Ship's equipment	Page IV	14	Alarm + safety equipment	Page VII
6	Hydraulic + pneumatic	Page V	15	Port construction	
7	Onboard power supplies	Page VI	16	Offshore + ocean technology	Page VIII
8	Measurement + control devices	Page VI	17	Maritime services	Page VIII
9	Navigation + communication	Page VII	18	Buyer's Guide Information	Page IX

1 Shipyards

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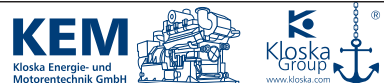
2 Propulsion plants

2.01 ENGINES



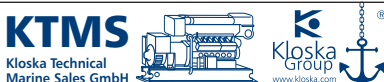
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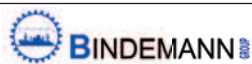


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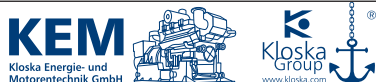
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4.02 COATINGS



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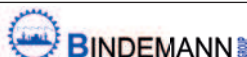
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5 Ships' equipment

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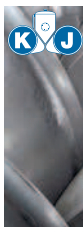
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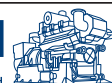
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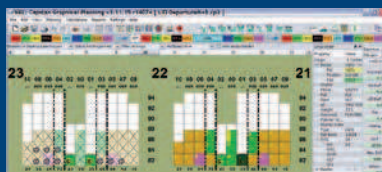
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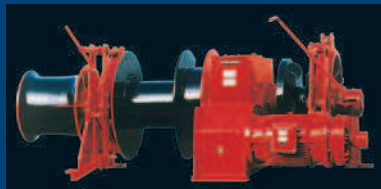
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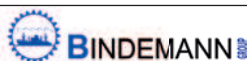
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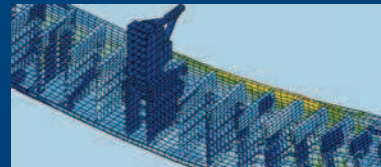


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Finnish initiative transforms Arctic communications



The new technology has been tested on board the *Hebridean Sky*

SITUATIONAL AWARENESS | Finnish start-up communications company Fleetrange Ltd and KNL Networks Oy have successfully tested a new communications technology which is based on a combination of the Internet of Things (IoT), the cloud, 3G and high-frequency long-range radio waves, and provides reliable connections in areas where satellite communications are expensive, unreliable, or non-existent. Fleetrange with KNL, as it is known, facilitates the transmission of up-to-date information on weather, ice conditions, ship location, shipboard sensor data and critical email traffic.

The new technology has been successfully tested on board the *Hebridean Sky*, operated by Salén Ship Management of Sweden, as the vessel sailed around Svalbard during its 2017 Arctic season. Both companies'

systems were thoroughly tested and monitored and were found to provide a reliable communications channel between ship and shore and vice versa. Information transmitted successfully included shipboard sensor data, weather conditions, ice charts, and e-mails, despite the fact that satellite communications in this area are patchy.

IT officer on the *Hebridean Sky*, Dindo L. Talon, expressed his appreciation. "Fleetrange and KNL has always been a big help on our entire stay in Svalbard, especially on those areas that we don't get any signal at all with the VSAT, by receiving the updated ice charts and weather forecasts. I am impressed with how useful the HF email is when nothing else is available to connect and contact from the head office. And it enabled us to send reports despite the loss connection on our VSAT."

Henrik Ramm-Schmidt, CEO and founder of Fleetrange, said: "Ships in the northern Arctic waters have been relying on non-existent or lower quality and expensive digital satellite communications for a long time. It is truly amazing for us to be able to change this and be the pioneers with KNL in providing high availability digital communications and situational awareness for these harsh waters."

The CEO and founder of LNG Networks, Toni Lindén, added: "At KNL, our mission is to free the maritime industry from connectivity constraints, and this trial with *Hebridean Sky* is a great example of fulfilling that vision. Together with Fleetrange, we're proud to have provided the key link of communication and content where satellite is unavailable."



DOF crew member
on board Skandi Skansen

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Lillian Bøe Larsen, CEO, MariniT (IT Service Provider for the DOF group)

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“Unified threat management” service tackles maritime cyber risks

DIGITAL SECURITY | Inmarsat has launched a new fully managed service, Fleet Secure, to detect vulnerabilities, respond to threats, and protect ships from cyber attack as an integrated component of its rapidly expanding Fleet Xpress service. The high-throughput satellite communications system, introduced in April 2016, is available both to direct Inmarsat customers and wholesale partners. More than 10,000 vessels have been signed up to Fleet Xpress and about 2,500 vessels are already connected. New installations are now running at about 250 ships per month. Fleet Secure is embedded in the VSAT service and will not require any additional spending on hardware or affect a customer's existing contracted bandwidth. Inmarsat has developed Fleet Secure in cooperation with Trustwave, a US-based information security specialist and a subsidiary of Singapore Telecommunications Limited (Singtel). The US company

has established a sound track record in providing robust cyber security across a range of land-based industrial sectors including finance, hospitality and retail, protecting thousands of businesses by carrying out its own “ethical hacking”, forensic investigations and threat intelligence.

Speaking at the London launch of Fleet Secure, Inmarsat Maritime SVP of Safety and Security, Peter Broadhurst, noted shipping's relative vulnerability to cyber attack because digitalisation is a relatively recent development in a maritime context. Whilst new high-speed connectivity and the internet of things offers potentially huge benefits for ship operators and maritime service providers, Broadhurst warned that cyber security in shipping is still a risk that many do not fully appreciate.

“The threats from cyber attack demand robust technical solutions, network integrity, operational and training support, and raised awareness across

the maritime sector,” Broadhurst declared. Fleet Secure is the industry's first and only fully managed “unified threat management” service, he said, explaining that it is available on three service levels. The fully managed gold standard provides real-time threat monitoring and analysis, immediate notifications to customers with major threats followed up by telephone to ensure a rapid response to potential dangers. The silver service provides a daily review of threats and notifies customers of potential risks, while the bronze service provides a portal through which customers can monitor potential risks, see current alerts, and take proactive steps when necessary.

The rapid expansion of crew connectivity at sea is a major challenge, Broadhurst noted. The cyber risk associated with BYOD – bring your own device – is a particular issue, he said, because it is one of the easiest ways to infect a whole ship.

Reporting platform to be launched

JOINT PROJECT | The CSO Alliance, a group of maritime company security officers (CSOs), is to work with Airbus Defence and Space partners on the design of a secure online reporting platform to help counter maritime crime. The platform will be launched in October to provide CSOs and company information security officers with a global portal for voluntary and anonymous incident reporting of physical and cyber threats.

Whilst the digital revolution is having a dramatic impact on many aspects of shipping's operational efficiency, it is also laying bare some of the sector's vulnerabilities. New threats have emerged and a centralised reporting system is needed for the anonymous reporting of cyber-attacks both on land and at sea. Incident data will be collected; risks assessed; trends analysed; and alerts issued as required.

Olivier Surly is head of Maritime Solutions at Airbus Defence and Space. “The evolving physical threats and cyber-attacks that the maritime industry faces are still vastly under-reported,” he said. “Building upon our strong and established experience in maritime domain awareness, we are supporting CSO Alliance to develop an effective and collective tool which will empower shipowners and operators, ports, insurers, flag states and classification societies to improve overall safety and security.” Mark Sutcliffe, managing director of CSO Alliance, added: “By ensuring that not only captains and crews, but the wider maritime supply chain are fully briefed on the cyber threats we all face too, risk is more accurately assessed and we achieve security through community.”

Marlink upgrades Sealink C-band service

MULTI-BAND CONNECTIVITY | Marlink has relaunched its Sealink C-band service to facilitate easier integration with existing and future Ka- and Ku-band VSAT services, providing more flexibility for customers and ensuring constant access to high-speed business and operational applications. The move comes as part of shipping's accelerating digitalisation and connectivity process enabling customers, particularly in the most demanding high-throughput sectors such as cruise shipping and offshore

energy, to rely on continuous and robust high-speed connectivity. Cruise ships, seismic vessels and offshore supply vessels, therefore, will be among Marlink's clients which benefit from the combination of C-band with other frequencies. The upgrade will ensure the availability of broadband connectivity, regardless of the carrier in use.

Tore Morten Olsen, Marlink's president, Maritime, explained: “We have updated our Sealink C-band services to match the streamlined structure of our other VSAT services. This ena-

bles customers to maximise their regional, multi-regional and global coverage and quality of service, by adding alternative carriers based on their specific requirements for throughput and value-added services which are covered by our frequency agnostic network.”

Marlink, together with sister companies Telemar and Palantir, is now owned by Apax Partners, a London-based private equity firm. This combination, the company claims, provides an unrivalled portfolio of multi-band communication systems.

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Consortium to accelerate electric ferry development



Artists impression of new zero-emission, fully electric, autonomous ferry concept

SHIP AUTONOMY | Kongsberg Maritime is heading a Norwegian consortium to accelerate the technology required for the development of zero emission, fully electric autonomous ferry concepts. The company has signed a research and innovation (R&I) contract with Pilot-E, a technology acceleration organisation established in a collaboration between the Norwegian Research Council, Innovation Norway and Enova, a US-based technology and data analytics company.

The R&I contract with Pilot-E provides Kongsberg with partial funding for the development of new autonomous technologies including auto docking and auto sailing, thereby making more resources available for the technology specialist to develop autonomous functionality for commercial vessels.

“The overall vision of the Pilot-E autonomous ferry concept is to develop a state-of-the-art ferry as an integrated zero emission aspect of a national transportation plan,” said Kongsberg in a statement.

The Kongsberg-headed consortium is made up of Grenland Energy on marine battery technology, Fjellstrand shipyard on vessel design, Grønn Kontakt on the charging of electric cars both on the quay and on board the ship, and the Norwegian University of Science and Technology (NTNU) as research partner in autonomy and energy management.

An-Magritt Tinlund Ryste, Kongsberg Maritime project manager, explained: “The stakes are high and the autonomy vision is materialising as we speak. The Pilot-E autonomous ferry project introduces a new mindset encouraging us to look beyond the traditional organisational

setup. To meet the ambitious time-to-market expectations, we must really adopt the true meaning of collaboration and step up the work across technological areas within Kongsberg and between partners, to harvest the best from each area of expertise.”

Kongsberg is already working on a number of other projects with other industrial partners focused on autonomy and sustainability in shipping. They include the *Yara Birkeland*, a 120-TEU open top container ship which, it is claimed, will be the world's first fully electric and autonomous container carrier, with zero emissions. Kongsberg is providing automated control systems and components including sensors, an electric drive, batteries and propulsion control.

The Norwegian company is also working with the UK's Automated Ships Ltd and Marseille-based offshore support vessel operator Bourbon in development of an autonomous prototype vessel for offshore operations. The *Hrönn* is a light-duty, offshore utility ship concept under development for a range of functions including scientific and hydrographic research, ROV and AUV launch and recovery, open water fish farm support, and offshore platform standby operations including fire-fighting.

Simulation to improve poor lifeboat drill safety record

VIRTUAL TRAINING | Transas has introduced a new survival craft simulator (SCS) to prepare crew for the multitude of possible scenarios that can occur during lifeboat drills, aiming to address one of the most notorious sources of accidents in shipping without exposing personnel to physical danger. By moving to a simulated environment, risks are minimised and sea-going personnel can focus more closely on safety procedures and try out what-if scenarios to minimise potential risks, the company said.

“No one doubts the importance of effective survival craft training,” said Frank Coles, Transas CEO. “Guidance issued by insurers reaffirms that crew should be capable of operating lifeboat systems and understanding

the mechanics and procedures, but training itself cannot be the source of risk.

“The majority of the maritime industry stakeholders still have some way to go to fully embrace the use of simulation to enhance and improve competency in shipboard operations,” he continued. “This tool is further evidence that competence can be raised safely and efficiently without endangering lives. The time for platitudes is over; resources and recurrent training save lives and enhance safety.”

The SCS makes it possible for training to take place in either a training centre or on board a ship in a virtual environment, enabling seafarers to learn essential procedures including the preparation, boarding and launching of survival craft, without any physical risk.

The simulator comprises a detailed model of an enclosed, davit-launched, self-righting lifeboat. A functional model simulates hook-release gear, wire lashings and gripes, and boat securing onto a davit. Instruction on using the release handle, a safety pin, and hydrostatic interlock level can be effected either virtually or by connecting a physical device to the simulator.

The poor safety record of real-life lifeboat drills has been a concern of the IMO's Maritime Safety Committee for some time and the issue was last discussed at its 98th session in June. The Committee adopted amendments to the guidelines relating to abandon-ship drills using lifeboats and has made compulsory various measures to prevent lifeboat drill accidents, likely to enter force in January 2020.

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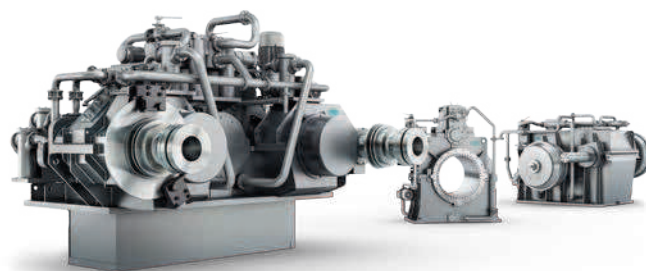
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