№ 6 | 2025

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Future-proof

The day before this issue of Ship&Offshore went to press, I had the honour of boarding the research vessel *Polarstern* in Bremenhaven. The icebreaker, which belongs to the German Federal Government, had just returned to its home port after a 20-week Antarctic season. After around six weeks of routine maintenance and repair work at the Lloyd Werft shipyard, the research vessel was scheduled to depart for the Arctic again at the end of May.

This ship has many impressive features, one of which is certainly that the old lady has been in service since 1982. Built at the Nobiskrug shipyard in Rendsburg, Northern Germany, in just 14.5 months, the ship was built without any precedent and many of the then planned technologies and designs are still useful and future-proof today.

But even more impressive were the people we met on board – the captain, who speaks very fondly of the ship after 15 years on board, representatives of important research institutions, the ship's doctor (in fact, an appendectomy has already been performed on board three times), the ship's electricians, kitchen staff, scientists, and engineers. They are all united by their love of the ship, the important marine and polar research to which the *Polarstern* makes a vital contribution, and their connection to seafaring.

I'm really looking forward to filing the copy of my visit – the photos and the interview responses for the next issue of Schiff&Hafen and, of course, the Ship and Offshore Repair Journal – because without the semi-annual dockings in Bremerhaven and Lloyd Werft's devotion to the ship, the 'pin-up girl' of research vessels, as the *Polarstern* was once called according to Captain Thomas Wunderlich, would probably not be in such good shape today. She sometimes groans, says Wunderlich, but she's allowed to do that at her age.

In our coverage of the topic, we will of course also focus on the new icebreaker, the *Polarstern 2*, for which, after 17 years of complex planning and funding discussions, the construction contract was finally awarded last December. We will also address the dramatic decline of polar sea ice and land ice at both the North and South Poles, which the *Polarstern's* expeditions have repeatedly documented. And which needs our urgent attention!

But before that, the journey continues to Oslo for Nor-Shipping, which is celebrating its 60th birthday this year and will once again welcome the international maritime community this June — both at the exhibition centre in Lillestrøm and throughout the city at various social gatherings.

Industry events like Nor-Shipping continue to play an important role in fostering exchange and cooperation across the maritime sector. In light of current global developments, it is more important than ever to reflect on past experience in order to make informed, future-oriented decisions. With "Future-proof" as this year's guiding theme, the exhibition provides a fitting framework for these discussions. Our team will be present at the German Pavilion in Hall C. We are looking forward to seeing you there!

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Special Features in this issue

The June issue of Ship&Offshore offers extensive reading with three integrated features. In addition to the latest edition of the Ship and Offshore Repair Journal, we focus on digitised and automated systems and developments in our SmartShip Edition. Furthermore, our biennial VDMA Special on the innovative strengths of the association's member companies is included.

The SmartShip Special Edition starts on page 19; the Ship and Offshore Repair Journal on page 29, and the VDMA Special German Marine Equipments starts on page 55

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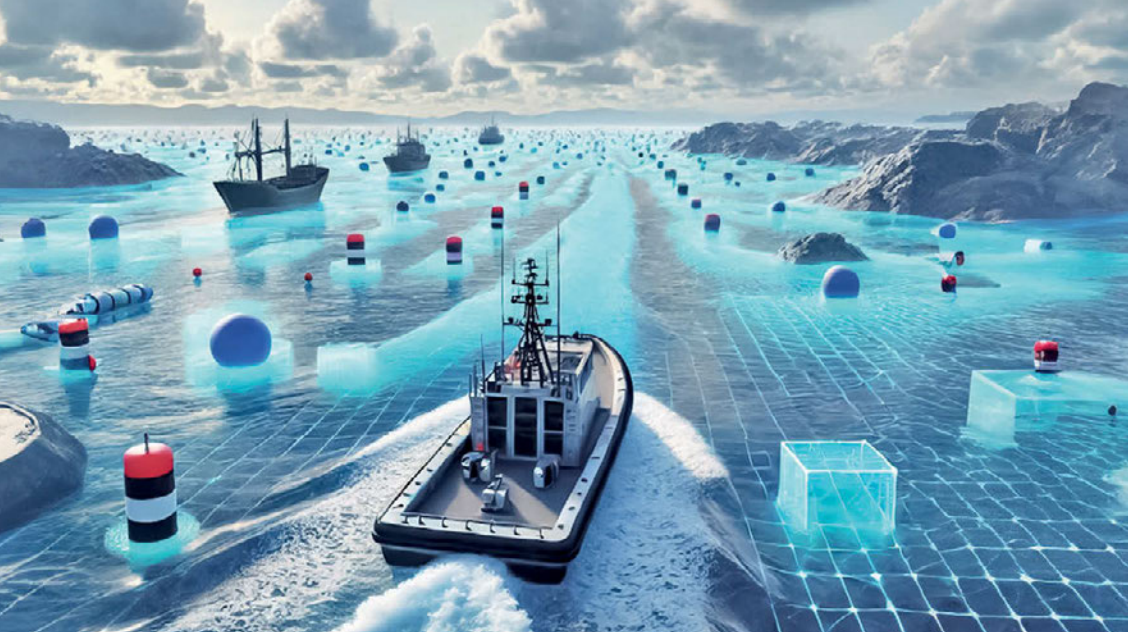

The aim of the project is to explore AI-supported methods in order to develop and evaluate new and proven tactical behaviour patterns and decision-making processes for naval warfare Source: TKMS

AI maritime defence project started

GhostPlay@SEA | Atlas Elektronik, the marine electronics division of thyssenkrupp Marine Systems (TKMS), is to become consortium leader in the GhostPlay@SEA research project. This is an extension of the original GhostPlay project which created a 'Defense Metaverse' to simulate AI-based combat situations on land and in the air. At that stage, however, there was no maritime dimension.

The aim of the new project is to explore AI-supported methods to develop and evaluate behaviour patterns and decision-making processes for naval warfare. The transfer of virtually trained tactics to real hardware will also be researched and piloted. The project underlines the innovative strength of the German defence industry in the age of digitalisation. By using state-of-the-art AI and simulation technologies, future threat scenarios – from drone swarms to autonomous submarines – can be simulated in advance within a risk-free virtual environment.

Dr Jeronimo Dzaack, co-head of Future Tech at Atlas Elektronik, commented: "In the virtual environment, highly complex combat situations can be realistically simulated, and optimal tactics can be safely tested."

Providing AI-powered insights

Port congestion | Bergen-based weather intelligence and voyage optimisation specialist, StormGeo, and Finnish artificial intelligence analytics company, Awake.AI, are to collaborate on the provision of advanced port call analytics.

The partnership will improve the accuracy of estimated time-of-arrival predictions on competing vessels and provide more information on port congestion. This aim is to support voyage optimisation by enabling just-in-time arrivals together with fuel and emission savings.

StormGeo vice president of Route Advisory Services, Rolf Reksten, said: "By teaming up with Awake.AI, we are enhancing our voyage optimisation services by allowing our clients to plan their port calls more accurately and efficiently and ultimately help the industry save fuel and reduce emissions."

Source: Strategic Marine

Strategic Marine has now delivered the fast crew boat *TMS Chana*

Another fast crew boat delivered

TMS Chana | Singapore-based Strategic Marine has delivered another fourth-generation fast crew boat to Thailand's Truth Maritime Services (TMS). The latest fleet addition follows the handover of the first two crew boats in the class, *TMS Ranod* and *TMS Raman,* last year and takes the company's fleet to 17 crew boats and two 300-passenger accommodation barges stationed near offshore rigs.

TMS specialises in crew boat operations and has been expanding steadily to meet growing demand for support vessels in the offshore markets.

Efficiency retrofit completed

BAM Shipping | Damen Shipyards Group has completed a major retrofit programme on four bulk carriers for Liberia-based logistics company BAM Shipping, involving a range of energy and emissions-saving systems. The project is expected to cut fuel consumption by up to 25% and reduce emissions by around 90%, according to initial estimates.

The retrofit is the first of its kind to incorporate this specific combination of technologies on a single set of vessels. Key upgrades include the Damen Air Cavity System (DACS), Triton IoT platform, low-friction coatings, variable frequency drives, shore power compatibility, and carbon capture systems. Additional improvements introduced during the project included fuel and oil additives, propeller coatings, and a nano EFX spray for enhanced combustion.

The work supports compliance with the IMO's CII and EEXI regulations and is expected to extend the life of each vessel by approximately twelve years.

BAM vessel at the Tuzla Shipyard Zone, Turkey Source: Damen

Damen lands new tug contracts for German owner

Fairplay | Hamburg-based tug operators have placed orders for four new vessels with Damen Shipyards Group. Fairplay Towage has ordered three vessels – two RSD 2513s and one ASD 2312, and Louis Meyer has contracted an ASD 2312 which will be bareboat chartered to Fairplay from delivery.

Damen's strategy of building for stock means short delivery times: one of the reversed stern drive vessels and both azimuth stern drive vessels will be delivered later this year. The second reversed stern drive boat is due for completion early next year.

The vessels, based on standard designs, will have additional features. These will include LNG, firefighting (FiFi-1) and winterisation packages. They will also have Damen Marine NOx Reduction Systems to ensure IMO Tier III compliance.

Illustration of the four new tugs to be built for Fairplay Towage and Neue Schleppdampfschiffsreederei Louis Meyer Source: Damen

The 24m-long and 7.5m-wide *USV Challenger* has been designed to perform underwater inspection, maintenance and repair, mapping and survey work without the need for a crew on board

Source: Gondan

Gondan hands over autonomous USV

IMR works | Spain's Gondan Shipbuilders has delivered the first unmanned vessel to be built at its facilities. The *USV Challenger* has been developed in a joint venture project with Solstad Offshore, Østensjø Rederi and DeepOcean. It represents a key development in the future of shipbuilding, according to the partners.

The vessel, 24m long and 7.5m wide, has been designed by Salt Ship Design to carry out underwater inspection, maintenance and repair (IMR) and survey work with no crew. It has a hybrid diesel-electric propulsion system, an endurance at sea of 30 days, and an emissions profile that is over 90% less than conventional vessels of this type.

It has a remotely operated vehicle launch and recovery system designed by DeepOcean that is fitted with a range of tools to carry out underwater tasks. The all-electric robot can operate at depths of up to 1,500m.

After final approval from the relevant authorities, the vessel will be deployed on IMR work for DeepOcean.

Incat launches world's largest battery-powered ship

China Zorrilla | The largest battery-electric ship in the world has been launched at Incat's shipyard in Hobart, Tasmania. The ferry *China Zorrilla* is being built for the South American ferry operator, Buquebus, and will operate across the River Plate between Buenos Aires and Uruguay. The all-electric vessel will be capable of carrying up to 2,100 passengers and 225 vehicles.

The ferry, the ninth that Incat has built for Buquebus, has an energy storage system consisting of more than 250 tonnes of batteries and over 40MWh of installed capacity. The system is four times larger than any battery installation so far and is connected to eight Wärtsilä waterjets powered by electricity.

"This is a historic day – not just for Incat, but for the future of marine transport," declared Robert Clifford, Incat chairman. "We've been building world-leading vessels here in Tasmania for more than four decades, and Hull 096 is the most ambitious, most complex, and most important project we've ever delivered. This ship changes the game."

Buquebus president, Juan Carlos López Mena revealed that it was originally envisaged that the ferry would use LNG as fuel. But in what he described as 'a true milestone achieved between private companies', the two company heads took the decision to switch to electricity.

Incat CEO, Stephen Casey, added: "We're not just building a ship – we're building the future. Hull 096 proves that large-scale, low-emission transport solutions are not only possible, they are ready now. This is a proud day for Tasmania and for Australian manufacturing."

Fitting out the vessel's interior, including a 2,300m^2 duty-free retail area, will continue over the next few months. Final fit-out, installation of batteries, and energy system integration will prepare the ferry for sea trials later this year.

The ferry is named after the Uruguayan actress and director, *China Zorrilla* Source: Incat

Vard wins third CSOV contract from Taiwanese customer

The CSOVs have been developed with large design flexibility to accommodate future operational demands Source: Vard

Option | Taiwanese offshore energy contractor Dong Fang Offshore (DFO) has declared an option for a third commissioning service operation vessel (CSOV) at Fincantieri-owned Vard. The vessel will be built to a Vard 4 39 design, developed jointly by DFO and Vard and the same as the first two CSOVs that were ordered in May last year.

On delivery, the vessel will enter into a 15-year service contract with an unnamed wind farm operator in Taiwan. The flexible design, with a 700m² open deck, ensures that the vessel can be deployed both on wind farm construction and installation, as well as providing support subsequently during farm operation.

The 120-person ship, with 90 cabins designed for single occupancy, will have a powerful battery package, a fully electric crane, and a motion-compensated walk-to-work gangway. It will also have a SeaQ Integrated Bridge, a Power Management System, an Energy Management System, and will be built 'ready' for future fuels.

Cathrine Kristiseter Marti, Vard Group CEO, commented: "We are proud that DFO already chose to return to Vard for one more vessel of similar design to the two CSOVs Vard is constructing, and the offshore subsea construction vessel contracted in April. This new contract truly shows Vard's strength as an integrated shipbuilder, and the trust we have in the market regarding our ability to deliver on time and budget … We are looking forward to continuing our partnership with DFO in the years to come. Together we will find sustainable solutions for the offshore energy industry."

Delivery of dual-fuel ULCS

Delivery ceremony of the *CMA CGM Seine* Source: CMA CGM

CMA CGM Seine | French container liner CMA CGM has taken delivery of the 24,000-TEU LNG dual-fuel ultra-large container ship (ULCS) *CMA CGM Seine*. Built at Hudong-Zhonghua Shipbuilding in China, this is the first in a four-ship series for the French container line.

The 400m-long vessel, classed by Bureau Veritas, has a range of distinctive features which, it is claimed, represent a significant shift to more sustainable, low carbon operations in the ultra-large boxship sector. Its WinGD W12X92DF-2.0 main engine incorporates the engine company's Intelligent Control by Exhaust Recycling system, improving fuel performance and reducing methane emissions.

The classification society was closely involved through the ship construction process, participating in engine tests prior to the issuance of an Engine International Air Pollution Prevention certificate.

Latest crane order for MacGregor

Vertom | Four multipurpose ships to be built at India's Chowgule shipyard for Netherlands-based Vertom group, will be equipped with fully electric cranes from MacGregor. Each vessel will have two cranes with a safe working load of 80 tonnes at 18m. The crane order, finalised with the support of MacGregor's local agent, Varya Tech Pvt Ltd, is being booked in the second quarter of this year. Deliveries will start in 2026.

Rolf van Leeuwen, Newbuilding superintendent at Vertom, commented: "We are pleased to partner with MacGregor on this important step forward in the electrification of our fleet. These electric cranes support our commitment to safer and more sustainable operations and reflect our ambition to lead by example in responsible shipping."

Speaking for MacGregor, Magnus Sjöberg, SVP Equipment and Solutions Division, said: "We are pleased to partner with Vertom in bringing next-generation electric crane technology to their fleet."

Artist's impression of the multipurpose vessel design Source: Vertom

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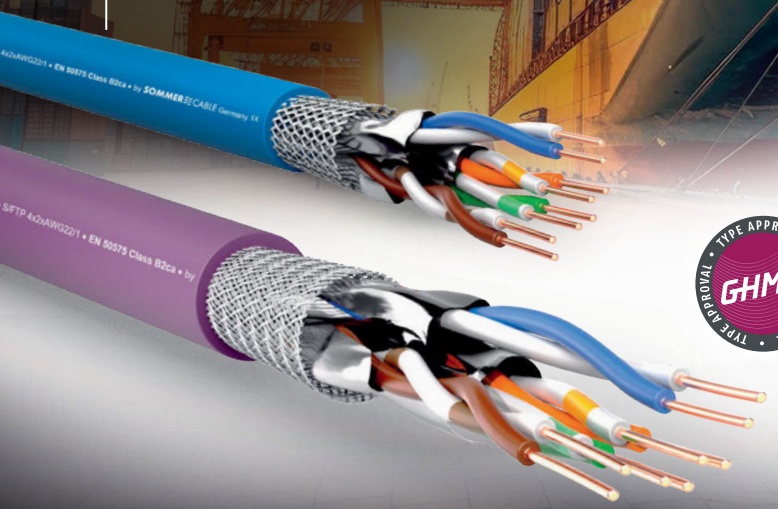

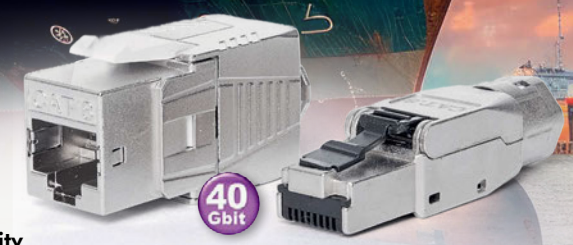

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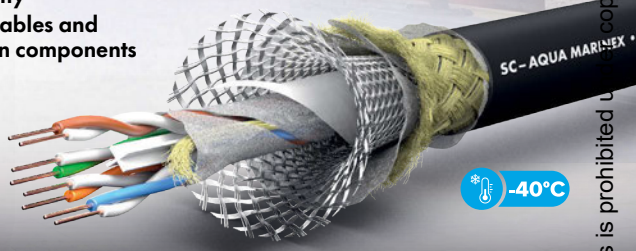

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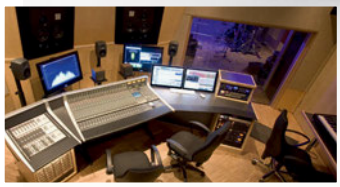

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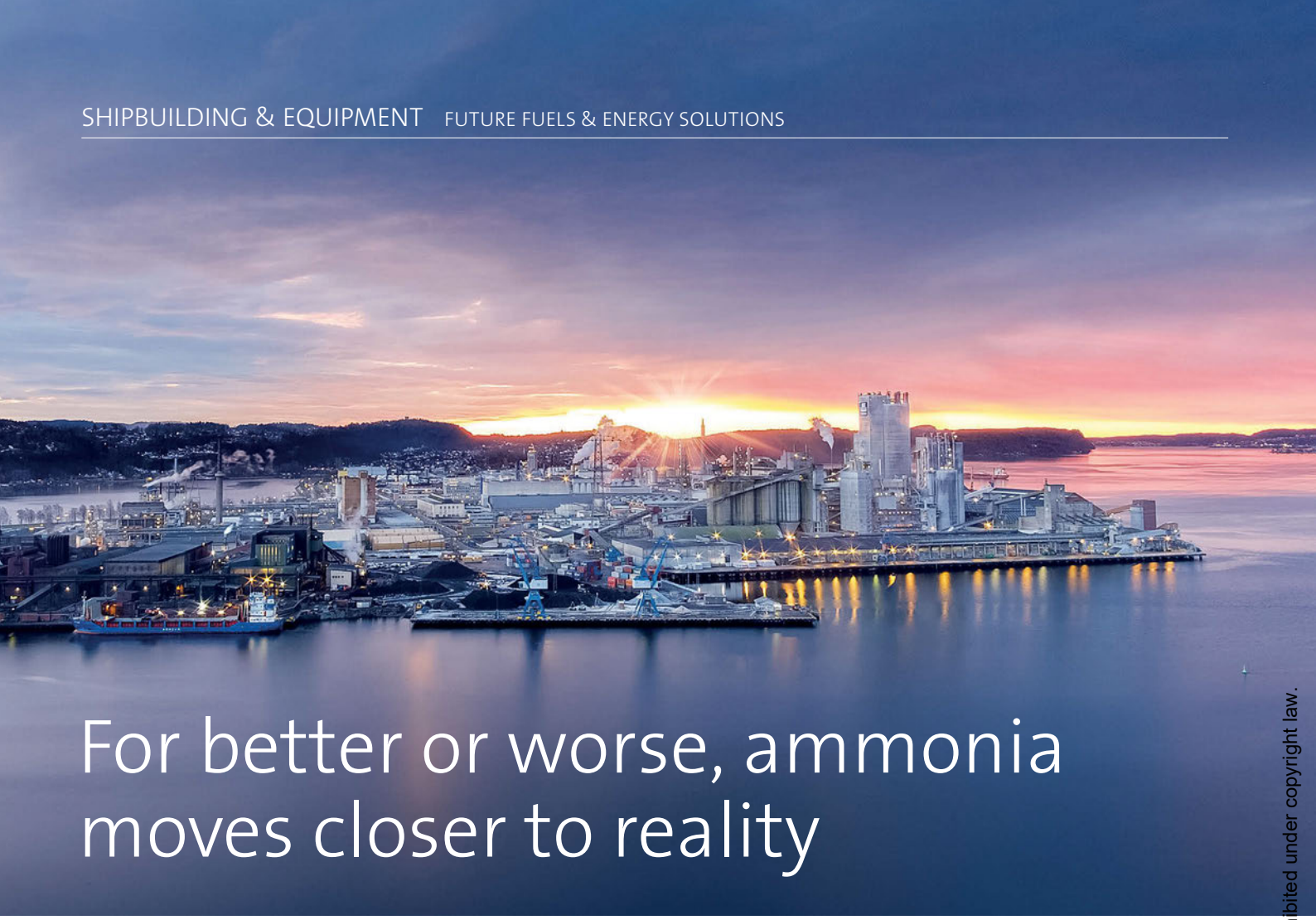


For better or worse, ammonia moves closer to reality

Yara's Porsgrunn fertiliser plant

Source: Yara

SCALABILITY Difficult and dangerous, ammonia may not be everybody's idea of an environmental win-win, but Norwegian companies are pushing ahead. The green ammonia-fuelled shipping economy would be scalable in a way that other fuels are not, writes freelance journalist Charlie Bartlett.

Highly toxic, and life-threatening in relatively low concentrations, concerns over safety are impossible to ignore with ammonia, and DNV, too, is preoccupied with the implications of bunkering. "You need to do a risk assessment, case by case, where you need to find out the required safety zones and how to deal with a leakage during bunkering," said Linda Hammer, principal engineer, DNV Maritime. "I think many ports see that as a real challenge to go through that process."

The IMO safety guidance for ammonia specifies that crew have a designated refuge on their vessel in which to shelter, in the event of a leak. "There is an important requirement in the interim guidelines, for a safe haven … for the people on board the ship so they can go to a safe place that is not affected by the toxic gas, plan, and find out how to proceed," Hammer explained. "So that's an important part of the finance."

There does not seem to be a plan for the eventuality that an ammonia-powered vessel sinks. According to a study by Environmental Defence Fund (EDF) Europe, "Ammonia at sea: studying the potential impact of ammonia as a shipping fuel on marine ecosystems", a spill in coastal waters could be deleterious, causing an "increase in algal growth" that could lead to "smothering of intertidal habitats" and have implications for food chains.

"It's very obvious we would need to try to empty that tank somehow," Hammer said. "I don't know if I have a clear answer for that. We would need to make a risk assessment for that ship, on a case by case basis, and find out how to proceed."

Safety concerns

Quizzed over safety issues with ammonia, Hoëgh Autoliners CEO Andreas Enger highlighted the number of vessels already transporting ammonia around the world, but acknowledged that concerns remained over matters of bunkering. "Personally, I believe that bunkering is the riskiest aspect of operating on ammonia," Enger told Ship&Offshore. "It's not creating a risk new to shipping or to major ports. [But] any kind of sloppiness, any mishap with ammonia will get nuclear attention.

"If something goes wrong [with bunkering] we will seal the tanks and we won't go there again. I think we will need to be very specific about the ports where we bunker ammonia, for this reason."

It could be that Hoëgh's newest car carriers are the most 'ammonia-ready' in the world, with tanks already fitted that will handle ammonia, as well as LNG. These advanced tanks, built from strong material, can withstand both the extreme temperatures of LNG and the chemical and weight particulars of ammonia.

When the time comes to switch to operation on ammonia, very little will need to be altered, Enger said. "The difference is the top-end injection valve and stuff on

the engine. So it's some small parts of the engine, and the piping."

Reiterating his company's own commitment to an ammonia-fuelled future, Enger admitted, in conversation with Ship&Offshore, that after an initial phase of enthusiasm, Höegh's peers appeared to be backing off from the fuel – but Höegh would not. "We have made it clear, ammonia is more scalable and cheaper than methanol, full stop. There's a long history in shipping of using cheap fuels to manage cost."

Combining nitrogen found at high concentrations in the atmosphere with hydrogen electrolysed from sea water, a more scalable fuel than green ammonia is hard to imagine. Production is limited only by the amount of renewable energy that can be set aside for the purpose. Contrast this with ammonia's competitor, green methanol, which requires limited sources of biogenic carbon, competing with biofuels and bio-LNG.

Höegh Autoliners CEO Andreas Enger with the new Aurora-class Source: Charlie Bartlett

Scalable?

Though limitless in scalability in theory, in practical terms, green ammonia suffers severe bottlenecks. Not only will it require renewable energy to be devoted to its production, but also proton exchange membrane (PEM) electrolysers to generate the hydrogen. At least for the moment, Yara, which intends to assume responsibility for manufacturing a large portion of the world's ammonia, claims not to have control of where its power comes from.

"We will not be a power producer as such," explained Vibeke Rasmussen, SVP Product Management and Certification, Yara Clean Ammonia. "So for us, in projects, it's either working with somebody that can live with that, or in places like Norway where we have the grid, hydropower."

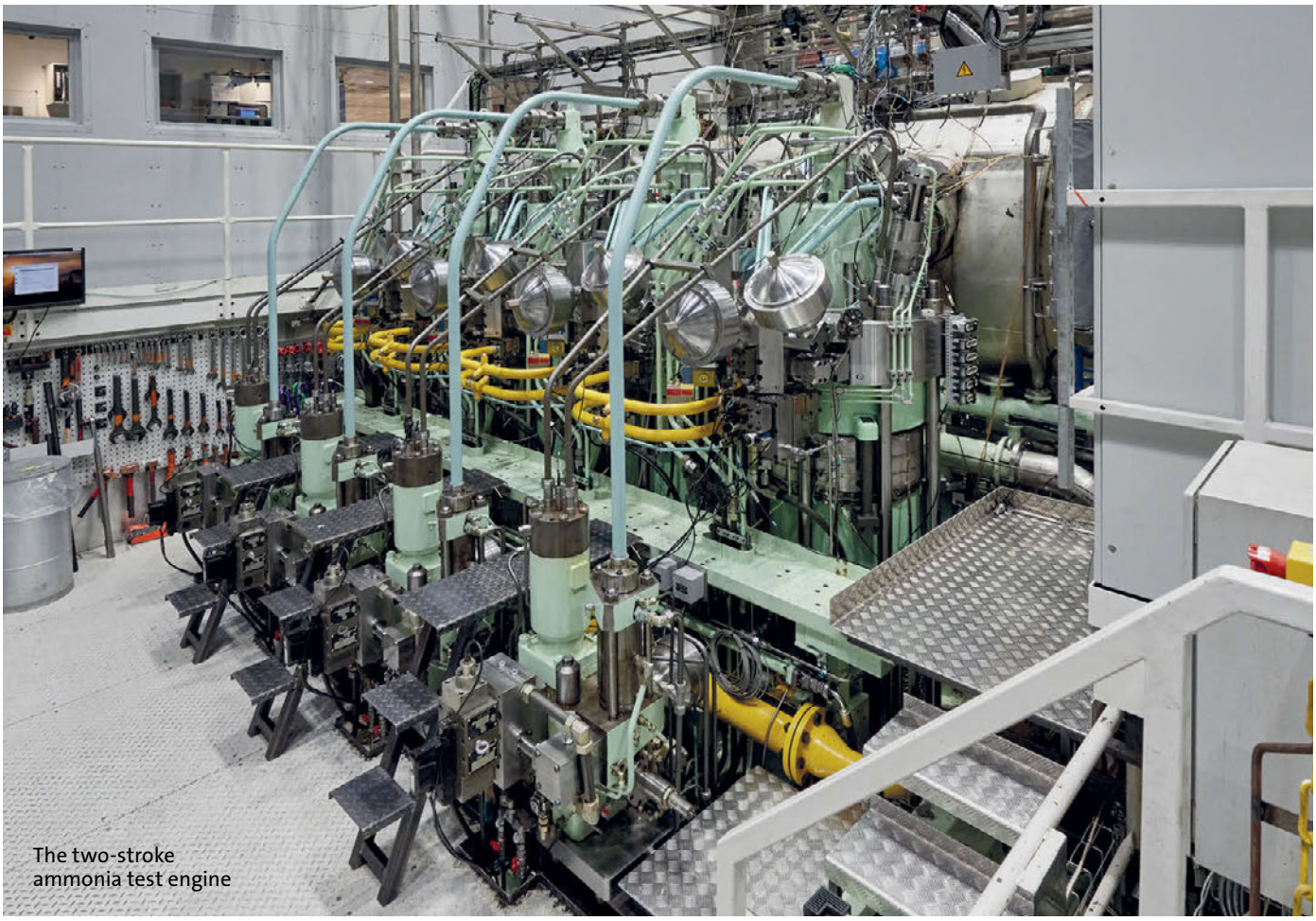
Practically all the ammonia Yara produces is of the grey variety, extracting hydrogen from natural gas through steam-reforming, combined with the Haber-Bosch process to generate the requisite nitrogen. Widescale adoption of grey ammonia as ship fuel would be an environmental disaster, as this would generate significantly more greenhouse gas emissions than conventional fossil fuels.

Fortunately, shipowners seem to recognise this. Enger reassured Ship&Offshore that Hoëgh has "no intention" of using grey ammonia. "If mass balance is organised through certificates allowing us to swap the molecules, we would be happy to do that. But if it's using these vessels to scale up grey ammonia consumption – no, we would not do it."

Instead, Yara's immediate strategy seems to involve blue ammonia – the type that is created with steam-reforming of fossil fuels, but also carbon capture. If implementation of the latter is successful, and works, Yara could provide as much ammonia as shipping needs without increasing carbon dioxide emissions.

"CCS is a known technology and a quicker path to decarbonisation today [than electrolysers]," Rasmussen said. "The electrolyser technology is not mature enough either for full industrial scale.

That's why we say it's easier to scale with the [blue] ammonia. Especially in Europe, we know that energy is an issue at the moment, that will take more time."



Source: MAN Energy Solutions

The two-stroke ammonia test engine

Blended to perfection

BIOFUEL Shipowners looking to meet IMO carbon intensity indicator (CII) requirements should be careful what bio-blend they put in the tank, writes freelance journalist and PR expert Patrik Wheater

Despite the Trump Administration's withdrawal from IMO carbon reduction talks and BP backtracking on its green ambitions, geopolitical mixed messages are unlikely to deter the shipping industry from its decarbonisation goals.

Nowhere is this more evident than the cruise sector's growing use of biodiesel, with Royal Caribbean, Norwegian Cruise Line, MSC, Hapag-Lloyd Cruises, and Carnival all having trialled fatty acid methyl esters (FAME) and hydrotreated vegetable oil (HVO) type biofuels as a way of reducing their reliance on fossil fuels.

However, the transition away from conventional bunker fuel presents complex challenges that ship operators must consider if they are to ensure their prime movers (and ships) remain safe and efficient.

"The route to widespread adoption is paved with technical complications. Operators need to know exactly what they're working with," said Jørgen Skødt Vedsted, Principal Promotion manager, MAN Energy Solutions, recently.

Of the two types of biofuels, HVO is the easiest option. With HVO there are no cold flow issues or problems relating to the lower calorific value, although viscosity is still a concern.

FAME, on the other hand, while more widely available and often cheaper, oxidises quickly, absorbs water, and can act as a solvent, releasing deposits from tank walls and pipework and into the fuel system.

In Singapore and Europe, shipowners are increasingly bunkering pre-blended FAME biofuels such as B24 or B30. But even these ready-made, ISO-approved blends require caution, and engine builders and designers have expressed concern over the use of high-percentage blends such as B80 and B100.

Among the primary issues raised by CIMAC in its 2024 Guideline on Marine Fuels Containing FAME is the risk of oxidation instability during storage. The document highlights that FAME degrades more rapidly than conventional marine fuels, especially when exposed to air and elevated temperatures, forming peroxides, acids, and insoluble gums.

"FAME oxidises more quickly and easily than fossil fuel," the guideline states, with resulting by-products that "may cause operational problems, including deposits, gum formation and corrosion".

Luboil selection is a critical consideration. The acid-forming tendencies of FAME can benefit from lubricants with a higher base number (BN) to neutralise corrosive by-products during combustion. But switching to higher BN lubricants is not without side effects. If the additive package is not properly consumed, it can lead to ash deposits and fouling in the cylinder liner and piston crown.

To this end, MAN ES recommends a Grade II Low BN cylinder lubricant but to keep an eye on the feed rate, the condition of the cylinders, and drain oil, and adjust accordingly.

'It's a delicate balance that must be struck between corrosion protection and deposit control – a challenge that requires careful monitoring of wear rates and regular analysis of drain oil samples," said Vedsted.

FAME's hygroscopic nature can also create the perfect conditions for microbial growth and contamination. Diesel bugs that live between the water and the fuel, clog filters and corrode components. But the bugs are only part of the problem.

CIMAC raises the issue of compatibility, especially when mixing different fuel batches. The guidelines strongly advise against mixing unverified FAME blends, recommending pre-use laboratory testing or, if mixing on board, comprehensive evaluation of the physical and chemical compatibility of the fuels involved.

Incompatibility, it notes, may lead to the formation of sludge and deposits that obstruct filters, separator systems, and injectors. This is particularly critical for operators switching between fuel types or suppliers.

Cold weather also presents a challenge. FAME has poorer cold flow properties than traditional diesel or HVO, and this can lead to wax formation and blocked filters, particularly in vessels that lack heated fuel systems.

Despite the challenges, both CIMAC and MAN Energy Solutions believe biofuel success lies not in the fuel specification alone, but in how the ship is prepared to handle it.

"Biofuels are a practical step to meeting FuelEU Maritime and IMO CII requirements," said Vedsted. "But ship operators must be prepared, crews properly trained, and routine engine and fuel monitoring commonplace. Operators should demand proof of compliance with ISO standards and work only with trusted fuel suppliers. The fuel you choose and how you manage it can determine whether your engine keeps running or breaks down at sea."

There are currently more than 30,000 two-stroke engines in operation, of which 24,000 are MAN ES designed. Of the latter, about 15,000 are mechanical engines – older units relying on camshaft-driven fuel injection systems – that cannot be converted to use alternative fuels like methanol, ammonia or methane.

"Mechanical engines will remain on the water for the next 10 to 15 years and will need biofuel solutions tailored to their limitations," said Vedsted. "If we can't change the output, and we can't change the engine, then the only viable solution is to change what we put in it."

For shipowners operating mechanical two-stroke engines, MAN ES recommends a phased, empirical-based approach to understand more effectively which biofuel blend works and which ones do not.

"For two-stroke engines, we advise shipowners first try a blend on an electronical engine before use on a mechanical engine, due to the fuel booster and low calorific value," Vedsted said.

"Test for a couple of hundred hours on one engine before using the fuel across the fleet. This controlled testing allows operators to assess wear patterns, oil condition, and combustion behaviour before committing to a fleet-wide adoption. It will minimise the risk of unexpected failures or costly downtime."

Electronically controlled engines have greater flexibility to manage variations in fuel quality and combustion more efficiently, though MAN ES stresses that even with electronic control, using biofuel still demands careful testing and fuel management.

While acknowledging that methane, methanol and ammonia will form part of the future marine energy mix, for mechanical and electronical MAN ES believes liquid biofuels are the most important fuels in the transition towards a carbon-neutral position for owners of larger merchant ships. There is a caveat. Anything other than ISO 8217:2024-certified FAME or HVO is not approved for use and may void MAN Energy Solutions engine warranties.

Despite the biofuel challenges, MAN ES is actively preparing its engine platforms to handle these fuels and new combustion profiles.

"We are sticking with combustion engines because they work," Vedsted remarked.

Spark plug with pressure sensor

CONTROL CONCEPT | Germany's Imes has developed the ISP-01 IMES spark plug, calling it an innovative dual-function component that integrates a miniaturised pressure sensor into a long-life spark plug, enabling real-time pre-chamber pressure measurement for combustion optimisation, emission reduction, and condition-based maintenance in gas engines.

The main users of IMES cylinder pressure sensors are original equipment manufacturer customers of large gas engines for the auxiliary and main propulsion of ships and power plants, which can also be operated with alternative fuels such as methanol, ammonia or hydrogen in the future.

For monitoring and combustion control, cylinder-specific pressure measurement using a pressure sensor is often used in these engines (closed loop control – CLC). The pressure and thus the combustion process in the main combustion chamber is measured, analysed and evaluated, so that the combustion process of each individual cylinder can be optimised. To optimise efficiency, the ignition spark is ignited using a spark plug in the pre-chamber.

The pressure in the pre-chamber is currently not measured in any series engine during normal operation, as the necessary installation space and access options are usually lacking.

In addition to monitoring and condition diagnosis, recording the combustion process in the pre-chamber also offers the advantage of optimising combustion in the engine component, minimising emissions and avoiding methane slip. This is an essential point for meeting existing and new regulations and rules regarding exhaust emission values. Regardless of the combustion concept used, the only access that is always possible is via the spark plug.

The PSP-01 pressure spark plug

ISP-01 IMES spark plug

In 2022, IMES started to develop its own spark plug with an increased service life of 4,000 – 6,000 hours. In contrast to a known hook spark plug, the design of annular gap shielded with a centre electrode as a ring was chosen.

The centre and ground electrodes are made of special precious metals, which have proven to be advantageous in terms of temperature, oxidation and thus wear behaviour for the service life of the spark plug.

The IMES spark plug type ISP-01 with M18x1.5 screw-in thread has been successfully tested on various gas engines over the last two years.

For the integration of a pressure sensor into the spark plug, IMES has developed a miniaturised pressure measuring element that turns two products into one. The pressure spark plug is a future-oriented and innovative product for series use on purged pre-chambers.

Future ignition technology – an innovative control concept

By integrating the innovative pressure spark plug into the pre-chamber, the intensity of the ignition flares that go from the pre-chamber into the main combustion chamber can be precisely determined and, with the help of a "closed loop" control circuit, the purge quantity for the pre-chamber can be adjusted directly from working cycle to working cycle. The controlled variable is the pressure gradient in the pre-chamber, which provides direct information about the lambda in the pre-chamber.

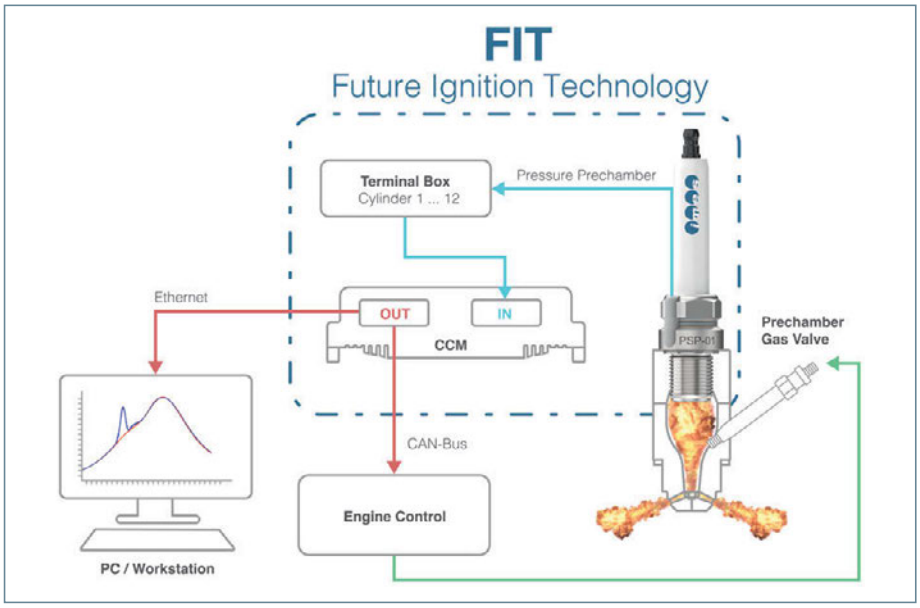
This is an essential point for compliance with existing and new rules and regulations regarding permissible emission values for gas engine-powered ships and power plants.

In addition to combustion optimisation, pre-chamber pressure indication can also be used to troubleshoot combustion misfires in individual cylinders. This makes it possible to determine whether, for example, the ignition, the pre-chamber gas valve or the port injection valve is defective. Thus, pressure measurement in the pre-chamber is a tool for the "Failure Root Cause" analysis, or condition-based maintenance function.

The concept also allows conclusions to be drawn about the wear of the pre-chamber system. The highly stressed dome with the firing channels shows signs of corrosion during operation, which makes it necessary to replace the pre-chamber at certain maintenance intervals.

By knowing the pressure curve over the crankshaft angle, it is possible to draw immediate conclusions about the condition of the firing channels and to optimise the replacement interval of the pre-chamber.

Overall, this innovation enables a new approach to optimising efficiency and reducing unburnt hydrocarbons in scavenged pre-chamber gas engines.



Control concept

Source for both images: Imes GmbH

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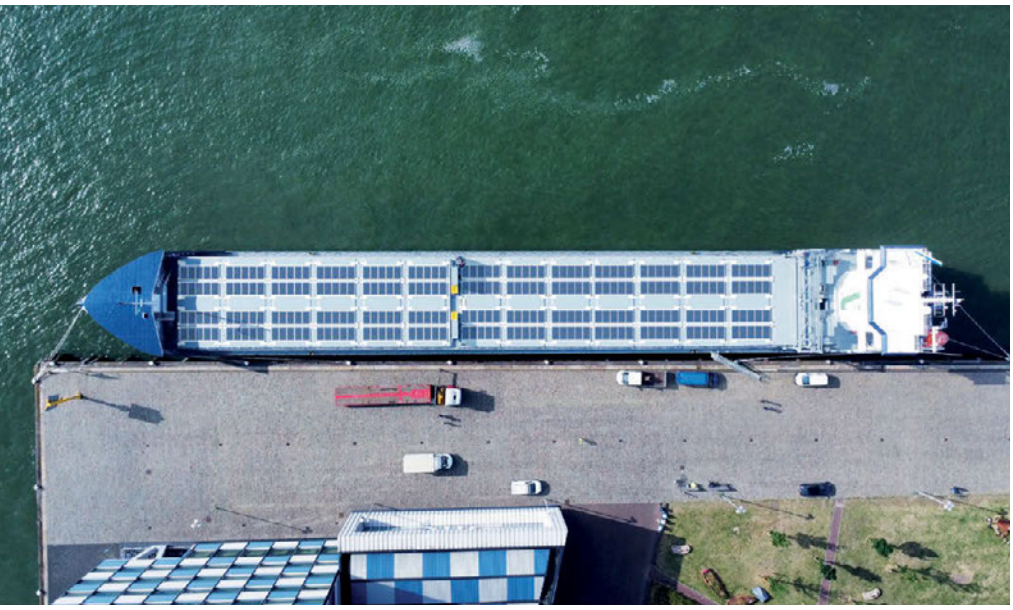
Solar power for shipping takes a step forward

OCEANGOING VESSELS | Netherlands-based solar power specialist, Wattlab, has launched its SolarDeck technology for oceangoing ships. The deck-mounted solar panels have been successfully tried and tested on the 119m-long general cargo vessel, *Anette*, owned and operated by Netherlands-based shipping company, Vertom.

Eight-year-old Wattlab has focused so far on a similar technology for inland shipping, Solar Flatrack. Now, with the positive results from the *Anette* project, the company is turning its attention to seagoing vessels.



The *Anette* has been equipped with the SolarDeck panels Source: Wattlab

The *Anette* trials demonstrated fuel savings of about 20 tonnes a year and annual emission reductions of 68 tonnes of carbon dioxide. This level of saving, the company said, would have a significant impact on EEXI and CII ratings as well as potential savings under EU ETS and FuelEU Maritime regulations. The impact of the technology would rise in step with vessel size.

Wattlab's CEO, Bo Salet, said: "At all times during the design of SolarDeck, we prioritised the shipowner's requirements. We know that 'time is money'. That's why the SolarDeck can be installed in a minimum amount of time using container twist lock fittings. It also does not impact normal loading and unloading procedures. However, we also know – for cargo shipowners especially – that 'space is money'. In the event of a deck load such as offshore wind blades, the ship's crew can store the SolarDeck inside the volume of a 20-foot container, thus freeing up the deck for cargo."

Wattlab's SolarDeck pilot project has been co-financed by the European Union's Just Transition Fund (JTF).

Norwegian consortium launches carbon capture project

LNGAME CHAMGER | A Norwegian consortium has launched the LNGameChanger project to develop new onboard carbon capture and storage (OCCS) of carbon dioxide from LNG-fuelled solid oxide fuel cell (SOFC) power trains. Led by maritime technology supplier HAV Group, the partnership includes Havila Voyages, Molgas Norway and research institution SINTEF.

"The LNGameChanger project aims to create the basis of a new product in the form of a low- or zero-emission solution for the maritime industry, strongly positioned for a growing LNG market and infrastructure with superior efficiency to alternative solutions," said Gunnar Larsen, CEO of HAV Group.

"If this objective is achieved, LNG can become not only a transitional fuel but a permanently viable option in low-emission maritime transport, alongside, for example, hydrogen," added Larsen.

Instead of converting chemical energy into heat and then into electrical power as diesel generators would, fuel cells can improve the fuel efficiency of ship engines by as much as double by skipping the intermediate step. Meanwhile, carbon capture from fuel cells could be highly efficient, with a ready supply of heat available as well as potentially much more concentrated exhaust gases. The concentration of carbon dioxide within exhaust gas entering the CCS is an excellent indicator of its performance.

Supported by a NOK 5 million grant from the Norwegian Research Council, SINTEF will contribute research to the two-year initiative.

The LNGameChanger project is aimed at reducing CO_2 emissions in Norway's fjords

Classification society signs up for hydrogen research project

As part of the initiative, BV will deliver three AiPs, covering the liquid hydrogen storage system, fuel system, and their integration into an SOV Source: Bureau Veritas

EUROPEAN INITIATIVE | Classification society Bureau Veritas (BV) has joined the NavHyS project, a European initiative aiming to develop liquid hydrogen technology for maritime applications. With funding from the Clean Hydrogen Partnership, NavHyS already has 14 partners from across Europe.

BV has worked closely with ArianeGroup, a joint venture aerospace company owned by Airbus and Safran. Together, they have developed the project proposal and consortium structure as well as safety guidelines, rule development and classification in support of hydrogen-fuelled vessels.

A key focus has been the development of below-deck Type C liquid hydrogen fuel tanks for service operation vessels (SOVs). The outcome is that BV will soon issue three approvals in principle relating to liquid hydrogen storage systems, fuel systems and their integration into a SOV.

The combination of maritime design and cryogenic expertise from the space sector will underpin NavHyS' ability to develop hydrogen-based fuel systems for SOVs. So far, designs are likely to be based on storage tanks of 200m³ to 300m³ with a capacity of 12 to 18 tonnes of liquid hydrogen. The fuel would be loaded at about ten tonnes per hour, providing up to ten days of operation.

BV will also oversee safety research and rule development relating to liquid hydrogen in marine environments. In addition, it will assess shore-based hydrogen supply systems and the lifecycle of hydrogen-fuelled vessels.

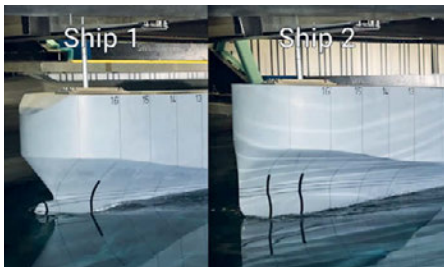
The NavHyS project was officially launched in January of this year and will run for three years. It is expected to reach Technology Readiness Level 8-9 by 2030, enabling systems to be deployed between five and ten years later.

President of Bureau Veritas Marine & Offshore, Matthieu de Tugny, commented: "BV is proud to support the NavHyS project and contribute to overcoming the technical and safety challenges linked to liquid hydrogen deployment in shipping. Our involvement in this innovative consortium reflects our commitment to supporting advanced technologies that accelerate maritime decarbonisation, helping to shape a safe, scalable future for hydrogen-powered vessels."

New project to focus on wave resistance in ship design

REAL-LIFE DATA | Design and engineering consultancy, Houlder, is to collaborate with Siem Shipping UK and the University of Southampton on a new ship design tool to improve wave resistance predictions in the early stages of ship design. The aim is to improve the accuracy of wave resistance modelling by using real-life wave data to make vessel operations more efficient.

The Conceptual, Operational, Modelling Linked (COMLink) Tool, a project funded by the Smart Shipping Acceleration Fund, will tackle the issue of additional power requirements in real ocean conditions. Traditional design methods focus mainly on the conditions prevailing in calm waters. However, by developing a model that blends empirical data with accurate simulations of real-life conditions, ship designers should be able to raise efficiency by designing vessels with more resilience from the outset.



The aim of the new tool is to improve the accuracy of wave resistance modelling by using real-life wave data to make vessel operations more efficient Source: Houlder

Houlder will lead the project and coordinate findings. Siem Shipping UK will contribute operational data from its fleet of car carriers as well as data from studies of car carrier and reefer ship designs. The University of Southampton will support the development of surrogate models through machine-learning and high-fidelity simulations.

Iebum Shin, Houlder's Data Analytics Lead, said: "The COMLink Tool is a game-changer for ship design. By combining real-world operational data with cutting-edge modelling techniques, we can move beyond conventional assumptions and create vessels that are truly optimised for their working conditions. This project underscores Houlder's commitment to driving innovation and efficiency in the maritime industry."

The Smart Shipping Acceleration Fund is part of the Department for Transport research programme, UK Shore, which is backed by GBP 206 million in research and development funding from the UK Government.

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Ship&Offshore

Special **SmartShip**

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Innovation needs alignment

The maritime industry stands at a historic crossroads. On the one hand, we are seeing an unprecedented wave of technical innovation: alternative propulsion systems, smart ship applications, digital twins, and AI-based navigation support – the toolbox for decarbonisation and digital transformation is growing fast. On the other hand, progress tends to remain slower than technological advancements may promise.

This gap often stems from a misalignment between innovation, regulation, and operational realities. New technologies require clear and harmonised regulatory frameworks to enable widespread adoption, especially when it comes to digitised and automated systems. At the same time, ship operators and crews need practical applications that can be integrated smoothly into existing workflows without compromising safety or efficiency. Achieving this balance demands close collaboration across the entire value chain – from technology developers and regulators to shipbuilders and operators.

Without coordinated efforts, there is a risk that promising innovations remain underutilised or that fragmented regulations create barriers rather than incentives for change. The key challenge lies in aligning technological potential with regulatory support and operational feasibility, ensuring that sustainable maritime solutions are not only developed but effectively implemented on a global scale.

On the following pages of our SmartShip feature, we highlight several promising developments that demonstrate how innovations can be practically applied to meet the industry's challenges.

The importance of data for operational efficiency

MAJOR SHIFT The maritime industry is undergoing a major shift thanks to more widespread digitalisation, a cornerstone of which is efficient data use, writes Alex Caizergues, founder and Chief Executive Officer of Syroco

As pressure mounts from increasingly stringent environmental regulations, industry players will be pushed to act more than ever before to meet approaching decarbonisation target deadlines. But the benefits data can bring extend beyond just compliance, and can end up revolutionising the way ships operate, as well as reshaping maritime shipping as we know it.

The adoption of digitalisation and smart shipping technologies is causing a transformational shift in the maritime industry. Key to this transition is data collection and analysis, which is being embraced by more shipping companies and, as a result, is greatly enhancing operational efficiency and paving the way for a smarter, more connected future. Benefits range from optimised fuel consumption in line with decarbonisation targets, to streamlined operations, enhanced safety, cost savings, and improved transparency and accountability.

Behind this march to digitalisation is mounting pressure from increasingly stringent environmental regulations. The recent Marine Environment Protection Committee (MEPC 83) meeting in London saw delegates agree to the IMO Net-zero Framework, which includes a new fuel standard for ships and a global pricing mechanism for emissions, which, if formally adopted in October, will come into force as soon as March 2027.

Meanwhile, both the IMO and EU already have several mandatory schemes for recording GHG emissions data from vessels exceeding 5,000gt. Efficient collection of data will also be crucial for compliance with the EU Emissions Trading System (EU ETS). As 2050 approaches, shipowners and operators will face ever-greater pressure.

But the need to reduce costs, optimise operations, and improve safety are all major drivers. As the global economy evolves at breakneck speed and companies vie to stay competitive, measures that will intelligently and strategically streamline activity, save on resources, and protect the safety of operations and the well-being of crew and personnel will become ever more important.

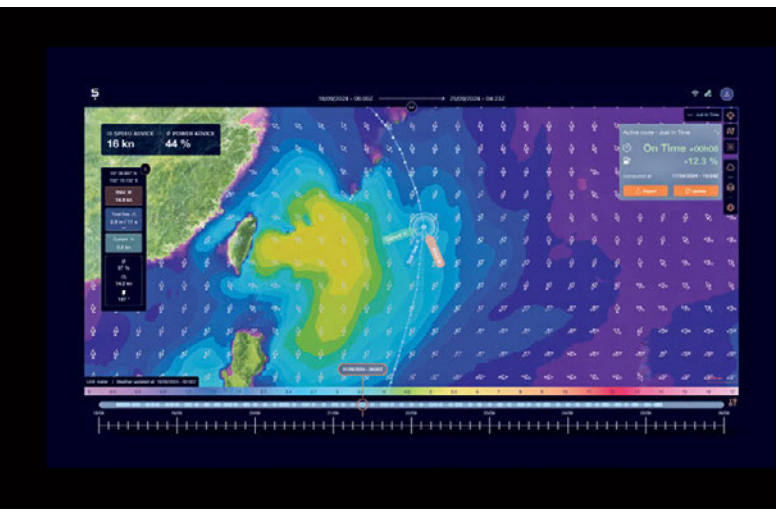
A plethora of digital tools

The maritime industry is fortunate to have a wide array of digital tools at its disposal to help facilitate the journey towards decarbonisation. These tools not only contribute to environmental sustainability but also offer significant operational and economic benefits.

For instance, continuous monitoring systems, equipped with a range of sensors and technologies, can accurately measure a vessel's performance and assess its fuel consumption. This data is invaluable for optimising vessel energy efficiency and evaluating the performance of all the systems. Electronic monitoring systems further enhance performance optimisation efforts by providing real-time insights into energy usage.

The integration of such technologies can significantly improve the accuracy and effectiveness of vessel performance modelling and optimisation. This, in turn, leads to cost savings for vessel operators and enhances their appeal to potential charterers. By minimising fuel consumption and maximising operational efficiency, these digital tools can make vessels more cost-competitive and environmentally friendly, thereby creating a win-win scenario.

Real-time tracking systems can provide continuous visibility of vessel locations, cargo status, and route progress. This, in turn, allows shipping companies to make informed decisions quickly, avoid delays, and reduce emissions. Meanwhile, predictive main-



User-friendly interface of the Syroco Live platform Source: Syroco

Syroco Live on the vessel bridge Source: Syroco

Syroco Live has been deployed on the *Socatra Alcyone* for weather routing and voyage optimisation Source: Socatra

Geogas' *Jean Raspail* was able to achieve operational excellence, following the most optimised routes with the deployment of Syroco Live

tenance uses data analytics and Internet of Things (IoT) sensors to monitor vessel equipment, and can identify potential issues and address them before they malfunction. This, in turn, minimises downtime and extends the lifecycle of equipment.

The integration of IoT and artificial intelligence (AI) is also having a significant impact. By collecting and analysing data from ship sensors, these technologies are improving navigational safety, optimising routes, and increasing fuel efficiency. Additionally, AI-driven automation systems are being developed to manage complex tasks like cargo handling and fleet management. As demands for efficiency and safety increase, IoT and AI are well-equipped to meet these challenges through real-time data collection and intelligent decision-making.

What is lacking?

The shipping industry is often held back by reliance on manual processes and inflexible legacy technologies, which prevent optimal data use. Investing in the right platform can break down data silos and ensure that all users can access the same high-quality, validated data for decision-making and operational processes.

Organisations should work to optimise data usage by fostering a company culture that values data as a strategic asset, ensuring leadership buy-in and enterprise-wide support. Aligned from top to bottom, organisations can implement data management and governance best practices, prioritising data quality, transparency, and completeness. A unified approach to data management will ensure that data is treated as an organisational asset, not just an IT concern.

Regarding decarbonisation, obtaining, maintaining and properly using high-quality data is pivotal to voyage and vessel optimisation. The data that does exist often has room for improvement in both quality and quantity. With new emissions regulations on their way, some shipowners and operators will soon realise that they are missing important information required to report on emissions and fully optimise their vessels. This is further hindered by a lack of transparency and data flow unification between contractual parties.

A first step towards improving the accuracy of vessel performance would be to improve data collection and reliability, for example using identical reporting frequencies, naming conventions, and definitions of terms for reports coming from vessels. This can be enabled by more accurate software and models, as well as continuous monitoring systems with advanced sensors. The maritime industry's decarbonisation journey can be further enabled by increased data-sharing and collaboration, which can be achieved by adopting a standard holistic report from vessels, but also by including proper contractual clauses that facilitate such exchanges.

The good news is that modern software and modelling are readily available to support speed, route, weather, and bunkering optimisation. Voyage routing specialists can ensure safety and cost efficiency using advanced digital tools. Weather conditions are a critical influencing factor of a vessel's speed and fuel consumption. Proper routing using advanced satellite data and sophisticated software can also greatly affect the outcome of a voyage.

Technology continues to change the game

Another innovative development has been digital twin technology, made possible thanks to IoT connectivity and sensor technology combined with more advanced data analysis techniques. Digital twins use data streams to connect a physical entity with its digital counterpart, making them more powerful than pure models and simulations. This connection allows digital twin analytics to use real-time and historical data to simulate outcomes.

Today, digital twin technology is enhancing the industry's safety, sustainability, and regulatory compliance by facilitating proactive maintenance and risk management, as well as optimising fuel consumption and route planning. As these exciting developments in digitalisation continue to advance and progress, the maritime sector is on a firm trajectory to transform into something even more resilient and capable in the face of an evolving global economy.

Ship autonomy: slow ahead!

REGULATORY BARRIERS The excitement around autonomous ships has lost some of its momentum recently – but this has more to do with regulatory drag than technology drift. Norway is a pioneer in the field, and Charlie Bartlett caught up recently with some of the main players for Ship&Offshore.

Remota is keen to have offshore vessels controlled from shore

Five years later, the "world's first autonomous ship", the *Yara Birkeland*, is still, at time of writing, not autonomous. But, it is getting there. With just three crew remaining on the vessel's portacabin-like bridge, navigation is closer than ever to being fully crewless.

The bridge is mounted with bolts to standoffs on the deck, and is intended, eventually, to be removed and hoisted off the vessel by crane. On its side there dangles an ancient-looking brass bell, an absurd anachronism amid the rest of the vessel's sleek, sportscar-like aspect.

"This bell is a symbol of what we're up against," said Captain Svend Ødegård. "It may look silly, but the regulations say that we have to have this."

Other crew accommodation includes a windowless half-room, half-stairwell at the stern of the vessel. A television and scant kitchenette, with makeshift walls and ceilings delineated by shiny insulating foil, it gives the impression of a polar outpost. With barely enough standing room to accommodate the small tour group, the meagre concession to human crew gives the impression of the shipowner's embarrassment at having them on board at all.

Indeed, the presence of a crew is a touchy subject. Nearly every navigational function is actually performed from a remote control centre in Horten. Footage from infrared cameras, as well as light detection and ranging (LIDAR) and sensor data, is broadcast to the shoreside control centre via high-tech satellite and cellular communication equipment mounted on the vessel's spoiler-like fore and aft pillars.

Delivered in 2020, the vessel is now one of several designs vying to be the first crewless vessel. It could be that it is beaten to the title by RoRo barges *Asko Marit* and *Asko Therese*; or, by container vessel Pos Singapore, a demonstrator built by Hyundai Mipo Dockyard as part of the Korea Autonomous Surface Ship (KASS) project, which now claims to be the first autonomous vessel with autonomy 'level three,' meaning there are no crew on board. For the moment, all four are still sailing with small crews.

As the vessel's operators will insist, *Yara Birkeland* could be completely autonomous if they wished. The ship already berths automatically, and the centre in Horten could take full navigational control should it be deemed necessary. Even the Chief Engineer could be relocated to shore, at least according to classification society DNV, which launched new class notations pertaining to autonomous ships in January this year.

The Autonomous and Remotely Operated Ships (AROS) notations cover navigation, engineering, operation and safety. "With the AROS notations, we will see novel autonomous and remotely controlled pilot projects achieving at least the same safety levels as conventional vessels," said Geir Dugstad, DNV Maritime technical director of Classification, at the time of the announcement.

"It is just that Norwegian Government regulations have not caught up yet. "We don't yet have permission to navigate autonomously, so we are keeping a crew on board," Ødegård said.

But despite the vessel's still-not-autonomous state, it is extremely innovative in many other respects. *Yara Birkeland* is the first container ship to run entirely on batteries, some 6.7 MWh of them, divided into seven battery rooms.

With no engine, and no shaft line to transmit noise to the exterior, the vessel is relatively quiet above and below the waterline, ideal for a coastal feeder ship. Power is delivered via two stern azimuth pods and two bow thrusters, making the ship highly

manoeuvrable. It can turn on the spot, and steers "like an offshore vessel," according to Captain Ødegård.

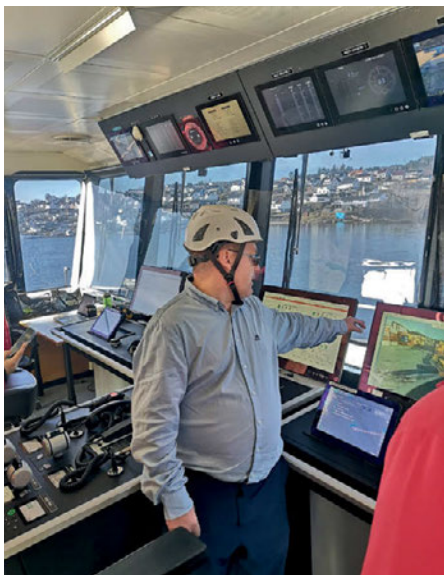
Because of the high efficiency of electric propulsion, the vessel uses surprisingly little energy for a typical voyage. About a quarter of the energy is left in the batteries once the hour-long journey between Brevik and Herøya is completed.

With Norwegian green hydropower on tap, *Yara Birkeland* can perform the work of 120 trucks entirely carbon-free, replacing 40,000 truck journeys each year. Even its USD 25 million construction at Vard Brevik can claim relatively low carbon emissions, with energy having been supplied at low carbon cost.

It is easy to see how Norway, a country of islands and the world's second longest coastline, could be tempted by the promise of networks of green micro-feeders, nabbing cargo from trucks without the need for fuel. But this model could also be applicable elsewhere, as well.

A 100 TEU 'e-barge', another version of the battery-powered micro-feeder principle, has been mooted by CMA CGM in Vietnam, for carrying Nike trainers down the Dong Nai river to Cai Mep Port. Meanwhile, a 2022 study by UMAS, "The Maritime Fleet of the USA – the current status and potential for the future", suggests renewing the ageing US domestic fleet, estimating that the US could replace 17% of its fleet with battery-powered feeder ships "before the end of the decade," and cut its carbon emissions by 40% in the process.

Batteries are often derided as a power source for ships; as the axiom goes, to power a deep-sea ship, it would have to tow a second ship, made of batteries, behind it. But on the small, coastal scale, the logistics and the economics are very different.



Temporary bridge of *Yara Birkeland*

Yara Birkeland at the quayside

Source for all images: Charlie Bartlett

Replacing trucks or RoRo ferries with battery-powered micro-feeders would be an extraordinarily effective use of the world's limited renewable energy. Compare this with the methanol and ammonia-powered deep-sea vessels entering the fleet: all told, burning e-fuels manufactured with renewable energy entails putting less than 10% of that energy to any useful purpose, wasting the rest. Meanwhile, of the energy produced by a given solar panel, wind or hydroelectric turbine, Yara's battery-electric vessel gets over 90% of it.

But while the decarbonisation bang-for-buck might be enormous, getting crew off the vessel will still be central to the modal-shift business case for which *Yara Birkeland* is the prototype. Advocates of ship automation may use a shortage of seafarers as justification for their claims; but shipping is likely already paying all the seafarers – particularly Norwegian ones – that it cares to.

"We need to attract personnel coming into the business," said Sveinung Soma, CEO of Norwegian autonomy expert Remota, who claims that operations in offshore could cut companies' carbon footprints massively using crewless vessels. "If you don't need to go to the vessel to do that job, you can work from a shore-based location, then we tap into a much wider recruitment tool.

"And also those coming from a vessel, maybe because they've got a family, and then there are usually the women that first go to a shore-based job," he added.

"When we look to operate offshore vessels, we see that many times we have big vessels performing small tasks. By having small, remote-operated vessels doing the same work tasks, we can reduce 90, 95% of the CO_2 emissions for the same operations," Soma said.

Offshore is a good place to start, Soma believes, because the rules developed to govern deep-sea shipping do not pertain to remotely operated vehicle (ROV) operations. Remota intends to get around regulatory hurdles by making vessels more ROV than ship, and less generalist in the functions they perform.

"I think for deep sea safe manning, there are some ways to go. But I think we are paving the road ahead, showing what's possible, what kind of systems you need to have in place, the legalities of who is in charge. So this is probably the reason why the ROV case is a good place to begin and develop the technology – because it's subsea, you don't have those rules and regulations."

Soma's comments are particular to the offshore industry, which supports large teams who need to be accommodated throughout an operation; but in aspects, it is true for cargo operations too. "Per person, per day, you have to produce 250 litres of fresh water," he said.

"It is also about travelling," he added, referring to one aspect of shipping's overall carbon footprint for which aviation, instead, gets the blame. "We are sending people all over the globe to go aboard the vessels," he concluded.

Maritime safety in an autonomous world

MACHINE-LEARNING As maritime operations edge toward full autonomy, the challenge of detecting, rescuing and recovering passengers and crews that fall overboard is both critical and complex. For UK-based maritime safety technology company Zelim, the answer lies in teaching machines not just to see, but to understand.

Doug Lothian, co-founder of Zelim, has created AI-based technologies designed to save lives

Source for all images: Zelim

In 2020, when the Edinburgh-based firm Zelim began developing Guardian – an unmanned craft designed to rescue and recover people from the water – one of the first challenges the company had to solve was how to find people in the water when there are no humans on board to do the searching.

"We were looking for a system that could automatically detect people in the water to enable fully remote or even autonomous search with our Guardian vessel," said Doug Lothian, co-founder of Zelim. "After looking at what was available on the market, nothing fitted the bill. All the existing maritime detection technology was focused on collision avoidance for the safety of navigation, nobody was focusing on search."

At that point, the design team realised they needed to develop the technology themselves. It had to be a system that didn't just detect objects for collision avoidance – it would have to be able to detect and classify the object to be useful to a searcher.

"The system would have to know the difference between a human head in the water, a rock, a dolphin or even a lobster pot," said Lothian. "At this point we made our giant leap into artificial intelligence."

The idea of intelligent machines dates back to 1958 when Frank Rosenblatt, with the US Office of Naval Research, unveiled a 5-tonne computer called 'Perceptron.' And while this only hinted at the possibility of automated learning, by the 1980s, advances in statistical methods and neural networks laid the groundwork for modern machine-learning. However, progress was slow, limited by computing power.

When Zelim began exploring AI, this was reaching a tipping point. Major tech firms were open-sourcing frameworks that could detect and classify objects on land with increasing accuracy. At the same time, graphical processing units (GPUs) were becoming more powerful and affordable, offering processing that could crunch huge volumes of image data in milliseconds. "These two developments made it possible for us to train real-time vision systems outside the realm of Big Tech," Lothian explained.

However, the sea proved a tough environment for machine-learning technology. Everything is in motion, and sea spray and light reflections can play havoc with vision systems, making the task of differentiating a floating human from a drifting bag of rubbish or piece of driftwood immense. Detection systems that worked on land simply could not stand up to the challenges of the sea. "It required a different logic," said Lothian.

Spotting the human

Detecting something in the water is one thing, but classifying that something as a person is a very different thing altogether. And doing it in real time, from a moving vessel, in unpredictable sea states, adds unprecedented levels of complexity.

"A person in the water does not have a fixed profile," Lothian said. "They might be wearing dark clothes, submerged, face down, bobbing, rolling, or tangled in equipment. From an AI perspective, that is a moving target in every sense."

To address this, Zelim began building its own maritime-specific database. Using drones, they flew hundreds of test missions

and recorded people in the water from different heights, angles, and distances, under varying weather conditions. Every image was manually annotated – bounding boxes were drawn around people, labelled, and fed into training models.

The resulting dataset includes more than 6.5 million labelled objects which, according to the US Coast Guard, is the largest and most rigorously tested visual dataset in maritime search and rescue.

"That validation matters," says Lothian, "because it is the foundation for how our models 'learn' what a person – an adult, adolescent, child or infant – looks like in the water, not just from one point of view, but from every conceivable angle. You are not just teaching AI what a person looks like, but enabling it to recognise a person it has never seen before, from a distance it has never experienced, in conditions it has not yet encountered.

"Early AI models would look at a still image and make a judgement about what was in it. But that approach proved flawed, as AI could misidentify wave crests, foam, or a seabird as a person, leading to false positives which, in a rescue scenario, could cost lives."

Instead of relying on single-frame decisions, the technology Zelim developed looks at how features persist and move across multiple frames. "We also added range estimation," says Lothian. "Using camera intrinsics we can accurately calculate how far the object is from the camera. From that, we estimate its size, and from its behaviour, we can also predict its future drift path. The result is a system that does not just detect – it reasons. It watches. It tracks."

Autonomous ecosystems

As detection capabilities mature, their possibilities multiply. If a machine can reliably detect and classify people, it can also detect obstacles, navigational hazards, and security threats. That forms the basis for full maritime autonomy, not just for rescue vessels but for all commercial ships.

The US Coast Guard says Zelim has the largest and most rigorously tested visual dataset in maritime search and rescue


Studies show that the probability of flight crews spotting a person in the water is just 18%

Zelim has begun designing this into new product modules. As an option with the ZOE Intelligent Detection System, 'Watchkeeper' capability can be included to deliver continuous visual monitoring for bridge navigators. "Watchkeeper acts as an AI-powered lookout," says Lothian. "It alerts crews to any navigational obstacles to reduce the risk of collisions and accidents."

'Shield' is another new product module. It builds on the same foundation to provide greater situational awareness and security, helping crews detect suspicious craft, unauthorised boarding attempts, or potential collisions.

Both modules rely on the same underlying AI engine originally built for man-overboard detection. Now, they are being used in wider contexts, fusing Radar, AIS, GPS, and electro-optical and infra-red visual data into one cohesive operating picture that can be integrated with modern bridge systems (ECDIS).

The future

At present, Zelim's systems process real-time detection in high-definition resolutions. Processing every frame at 30 frames per second, applying object detection, classification, tracking, and probability estimation within milliseconds, remains a monumental computing task. The company is working with graphics processing unit arrays and edge-processing to push this further.

"But resolution is only part of the picture," Lothian noted. "We are now deploying multi-sensor fusion techniques and expanding our classification range."

He acknowledged that in many operational scenarios today, human decision-making still outperforms automation in nuanced judgement – but not in consistency or speed. "The US Coast Guard's own studies show that the probability of a helicopter crew spotting a person in the water – even when flying directly over them – is just 18%. In comparable studies, ZOE has demonstrated 96% probability of detection and recognition, outperforming the human by over five times."

AI systems do not get tired, do not blink, and do not overlook what is right in front of them. "That is why we believe this technology is not just the future of search and rescue," said Lothian. "It is the future of maritime safety in an increasingly autonomous maritime world."

First automated mooring system in China

AUTOMOOR | Dubai-based Trelleborg Marine and Infrastructure has landed a contract to supply the first automated mooring system to a port in China. The company's AutoMoor technology is to be deployed at an unnamed container terminal in China which handles 400m-long 'megamax' vessels.

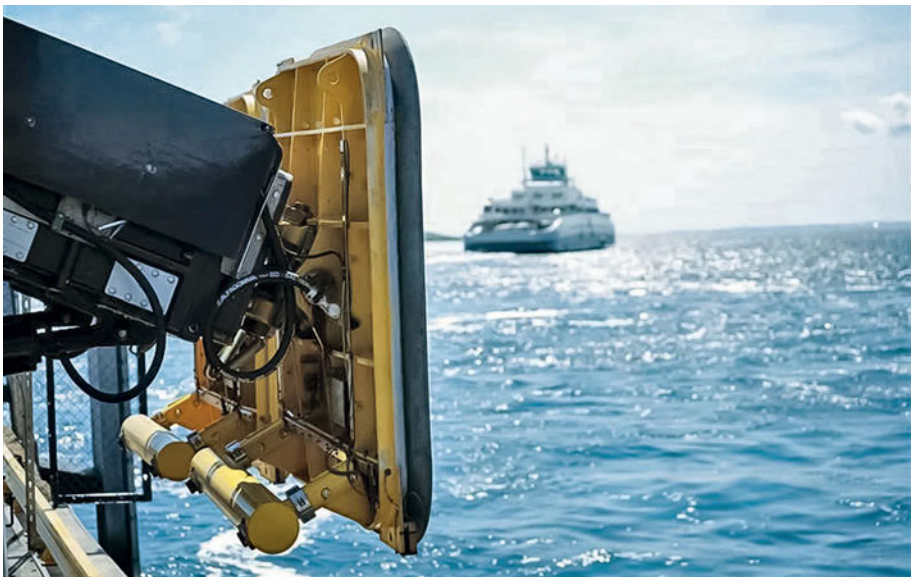
Trelleborg said that its technology will make the berthing process more efficient at the terminal, improving vessel stability, reducing turnaround times, and cutting emissions during the mooring process. It will set a new benchmark for port automation and efficiency in the region, the company said.

Trelleborg is currently conducting a detailed assessment to evaluate factors such as vessel sizes, berth infrastructure, and environmental conditions. This will ensure the supply of an optimally designed system that can operate as efficiently as possible.

When it is installed, AutoMoor's 'click of a button' technology will enable faster docking times, cutting loading, unloading, and turnaround times. The system automatically ensures vessel stability during box-handling operations and its Always Active Mechanical Damping system is designed to minimise port energy consumption, increasing sustainability as compared with fully hydraulic alternatives, Trelleborg said.

The company's Business Unit president, Richard Hepworth, commented: "This contract underscores the confidence in our AutoMoor technology as a transformative solution for modern port operations. By providing advanced solutions like AutoMoor, we're driving improvements in safety, efficiency, and sustainability, enabling ports to thrive in an ever-evolving environment."

Described as the first global deployment of AutoMoor technology at a container terminal, the system is expected to become fully operational within the next few months following the completion of tests and assessments.



Once implemented, the technology will allow vessels to moor faster and more securely, reducing unloading, reloading, and turnaround times Source: Trelleborg Marine & Infrastructure

AI-driven freight rate processing service unveiled

DIGITAL LOGISTICS | Rotterdam-based DataMondia, a data processing and back-office support firm, has launched a new AI-driven robotisation system for processing ocean freight rates. In a move that expands its support of the digital transformation of the logistics sector, the system will transform what are now time-consuming and error-prone methods of handling rate sheets from shipping lines into an automatic digital system, with minimal manual input.

The new service will cut processing times by using AI robots to process rates in seconds; it will use advanced algorithms enabling AI systems to process data with unmatched precision; and the system is flexible and scalable so that it can be adapted for the changing demands of businesses. And if, for some reason, the AI system cannot process any specific data, it will be processed by DataMondial's ocean freight rates team, enabling the company to provide a 100% processing guaranteed to clients.

DataMondial founder and owner, Burt Propsma, commented: "Freight forwarders and other logistics professionals who work daily with complex rate sheets from various carriers know the frustration – long processing times due to manual handling and the risk of errors. We've developed an AI-powered solution to improve this, allowing logistics companies to spend more time serving their customers. Our new service drastically shortens the turnaround time for customer proposals.

"We're very proud of our team that developed this AI-powered system," he continued. "With our innovation, freight forwarders, shipping lines, third-party logistics carriers, and warehouses can respond to requests instantly by incorporating the latest rates into their proposal at lightning speed."

Propsma promised more digital developments soon: "This AI-powered solution is just the beginning of what DataMondial has in store for the sector!" he declared.

SORJ

SHIP AND OFFSHORE

REPAIR JOURNAL

MAY / JUNE 2025

In cooperation with

The International Association of Shiprepair Agents Ltd. – Professionals in a professional industry – IASA

WELCOME to the latest edition of Ship and Offshore Repair Journal which will be widely distributed at this year's Nor-Shipping event in Oslo, as well as Seaworks in Southampton among others. To coincide with some of the issues that will focus minds at the shows, we have explored three key topics – European repair yards and potential new opportunities on which they can capitalise; refits and upgrades for offshore vessels; and the huge challenge that global shipping must tackle in its overarching drive to decarbonise.

As was clear from the IMO's recent MEPC meeting in London, shipping's role as the principal conduit of physical trade, is directly in the spotlight. There is no time to lose.

We cover, in particular, pioneering initiatives by some of Norway's leading owners as they extend their lead in the drive to cut emissions. Some have discovered that alongside innovative energy saving devices and onboard carbon-cutting systems, much can be achieved simply by adjusting the operation of engines and propellers to achieve maximum efficiency. One particular company has successfully reduced its emissions by more than half since 2008. It continues the drive but its executives know that they now face the really hard yards.

Paul Bartlett
Managing Editor

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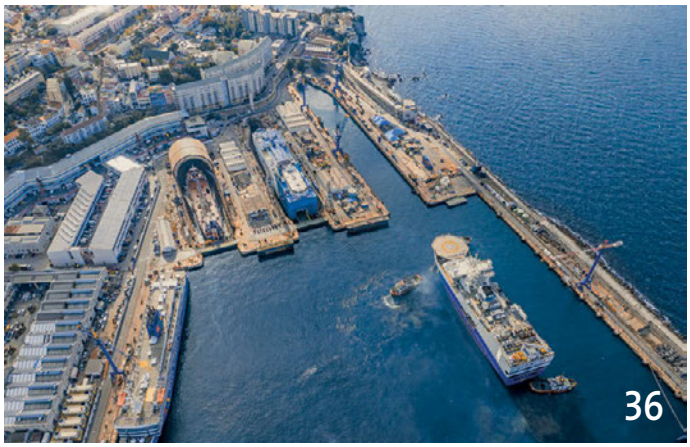

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Offshore energy and fuel regulations bode well for north Europe repairers

Source: UK Docks Marine Services

Over recent decades, repair yards in northern Europe have struggled to compete effectively with rivals in locations including the Middle East and Asia. But with a growing retrofit requirement to comply with tightening fuel regulations and a sharp focus on green energy, the backdrop is changing. SORJ staff report.

Gardline's *Ocean Vantage* was under repair at UK Docks Marine Services as Horizon's *GeoDiscovery* arrived for an overhaul

Up until April, it was the owners and operators of ships running to, from, or within Europe who had to worry about fuel regulations. However, since the IMO's latest meeting – MEPC 83 in April – owners of ships more than 5,000gt across the world will have to tackle ship emissions from 2028 onwards or face large and increasingly pricy penalties.

Perhaps not for proactive owners, but for many others, this is a gloomy outlook. The scale of the decarbonisation challenge is hard to imagine, but one thing is clear: doing nothing is not an option.

In its post-MEPC analysis, Lloyd's Register demonstrated that the 'total cost of ownership' of an Aframax tanker would be more than 15% higher between 2028 (when the IMO's mid-term measures are likely to enter force) and 2040 by continuing to burn heavy fuel oil instead of adopting a strategy of steadily increasing biofuel combinations and investing in energy saving devices (ESDs). This, even allowing for the additional investment and higher fuel costs along the way.

What appears daunting for owners and operators, however, offers a major opportunity for on-the-ball repair yards. Thousands of ships will need modifications and experts now stress that there is no silver bullet. Regulatory compliance will require a combination of measures possibly including new fuels, ESDs, air lubrication, modifications to bows, propellers and rudders, and for some ship types, the power of the wind.

Which brings us neatly on to green energy. President Trump may have given offshore wind the thumbs down, much to the chagrin of Norway's state energy company, Equinor, which has already spent billions of dollars on *Empire Wind* off the coast of New York state. But elsewhere the sector is thriving and driving demand for regional installation, support, and service craft and maintenance requirements.

The five countries around the North Sea – the UK, Germany, Denmark, Netherlands, and Belgium – are North Sea wind heavyweights. *Hornsea 2*, operated by Danish multinational, Ørsted, from the UK's east coast, is understood still to be the world's largest operating wind farm, but *Dogger Bank* will soon nudge it off top spot when it

is commissioned from later this year until 2027.

Facilities like these generate inelastic demand for routine repairs and servicing and will ensure a baseload of constant work for many regional repair yards in northern Europe.

UK Docks moves up a gear

UK Docks Marine Services has expanded dramatically this year, having taken over part of the former Smith's Dockyards on the River Tees. Eight months of negotiations with landowner PD Ports came to a successful conclusion in March.

Jonathan Wilson, managing director, tells SORJ that the company has boosted drydock capacity from two to four and expanded its site from just over five acres to more than 16. It has now embarked on a far-reaching recruitment programme, with vacancies ranging from project managers to various types of engineers, dock operators and steel workers.

The expansion has come at a key moment. Dock occupancy was proving a constraint on the number and scale of projects UK Docks could previously bid for. The company originally invested in the Teesside site in 2014 when it acquired two docks, one of 168x20m and a second unit of 137x19m.

Now, a larger 175x22m dock will provide space for larger vessels, whilst the 120x17m unit will increase operating flexibility. The new facility will provide lay-by berths, an extra 200m of quay, as well as fabrication, engineering workshop facilities and laydown areas.

Strategic location

UK Docks' location is a significant advantage, sited on the North Sea coast and close to arterial routes between north and south Europe. The company has also benefited from a Norwegian connection with Brunvoll AS and Steerprop Ltd.

For almost three decades, UK Docks has been the sole sales and service agent in the UK and Ireland for Brunvoll, a specialist in superior thruster systems. These are used by shipping companies across the globe, and the Norwegian-based company is fully committed to supporting servicing.

Additionally, since 2007, UK Docks has been the sole service agents in the UK and Northern Atlantic coastline region for Steerprop. The company designs and builds azimuth propulsors for ships and offshore assets.

UK Docks has a number of regular customers. They include Aberdeen-based North Star Shipping, one of the largest operators of offshore supply vessels in the North Sea, Transport for London, marine aggregates company Cemex, and dredging firm Tarmac Marine. The company also carries out afloat repairs and drydockings for the UK's Royal Navy.

More wind business

However, Wilson sees the yard's proximity to the North Sea as its unique selling point. The dramatic expansion in offshore wind has generated a robust revenue stream, and one that is likely to grow.

Construction of the world's largest wind farm, the 3.6 GW *Dogger Bank* facility, has already generated business from support vessels working on the site off the UK northeast coast. The wind farm is due to come on stream in three phases from later this year until 2027, and will generate a continuing requirement to service a substantial number of support vessels of various types.

Meanwhile, the owners of vessels, including dredgers, coasters, ferries, RoRo vessels, survey ships, tugs, and workboats, are all frequent customers. The company also carries out ship reconstruction and conversion.

One recent project involved the conversion of a platform supply vessel into a research and survey/offshore supply vessel. Work included the removal of cement tanks and the installation of a moonpool and a geotechnical drill rig. In another project, a PSV was converted into a 300-survivor multi-role emergency response and rescue vessel.

The *MV Arrow*, a RoRo ferry owned by the Isle of Man Steam Packet Company, recently underwent a special survey at UK Docks' Teesside drydock number two. The vessel, currently on charter to DFDS, is likely to return to the yard later this year for installation of a new ramp/stern door.

EDR's strategy demonstrates a model for the future

Less than two decades ago, Antwerp-based Engine Deck Repairs (EDR) typically completed around 500 maintenance projects within the lay-by berths of the Port of Antwerp. But today, with four drydocks, private repair berths of 2,500m with 9m draught, the ▸

The OSV *Putford Terminator* recently had a refit and upgrade

Source: UK Docks Marine Services

repair yard sources a steady stream of more complex repairs on vessels ranging up to panamax bulkers and LR1 tankers.

There are four drydocks, the largest of which is 312x52m; a second one is 260x39m; and two smaller ones are 206x27m. All have depth limits of about 8.5m.

Philippe Trouillard, commercial manager, runs the privately owned facility and explains how its 15-year business plan has proved a success story. A key element of its strategy, he says, is to work with shipowners and approved intermediaries in a collaborative setup for the benefit of all parties.

Transparency, reliable quotations, effective execution, and accurate invoicing have proved transformational. Repair, he says, can often be a 'spot' business in which so-called 'emergent works' can lead to a doubling in price estimates at other yards, sometimes more.

Trouillard insists that mutual trust with clients is essential in this complex sector, and provides a foundation for much-sought-after repeat business. He is certain that assisting clients when they are in dire need of repairs with clear and transparent pricing will lead to a long-lasting cooperation of mutual benefit to all parties.

Location is a key selling point. In contrast to most European cities where shipyards were closed by local authorities to make way for upmarket property developments, EDR is sited close to Belgium's third largest city, but well embedded in the petrochemical cluster of the Port of Antwerp.

He cites a record time for a ship completing discharge in the centrally located port to docking at the yard in just four hours. Minimum deviation, he points out, saves time and fuel and is therefore beneficial in terms of operational sustainability.

This feature is attractive to clients, he says, but there are others. Despite a location which might be expected to be high-cost, the yard competes effectively with repair yard competitors from Europe's north to south – "from Remontowa to Liznave", he says proudly.

One of the key priorities at EDR and one that is unusual in the repair business, Trouillard explains, is constancy. A feature that helps to underpin a loyal customer base.

"Apart from when we had to cover an unexpected hike in electricity costs two years ago, our prices have stayed the same for more than five years," he says. "And we don't jack them up just because capacity is tight, as it is at the moment. We treat clients fairly and view what we do as an essential service with partners."

"We have a large volume of repeat business, resulting in positive returns even when the repair market is under pressure. You can make a lot of money in ship repairs for twelve to 24 months, but if you want to make money in a sustainable business over a long time – the next 25 years – you have to be careful and fair."

Trouillard believes that ship sustainability will be a key differentiator in the future, not only central for clients but also for yards themselves. The shipyard has invested in solar panels, 80 charging points for employees' electric cars, and will soon have shore power connections in docks at the 70-year-old site.

The yard has also worked recently on various ship-related sustainability upgrades. They include suction sail installations from Spanish wind energy firm, bound4blue, on Odfjell's chemical tanker, *Bow Olympus* (see page 40), and the application of electrostatic coatings on a range of vessels in partnership with Pennsylvania-based PPG Protective and Marine Coatings.

Orient Adventurer – from offshore construction to renewables

One of Norway's most famous shipbuilding names, Ulstein, is currently engaged in a major project to convert an offshore construction vessel, originally delivered in 2014, into a cable-layer. The *Orient Adventurer,* owned by Taiwan's Dong Fang Offshore, is to be converted at a so-far undisclosed shipyard to a specification currently being prepared by Ulstein Design & Solutions AS, and its lead naval architect, Geir-Magne Indregård.

He believes there is significant scope to repurpose vessels of certain types, thereby cutting the emissions relating to new ship construction dramatically while, at the same time, meeting the changing needs of the offshore energy sector. The company, he points out, has already successfully converted platform supply vessels into geotechnical vessels for deployment in the offshore wind sector.

The vessel originally had a Huisman VLS tower (vertical lay system) positioned in a potential future cable-laying space. This will be relocated to a new space on the main deck, and decks A and B. The vessel will also be equipped with a walk-to-work gangway system and a 3,000-tonne cable carousel from Huisman. The conversion will be completed later this year and the vessel will be ready to lay cables in 2026.

The project demonstrates the potential for repurposing and upgrading existing vessels for deployment in offshore renewables, Indregård tells SORJ. He believes the project is setting a precedent for other similar initiatives and should encourage other owners to consider upgrading their vessels for new market opportunities.

"The flexibility and adaptability demonstrated in this project can be applied to a wide range of vessels, regardless of their original builder," Indregård declared. "The conversion of the *Orient Adventurer* is a milestone for Ulstein Design & Solutions' aftermarket services."

Source: Ulstein

The *Orient Adventurer* conversion shows the potential to repurpose vessels

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Gibdock's favourable location at the western end of the Mediterranean will be enhanced as the Sea becomes an Emissions Control Area

Source for all Images: Gibdock

Gibdock gears up to meet growing repair demand

The Gibraltar repair yard Gibdock has been running at close to capacity so far this year and is expanding facilities to meet new business demands. In fact, John Taylor, managing director, told SORJ that the yard was working 'flat out' for at least the first quarter of the year and is still very busy.

These days, John Taylor, managing director of Gibraltar's Gibdock, and his team are focusing on increasing work space and extending fabrication facilities so that the yard can handle more of the large mobilisation, refit and conversion enquires that are frequently coming in. Prefabrication of components, to save vital yard time, is increasingly important, he says.

Gibdock has a permanent workforce of around 200, but this is complemented with subcontractors from countries including Romania and Bulgaria to as many as 600, depending on workload. The company is running a training centre in conjunction with the Government of Gibraltar that will help ensure the future supply of welders, steel workers, and fitters.

At a macro level, the outlook for the global ship repair sector is broadly positive, with a renewed focus on ship operating efficiency, fuel consumption, and emissions performance. However, for owners of ships operating in European waters, and therefore repair yards across the region too, these issues are top priorities Gibdock's location, at a key crossroads between north and south, and east and west, is an appealing marketing point and the yard is experiencing a high level of demand amongst both new and existing clients.

European emissions

Owners and operators in Europe, as well as those trading to and from the continent, face significantly tighter regulations than those elsewhere. Analysts say that the growing impact of emission regulations is already focusing the minds of ship operators as they contemplate surrendering their first allowances under the EU Emissions Trading System to cover 2024 emissions by the end of September.

Meanwhile, the IMO's recent MEPC 83 meeting in London will generate more ship repair demand further into the future. Although the UN agency's mid-term measures have not yet been adopted, they are expected to be approved at an extraordinary session of the MEPC in October, with entry into force anticipated in March 2027.

In the short run, the beginning of May marked the date when the Mediterranean Sea became the IMO's latest Emissions Control Area (ECA) with important implications for Gibdock. The yard has already benefited through a contract to construct more oil storage tanks for the Port of Gibraltar. These are required as the ECA stimulates demand for a more diverse mix of marine fuels.

Now, though, owners with vessels trading in or through the ECA must use ultra-low sulphur fuel oil (ULSFO) with a sulphur content of 0.1% or less or use scrubbers capable of scrubbing down to this level. Bunker experts

point out that this will require owners with ships sailing through the Mediterranean to take the appropriate fuel on board either outside the Strait of Gibraltar or east of Suez. It is thought that this could generate more business for Gibdock as ships break their voyages nearby to take ULSFO on board.

Even if this proves not to be the case, regional repair yards including Gibdock are likely to prove direct beneficiaries of tightening regulations as owners and operators adopt strategies to cut their emissions. Energy saving devices, sophisticated hull coatings, engine modifications, and wind sails will all be on the table as possible carbon-cutting options.

Ferry focus

For Gibdock, a focus on ferries is a feature of the early months of every year and 2025 has been no exception. Taylor describes ferries as part of the company's 'bread-and-butter business'.

Ferry lines including Africa Morocco Link (AML), Balearia, Naviera FRS, and Transmediterranea are amongst the repair yard's regular clients who require routine maintenance and upgrades of vessels before peak-season every year. Precise timing of repairs is, of course, essential in any ship repair business, but with tight voyage itineraries over the busy summer months, accurate work schedules for ferry customers are essential.

John Barnard, commercial director, told SORJ that the company's ferry customers definitely have a new focus on emissions performance. Whereas clients used to opt for spot blasting rather than a full hull blast, and a focus on the vertical sides of ferries rather than the flat bottoms, this has changed. More sophisticated coating schemes using products based on silicone or graphene, are now in demand, together with scrubber installations and dual-fuel conversions.

Last year, the yard installed its first air lubrication system – an Armada Technologies' Passive Air Lubrication System (PALS). In October, the two companies formalised their cooperation in a memorandum of understanding to promote the PALS technology amongst Gibdock customers. Installation of the Armada system is less complex than some other air lubrication technologies and can usually be completed within a normal docking schedule.

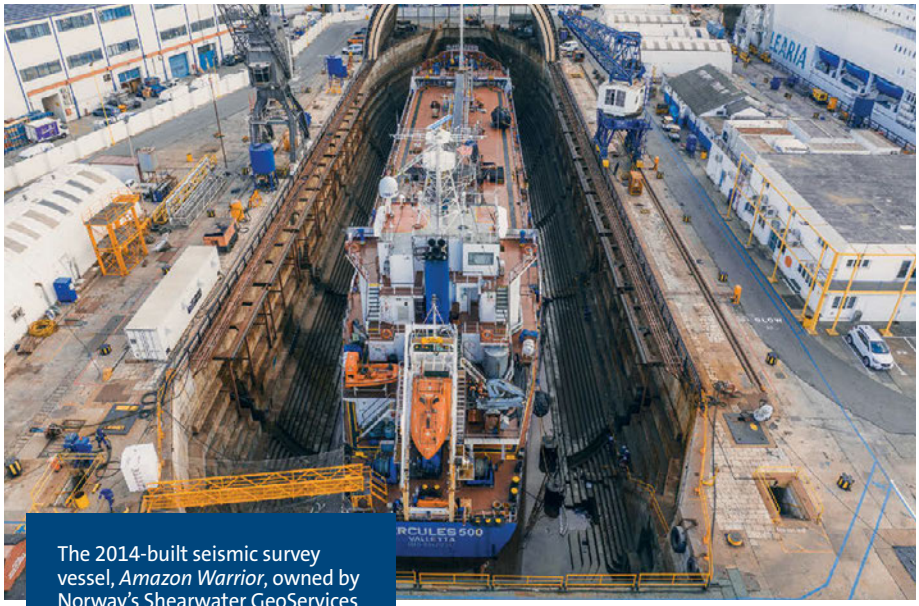
Energy demands

Meanwhile, Gibdock is landing more projects in the offshore sector. Owners of drillships, rigs, jack-ups, and FPSOs are regular customers. However, these projects require more space for storage, prefabrication and heavy lifts. The yard recently fabricated an entire deck in advance for an offshore vessel so that it could be installed when the vessel arrived in the yard.

Taylor says that an additional deepwater berth with a depth of 20-25m will increase capacity for these units. He also describes one specific project that is being considered as demand for prefabrication continues to climb. The yard already has a 70m by 40m fabrication and mobilisation bay adjacent to No. 1 dock. However, there is scope to have a second similar-sized area on the other side of the dock, effectively doubling capacity.

In another development at the yard, IT systems are being upgraded to digitalise aspects of the relationship with clients. This includes 'customer relationship management', the potential to use artificial intelligence in digital estimating, and the ability to provide clients with real-time live updates on the progress of projects. Costing and estimating will become faster and more accurate, and the completion dates more certain.

So far, though, there are no real-time links with trading assets to monitor operational performance at sea. However, as ship connectivity continues to develop exponentially, this may only be a matter of time. ■



The 2014-built seismic survey vessel, *Amazon Warrior*, owned by Norway's Shearwater GeoServices underwent a recent docking following a project in Suriname

Regional RoRo ferries are big business for the yard, particularly in the months before summer

Majority of efficiency gains left on the table, say Norwegian shipowners

Cutting emissions in European waters is already well under way with tightening regional regulations. From 2028, however, and following the outcome of the IMO's recent meeting on 'mid-term measures', owners everywhere will have to consider decarbonisation strategies as a priority or risk paying fuel penalties. Owners in Norway are ahead of the game, reports Charlie Bartlett.

Source: Utkilen

Chemical tanker firm Utkilen is optimising its fleet

Chemical tanker firm Utkilen is optimising its vessels to operate more slowly, and retooling vessels' gears has already made a striking difference. "We are rebuilding gears. It sounds a bit boring to talk about gears, but that is where we see some of the biggest savings ... more than 10-15% on that alone," said head of Ship Management Jarle Hillestad.

"They were designed in a different era, where the speed was 15 knots, whilst most vessels today are operating on 11, 12. So we are reducing the RPM output of the propeller, optimising it to the speed that we are operating on today."

Utkilen is also taking a rare interest in ship lifespan, which is enabling a circular-economy stance on retrofits. "In the chemical carrier business, we are restricted by the 25-year lifetime restrictions coming from some of the oil majors," Hillestad said. "But we are lucky. We have started a project with one of our charterers for a lifetime extension on the oldest vessels that we have.

"This goes into this context about saving energy, saving the environment – because why should you scrap vessels which are perfectly good? These vessels, they are in excellent condition when it comes to steel and technical condition! We have upgraded the engine automation, navigational equipment, Mewis duct fitted, new propeller blades, hull treatment. We plan to operate them for at least 15 years more. So also something to remember – we can utilise existing vessels longer by upgrading them."

Utkilen recently retrofitted its vessel *Mostraum* to operate on LNG, retrofitting tanks above deck in the hope of trimming 25% off its carbon dioxide emissions, and eliminating NOx and SOx entirely. After a successful job on *Mostraum*, the company now plans to retrofit three more vessels to LNG operation. "This is definitely not a final solution," explained Hillestad. "We are all aware of methane slip, and there are other challenges, but it is flexible."

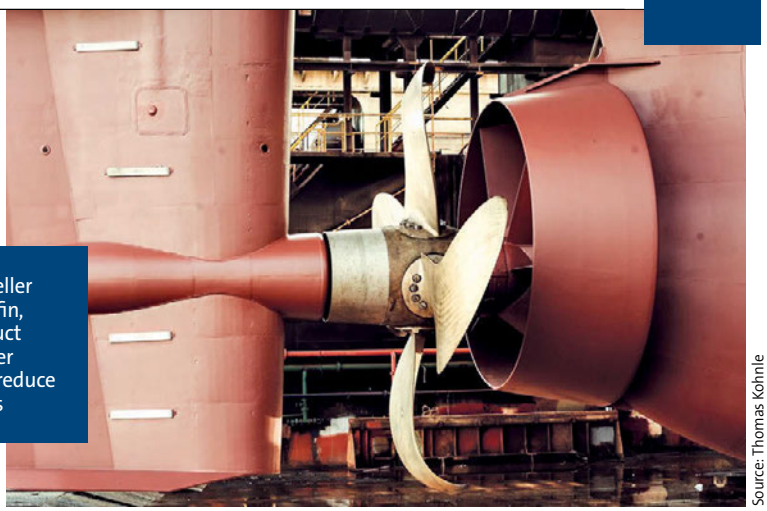
Efforts to plug into shore power have so far met with limited success, he explained. "At least in Norway, we have green 100% renewable energy available, so if we could make use of that, that would be a huge step forward. But the terminals are not ready – maybe not even willing to mix dangerous chemicals and electricity. So we are working together with some of the suppliers to find good solutions hopefully."

'Bad energy economics'

Highlighting that efficiency measures are achieving improvements "without any speed loss," Erik Hjortland, Odfjell Technology vice president, suggested that tanker firm Odfjell does not appear to consider slow-steaming part of its decarbonisation strategy. Instead, combining comprehensive performance analysis with a myriad of retrofitted fuel efficiency devices and operational adjustments, Odfjell has managed to reduce its fleet CO_2 emissions by 53% since 2008, and is targeting an increase to 57%.

Speaking to the shipping press in April, Hjortland urged other shipowners to do the same, arguing that there is much to be gained for a majority of the world fleet. "According to a Clarkson's study earlier this year, 63% of the world fleet has not installed any energy saving devices," he said. "Imagine the potential for what we as a sector could accomplish, if everybody did this."

Hjortland highlighted one of the inherent contradictions in plans to decarbonise mainly through a switch to green ammonia, green methanol, and other e-fuels. "If we target e-fuels ... for every kilowatt hour [of renewable energy], you lose 30% producing green hydrogen, you lose another 30% when you use that to make green ammonia or green methanol," he said. "Then, you lose 50-60% of the energy in the engine of the ship. From 1 kWh, you end up with 0.2 – an 80% energy loss.



The propeller boss cap fin, Mewis Duct and rudder bulb can reduce emissions

Source: Thomas Kohnle

"This is bad energy economics. All sectors are chasing zero, all sectors need renewable electricity to get there."

Rather than waiting on a new miracle fuel, then, Odfjell hopes to maximise efficiency gains to minimise fuel burned – whatever this might be. In March, Odfjell chemical tanker *Bow Olympus* had four 22m-high bound4blue eSails retrofitted at EDR Antwerp. At the time, David Ferrer, co-founder and CTO of bound4blue, reported that uptake in the tanker segment is growing, and added that bound4blue's eSails can "generat[e] six or seven times the propulsive lift of equivalently proportioned rigid sails in most scenarios."

The vessel recently completed a trans-Atlantic voyage which met FuelEU Maritime's 2050 greenhouse gas intensity targets and the IMO's Greenhouse gas Fuel Intensity (GFI) Direct Compliance targets well into the 2040s. The was achieved through a combination of B100 biofuel and four bound4blue suction sails.

This appears to have met with Hjortland's definition of good 'energy economics'. "The reason why we find sails to be so elegant on our ships [is] because they harness wind power directly," he explained. "You only lose 10% of it from the sail to the propeller."

The sails upend an operating paradigm that Odfjell has been meticulously refining for some years, he admitted. Between 2008 and today, the average sea state in which Odfjell's vessels sail has decreased from 3.5m to 0.6m, owing to weather routing for fuel efficiency.

Now, though, Odfjell is having to adopt a new model. "We have to flip this a little bit upside down, because now we want wind and weather," he said. "We have deployed an AI-based weather routing system to get the ships into weather. I can say that this has so far been a success. It has delivered above our expectations on the first voyage at least."

Among other devices to be retrofitted, there are aft-hull devices such as Mewis ducts, propeller boss cap fins and rudder bulbs;

and meanwhile inside the vessel, substantial gains are expected to be made as a result of replacing conventional lightbulbs – 700 per vessel, Hjortland said – with LED bulbs. These are expected to save 40-100t of fuel per vessel per year.

All in all, there are around 140 efficiency retrofits on Odfjell's fleet; an average of two per vessel. Easy efficiency gains are now fully exploited, Hjortland admitted, which means that getting to 57% as planned will be substantially harder. The difficulty is compounded by the fact that not all of the efficiency devices tested actually provided the intended gains.

Solid oxide fuel cells (SOFCs), supposed to improve the efficiency at which chemical energy in fuel is converted into electrical energy for use on the ship, failed to live up to their promise. "This was terminated last year," Hjortland said. "The short answer is, because of the economics and finances."

Shockingly, another industry darling, air lubrication, likewise proved ineffective. "We installed air lubrication on one of our ships in 2023 ... it did not work for us – we don't know why," he said. "The vendor doesn't either. Our personal opinion is that that technology is not compatible with some other energy-saving device sets that we have on that ship."

On the other hand, Odfjell demonstrates where operational efficiencies might be gained in another context: hull cleaning. Recently it partnered with ECOsubsea, which deployed an ROV to carry out hull cleaning on *Bow Cedar*.

There are "enormous" gains to be made from increasing the frequency of hull-cleaning, Hjortland said. "I cannot stress enough the importance of cleaning. The first 20 ships we did this on, we saved about 3.5 tonnes of fuel a day, on average."

Höegh Aurora's fuel tanks a stitch in time

By equipping its Aurora-class vessels with specialised heavy-duty fuel tanks, Höegh believes that the vessels are positioned to the best possible extent when the time comes to retrofit them to burn green ammonia. The high-specification fuel tanks are made to an exacting standard in order to withstand the temperature extremes of LNG, and the corrosiveness of ammonia, explained Hoegh CEO Andreas Enger.

"We went through the entire retrofit scenario and figured out the most difficult thing to do something about is the tank," he explained. "Because ammonia has a higher density, it is heavier, and you need different structural strength in the hull, stability, different materials."

"The risk of ammonia in the engine room is, from a safety point of view, fairly manageable. The risk lies in the tank and during bunkering, where you have potential for large leakages."

When it comes to the eventual retrofit operation, the vessels will need relatively little work done compared with other supposedly 'ammonia-ready' vessels, Enger explained. "The difference is the top end injection valve and stuff on the engine. So it's some small parts of the engine, and the piping," Enger explained. "This can be done during a routine drydocking."

Carbon recaptured

Another tanker owner, Solvang, has made an unexpected breakthrough with onboard carbon capture (OCCS). Having installed an OCCS on *Clipper Eris* – which now features a gargantuan funnel array and two large oblong carbon tanks on deck – Solvang has learned that exhaust gas recirculation, a technology previously developed to reduce NOx, plays very well together with OCCS.

This has allowed the company to claim that it has effectively doubled the efficiency of its OCCS compared with other systems on the market, which generally sequester around 30% of a ship's carbon dioxide in exhaust gas while increasing its fuel consumption by 50% to generate sufficient heat for the reaction.

Speaking with SORJ, CEO Edvin Endresen claimed that Solvang has managed 60% and 20% respectively, apparently by accident – a ratio which outperforms even CCS systems installed on land-based powerplants. "This is just lucky," he said. "We were not thinking about CCS when we developed the exhaust gas recirculation (EGR). But with our EGR, the concentration is extremely high, which is how we can get such high percentages.

"We have found that going between 30-50% [carbon captured], there is hardly any [increase in fuel consumption] – like 5%," explained Endresen. "But when you go past 60%, it climbs – 10, 15%. When you get close to 70%, you get a 15, 20% increase in fuel consumption. After that, the curve goes really steep, because you need to apply much more heat to get the extra out of it."

"The problem with projects that are capturing CO_2 from air, like vacuum cleaners – the concentration of CO_2 in the air is super low," Endresen added, commenting on land-based direct air carbon capture and storage (DACCS).

Though this sort of carbon capture has recently been taken up by Japanese ONE partners NYK and MOL – the latter in late April - such facilities have faced criticism for requiring extreme amounts of energy to sequester carbon at ambient atmospheric concentrations of only around 0.04%. Climeworks, the start-up engaged by MOL, gets around this by operating DACC plants in Iceland, where abundant geothermal energy provides a ready source of zero-carbon heat and electrical power.

Source: bound4blue

The Odfjell tanker *Bow Olympus* has been retrofitted with rotor sails

Bollinger and Edison Chouest launch United Shipbuilding Alliance to support Arctic operations

Bollinger Shipyards and Edison Chouest Offshore have announced the formation of the United Shipbuilding Alliance (USA), a strategic partnership aimed at constructing next-generation icebreakers to renew the ageing US icebreaker fleet. The alliance brings together two major players in commercial vessel construction to offer a streamlined design-to-delivery model for the US Coast Guard and other federal stakeholders.

Source: Bollinger

Bollinger's Morgan City shipyard in Louisiana

The initiative follows a response to the U.S. Coast Guard's April request for information regarding Arctic-capable vessels. The strategy is based on using commercial vessel acquisition methods to speed up delivery timelines – targeting a 33-month window from contract award to delivery. This is aimed at reducing costs through flexible execution and reduced bureaucracy.

Bollinger and Edison Chouest have a combined workforce of over 6,000 across 33 US shipyards and fabrication sites. Their shared record includes four icebreaker deliveries over the past three decades. Bollinger is also leading the US Coast Guard's Polar Security Cutter programme after acquiring the previous contractor in 2022.

The alliance argues that its commercial model offers faster delivery and lower costs than traditional US Government procurement. By shifting work between yards and avoiding redundant reporting processes, the partners aim to stabilise schedules and budgets while maintaining US-built vessel standards for national security missions.

Source: Eidesvik Offshore

The *Viking Energy* will use ammonia as fuel after the engine conversion

Clear focus on emissions

As global initiatives to reduce carbon emissions gather pace, companies are pioneering approaches to raise the sustainability of existing vessels, while yards add capacity to undertake more projects. Nick Savvides reports.

Norwegian offshore vessel operator Eidesvik Offshore claims that its converted platform supply vessel (PSV), *Viking Energy*, will be the first commercially operated ammonia-powered vessel when it enters service next year.

Eidesvik is one of eight partners in the Apollo project, named after the Greek god of archery, which aims to develop not just a vessel, but to kickstart ammonia retrofits and a regional ammonia economy that will develop further afield by generating increasing demand.

Speaking at a press briefing in April, Marie Launes, Eidesvik's VP of sustainability, said that the company is collaborating with seven partners to convert the PSV to operate on a Wärtsilä 25 dual-fuel engine.

Preparation for the conversion of the 2003 built *Viking Energy* is well under way. The Wärtsilä 25 engine was ordered in July last year, the conversion is set to start in January 2026, and the vessel is scheduled to be recommissioned by April 2026.

"We started this project in 2023, and we've learned a lot as we go, and what we see with the ammonia is the same thing we experienced with LNG: it's uncharted territories when it comes to requirements and regulations. So, we have to learn as we go and we encounter challenges that there are no established solutions for, making it extremely important that we have cooperation in projects like this throughout the value chain," explained Launes.

Testing the technology

The Viking Energy project is a fact-finding project with the group of eight companies' stated aims including a successful demonstration of the use of an ammonia-based dual-fuel internal combustion engine in an existing vessel. It may well prove the successful reduction of 70% of carbon emissions and NOx emissions below 2.4 g/kWh from vessel operations.

Moreover, these reductions must be achieved through a complete retrofitting arrangement to operate on ammonia and through the development of demonstrably safe ammonia storage and operation, including both deck loads and below deck tanks.

Apollo is also seen as a method of supporting the expansion of ammonia as fuel from a regional North European bunkering network to areas beyond European waters. According to the Apollo project's stated objectives, the group wants to create a "validated business case for ammonia as a ship fuel with operational expenditures of less than 130% from its baseline by the end of the project".

Apollo should also be able to demonstrate the feasibility of retrofitting other vessel

types, initially dredgers and offshore construction vessels. The project is also aimed at completing first classification under DNV's "Gas fuelled, Ammonia" rules which will give an independent assessment of the design's safety measures.

Safety first

One of the eight Apollo partners is Breeze Ship Design which has outlined the challenges involved in converting an LNG-powered platform supply vessel to ammonia fuel. In the first instance, Breeze said it is critical to ensure the safety of the crew and the environment by making certain that accommodation, service control spaces, and muster stations are safe from ammonia's toxic properties.

To ensure this, the yard will install protective equipment, improve ventilation, and introduce gastight doors and airlocks. Refuelling will be made safer with the redesign of the bunkering station that will allow for the containment of ammonia leakages.

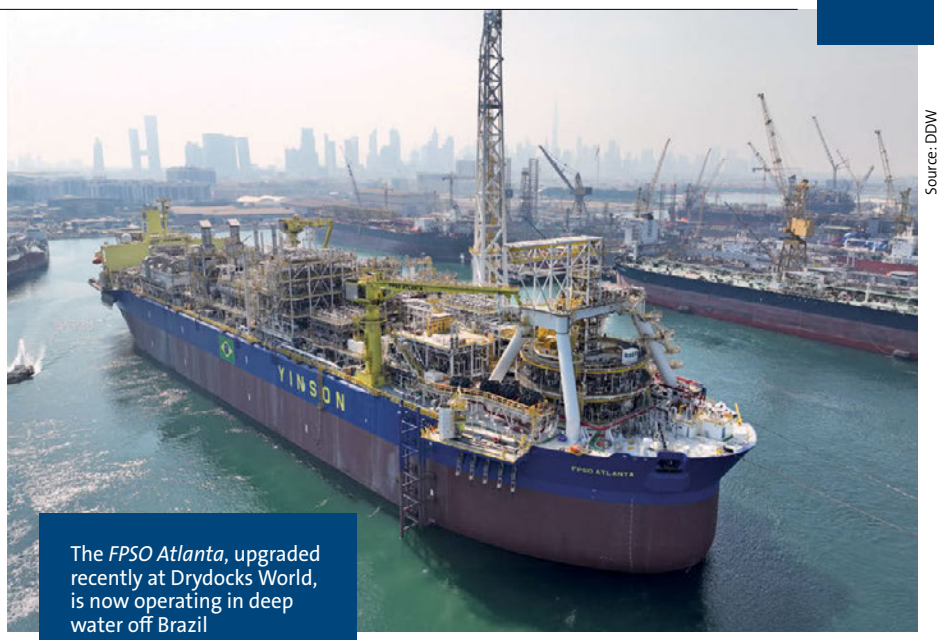
These improvements will include dedicated ventilation systems, water safety systems, and fire protection measures. Personal protective equipment and robust gas-freeing protocols are also essential. Another critical area is fuel storage and connection spaces which will have pressurised or refrigerated tanks designed to handle ammonia's unique properties installed.

Breeze added: "Ammonia fuel supply piping needs secondary enclosures to contain leaks, trace heating to prevent freezing, and monitoring equipment to ensure safe operation. The system also requires a specialised ammonia release mitigation system (ARMS) to handle purging and leakage scenarios."

Further safety measures have been included in the engine room, which must be gas-safe, with protective measures in place to contain potential leaks. Suitable decontamination facilities and eye washes must also be available.

The Apollo project received EUR 5 million funding from the EU and *Viking Energy* will be operated by Eidesvik for Norway's majority state-owned Equinor. The project should enable the company to reduce its emissions footprint for greenhouse gases including SOx, and reduce carbon emissions by over 70%, even with the fossil fuel required as pilot fuel.

The eight Apollo partners are Eidesvik, Breeze, VTT, Equinor, Wärtsilä, Maritime Cleantech, DEME and Demokritos.



Source: DDW

The *FPSO Atlanta*, upgraded recently at Drydocks World, is now operating in deep water off Brazil

Expansion opens new offshore opportunities for Drydocks World

A buoyant regional market has seen Dubai-based Drydocks World (DDW) substantially expand its capacity to handle larger ▸

Source: DDW

The *FSO Yamoussoukro* will supplement storage capacity for the *FPSO Petrojarl Kong* off the coast of Côte d'Ivoire

projects in the offshore vessel repair, retrofit and conversion sector. At the centre of this expansion is the newly inaugurated 75,000m² South Yard, which has increased the company's fabrication space by 40%.

The facility includes a 250m berth and a 37,000-tonne load-out facility, enabling the handling of larger and heavier offshore assets. Additional cranes, upgraded workshops, and plans to extend Berth 10 are all part of a broader effort to enhance throughput and technical capabilities.

Extra lifting capacity

A key addition to the yard's future capabilities is a new 5,000-tonne floating sheerleg crane, expected to be operational by mid-2026. It will have a 160m A-frame capable of lifting loads of up to 5,000 tonnes to 120m above the water, along with a 600-tonne fly jib extending its reach to 180m.

The crane will enable the installation of large, prefabricated modules for FPSOs, converter platforms, and offshore structures. Its capacity to carry up to 50 personnel offshore will reduce reliance on support vessels and improve overall project efficiency.

Several major projects are currently in progress, *FPSO Petrojarl Knarr* and *EMEM FPSO* were on site in April for upgrades, including recent heavy-lift operations. The *FPSO Baobab Ivoirien* is expected to arrive in the second quarter for refurbishment including steel renewals, tank recoating, and piping renewal. Once completed, the project is expected to extend the vessel's operational life by 15 years and support daily production of up to 70,000 barrels of oil.

The 14-month conversion of the *FPSO Petrojarl Kong*, formerly Voyageur Spirit, involved extensive production engineering, bulk procurement, and the installation of new modules, including significant structural steel and coating work. Meanwhile, an eleven-month project to convert the shuttle tanker Nordic Brasilia into the *FSO Yamoussoukro*, completed on time, involved structural refurbishment, life extension, and new coatings for all cargo and ballast tanks. *FSO Yamoussoukro* will provide additional storage capacity for the *Petrojarl Kong* located off the coast of Côte d'Ivoire.

Gas business

In the LNG segment, DDW completed conversions of *Tango FLNG* and *Excalibur FSU* for Eni Congo's Marine XII development. The project added over 4,000 tonnes of steel and integrated liquefaction, storage, and offloading systems using a spread mooring setup. It also achieved a 15% increase in LNG production, reaching approximately one billion cubic metres annually.

The company also completed the refurbishment of the *FPSO Atlanta* last year, which is now located in the *Atlanta Field* in the Santos Basin, offshore Brazil. The upgrade included new process systems and emissions reduction technologies, improving operational efficiency and supporting more sustainable production in deep-water conditions.

Multi-vessel approach suits Tidewater's 16 ship upgrade

One of the world's major offshore operators, Tidewater, contracted GLO Marine and VMS

"Nature of ship repair business is changing"

"We are witnessing a marked shift in the ship repair industry," Capt Rado Antolovic, Drydocks World CEO, told SORJ in a recent interview. "Our portfolio of long-term agreements has grown steadily, and we now maintain recurring ship repair and maintenance contracts with over 50 global clients."

Antolovic noted that ship repair has traditionally been driven by spot opportunities, but the market is evolving into one in which owners and operators are seeking more secure, long-term partnerships. This change is largely driven by the need for greater operational predictability, he believes, as well as integrated service delivery, and alignment with sustainability and compliance standards.

The recent South Yard expansion, he said, is providing a wide range of benefits and has been designed to align with DDW's vision to support the energy transition and meet growing demand for sustainable infrastructure. The first few months of operation have validated the approach, he said. "We're confident that this facility will be a key driver of future growth, particularly as the global maritime industry accelerates towards decarbonisation."

He continued: "We have made considerable investments in sustainability, significantly reducing our carbon footprint by 53.4%, one of the key initiatives being the procurement of 100% green electricity generated at the Mohammed bin Rashid Al Maktoum Solar Park."

In general engineering terms, DDW has been instrumental in building HVAC and HVDC platforms for the renewable wind energy sector. The company's components are already supplying green energy to four million homes a year; the number will soon double as new facilities are commissioned.

On shipping-related sustainability projects, "our recent upgrades include the installation of ballast water treatment systems, exhaust gas scrubbers ... optimised propellers, advanced hull coatings, and bow replacements," he said, adding that yard experts are actively exploring hybrid propulsion systems and alternative fuels including hydrogen-ready systems.

The yard is blazing an operational trail, with IoT technologies, automated CNC plate-cutting, cryogenic pipe fabrication, and automated gasket manufacturing just some of the innovations that are now boosting efficiency, reducing environmental impact, and support faster project turnround.

Antolovic is keen to stress the importance of digital integration which, he said, is central to the future of maritime operations. "We leverage cutting-edge digital technologies including artificial intelligence, robotics, and advanced IoT solutions extensively across out operations.

"Our implementation includes predictive maintenance systems, real-time monitoring for operational oversight, and the Cargoes Rostering System (CRS), an automated platform optimising workforce scheduling and resource management, he said, adding, "Digital transformation and robotics have significantly improved efficiency and accuracy in tasks such as blasting, painting, and pipe alignment, reducing reliance on manual labour."

In conclusion, he said: "By maintaining our focus on delivering comprehensive, high-quality solutions for maritime, offshore and renewable energy sectors, we are positioned not only to meet current industry challenges, but also to lead the sector. Our strategic infrastructure expansions and continuous technological advancements underscore our dedication to fostering growth, innovation, and global competitiveness."

Source: DDW

Rado Antolovic, Drydocks World CEO

Source: Tidewater

Garza Tide is one of 16 vessels having ballast water system installations

Group to install ballast water treatment systems (BWTS) aboard 16 vessels last December. Since then, the project has progressed at pace with more than 50 personnel working across three continents – US, Africa and Europe – a strategy to provide reliable and efficient retrofit capabilities in the offshore sector.

Work has progressed at pace with 16 systems now delivered. Two ships have already been retrofitted, a further ten have had engineering packages approved by class societies and others have completed prefabrication and materials procurement processes.

Alin Pohilca, operations director at GLO Marine, explained: "By treating this as a full fleet programme, rather than managing each vessel separately, we have reduced engineering hours by 25% and lowered materials and logistics costs by 15% per vessel. This was made possible through a plug-and-play system that speeds up the work while keeping the quality where it needs to be."

GLO Marine was initially founded in 2014 to meet the needs of the UK offshore oil industry. It now has offices in the UK and a design office set up in 2016, GLO Offshore Design Romania. The company is working with Danish service, repair and parts company, VMS Group which is based in Frederikshavn with offices in Rio de Janeiro.

GLO Marine and VMS Group combine engineering expertise, turnkey project control, and global delivery capacity. This combination meets the industry's growing demand for efficient upgrades completed with the minimum impact on operations.

"This programme is a clear example of what we bring to the table: high-volume coordination, technical precision, and hands-on execution at scale. We are fully equipped to support offshore vessel operators globally with retrofit and upgrade programmes that demand both engineering proficiency and speed," said Pohilca.

The work is carried out through a fully integrated engineering, procurement, construction, and installation model, with GLO Marine managing engineering, prefabrication, logistics, and installation. The contractors say that this approach benefits the client, which deals with only one point of contact throughout the project.

Palle Andersen, engineering manager at VMS Group, noted: "Offshore projects today are more complex and need close teamwork between different companies. Our partnership with GLO Marine helps us work as one team, providing retrofit solutions that are efficient, scalable, and ready for the future."

VMS brings deep experience in propulsion systems, engine overhauls, and global field support. GLO Marine, meanwhile, contributes class-approved engineering, procurement coordination, and turnkey execution. Their combined strengths allow for highly integrated services, optimised for the operational realities of offshore fleet upgrades.

"In today's offshore energy landscape, no single company can tackle the complexity alone. The ever-more-difficult challenges demand cross-border collaboration and a shared vision. Strategic partnerships like ours enable engineering, equipment, and service teams to act as one – delivering scalable, efficient, and future-ready solutions," said Andersen.

Tidewater, which is headquartered in Houston, Texas, has the largest OSV fleet in the world with 211 owned ships with an average age of 12.6 years and is active in major markets across the globe including the US, Europe, Middle East, Africa and Asia.

Hull coatings more critical than ever in decarbonisation drive

Until recently, underwater hull coatings were purely a commercial consideration. Now they are also a key component in shipping's drive to cut greenhouse gas emissions (GHG). Even so, there are many thousands of ships in service with old coating products that constantly gather fouling and increase fuel burn costing millions of dollars a week, with corresponding emissions.

However, as fuel costs rise dramatically in the years ahead, adopting carefully formulated coating strategies based on variables including ship type, speed, region of deployment, idle time, and so on, will become essential. And keeping coatings clean between applications will become a necessary standard.

Proactive shipowners have demonstrated for some time that advanced coatings, carefully applied and maintained, have rapid payback periods. Up-front costs are, of course, higher, but as shipping faces a future of fuel prices higher by a multiple, the investment and through-life care will be a commercial necessity.

Keeping hulls clean between coating applications is already an instant win. Odfjell Tankers, for example, recently undertook a project to have the hulls of 20 vessels cleaned by a robot (see page 38). The company clocked up average fuel savings of 3.5 tonnes a day across the tankers and, of course, corresponding reductions in emissions.

All of the marine coatings companies, whatever technology they offer, already have a strong pitch. But following the IMO's recent MEPC meeting, more ambitious targets are likely to be adopted later this year and will drive further emissions reduction requirements from 2028. The potential penalties for shipowners who do not meet the targets will be substantial from the outset, but are set to increase steadily from then until 2040. There is, therefore, an even stronger case now for owners and operators to adopt progressive coatings strategies.

In a recent interview, Ariana Psomas, global segment director at Pennsylvania-based coatings company, PPG, told SORJ about some of its recent initiatives, both in terms of the coatings themselves, as well as application efficiency. The company produces coatings for newbuildings, ships under repair and sea stores, with a focus on biocide-free silicone fouling release coatings and copper-free low-friction antifoulings suitable for electrostatic application.

Recent additions to its coatings range include the biocide-free, silicone-based PPG Sigmaglide® 2390 fouling release coating. Shipowners can clock up 20% instant power savings and reductions of up to 35% in greenhouse gas (GHG) emissions, Psomas said, compared with traditional antifoulings. Meanwhile PPG Nexeon™ 810, launched last year, can facilitate a 25% reduction in GHG emissions compared with traditional coatings, the company claims, while also supporting up to 60 days of idle time, with minimal speed loss. The coating features photodegradable biocides that reduce environmental impact while maintaining superior performance and colour retention throughout a ship's service life, it says.

Psomas also spoke of the benefits of recently introduced electrostatic coating application. Widely used in the automotive, aerospace, and manufacturing sectors, PPG claims to be the first coatings company in the maritime sphere to adopt the technology and claims that there are benefits for both newbuilding and repair yards.

Electrostatic application, Psomas explained, significantly improves transfer efficiency compared to traditional airless spraying. The process uses charged paint droplets that are attracted to the grounded vessel surface with high accuracy. The result is a uniform, ultra-smooth and long-lasting film layer, helping to lower volatile organic compound emissions and the resulting environmental impact. The end result is reduced coating overspray, minimised waste, and a cleaner working environment for applicators.

Source: PPG Protective and Marine Coatings

Electrostatic application creates an ultra-smooth layer and reduces overspray

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• DAMEN Shiprepair Van Brink Rotterdam (Netherlands);
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ZAMAKONA Yards:
• Zamakona Pasaia (Spain);
• Zamakona Las Palmas (Canary Isl., Spain);

MARINE SERVICE COMPANIES
ARGO NAVIS (Greece) - Marine consulting & engineering (BWTS, SOxNOx);
CHINAPORT CLEANSEAS - de-slopping, cleaning (China);
DGS Industrial & Naval (Brazil) - afloat repairs;
ELSSI - Drug & Alcohol Testing;
MECHADINAMIK - mechanical services, Turkey
ONE NET - satelite communications, bridge equipment service;
ONE TECH - technical service;
RANDOX - Drug & Alcohol Testing;
SYM - afloat repairs & marine services.

Benelux

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DSIC Changxingdao Shipyard (Dalian)
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German Ship Repair (Germany)
Offshore Inland (US /GoM)
Bludworth Marine (Houston)
Unity Marine Services (Panama)
Mapamar (Brasil)
Brightsun(Singapore)
Trident divers (Worldwide)
SIRCO (Panama)

ESMA MARINE AGENCIES B.V.

MEMBER The International Association of Shiprepair Agents Ltd

Kuiperbergweg 35, 1101 AE
Amsterdam, The Netherlands
Tel: +31 20 312 1353
Email: shiprepair@esma.nl
Contact: Cees Onink
Mob: +31 622 790 463
Web: www.agentondemand.nl

AGENT ON DEMAND MEMBERS
AFRICA
ASABA Astilleros De Guinea Ecuatorial S.A (Malabo, Equatorial Guinea)
CHINA
Cosco Shipyard Group
Zhoushan Changhong
EUROPE
Astilleros Ria de Aviles (Aviles, Spain)
Cernaval (Algericas, Spain)
Kuzeystar (Tuzla/Istanbul, Turkey)
Netaman Repair Group (Riga, Tallin)
Soby Vaerft (Soby, Denmark)
Adriatic42, Montenegro
FAR EAST
Colombo Dockyards (Colombo, Sri Lanka)
MIDDLE EAST
Drydocks World (Dubai, UAE)
Drydocks World Global Offshore Services (DMC Dubai Maritime City, Shiplift)

AIMSS NL

Snellenshovf 51, 4811 LN Breda, The Netherlands
Tel: +31 76 737 0002
Email: sales@aimss-shiprepair.com
Web: aimss-shiprepair.com

SHIPYARDS
• APCL (UK)
• ASL (Indonesia)
• ASMAR (Chile)
• ASYAD Drydock (Oman)
• CNDM (France)
• DQS (Vietnam)
• NASCO (China)
• SGDP (Italy)
• SNC (Romania)
• TERSAN (Turkey)
• TNG (Mexico)
• UNITHAI (Thailand)
• ZTHI (China)

MARINE SERVICES
• AIMSS RIDING TEAM (Romania)
Supply of Qualified Welders, Fitters, Technicians, Electricians etc.
• AATELCO (The Netherlands)
IT, PBX, Audio & CCTV Spares, Maintenance, Upgrades & Lifecycle Extension
• CROSSCOMAR (Spain)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
• GENERAL SHIPPING (Greece)
Tank Coating, Docking Services & Turnkey Projects
• HAI HA M&S (Vietnam)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
• JASON MARINE ELECTRONICS (Spain)
Supply, Repair, Maintenance & Surveys for Marine Electronics & NavCom
• MANTA MARINE TECHNOLOGIES (Norway)
Fuel Optimisation & Shore Power
• PMS (Panama)
Afloat Repairs, Voyage Repairs & Underwater Services
• SINGATAC (Singapore)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
• WINKONG (China)
Supply of Parts & Equipment, Afloat Repairs, Voyage Repairs & Underwater Services
• ZEBEC MARINE (India)
Design, Engineering & Consulting Solutions

Cyprus

WSR SERVICES LTD

MEMBER The International Association of Shiprepair Agents Ltd

234 Ayias Fylaxeos, CY 3082 Limassol, Cyprus
Tel: +357 25344418
Email: mail.cy@umarwsr.com
Web: www.umarwsr.com

SHIPYARDS
ASRY (Arab Shipbuilding& Repair Yard) – Al Hidd, Kingdom of Bahrain
ASL Marine Holdings Ltd-Batam, Indonesia

SORJ (Ship and Offshore Repair Journal) takes no responsibility for the accuracy of the information in the Agents Contact Directory (ACD). All information was supplied by the individual agents

Bredo Dry Docks – Bremerhaven, Germany
Caribbean Dockyard Engineering Services Ltd (CDESL) - Trinidad & Tobago
Chengxi Shipyard Co. Ltd - Shanghai, China
Colombo Dockyard Ltd – Colombo, Sri Lanka
CUD (Weihai) Shipyard – Shandong, North China
Dakarnave - Dakar, Senegal
Detyens Shipyards - Charleston, South Carolina, USA
Dormac Marine & Engineering - Capetown/Durban, South Africa
EDR Antwerp Shipyard - Antwerp, Belgium
Fayard A/S - Munkebo, Denmark
Gemak Shipyard – Tuzla, Turkey
Guangzhou Wenchong Shipyard – Guangzhou, South China
Harland and Wolff Heavy Industries – Belfast, N. Ireland
Hengli Heavy Industry - Dalian, North China
Hindustan Shipyard Ltd (HSL) - Visakhapatnam, India
Huarun Dadong Dockyard (HRDD) - Shanghai, China
Hutchison Ports TNG (Talleres Navales del Golfo S.A.) – Veracruz, Mexico
International Ship Repair - Tampa, Florida, USA
Lisnave Estaleiros Navais - Setubal, Portugal
Lloyd Werft Bremerhaven AG - Bremerhaven, Germany
MTG Dolphin - Varna, Bulgaria
Netaman Repair Group - Tallinn, Estonia
Onex Neorion Shipyards - Syros Island, Greece
Onex Elefsis Shipyards SA – Elefsina, Greece
Sociber - Valparaiso, Chile
IMC Shipyard (Zhoushan) – Zhoushan, China
Nanyang Star Group – Zhoushan, China
Shanhaiguan Shipbuilding Industry Co., Ltd – Hebei, North China
Orient Shipyard Co., Ltd – Busan, South Korea

UNDERWATER AND AFLOAT

Argus Marine Services - Columbia
Avalontec Engineering - Singapore
ROG Ship Repair – Rotterdam
Atlantis Marine Services LLC - Fujairah, UAE
I-Dive Services, Singapore
Underwater Contractors -Spain
Resolve Marine Services – Gibraltar
Reprosub – Las Palmas
On Site Alignment – Rotterdam Netherlands
LongKong Marine Engineering Co., LTD – China
Voyager Marine – India & Singapore
LDM Stations in Singapore and Europe

Denmark / Finland

BSA SHIPPING AGENCIES ANS
Competitive Shipyards Worldwide

BSA SHIPPING AGENCIES ANS

MEMBER The International Association of Shiprepair Agents Ltd

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Brodogradiliste d.o.o Shipyard LP (Croatia)
Falkvarv (Sweden)
Cernaval Group Algeciras (Spain)
Hidramar S.L (Canary Islands)
General Shipping S. A (Greece)
TK Tuzla Shipyard (Turkey)
Sandock Austral Shipyards (South Africa)
Qatar Shipyard Technology Solutions (Qatar)
Seagull Group (Singapore & Malaysia)
Unithai Shipyard & Engineering Ltd (Thailand)
Fujian Huadong Shipyard Ltd (China)
HuaRunDadong Dockyard Ltd HRDD (China)
CUD (Wehai) Shipyard (China)
Pax Ocean Shipyard Zhoushan (China)
First Suez Ltd - Suez Canal Transit and Shiprepair (Egypt)
Caribbean Drydock Company S.A CDC (Cuba)

JML Shipyard Agency

JML SHIPYARD AGENCY

Falkevägen 3,
457 40 Fjällbacka, Sweden
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Mobile: +46 702 20 37 43
Email: markus@jmlshipyardagency.com
Web: www.jmlshipyardagency.com

SHIPYARDS REPRESENTED

EUROPE
Lloyd Werft, Bremerhaven, Germany
MSR Gryfia Shipyard, Szczecin, Polen
Sefine Shipyard, Tuzla, Turkey
San Giorgio del Porto, Genoa, Italy
Chantier Naval de Marseille, France
EDR Shipyard, Antwerp, Belgium
ASIA
Drydocks World, Dubai
Chengxi Shipyard, Jiangyin, China
Changhong International Shipyard, Zhoushan, China
PaxOcean , Zhoushan, China
Wenchong Shipyard Guangzhou, China
Shan Hai Guan Shipyard, China
Qingdao Beihai Shipyard, China
DSIC Marine Services, Dalian, China
PaxOcean, Singapore
PaxOcean Pertama, Indonesia
PaxOcean Nanindah, Indonesia
PaxOcean Graha, Indonesia
US, CANADA & CARIBBEAN
TNG, Veracruz, Mexico
Ciramar Shipyard, Dominican Republic
Chantier Davie, Quebec, Canada
German Ship Repair Jamaica

AFLOAT REPAIR/SERVICES

Global Offshore Service, Dubai UAE
Offshore Inland, US Gulf/Mexico
Crosscomar, Algeciras
UMA Marine, India
Link Marine / Automation, UAE
MCU Coatings
Carell, Greece

Germany

CombiTrade since 1983

COMBITRADE GMBH

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Tel: +49(0)40 - 8080110-640
telefax: +49(0)40 - 8080110-699
Email: combitrade@combitrade.de
web: www.combitrade.de
Contact:
Timo Schultze (+49 172 453 9610)
Marco Löffelholz (+49 151 742 30009)

SHIPYARDS REPRESENTED

EUROPE
A&P Tyne (UK)
A&P Tees (UK)
A&P Falmouth (UK)
Aviles Shipyard (North of Spain)
Desan Shipyard (Turkey)
Eiffel Industries Marine (France Atlantic Side)
Gibdock (Gibraltar)
MTG Dolphin (Bulgaria)
Nauta Shipyard (Poland)
MIDDLE EAST
Heisco (Kuwait)
Qatar Shipyard, Qatar
AFRICA
Namdock, Walvis Bay (Namibia)
Nigerdock, Nigeria
SAS – Sandock Austral Shipyard, South Africa
SINGAPORE
ST Engineering Marine (Singapore)
INDIAN OCEAN
Colombo Dockyard (Sri Lanka)
FAR EAST
CHI Dalian (China)
CHI Nantong (China)
CHI Shanghai (Changxing + Huajing) (China)
CHI Zhoushan (China)
CHI Guangdong (China)
Fujian Huadong Shipyard, Fuzhou (China)
Beihai Shipyard, Qingdao (China)
CUD, Weihai (China)
CSSC GUANGZHOU WENCHONG, Guangzhou, China
CSSC SHANHAIGUAN SHIPBUILDING INDUSTRY CO. LTD., Qinhuangdao, Hebei, China
YIULIAN DOCKYARDS (SHEKOU) LIMITED, ShenZhen, Guangdong, China
ZTHI (China)
Nasco (China)
Huarun Dadong Dockyard (HRDD), China
DS Ship, Korea
Huangpu Wenchong (China)
Dung Quat Shipbuilding Industry Company Ltd., Quang Ngai, Vietnam
CSBC Koahsiung (Taiwan)
CSBC Keelung (Taiwan)
Mitsubishi Heavy Industries (Japan)
Orient Shipyard CO. LTD (HQ) Busan & Gwangyang Shipyard (Korea)
Sam Kang Shipbuilding & Conversion (Korea)
CENTRAL AMERICA
Caribbean Drydock (Cuba)
Ciramar, Dom. Rep.
Caribbean Dockyard (Trinidad & Tobago)
SOUTH AMERICA
SIMA, Callao (PERU)
Cotecmar, Mamonal (Colombia)
Tsakos Industrias Navales (Uruguay)

SPECIAL SERVICES:

Eras Ltd – worldwide (Thickness Measurement, Flying Squad),
(afloat voyage repair/main engine overhaul),
Marcontrel – worldwide (Port Repair, Voyage Repair and Electric Cargo Crane Automation),
Marship (afloat repair with own berth/voyage repair in European ports/yards),
STEP Consolidated – workshops in Brazil, Portugal and South Africa(Port Repair, Voyage Repair incl Flying Squads)
Seagull Marine – SE Asia (Port Repair, Voyage Repair, specialised in PBCT propeller),
Kwang-Youn-Gi Engineering Co. Ltd – Taiwan (Repair workshop with flying squad),
Pasras - Balboa (port repair, specialised in ship's automation / main engine remote & safety)
Bacviet, Haiphong (Taiwan) (port and voyage repair incl spare parts)
Shanghai Marine Technology (China) (specialized in port repair, voyage repair)
Hatchtec Marine Service, Shanghai (China) (specialized in hatch cover/deck crane/windless/winch/roro/grab)
General Shipping, Piraeus, workshop, tank treatment, blasting/painting specialist
Kamji, all China, workshop, spare parts, agent
Dimar-Tec, Singapore, fuel efficiency + monitoring systems
Cliin Robotics, Denmark
Seven Ocean, spare parts India
Dai Hwa Engineering, Korea, workshop
HMPS, Korea, retrofit, ship repair, eco-friendly conversion

GERMANIA SHIPYARD AGENCY

GERMANIA SHIPYARD AGENCY GMBH

MEMBER The International Association of Shiprepair Agents Ltd

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Fax: +49 40 303 826 07
Email: germania@shipyard-agency.de
Web: www.shipyard-agency.com
Contacts:
Christof Gross, Eliane Tietz, Oliver Kirmse, Kai Pahnke

SHIPYARDS

NORTH AMERICA/CENTRAL AMERICA/CARIBBEAN:
• Astibal (Panama)
• Chantier Davie Canada Inc. (Canada)
• Seaspan Vancouver Drydock (Canada)
• Seaspan Victoria Shipyards Company Ltd. (Canada)
• TNG Talleres Navales del Golfo (Mexico)
SOUTH AMERICA:
• SPI Astilleros S.A. (Argentina)
FAR EAST:
• DSIC Changxingdao Shipyard Co., Ltd. (Dalian)
• Huarun Dadong Dockyard Co., Ltd. (China)
• IMC Shipyard (Zhoushan) Co., Ltd.
• PaxOcean Engineering Zhoushan Co. Ltd. (China)
• PaxOcean Shipyard Pte. Ltd. (Singapore)
• PaxOcean Asia (Pertama, Indonesia)
• CSSC Qingdao Beihai Shipbuilding Co., Ltd.
• Unithai Shipyard and Engineering Ltd (Thailand)
• Yiu Lian Dockyards Limited (Hongkong)
• Yiu Lian Dockyards (Shekou) Limited, China
• Yiu Lian Dockyards (Weihai) Limited, China
• Yiu Lian Dockyards (Zhoushan) Limited, China
PERSIAN GULF:
• Drydocks World Dubai LLC (UAE)
MED/BLACK SEA:
• Adriatic42 (Montenegro)
• Bulyard Shipbuilding Industry AD (Bulgaria)
• Carell S.A. (Greece)
• Chantier Naval de Marseille (France)
• San Giorgio del Porto Genoa (Italy)
• Sefine Shipyard (Turkey)
EUROPE ATLANTIC/BALTIC:
• Astander (Spain)
• Astican (Gran Canaria, Spain)
• Balt Yard (Gdynia)
• BREDO Dry Docks GmbH (Germany)
• Blohm+Voss B.V. & Co. KG (Germany)
• Harland&Wolff (Belfast, UK)
• Navikon SRY Ltd (Poland)
• Oresund Drydocks (Sweden)

AFLOAT COMPANIES:

• Bludworth Marine (USA)
• BMT Repairs (Spain)
• Drydocks World Global Offshore Services (UAE)
• DSK Co., Ltd (Korea)
• HON Marine (Malaysia)
• Longkong Marine Engineering Co., Ltd (China)
• Oceantrans Marine Services Co. Ltd (China)
• Offshore Inland Marine & Oilfield, LLC (USA)
• On Site Alignment (Netherlands, UK, USA, Singapore)
• MarineService Hirthals A.S. (Denmark)
• Metalock (Brasil)
• ROG Rotterdam Offshore Group (Netherlands)
• Trident B.V. (Netherlands)
• Trident (Italia)
• Trident (Malta)
• Trident (Spain)
• Trident (UAE)
• UMA Marine Group (India)

SPARES AND EQUIPMENT:

• Greentec Marine Engineering Co. Ltd
• IHB ShipDesign AD
• LAB S.A.
• OceanWings
• SunRui Marine Environment Engineering (China)
• Senda Shipping Engineering & Service Ltd (China)
• VICUS Desarrollos Tecnologicos S.L. (Spain)

Greece

T. J. GIAVRIDIS MARINE SERVICES

T J GIAVRIDIS MARINE SERVICES CO LTD

MEMBER The International Association of Shiprepair Agents Ltd

Georgada16, 145 61 Kifissia, Athens, Greece
Tel: (0030) 211 10 42000,
Fax: (0030) 210-4182 432
Email: info@giavridisgroup.gr
Web: www.giavridisgroup.gr
Contact: Mr John Giavridis

Mobile: (0030) 6936 201988
Contact: Mr Nikolaos Giavridis
Mobile: (0030) 6936 766165

SHIPYARDS AND SHIP REPAIRERS REPRESENTED

AFRICA
NAMDOCK - Namibia Drydock & Ship Repair (Pty.) Ltd. - Walvis Bay (Namibia)
Dormac Marine & Offshore Engineering
AMERICAS
ASTIBAL (Panama)
Breakwater International (U.S.A.)
Detyens Shipyard (U.S.A)
GSRJ – German Shiprepair Jamaica Ltd
Offshore Inland (U.S.A.)
Proios S.A. (Argentina)
Talleres Industriales S.A. (Panama)
Tandanor Shipyard (Argentina)
Vancouver Drydock Co. - SEASPAN GROUP (Canada)
Vancouver Shipyards Co. Ltd. - SEASPAN GROUP (Canada)
Victoria Shipyards Co. Ltd. - SEASPAN GROUP (Canada)
ASIA
Chengxi Shipyard (China)
Cosco Shipping Heavy Industry Group (China)
Cosco Shipping Heavy Industry Dalian Shipyard
Cosco Shipping Heavy Industry Guangdong Shipyard
Cosco Shipping Heavy Industry Nantong Shipyard
Cosco Shipping Heavy Industry Shanghai Shipyard
Cosco Shipping Heavy Industry Zhoushan Shipyard
Cosco Shipping Maritime Technology Dalian Co Ltd (China)
Cosco Weihai Shipbuilding Marine Technology Co Ltd (China)
CSSC Shanghai Marine Diesel Engine Research Institute – SMDERI (China)
CUD Weihai Shipyard (China)
Dalian Shipbuilding Industry Company (China)
Fujian Huadong Shipyard (China)
Guangzhou Wechong Shipyard (China)
HAEIN (South Korea)
Huarun Dadong Shipyard (China)
IMC Shipyard Zhoushan (China)
Kwang Youn Gi Engineering (Taiwan)
Long Kong Marine Engineering (China)
Orient Shipyard Co. Ltd. (South Korea)
Pmax One Technologies Pte. Ltd. (Singapore)
Qatar Shipyard Technology Solutions (ex. Nakilat Keppel Offshore & Marine Shipyard – Keppel Group)(Qatar)
Qingdao Beihai Shipyard (China)
Ruitai Nantong Shipyard (China)
Sasebo Heavy Industries Co. Ltd. (Japan)
Seatrium Repairs & Upgrades Pte. Ltd (Singapore)
Seatrium Batangas Shipyard (Philippines)
Seatrium Subic Shipyard & Engineering (Philippines)
Shanhaiguan Shipyard (China)
Tru - Marine Dubai (U.A.E.)
Tru - Marine Pte. Ltd. (Singapore)
Tru - Marine Shanghai, Tianjin, Guangdong, Zhoushan (China)
Yui Lian Dockyards – Hong Kong
Yui Lian Dockyards – Weihai
Yui Lian Dockyards - Zhoushan
Yuilian Dockyards Shekou (China)
Zhoushan Changhong Shipyard (China)
Zhoushan Huafeng Shipyard (China)
Zhoushan Paxocean Shipyard (China)
Zhoushan Xinya Shipyard (China)
EUROPE
Astilleros Canarios S.A. (Astican Shipyard) (Spain)
Astilleros De Santandr S.A. (Astander Shipyard) (Spain)
Bulyard Shipyard (Bulgaria)
Desan Shipyard (Turkey)
Fincantieri Cantieri Navali Italiani S.P.A. Group (Italy)
Fincantieri Palermo Shipyard (Italy)
Fincantieri Trieste Shipyard (Italy)
Fincantieri Muggiano Shipyard (Italy)
Gemak Shipyard (Turkey)
Remontowa Ship Repair Yard (Poland)
Rotterdam Shiprepair RSR (The Netherlands)
T.K. Tuzla Shipyard (Turkey)
Tersan Shipyard (Turkey)
Tru - Marine Rotterdam (The Netherlands)
OCEANIA
Babcock Fitzroy Ltd. (New Zealand)
Varley Group (Australia)

RESOLUTE

RESOLUTE MARITIME SERVICES INC.

296, Kifisias Avenue, 152 32, Chalandri,
Athens - Greece
Tel: +30 211 182 9000 / +30 210 689 2743
Email: main@resolute.gr
Web: www.resolute.gr
Contact: Alex & Andreas Scaramangas, Nikos Pappas & Dimitris Svoronos

EXCLUSIVE REPRESENTATIONS

ASRY (Bahrain)
Lisnave (Portugal)
Dakarnave (Senegal)
Navalrocha (Portugal)
HSD Marine and Shiprepair (Singapore)
Maindeck (Technical project management software)

DEDICATED CO-OPERATIONS

Gemak Group (Turkey)
HAT SAN Shipyard (Turkey)
Odessos Shiprepair Yard (Bulgaria)
GSRJ – German Ship Repair Jamaica
Dominicana Caribbean (Dominican Republic)
Caribbean Dockyard (Trinidad and Tobago)
Gulf Marine Repair (Tampa, Florida, US Gulf)
CSSC Qingdao Beihai Shipbuilding Co., LTD. (China)
Fujian Huadong Shipyard (China)
Ruitai Nantong Shipyard Co., LTD. (China)
Zhoushan Huafeng Shipyard Co., LTD. (China)

WSR SHIP REPAIRS

WSR SERVICES LTD

77 Vasileos Pavlou, 1st Floor 16673, Voula, Greece
Tel: +3021 0428 2552
Email: mail.gr@umarwsr.com
Web: www.umarwsr.com

SHIPYARDS

ASL Marine Holdings Ltd-Batam, Indonesia
Bredo Dry Docks – Bremerhaven, Germany
Caribbean Dockyard Engineering Services Ltd (CDESL) - Trinidad & Tobago
Chengxi Shipyard Co. Ltd - Shanghai, China
Colombo Dockyard Ltd – Colombo, Sri Lanka
Detyens Shipyards - Charleston, South Carolina, USA
Dormac Marine & Engineering - Capetown/Durban, South Africa
EDR Antwerp Shipyard - Antwerp, Belgium
Fayard A/S - Munkebo, Denmark
Gemak Shipyard – Tuzla, Turkey
Guangzhou Wenchong Shipyard – Guangzhou, South China
Harland and Wolff Heavy Industries – Belfast, N. Ireland
Hengli Heavy Industry - Dalian, North China
Huarun Dadong Dockyard (HRDD) - Shanghai, China
International Ship Repair - Tampa, Florida, USA
Lloyd Werft Bremerhaven AG - Bremerhaven, Germany
MTG Dolphin - Varna, Bulgaria
Netaman Repair Group - Tallinn, Estonia
Torlak Shipyard – Tuzla, Turkey
IMC Shipyard (Zhoushan) – Zhoushan, China
Nanyang Star Group – Zhoushan, China
Port Said Shipyard - Egypt
Shanhaiguan Shipbuilding Industry Co., Ltd – Hebei, North China

UNDERWATER AND AFLOAT

Argus Marine Services - Columbia
Avalontec Engineering - Singapore
ROG Ship Repair – Rotterdam
Atlantis Marine Services LLC - Fujairah, UAE
I-Dive Services, Singapore
Underwater Contractors -Spain
Resolve Marine Services – Gibraltar
Reprosub – Las Palmas
On Site Alignment – Rotterdam, Netherlands
LongKong Marine Engineering Co., LTD – China
Voyager Marine – India & Singapore
LDM Stations in Singapore and Europe

SEADOCK

SEADOCK MARINE AGENCIES LTD

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Mobile: +30 6947 56 46 36
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Web: www.seadockmarine.com
Contact: George Lyras

SHIPYARDS

EDR Antwerp (Belgium)
Bulyard, Varna (Bulgaria)
CMI Yiu Lian Weihai (China)
CUD Shipyard (China)
DSIC Changxingdao (China)
DSIC Shanhaiguan (China)
Fujian Huadong Shipyard (China)
Guangzhou Wenchong (China)
HRDD Shipyard (China)
IMC YY Shipyard (China)
Longshan Shipyard (China)
Paxoean Shipyard (China)
Qingdao Beihai Shipyard (China)
Ruitai Shipyard (China)
Stonestar Shipyard (China)
Weihai Huadong (China)
Xinya Shipyard (China)
Yiu Lian Dockyards (China)
Zhoushan Huafeng Shipyard (China)
Blohm + Voss (Germany)
Emden Dockyard (Germany)
Bredo (Germany)
Lloydwerft (Germany)
Onex Shipyards (Eleusis, Syros), (Grecee)
Chalkis Shipyards (Greece)
Skaramangas Shipyard (Greece)
Yiu Lian Dockyards (Hong Kong)
ASL Shipyard (Indonesia)
Paxocean Shipyard (Indonesia)
Hankook Made (Korea)
Qatar Shipyard Technology Solutions (Qatar)
Paxocean Shipyard (Singapore)
Astilleros Cernaval (Spain)
Astilleros Ria de Aviles, S.L. (Spain)
Metalships & Docks (Spain)
Untihai Shipyard (Thailand)
Desan Shipyard (Turkey)
Ozata Shipyard (Turkey)
Sefine (Turkey)
Seltas Shipyard (Turkey)
Tersan Shipyard (Turkey)
Gemak Shipyard (Turkey)
Harland & Wolff (UK)

MARINE & UNDERWATER SERVICES

TurboTechnik GmbH & Co. KG (Germany)
Dynamic Co. (Greece)
Subsea Services (Singapore)

Italy

BANCHERO COSTA & C.

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16121 Genoa, Italy
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Fax: +39 010 5631 602
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Contact: Fabio Bertolini
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Contact: Daniele Perotti
Mobile: +39 335 7366801
Contact: Giovanna Ximone
Mobile: +39 335 7366802

COMPANIES REPRESENTED

Asaba shipyard (Equatorial Guinea)
Astilleros Cernaval, Algeciras (Spain)
Astilleros Mario Lopez, Malaga (Spain)
Chengxi Shipyard (China)
CM Korea Ltd
CMR Tunisie (Tunisia)
Colombo Dockyard (Sri Lanka)
Cromwell & C. (Argentina)
Crug-Versitec (marine sealing solutions - Cyprus)
Damen Shiprepair & Conversion
• Damen Shiprepair Amsterdam (The Netherlands)
• Damen Shiprepair Oranjewerf, Amsterdam (The Netherlands)
• Damen Shiprepair Brest (France)
• Damen Shipyards Den Helder (The Netherlands)
• Damen Shiprepair Dunkerque (France)
• Damen Shiprepair Harlingen (The Netherlands)
• Damen Oskarshamnsvarvet (Sweden)
• Damen Shiprepair Van Brink Rotterdam (The Netherlands)
• Damen Shiprepair Rotterdam (The Netherlands)
• Damen Shiprepair Vlissingen (The Netherlands)
• Damen Shipyards Sharjah-Albwardy Marine Engineering (UAE)
• Damen Curacao shipyard
• Damen Mangalia (former Daewoo Mangalia)
• Damen Verolme (former Keppel Verolme)
DIANCA Astilleros (Venezuela)
EST Engineering Ship Technology (Singapore)
Gemak Shipyard (Turkey)
General Naval Control (Italy)
General Shipping S.A (Greece)
Guangzhou Dengtai Shipyard (China)
Hyundai Mipo Dockyard (South Korea)
Hyundai Vinashin Shipyard (Vietnam)
Ibercisa (Spanish winches and deck machinery producer)
Komas-Korean Maritime Repairs Service (South Korea)
Malaysia Marine & Heavy Engineering (Malaysia)
MSR Gryfia Shiprepair Yard (Poland)
Paxocean Batam
Paxocean Singapore
Pregol Shiprepair Yard - Kaliningrad (Russian Federation)
Promar Uab (propulsion and sealing services – Lituania)
Qingdao Beihai Shipyard (China)
Riga Shipyard (Latvia)
Sasebo Heavy Industries (Japan)
Shanghai Shipyard (China)
Sociber (Chile)
SYM (Barcelona, Spain - Santo Domingo, Dominican Republic)
ST Marine
Underwater Shipcare, Singapore.
Zhoushan Xinya Shipyard (China)

Italy / Monaco / Switzerland

CAMBIASO RISSO SERVICES SAM

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Private email: max@cariservice.com
Contact: Giovanni Palumbo
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Mobile: +33 640616602
Contact: Mr Enrico Pittaluga
Direct Line: +37798801363
Mobile: +33640623184

COMPANIES REPRESENTED

Alabama Shipyard – Mobile (USA)
ASMAR, Chile
China Shipbuilding Corporation (Taiwan)
• Kaohsiung Shipyard
• Keelung Shipyard
Cosco Shipping Heavy Industry
• Cosco Dalian Shipyard

• Cosco Guangdong Shipyard
• Cosco Nantong Shipyard
• Cosco Shanghai Shipyard
• Cosco Zhoushan Shipyard
• Cosco Qidong Offshore
• Cosco Shipping Ppa, Greece
• Nacks
• Dacks
CUD Weihai (China)
Dakarnave (Senegal)
Drydock World Dubai
Elgin Brown & Hamer (South Africa)
Grand Bahama Shipyard (Bahamas)
Guangzhou Wenchong Dockyard (China)
Gulf Copper (Port Arthur / Galveston / Corpus Christi – USA)
IMC – Yy Zhoushan (Zhoushan, China),
Lisnave Estaleiros Navais SA (Portugal)
Namibia Drydock
Odessos Shiprepair Yard (Bulgaria)
ONEX Elefsis Shipyards SA, Greece
ONEX Neorion Shipyards SA, Greece
Orient Shipyard (South Korea)
PaxOcean Batam
PaxOcean Singapore
Qingdao Beihai Shipyard (China)
Remontowa Shiprepair Yard (Poland)
Renave (Brasil)
Santierul Naval Costanta (Romania)
Scamp Network Ltd (Gibraltar)
Smit International (Rotterdam)
Sefine Shipyard (Turkey)
Tersan Shipyard (Turkey)
Tsakos Indusrias Navales (Montevideo, Uruguay)
Tuzla Shipyard (Turkey)
Unithai Shipyard & Engineering (Thailand)
Western India Shipyard (India)

VICTORIA MARITIME SERVICES

MEMBER The International Association of Shiprepair Agents Ltd

7 Avenue des Papalins, MC 98000, Monaco
Tel: +377 99995160
Email: shiprepair@victoriamaritime.com
Web: www.victoriamaritime.com
Contact: Luca Spinelli-Donati,
Julia Sandmann, Carlo Spinelli-Donati,

SHIPYARDS REPRESENTED
Adria Docks of Trogir, Croatia
Asry of Bahrain
Alimia Group:
• Astander of Santander, Spain
• Astibal of Balboa, Panama
• Astican of Las Palmas de Gran Canaria, Spain
Besiktas Group:
• Art Shipyard of Tuzla, Turkey
• Besiktas Shipyard ofYalova, Turkey
• Park Shipyard of Yalova, Turkey
BLRT Group:
• Tallinn Shipyard of Tallinn, Estonia
• Turku Repair Yard of Naantali, Finland
• Western Shipyard of Klaipeda, Lithuania
Cammell Laird of Birkenhead, UK
Carell of Piraeus, Greece
Chantier Naval de Marseille, France
Dormac of Durban and Cape Town, South Africa
DS Ship / Yeosu Ocean of Ulsan, Korea
Fujian Huadong Shipyard of Fuzhou-Fujian, China
Huarun Dadong Dockyard (HRDD) of Shanghai, China
Oresund Drydocks of Landskrona, Sweden
PaxOcean Zhoushan, China
ROG of Rotterdam, Netherlands
San Giorgio del Porto of Genoa, Italy
Seatrium:
• Admiralty, Tuas, Tuas Boulevard, Benoi and Pioneer Yards of Singapore
• Tuas Boulevard Yard of Singapore
• Subic Bay of Philippines
• Estaleiro Jurong Aracruz of Aracruz, Brazil
Shanhaiguan Shipyard of Qinhuangdao, China
Talleres Navales Del Golfo of Veracruz, Mexico
Tampa Ship of Tampa, Florida
Tandanor of Buenos Aires, Argentina
Xinya Shipyard of Zhoushan, China
Yiu Lian Dockyards of Hong Kong

MARINE SERVICE COMPANIES REPRESENTED
Elettrotek Kabel of Bagnolo in Piano, Italy (special electrical cables producer)
Nextcorr of London, UK (marine growth prevention and corrosion protection systems)
PBM of Rijeka, Croatia (mechanical repairs)
Polyflake of Miami, USA (high-performance, long-term anti corrosion protection)
SES Marine Services of Singapore (voyage and afloat repairs)
Turbo-Technik Repair Yard of Wilhelmshaven, Germany (mechanical repairs)

Lithuania, Latvia, Estonia, Poland

ORCA MARINE UAB

MEMBER The International Association of Shiprepair Agents Ltd

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Klaipeda, Lithuania
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Mobile: +370 650 40900
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Web: www.orca-marine.eu
Contact: Viktoras Cernusevicius

SHIPYARDS
Asaba Shipyard (Malabo, Equatorial Guinea);
Asmar Shipyard (Chile);
Brodotrogir D.D. Shipyard Trogir (Croatia);
Carena (Abidjan, Ivory Coast);
Chantier Naval De Marseille (France);
Colombo Dockyards (Sri, Lanka);
Cosco Shipyards Group:
• Cosco Dalian (China);
• Cosco Nantong (China);
• Cosco Shanghai (China);
• Cosco Zhoushan (China);
• Cosco Guangdong (China);
• Cosco Lyanungang (China);
Davie (Quebec, Canada);
Detyens Shipyard (N. Charleston, Usa);
Dong Sung Engineering & Shiprepair (S.Korea);
Damen Shiprepair Group:
• Damen Shiprepair Dunkerque (France);
• Damen Shiprepair Oranjewerf Amsterdam (Netherlands);
• Damen Shiprepair Brest (France);
• Damen Shiprepair Den Helder (Netherlands);
• Damen Shiprepair & Conversion Rotterdam (Netherlands);
• Damen Shiprepair Vlissingen (Netherlands);
• Damen Shiprepair Amsterdam (Netherlands);
• Damen Shiprepair Harlingen (Netherlands);
• Damen Oskarshamnsvarvet (Sweden);
• Damen Shiprepair Van Brink Rotterdam (Netherlands);
• Damen Shiprepair Curacao (Curacao, Dutch Antilles).
Enavi Reparos Navais (Rio De Janeiro, Brazil);
Fama Group (Cyprus);
Gibdock (Gibraltar);
Harland & Wolff (Belfast, Uk);
Mmhe Shipyard (Malaysia);
Astibal (Panama);
Namdock (Walvis Bay, Namibia)
Narp Shiprepair:
• Kiran/Erkal Tuzla (Tuzla, Turkey);
• Hat-San Shipyard (Yalova, Turkey);
•Tersan Shipyard (Yalova, Turkey);
•Sefine Shipyard (Yalova, Turkey);
• Hicri Ercili Shipyard (Yalova, Turkey);
•Gisan Shipyard (Tuzla, Turkey);
Oman Drydock (Oman);
Sima (Peru);
San Giorgio Del Porto (Genova, Italy);
Tandanor (Buenos Aires, Argentina);
Tsakos Industrias Navales (Montevideo, Uruguay);
Zamakona Yards:
• Zamakona Pasaia (Spain);
• Zamakona Las Palmas (Canary Isl., Spain);

MARINE SERVICE COMPANIES
Argo Navis (Greece) - Marine Consulting & Engineering (Bwts, Soxnox);
Chinaport Cleanseas - De-Slopping, Cleaning (China);
Dgs Industrial & Naval (Brazil) - Afloat Repairs;
Mechadinamik - Mechanical Services, Turkey
One Net - Satelite Communications, Bridge Equipment Service;
One Tech - Technical Service;
Sym - Afloat Repairs & Marine Services

The Netherlands

AYS SHIPREPAIR

MEMBER The International Association of Shiprepair Agents Ltd

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SHIPYARDS
EUROPE
Bulyard (Bulgaria)
Bredo Drydocks (Germany)
Gibdock (Gibraltar)
Platinum (Turkey)
NORTH AMERICA – CARIBIC
Canada East - Davie (Quebec)
Canada West - Seaspan (Vancouver)
Seaspan (Victoria)
US EAST COAST
Detyens
German Ship Repair Jamaica Ltd
PERSIAN GULF
Qatar Shipyard Technology Solutions
AFRICA
Namibia
NAMDOCK (Walvis bay)
SOUTH AFRICA
Dormac (Capetown)
Dormac (Durban)
Dormac(Saldanha)
ASIA
Korea:Orient Shipyard (Busan)
Indonesia: ASL Marine(Batam)
AUSTRALIA
Thales (NS Wales)
CHINA
DSIC Changxingdao Shipyard (Dalian)
Yiu Lian Dockyards (Hong Kong)
Yiu Lian Dockyards(Shekou)
Yiu Lian Dockyards(Zhoushan)
CUD (Weihai)
Zhoushan Changhong International Shipyard Co., Ltd
Zhoushan Putuo Changhong Shipyard Co., Ltd
Zhoushan CIMC Changhong Shipyard Co., Ltd

SHIP REPAIR SERVICES
BMT (Spain)
Greentec Marine
Haien Enc
Rotterdam Ship Repair (Netherlands)
German Ship Repair (Germany)
Offshore Inland (US /GoM)
Bludworth Marine (Houston)
SIRCO (Panama)
Mapamar (Brasil)
Brightsun(Singapore)
Trident divers (Worldwide)

AIMSS NL

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Web: aimss-shiprepair.com

SHIPYARDS
• APCL (UK)
• ASL (Indonesia)
• ASMAR (Chile)
• ASYAD Drydock (Oman)
• CNDM (France)
• DQS (Vietnam)
• NASCO (China)
• SGDP (Italy)
• SNC (Romania)
• TERSAN (Turkey)
• TNG (Mexico)
• UNITHAI (Thailand)
• ZTHI (China)

MARINE SERVICES
• AIMSS RIDING TEAM (Romania)
Supply of Qualified Welders, Fitters, Technicians, Electricians etc.
• AATELCO (The Netherlands)
IT, PBX, Audio & CCTV Spares, Maintenance, Upgrades & Lifecycle Extension
• CROSSCOMAR (Spain)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
• GENERAL SHIPPING (Greece)
Tank Coating, Docking Services & Turnkey Projects
• HAI HA M&S (Vietnam)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
• JASON MARINE ELECTRONICS (Spain)
Supply, Repair, Maintenance & Surveys for Marine Electronics & NavCom
• MANTA MARINE TECHNOLOGIES (Norway)
Fuel Optimisation & Shore Power
• PMS (Panama)
Afloat Repairs, Voyage Repairs & Underwater Services
• SINGATAC (Singapore)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
• WINKONG (China)
Supply of Parts & Equipment, Afloat Repairs, Voyage Repairs & Underwater Services
• ZEBEC MARINE (India)
Design, Engineering & Consulting Solutions

Norway

BSA SHIPPING AGENCIES ANS

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SHIPYARDS
Brodogradiliste d.o.o Shipyard LP (Croatia)
Falkvarv (Sweden)
Cernaval Group Algeciras (Spain)
Hidramar S.L (Canary Islands)
General Shipping S. A (Greece)
TK Tuzla Shipyard (Turkey)
Sandock Austral Shipyards (South Africa)
Qatar Shipyard Technology Solutions (Qatar)
Seagull Group (Singapore & Malaysia)
Unithai Shipyard & Engineering Ltd (Thailand)

Fujian Huadong Shipyard Ltd (China)
HuaRunDadong Dockyard Ltd HRDD (China)
CUD (Wehai) Shipyard (China)
Pax Ocean Shipyard Zhoushan (China)
First Suez Ltd - Suez Canal Transit and Shiprepair (Egypt)
Caribbean Drydock Company S.A CDC (Cuba)

JML Shipyard Agency

JML SHIPYARD AGENCY

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Email: markus@jmlshipyardagency.com
Web: www.jmlshipyardagency.com

SHIPYARDS REPRESENTED

EUROPE
Lloyd Werft, Bremerhaven, Germany
Sefine Shipyard, Tuzla, Turkey
San Giorgio del Porto, Genoa, Italy
Chantier Naval de Marseille, France
EDR Shipyard, Antwerp, Belgium
ASIA
Drydocks World, Dubai
Chengxi Shipyard, Jiangyin, China
Changhong International Shipyard, Zhoushan, China
PaxOcean , Zhoushan, China
Wenchong Shipyard Guangzhou, China
Shan Hai Guan Shipyard, China
Qingdao Beihai Shipyard, China
DSIC Marine Services, Dalian, China
PaxOcean, Singapore
PaxOcean Pertama, Indonesia
PaxOcean Nanindah, Indonesia
PaxOcean Graha, Indonesia
US, CANADA & CARIBBEAN
TNG, Veracruz, Mexico
Ciramar Shipyard, Dominican Republic
Chantier Davie, Quebec, Canada
German Ship Repair Jamaica

AFLOAT REPAIR

Global Offshore Service, Dubai UAE
Offshore Inland, US Gulf/Mexico
Crosscomar, Algeciras
UMA Marine, India
Link Marine / Automation, UAE
MCU Coatings
Carell, Greece

ULRIK QVALE & PARTNERS AS

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SHIPYARDS REPRESENTED

EUROPE:
Bredo Drydocks (Germany)
Nauta Shipyard (Poland)
Lisnave (Portugal)
Gemak (Turkey)
AFRICA:
Dakarnave (Senegal)
Dormac Marine & Engineering (South Africa)
AMERICAS:
Asmar (Chile)
Grand Bahama Shipyard (Bahamas)
Renave Industrial Group (Brazil)
Seaspan Vancouver Shipyard (Canada)
ASIA:
Arab Shipbuilding and Repair Yard (ASRY)
CHI Dalian Shipyard (China)
CHI Guangzhou Shipyard (China)
COSCO Shipping Shipyard (NANTONG) CO Ltd (China)
CHI Shanghai Shipyard (China)
CHI Xidong (China)
CHI Zhoushan Shipyard (China)
Japan Marine United Corp (Japan)

AFLOAT REPAIRS

Rotterdam Ship Repair (Netherlands)
Eerland Shiprepair (Netherlands)
HSD Marine (Singapore)
Marval (Chile)

Singapore

WSR SHIP REPAIRS

WSR SERVICES LTD

MEMBER The International Association of Shiprepair Agents Ltd

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Singapore Post Centre, S408600
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Email: mail.sg@umarwsr.com
Web: www.umarwsr.com

SHIPYARDS

ASL Marine Holdings Ltd-Batam, Indonesia
Caribbean Dockyard Engineering Services Ltd (CDESL) - Trinidad & Tobago
Chengxi Shipyard Co. Ltd - Shanghai, China
Ciramar Shipyards - Dominican Republic
Colombo Dockyard Ltd – Colombo, Sri Lanka
CUD (Weihai) Shipyard – Shandong, North China
Detyens Shipyards - Charleston, South Carolina, USA
Dormac Marine & Engineering - Capetown/Durban, South Africa
EDR Antwerp Shipyard - Antwerp, Belgium
Fayard A/S - Munkebo, Denmark
Guangzhou Wenchong Shipyard – Guangzhou, South China
Huarun Dadong Dockyard (HRDD) - Shanghai, China
Hutchison Ports TNG (Talleres Navales del Golfo S.A.) – Veracruz, Mexico
International Ship Repair - Tampa, Florida, USA
Netaman Repair Group - Tallinn, Estonia
Onex Neorion Shipyard S.A - Syros Island Greece
IMC Shipyard (Zhoushan) – Zhoushan, China
Nanyang Star Group – Zhoushan, China
Port Said Shipyard - Egypt
Shanhaiguan Shipbuilding Industry Co., Ltd – Hebei, North China

UNDERWATER AND AFLOAT

I-Dive Services, Singapore
LDM Stations in Singapore and Europe

Sweden

BSA SHIPPING AGENCIES ANS Competitive Shipyards Worldwide

BSA SHIPPING AGENCIES ANS

MEMBER The International Association of Shiprepair Agents Ltd

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Web: www.bsaship.com

SHIPYARDS

Brodogradiliste d.o.o Shipyard LP (Croatia)
Cernaval Group Algeciras (Spain)
Hidramar S.L (Canary Islands)
General Shipping S. A (Greece)
TK Tuzla Shipyard (Turkey)
Sandock Austral Shipyards (South Africa)
Qatar Shipyard Technology Solutions (Qatar)
Seagull Group (Singapore & Malaysia)
Unithai Shipyard & Engineering Ltd (Thailand)
Fujian Huadong Shipyard Ltd (China)
HuaRunDadong Dockyard Ltd HRDD (China)
CUD (Wehai) Shipyard (China)
Pax Ocean Shipyard Zhoushan (China)
First Suez Ltd - Suez Canal Transit and Shiprepair (Egypt)
Caribbean Drydock Company S.A CDC (Cuba)

JML Shipyard Agency

JML SHIPYARD AGENCY

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Email: markus@jmlshipyardagency.com
Web: www.jmlshipyardagency.com

SHIPYARDS REPRESENTED

EUROPE
Lloyd Werft, Bremerhaven, Germany
MSR Gryfia Shipyard, Szczecin, Polen
Sefine Shipyard, Tuzla, Turkey
San Giorgio del Porto, Genoa, Italy
Chantier Naval de Marseille, France
EDR Shipyard, Antwerp, Belgium
ASIA
Drydocks World, Dubai
Chengxi Shipyard, Jiangyin, China
Changhong International Shipyard, Zhoushan, China
PaxOcean , Zhoushan, China
Wenchong Shipyard Guangzhou, China
Shan Hai Guan Shipyard, China
Qingdao Beihai Shipyard, China
DSIC Marine Services, Dalian, China
PaxOcean, Singapore
PaxOcean Pertama, Indonesia
PaxOcean Nanindah, Indonesia
PaxOcean Graha, Indonesia
US, CANADA & CARIBBEAN
TNG, Veracruz, Mexico
Ciramar Shipyard, Dominican Republic
Chantier Davie, Quebec, Canada
German Ship Repair Jamaica

AFLOAT REPAIR/SERVICES

Global Offshore Service, Dubai UAE
Offshore Inland, US Gulf/Mexico
Crosscomar, Algeciras
UMA Marine, India
Link Marine / Automation, UAE
MCU Coatings
Carell, Greece

Switzerland

ENCOMPASS MARINE

ENCOMPASS MARINE LIMITED

MEMBER The International Association of Shiprepair Agents Ltd

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Fax: +44 (0) 1472 245511
Email: services@encompassmarine.com
Web: www.encompassmarine.com
Contacts: David Maitland, Jon Thompson
Diving & Marine: Alan Jagger, Danielle Roberts

SHIPYARDS REPRESENTED

ART (Tuzla, Turkey)
Asyad (Duqm, Oman)
Asaba Shipyard (Malabo, Equitorial Guinea)
Cammell Laird Shiprepairers (Merseyside, UK)
Colombo Dockyard (Colombo, Sri Lanka)
COSCO Shipping Heavy Industry, China
• CHI Dalian
• CHI Nantong
• CHI Shanghai
• CHI Zhoushan
• CHI Guangdong
CUD (Weihai) Shipyard Co., Ltd.
Detyens Shipyard (Charleston, USA)
EDR Antwerp Shipyard (Belgium)
Grand Bahama Shipyard (Freeport, Bahamas)
Guangzhou Wenchong Dockyard (Guangzhou, China)
Hidramar Shipyards (Canary Isles, Spain)
Malaysia Marine and Heavy Engineering (Pasir Gudang, Malaysia)
Namibia Drydock and Ship Repair (Walvis Bay, Namibia)
Navantia (Spain)
• Cadiz Shipyard (Cadiz)
• Cartagena Shipyard (Cartagena)
• Ferrol-Fene Shipyard (Ferrol)
• San Fernando Shipyard (San Fernando)
Orient Shipyards (Busan/ Gwanyang, Korea)
Shanhaiguan Shipyard (Qinhuangdoo, China)
Zhoushan IMC-YongYue Shipyard (Zhoushan, China)
Zhoushan Xinya Shipyard (Zhoushan, China)

DIVING & MARINE SERVICE COMPANIES REPRESENTED

Atlantis Marine Services (Fujairah, UAE)
Blay Marine Tech (Spain)
Hellenika (Bulgaria)
Irwin Marine
Komas (Korea)
Lagersmit
Link Instrumentation (UAE & Singapore)
Marine Technical Services (Poland)
Maritime Shipcleaning Rotterdam
NARP Ship Repair (Turkey)
PmaxOne Services (Singapore)
Rentong Marine (China)
Rotterdam Ship Repair
TruMaine Group (Rotterdam, Singapore, China, Dubai)
Underwater Shipcare (Singapore)
Underwater Contractors Spain (Spain)
Wortelboer
Zener Maritime (Rotterdam, Mumbai, Singapore)
Over 200 diving stations worldwide

Turkey

TURMAR

TURMAR MARINE SURVEY CONSULTANCY AND SHIPPING INC.

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COMPANIES REPRESENTED

Goltens
DMI
Optimarin
Norwater
AMI Heat Exchangers
Dalian Cosco Rikky Ocean Engineering
Zhejiang Energy Marine Environmental Technology
Shipyards Represented:
ART Shipyard – Turkey
Astander Shipyard – Spain
Astican Shipyard – Canary Islands
Besiktas Shipyard – Turkey
Chantier Naval De Marseille – France
Cosco Shipyard Repair Group – China
Heisco Shipyard - Kuwait

Hyundai Mipo Dockyard Co. Ltd. – South Korea
Hyundai Vinashin Shipyard – Vietnam
MYO Shipyard – Turkey
San Giorgio Del Porto – Italy
Sefine Shipyard – Turkey
Tersan Shipyard – Turkey
Yardgem Shipyard – Turkey
Shipyards Represented (China):
COSCO Dalian Shipyard
DSIC Marine Services
Shanhaiguan Shipyard
Xixiakou Shipyard
Qingdao Beihai Shipyard
COSCO Shanghai Shipyard
Huarun Dadong Dockyard
SUD Shipyard
CHI Nantong Shipyard
Nantong Ruitai Shipyard
Chengxi shipyard (Jiangyin)
Changhong International shipyard
Longshan shipyard
Zhejiang Eastern Shipyard (ZESCO)
COSCO Zhoushan Shipyard
Fujian Huadong shipyard
You Lian Dockyards Shekou,
Guangzhou Wenchong Dockyard
COSCO Guangdong Shipyard
CSSC Guangxi

U.A.E.

WSR SERVICES LTD

MEMBER The International Association of Shiprepair Agents Ltd

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SHIPYARDS

ASL Marine Holdings Ltd-Batam, Indonesia
Caribbean Dockyard Engineering Services Ltd (CDESL) - Trinidad & Tobago
Chengxi Shipyard Co. Ltd - Shanghai, China
Ciramar Shipyards - Dominican Republic
Colombo Dockyard Ltd – Colombo, Sri Lanka
Detyens Shipyards - Charleston, South Carolina, USA
Dormac Marine & Engineering - Capetown/Durban, South Africa
EDR Antwerp Shipyard - Antwerp, Belgium
Fayard A/S - Munkebo, Denmark
Guangzhou Wenchong Shipyard – Guangzhou, South China
Huarun Dadong Dockyard (HRDD) - Shanghai, China
Hutchison Ports TNG (Talleres Navales del Golfo S.A.) – Veracruz, Mexico
International Ship Repair - Tampa, Florida, USA
Netaman Repair Group - Tallinn, Estonia
Onex Neorion Shipyard S.A - Syros Island Greece
IMC Shipyard (Zhoushan) – Zhoushan, China
Nanyang Star Group – Zhoushan, China
Shanhaiguan Shipbuilding Industry Co., Ltd – Hebei, North China

UNDERWATER AND AFLOAT

I-Dive Services, Singapore
LDM Stations in Singapore and Europe

United Kingdom

AIMSS UK

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E sales@aimss-shiprepair.com
W aimss-shiprepair.com

SHIPYARDS

- ASL (Indonesia)
- ASMAR (Chile)
- ASTANDER (North Spain)
- ASTIBAL (Panama)
- ASTICAN (Las Palmas)
- DQS (Vietnam)
- GRYFIA (Poland)
- NASCO (China)
- REIMERSWAAL (The Netherlands)
- SNC (Romania)
- TERSAN (Turkey)
- TNG (Mexico)
- UNITHAI (Thailand)
- ZTHI (China)

MARINE PRODUCTS & SERVICES

- AIMSS RIDING TEAM (Romania)
Supply of Qualified Welders, Fitters, Technicians, Electricians etc.
- AATELCO (The Netherlands)
IT, PBX, Audio & CCTV Spares, Maintenance, Upgrades & Lifecycle Extension
- AEGIR MARINE (The Netherlands)
Stern Tube Seals & Propulsion Systems
- CROSSCOMAR (Spain)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
- DAMEN SCHELDE MARINE SERVICES (The Netherlands)
Supply & Overhaul of Engine Parts, Pneumatics, Hydraulics, T/C & Pumps
- GDI (The Netherlands)
Inspection of Confined Spaces with Drones
- HAI HA M&S (Vietnam)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
- JASON MARINE ELECTRONICS (Spain)
Supply, Repair, Maintenance & Surveys for Marine Electronics & NavCom
- KET MARINE (The Netherlands)
Supply of Separators & Spare Parts, Bowl Services, Services for Obsolete Control Units
- MANTA MARINE TECHNOLOGIES (Norway)
Fuel Optimisation & Shore Power
- PMS (Panama)
Afloat Repairs, Voyage Repairs & Underwater Services
- ROG (The Netherlands)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
- SINGATAC (Singapore)
Afloat Repairs, Mob/ Demob, Construction, Underwater Services & Voyage Repairs
- WINKONG (China)
Supply of Parts & Equipment, Afloat Repairs, Voyage Repairs & Underwater Services
- ZEBEC MARINE (India)
Design, Engineering & Consulting Solution

CALVEY MARINE LIMITED

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Contact: Suzanne Black
Mobile: +44 (0) 7867 785957
Contact: Jessica Smart
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COMPANIES REPRESENTED

AMI Exchangers (Hartlepool)
Beihai Shipyard (Qingdao)
Beihai Lifeboats (Qingdao)
Brightsun Group (Singapore) `
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Nor-Shipping honours innovators and sustainability

AWARDS | Themed #Future-proof, this year's Nor-Shipping will not only celebrate its 60-year-anniversay but will also provide "a commitment to give people the foundations they need to make optimal decisions for what lies ahead," according to the event's director Sidsel Norvik.

In addition to the trade fair and numerous conferences and, of course, social gatherings in the evenings, the programme also includes several award ceremonies. Just before this issue of Ship&Offshore went to print, Nor-Shipping announced the shortlists for the Next Generation Ship Award, the Ocean Solution Award and the nominees for the Young Entrepreneur Award 2025.

Celebrating innovation, technologies and pioneering projects capable of balancing both environmental and commercial sustainability, all initiatives attracted a huge number of entries from across the world. Selecting the eventual winners was, according to Norvik, "tougher than ever".

Nor-Shipping's Next Generation Ship Award champions trail-blazing projects that are either newbuildings under construction, conversions, retrofits or recent deliveries. This year's shortlisted entrants are:

- Windcat Workboats' Elevation Series CSOVs: hydrogen-powered offshore service vessels developed in collaboration with Damen and CMB.TECH;
- Solvang Shipping's *Clipper Eris* retrofit: a carbon capture and storage retrofit on a 21,000m^3 ethylene carrier, reducing GHG emissions;
- NYK's *Sakigake* conversion: the world's first ammonia-fuelled tug, converted from LNG fuel to demonstrate low-carbon alternatives;
- Samskip's SeaShuttle feeder vessels: hydrogen fuel cell-powered zero-emission container ships for shortsea routes;
- Bibby Marine's eCSOV hybrid vessels: offshore wind support vessels designed for long-term zero-emission operations.

The Ocean Solutions Award, meanwhile, is open to Nor-Shipping participants with landmark innovations capable of helping the industry meet some of its most pressing challenges. As always, the competition was intense, with the expert jury eventually selecting the following shortlisted nominees:

- Wärtsilä carbon capture and storage: a modular system designed for integration into existing propulsion setups, reducing CO_2 emissions;
- Zeabuz autonomous ship platform: pioneering remote and autonomous vessel operations to address crew shortages and enhance safety;
- Wärtsilä ammonia solution: a full-scale deployment of ammonia as marine fuel, demonstrating safety and operational efficiency;
- ORCA AI situational awareness: an AI-driven platform enhancing navigational safety through real-time risk detection and data analysis;
- bound4blue's eSail system: innovative suction sail wind propulsion systems cutting fuel consumption, emissions and easing regulatory compliance for a wide range of vessel types.

The Young Entrepreneur Award 2025 is set to be presented on June 2nd at Nor-Shipping's After Work 'kick-off' at Oslo's famous Leketer'n venue. The prestigious accolade celebrates innovators under 40, who make waves with commercially viable initiatives that address key ocean industry challenges. Previous winners include Cristina Aleixendri, COO and co-foundcer of bound4blue, and Boyan Slat, CEO of The Ocean CleanUp.

The quartet selected by an expert industry panel are:

- Joachim Bachmann Nielsen, CEO/CTO of Kvasir Technologies, a company transforming low-value biomass into scalable, carbon-neutral marine fuels;
- Fabian Fussek, co-Founder & CEO of Kaiko Systems, an AI-powered platform helping shipping companies enhance safety, compliance and maintenance;
- Josephine Le, founder of The Hood Platform, a digital hub breaking down barriers in maritime recruitment and supporting next generation talent; and
- Alisha Fredriksson, CEO and co-founder of Seabound, a climate tech innovator developing onboard carbon capture systems for hard-to-abate shipping emissions.

GERMAN

MARINE EQUIPMENT

ADVANCED TECHNOLOGY FOR WORLDWIDE SHIPPING AND SHIPBUILDING

VDMA

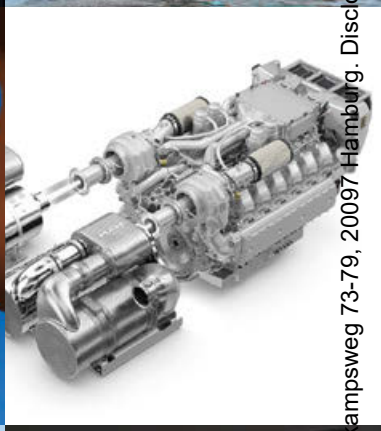
Marine Equipment and Systems









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2025/26

Navigating maritime challenges with advanced marine equipment and systems

The maritime industry, a cornerstone of global trade, faces multifaceted challenges. They range from disruptions caused by global tensions and technological shifts driven by ongoing decarbonisation of shipping to increasingly complex regulations and documentation requirements. In such tough times, the global shipping and shipbuilding sectors rely more than ever on trustworthy technology partners and suppliers. They need partners who can deliver innovative and flexible solutions to help them meet increasingly complex new demands. The marine equipment industry, represented by Europe's largest network organisation VDMA, is a proven, reliable partner — and a global innovation leader.

Hauke Schlegel and Katrin Caldwell, managing directors of VDMA – Marine Equipment and Systems

Traditionally, VDMA member companies align their efforts with the needs of the global maritime industry: enhancing economic performance, increasing efficiency, and minimising environmental impact, all while maintaining high standards of safety and operational reliability on board. To achieve these goals, marine equipment suppliers support shipbuilding and repair worldwide with smart designs, advanced components, integrated systems, and expert services.

This publication aims to provide international shipowners, shipyards, and naval architects with insights into current technologies and the latest developments in key marine systems offered by VDMA-affiliated suppliers.

On the following pages, you will find valuable information on major topics such as smart shipping and automation, fuel efficiency, alternative energy sources, onboard environmental protection, and the reduction of operating costs.

Readers will gain an overview of a highly qualified marine supply industry, whose globally recognised expertise is rooted in a unique blend of experience and innovation. The VDMA represents leading companies at the forefront of both market performance and technological advancement.

We are positive that you will find this publication both informative and inspiring, and that it helps you engage with these forward-thinking marine equipment companies.

› ABOUT VDMA – MARINE EQUIPMENT AND SYSTEMS

The association is a special division of the well-known nonprofit organisation VDMA (Machinery and Equipment Manufacturers' Association). VDMA – Marine Equipment and Systems represents the entire maritime supply industry with member companies from all disciplines including mechanical engineering, electrical engineering and electronics.

VDMA supports its member companies with a wide range of activities and services:

- intensifying mutual cooperation with operators and yards in technological as well as commercial fields;
- helping worldwide customers in arranging contacts with leading marine equipment manufacturers;
- fostering free and fair market principles in the global marine market by means of close contacts with various international organisations;
- sponsoring important international exhibitions and conferences in the shipbuilding sector.

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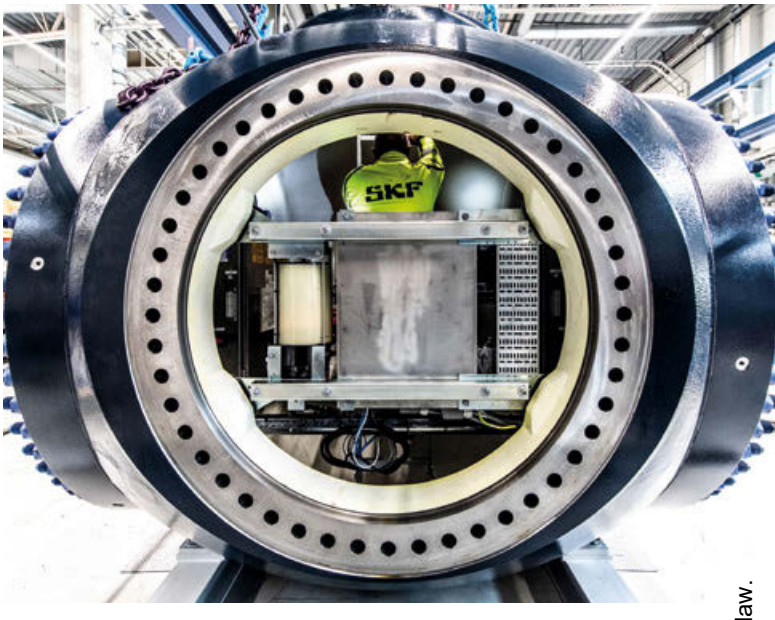

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In June 2024, the Italian shipping company Liberty Lines ceremonially launched the world's first hybrid fast ferry of this category and size in Trapani, Sicily, powered by an mtu hybrid propulsion system from Rolls-Royce

How power and efficiency are combined with eco-friendliness

ROLLS-ROYCE POWER SYSTEMS Under the mtu product brand, Rolls-Royce offers new propulsion, automation and service applications that support the maritime industry in the energy transition and already ensure reliable and efficient fleet operation. These include cutting-edge combustion engines that are approved and tested for renewable diesel, engines being developed for methanol operation, exhaust aftertreatment systems, hybrid systems, gas engines, automation and bridge systems. Sustainable service solutions from Rolls-Royce include mtu Remanufacturing and Insitu, which economically and quickly reconditions engines for a new lifecycle.

Rolls-Royce has approved mtu's most important diesel engines for ships (Series 2000 and 4000), including the large engines (Series 1163 and 8000), for operation with sustainable fuels such as hydrotreated vegetable oil (HVO). The fuel can be used without any adjustments to the engines.

HVO is already being used successfully, for example, by the Californian ferry operator Golden Gate Ferry, which is running its six mtu-powered ferries on the sustainable fuel. Meros Yachtsharing, a provider of alternatives to yacht ownership, has also successfully tested the mtu engines of its 28m-long *Sunseeker Blue Infinity One* with HVO fuel.

For the future, Rolls-Royce sees e-methanol as one of the most promising marine fuels. With green methanol produced with renewable energy, CO_2-neutral ship operation is possible. In addition, harmful emissions such as nitrogen oxides and particulates can be significantly reduced. Compared with other sustainable fuels such as hydrogen, methane and ammonia, methanol has the highest energy density when the tank system is taken into account.

Rolls-Royce is currently developing methanol propulsion systems for yachts and workboats. Within the publicly funded MeOHmare project, Rolls-Royce is currently focusing on single-fuel technology and will test this in the coming years on the single-cylinder test stand and on the full-engine test stand. The company is also testing dual-fuel engines, which are seen as a useful bridging technology.

Tugs and ferries in Europe and Asia powered by mtu gas engines

Rolls-Royce is currently equipping four new German customs vessels with a total of 15 mtu gas engines, which provide propulsion and, in some cases, onboard power. The advantages of mtu gas engines are their low exhaust and noise emissions and their dynamic performance.

mtu gas engines already fall well below the limits of current emissions guidelines (such as IMO III) without exhaust gas aftertreatment. The particulate mass is below the detection limit and they only emit small amounts of nitrogen oxides. Thanks to the double-walled design of the gas system, the engine room can be designed similarly to a diesel drive.

mtu gas engines are already powering tugs and ferries in Europe and Asia. Ferry

operators such as Rederij Doeksen in the Netherlands particularly appreciate the fact that mtu gas engines are quiet, produce little vibration, no unpleasant odours and no black smoke.

The municipal utility in Constance has been operating its newest Lake Constance ferry with mtu gas engines in a climate-neutral way using biogas since July 2024. The world's first liquefied natural gas (LNG)-powered hybrid tug from Sembcorp Marine Integrated Yard in Singapore also has two mtu gas engine installations.

mtu large engines from Rolls-Royce now approved for IMO III

In addition to mtu Series 2000 and 4000 engines, Rolls-Royce now offers these engines in the Series 1163 and 8000 ranges, with power outputs between 4.8 MW and 10 MW, equipped with SCR exhaust aftertreatment systems to comply with IMO III emission limits. The system itself is already designed to be shock-proof for military applications. If required, the setup is available with bypass in order to maintain safe engine operation and unrestricted propulsion power even under extreme shock requirements and long low-load periods.

Liberty Lines ferries in Sicily sailing with mtu hybrid systems

Rolls-Royce also supports customers in the hybridisation of their propulsion systems. A hybrid propulsion system that combines combustion engine, batteries and electric drive offers the possibility of completely emission-free local operation in ports.

Since the end of June 2024, the Italian shipping company Liberty Lines in Sicily has put the first six of a total of nine fast ferries with mtu hybrid propulsion systems from Rolls-Royce into operation. The battery-electric part of the drive is used for locally emission-free operation in the harbour area and as a booster.

All components are coordinated by the mtu NautIQ Blue Vision NG control and monitoring system. The complete propulsion systems of the first two ships are monitored by the mtu NautIQ Foresight equipment health monitoring systems.

From bridge to propeller – the mtu NautIQ automation platform

The mtu NautIQ family of automation systems has been specially developed for newbuilds and for easy retrofitting on older vessels. The product range consists of reliable, efficient and future-proof monitoring and control systems from the bridge to the propeller.

mtu NautIQ Master is the latest generation of Rolls-Royce's Integrated Platform Management System (IPMS). The advanced, tailor-made solution meets the complex automation and integration requirements of operators of modern specialised vessels.

All products in the mtu NautIQ family are based on state-of-the-art software platforms. They allow for easy integration or upgrade of additional hardware, software and auxiliaries throughout the life of the vessel, effectively reducing the risk of obsolescence and providing customers with long-term planning and reliability.

Rolls-Royce will supply command and automation systems for six new F126 frigates for the German Navy. The delivery consists of the components integrated ship automation system (IPMS) and condition monitoring system (CMS).

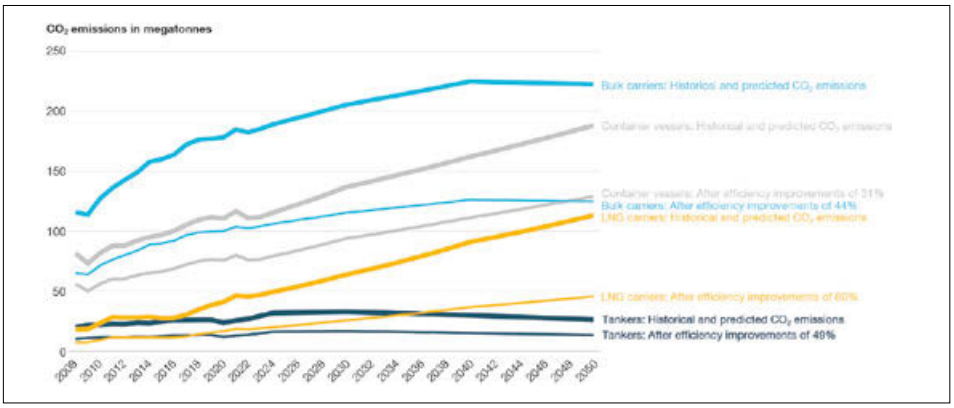
Reman and insitu: a fast and resource-efficient way to update engines

Rolls-Royce has developed various strategies for reconditioning marine engines quickly and in an environmentally friendly way. For example, the "insitu" service allows tugboat operators to have their engines overhauled directly in the cramped engine room, without having to remove the engine.

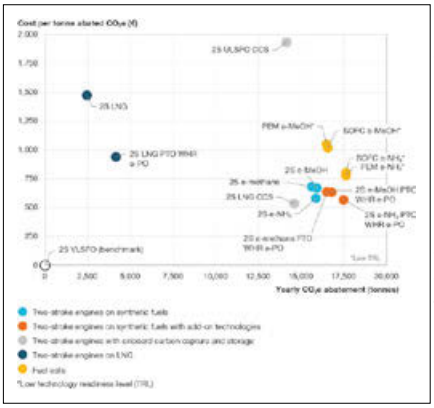
For ferries, there are Reman engines that can be installed in a day. Reman engines are overhauled by Rolls-Royce using a standardised process. They receive the same properties as new parts, as well as their full warranty. Reman engines not only save time and money, but also conserve resources by reusing many engine parts. In addition, Rolls-Royce relies on digital fault diagnostics to avoid or optimise onboard service calls.

› ABOUT ROLLS-ROYCE POWER SYSTEMS

Rolls-Royce Power Systems is headquartered in Friedrichshafen in southern Germany and employs more than 10,350 people. The product portfolio includes mtu-brand high-speed engines and propulsion systems for ships, heavy land, rail, defence vehicles, and for the oil and gas industry. The portfolio also includes diesel and gas systems and battery containers for power generation. mtu-solutions.com



Predicted total CO_2 emissions (not equivalents) and emissions after possible efficiency improvements of ship segments in the merchant marine



Source for both images: MAN Energy Solutions

CO_2 abatement through various propulsion technologies on a Kamsarmax bulk carrier

Decarbonisation technologies in merchant shipping

MAN ENERGY SOLUTIONS While efficiency improvements help reduce CO_2 emissions, MAN Energy Solutions believes that internal combustion engines remain essential for marine propulsion. The company sees ammonia, methanol, and e-methane engines as possible options for decarbonisation, with ongoing advancements in dual-fuel technologies.

Various technologies can be implemented on ships to reduce CO_2 emissions by increasing energy efficiency:

- Energy-saving devices can take many forms, for example, high-efficiency propellers in combination with a rudder bulb have been shown to yield around 8% savings;
- Wind-assisted propulsion can lead to around 5% savings on ship types where mounting sails is possible;
- Air-lubrication systems can lead to around 5% savings for large, flat-bottomed ships where air bubbles reduce the hull's frictional resistance;
- Waste-heat recovery on the propulsion plant can lead to around 5% savings;
- EcoEGR can lead to around 2% savings;
- Installing a power take-off system on the propulsion plant, leading to ship-type-specific savings;
- Speed optimisation, leading to ship-type-specific savings;
- Finally, alternative fuels can lead to different savings, depending on the type of fuel.

However, MAN Energy Solutions is firmly of the view that while these efficiency improvements can contribute to partly decarbonising the marine industry, the company's executives do not believe that these measures can replace the entire propulsion system because the internal combustion engine is still by far the most efficient means of transportation.

Currently, it seems that the cheapest and simplest way to decarbonise a large merchant-marine ship or a ship with a high energy demand is with an ammonia engine, closely followed by a methanol engine and an e-methane engine. Methanol has an advantage over ammonia for smaller commercial ships and ships with lower energy consumption as the capital expenditure increase is limited.

MAN Energy Solutions already offers two- and four-stroke methanol-burning engines as newbuilds or retrofits. Currently more than 210 of its low-speed ME-LGIM (Liquid Gas Injection Methanol) engines are on order or in service.

The company is also active with respect to ammonia: Mitsui E&S announced the beginning of the test phase for the world's first commercial, two-stroke, dual-fuel ammonia engine in February 2025, when the MAN B&W 7S60ME-LGIA (Liquid Gas Injection Ammonia) Mk 10.5 prototype engine began its ammonia fuel test-run at Mitsui E&S's Tamano Factory in Japan.

Similarly, the MAN Energy Solutions ME-GI (Gas Injection) engine enjoys a status as the default, dual-fuel methane-fuelled engine within low-speed commercial shipping. Since its market debut in 2014, the ME-GI has been broadly accepted by all marine segments and was expected to reach 1,000 engine orders during the first few months of 2025. To date, the strongest interest in the engine has come from the container segment with more than 400 engines ordered.

Looking ahead

The IMO's revised GHG strategy is now aligned with a 2°C pathway to net-zero shipping, following Article 2 in the Paris Agreement. After the MEPC 80 meeting in the summer of 2023, critical voices, including that of MAN Energy Solutions, expressed disappointment that the GHG strategy does not align with a 1.5°C pathway.

However, setting targets for one sector and not others effectively penalises that sector. Therefore, once the shipping sector

has shown its ability to implement and scale up decarbonisation technologies in operation, it will be possible to make yet another revision of the GHG strategy.

Before such a decision can be passed, however, shipping as a sector requires a commitment that other sectors will move in the same direction, i.e. alignment with 1.5°C instead of 2°C. Such a commitment could, for example, be formalised at a COP meeting. Once countries, having ratified The United Nations Framework Convention on Climate Change, sign up to a new pathway, shipping will be ready to follow so that all sectors have equal commercial conditions.

While waiting for the midterm measures of the IMO, a tentative conclusion is that dual-fuel engines, possibly in combination with energy-saving technologies, can advantageously be selected for newbuildings by now. As detailed above, MAN Energy Solutions already has a significant portfolio of two- and four-stroke engines ready to take advantage of this. This trend will solidify and amplify as we move closer to the year 2050. For existing ships, large ships, or ships with a high energy consumption, a dual-fuel conversion of their fuel-oil engine can be advantageous, or in some cases energy-efficiency retrofits may be sufficient for compliance. However, this depends on a ship's age and operational pattern.

Planning for a retrofit at the time of ordering a new ship may be risky with regard to securing yard capacity for the conversion some years later if there is a strong demand for retrofit. By ordering a dual-fuel engine for the newbuilding, the yard capacity for the dual-fuel build is secured.

› ABOUT MAN ENERGY SOLUTIONS

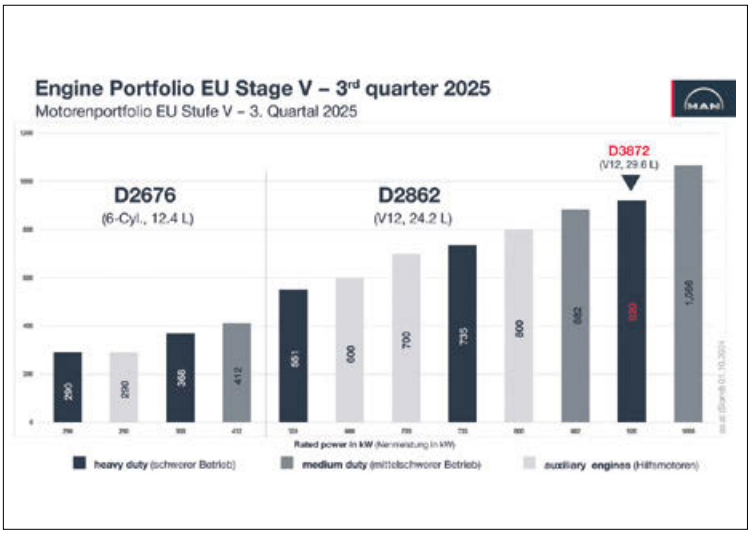
MAN Energy Solutions enables its customers to achieve sustainable value creation in the transition towards a carbon-neutral future within the marine, energy and industrial sectors.
www.man-es.com

To drive maritime decarbonisation, net-zero fuels must be available in quantities matching the propulsion technologies. This calls for investment in the energy value-chain and prioritisation of the shipping sector. The 'chicken and egg' dilemma – which comes first: installed technology or availability of synthetic fuels – is not a dilemma here.

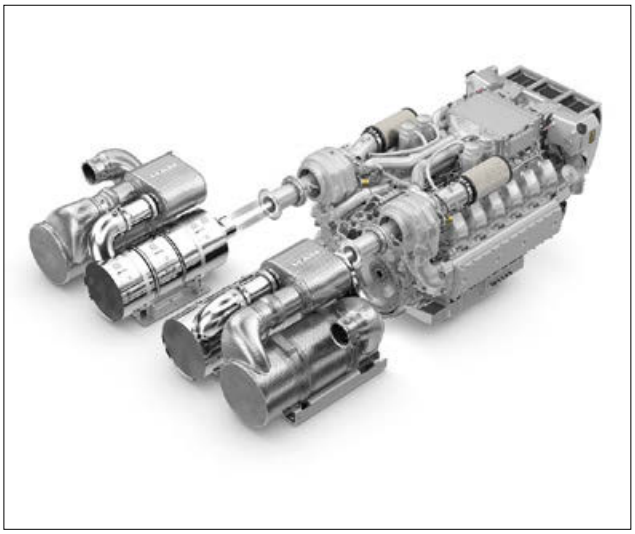
Both are needed. So while shipowners already now need to select an abatement technology for newbuildings, energy suppliers need to ensure the availability of synthetic fuels, matching the installed base of the merchant marine fleet.

In practice, there will be a need for e-methanol, e-ammonia, and e-methane. This requires scaling up green hydrogen production, as part of the net-zero fuels value chain. MAN Energy Solutions is convinced that green hydrogen will play a primary role as a feedstock for future fuels and has acted accordingly with its investment in subsidiary, Quest One, that develops and manufactures innovative PEM electrolysers and electrolysis stacks.

These facilitate the cost-effective, efficient, and reliable production of green hydrogen. Capital from a carbon levy could also advantageously be used for scaling green hydrogen production.



Engines for inland vessels from MAN Engines: a wide range of performance for a wide range of applications in light, medium and heavy operations



New in the EU Stage V portfolio is the MAN D3872 V12 engine with 30 litres displacement

Source for both images: MAN Engines

Expansion of engine portfolio for marine applications in EU Stage V

MAN ENGINES | In the course of the market launch of the MAN D3872 for workboats at the end of 2024, MAN Engines has expanded its portfolio with additional performance for heavy-duty applications. The new MAN D3872 in the LE427 variant for heavy-duty applications has an output of 920 kW (1,250 hp) at 1,800 rpm and is equipped with an exhaust gas aftertreatment system consisting of a diesel particulate filter and SCR system. This means that the engine meets the strict emission standards of the EU Stage V for inland navigation with the limits of 1.8 g/kWh nitrogen oxides (NOx), 0.015 g/kWh particulate matter (PM) and 1x1012 particles/kWh (particle number/PN).

The additional high output is intended to address new applications in inland navigation such as push convoys, tugboats, barges, passenger ships and special vessels. MAN Engines now offers a very broad range of services in the EU Stage V for inland waterway vessels, including in-line six-cylinder engines with a displacement of 12.4 litres and V12 engines with a displacement of 24.2 and 29.6 litres. These engines cover outputs from 290 to 1,066 kW (394 to 1,450 hp) in the strict emission regulations and take into account the requirements of light-, medium- and heavy-duty applications.

For more than ten years, MAN Engines has been working with exhaust gas aftertreatment systems for the EU Stage V to meet the emission standard with diesel particulate filter and SCR catalytic converter for in-line and V-engines. The first series systems were used in agricultural technology and the industrial sector in 2015, and in 2019 they were extended to maritime applications. Since then, many thousands of combined diesel particulate filters and SCR catalytic converters have been deployed by a wide variety of customers and in many applications and markets.

A major advantage of the company's own development of the exhaust gas aftertreatment system is that the engine, sensors, SCR system and diesel particulate filter are perfectly matched to each other. This integration is crucial to cope with the increasing complexity of modern engines and highly efficient exhaust gas aftertreatment systems. This precise coordination is the only way to ensure that the emission values are maintained in the long term and that the systems operate reliably.

The heavy-duty variant MAN D3872 LE427 is of course approved – like all engines from the current marine portfolio – for use with regenerative diesel in accordance with the EN15940 standard in Europe and the US specification ASTM D975 of the American Society for Testing and Materials (ASTM).

As an alternative, the MAN D3872 is available with an outer skin cooling system instead of a closed cooling circuit.

The MAN D3872 with 1,250 hp (920 kW) at 1,800 rpm is available in EU Stage V from the third quarter of 2025. Other emission stages such as EPA Tier 4, IMO Tier III and IMO Tier II are planned for 2026.

› ABOUT MAN ENGINES

MAN Engines – a business unit of MAN Truck & Bus – offers propulsion solutions for workboats between 221 kW and 2 MW. MAN engines and products guarantee maximum efficiency and reliability – even when used with the latest technologies to reduce emissions in accordance with global specifications

www.man.eu/engines

Certified battery system

LEHMANN MARINE | The CUBE battery system by Lehmann Marine has been type approved by classification society Lloyd's Register. This certification marks the fourth major classification society to approve the CUBE battery system, following Bureau Veritas, DNV, and RINA approvals.

The Lloyd's Register type approval further underlines Lehmann Marine's flexible battery modules' reliability, safety, and quality, paving the way for broader adoption across the maritime industry. With this latest certification, shipbuilders, operators, and integrators are set to have even greater confidence in the CUBE system's compliance with stringent industry standards.

"We are honoured to receive this recognition from Lloyd's Register," said Alexander Lehmann, managing director of Lehmann Marine. "This next milestone underscores our commitment to delivering high-quality, safe, and sustainable battery solutions to the maritime sector. We want to express our gratitude to the experts of Lloyd's Register for the smooth cooperation they have shown during the certification process."

CUBE provides a modular lithium iron phosphate (LFP) battery design with superior energy density. Any power storage scale is available by freely configuring modular units in strings of up to 1,000 VDC. They include an integrated battery management system (BMS), gas exhaust and pre-charge functionality. The battery system excels with a superior energy density, being able by design to be stacked flexibly for optimum use of space. CUBE is a modular system of compact design incorporating an innovative air-cooling technology that ensures uniform cooling of all cells for the highest cycle life.

With type approvals granted by BV, DNV, LR, and RINA, alongside the expansion of production facilities due to a strategic partnership with the Sunlight Group, Lehmann Marine's CUBE is well-positioned to meet strong demand from the shipping industry for safe and compact energy storage systems.

The battery system has now been approved by several major classification societies
Source: Lehmann Marine

New goals are established and clearly visible for the CUBE battery system. Lehmann Marine's project team is endeavouring to secure additional type approvals from international classification societies to unlock even more market opportunities.

› ABOUT LEHMANN MARINE GMBH

Lehmann Marine is a Germany-based leader in the shipping industry's advanced lithium iron phosphate (LFP) battery systems. The company's innovative energy solutions are designed to meet the evolving needs of maritime operators, offering safety, reliability, and sustainability through cutting-edge German engineering. https://lehmann-marine.com/

Germany's research vessel *Meteor IV* with two electric eVSPs and a VIT

Source: Voith

Pioneering the future of marine research: the first eight-bladed eVSP sets sail

VOITH TURBO The first electric Voith Schneider Propeller (eVSP) with eight blades is being used for the first time on board the *Meteor IV*, heralding a new era of marine research. On the new high-performance floating laboratory, the innovative propulsion system from Voith not only ensures exceptional manoeuverability but also especially sustainable and cost-effective operation. Thanks to its unique design, the eight-bladed eVSP enables precision steering, reduces fuel consumption and minimises underwater noise. When the *Meteor IV* sets sail in 2026, it will be one of the most modern platforms for ocean research in the world.

The world's oceans are a crucial regulator of global climate. They cover around 70% of the earth's surface and function as gigantic heat reservoirs that absorb a large part of the sun's energy and release it slowly back into the atmosphere. As a result, they compensate for temperature differences and stabilise the world's climate system.

At the same time, the oceans absorb large volumes of anthropogenic carbon dioxide (CO_2) and store it in deep waters. In addition, around 70% of the oxygen in the atmosphere is produced in the oceans. This is why the health of the world's oceans is closely associated with climate conditions on land.

Next-generation research vessels

Investigating the health of the oceans will be a core task of the *Meteor IV*, the new special-purpose vessel commissioned by the German Federal Ministry for Education and Research. When the floating high-tech laboratory fitted with high-precision echo sounders and special equipment for deep sea research is commissioned in 2026, the crew and scientists on board can rely on Voith's cutting-edge propulsion technology: two electric Voith Schneider Propellers (eVSP), each with eight blades, are a world first for this kind of vessel and an important factor in many of the tasks that the *Meteor IV* will perform.

Next-generation propulsion system with historical legacy

The eVSP is a fully electric iteration of an extensively proven propulsion and steering concept that was developed almost 100 years ago. For decades, countless

maritime applications have been using the conventional Voith Schneider Propeller (VSP).

It works on a simple but ingenious principle: movable and controllable blades – between four and eight depending on type – are installed at a 90-degree angle to a circular disk at the bottom of the vessel. Thrust is generated as the disk rotates. The speed of rotation determines thrust magnitude, while the blade angle determines its direction.

As a result of this basic principle, the vessel responds especially quickly and precisely to changes of direction. Vessels equipped with VSPs are therefore characterised by their exceptional manoeuvreability. This property helps with dynamic positioning (DP), i.e., the ability of a vessel to maintain a position accurately even under adverse conditions.

"Precise dynamic positioning is a key factor in many of the research tasks to be performed by the *Meteor IV*. This is one of the reasons why the client opted for Voith," said Dr Dirk Jürgens, who has been working on the evolution of the VSP for many years in his role as vice president Research & Development Voith Turbo Marine.

Moreover, the fast and precise steering characteristics are also the basis for effectively preventing vessel roll through automated steering commands, ensuring greater comfort on board for crew and passengers. This active roll stabilisation is already integrated into the eVSP. The maximum 71 people on board (36 nautical and technical crew members and 35 researchers) can therefore still work safely even if the vessel is in rough seas.

Efficiency meets sustainability

The *Meteor IV* is designed for a total service life of 30 years at 345 days of use per year. This high load over many years was another reason why the operators and shipyards opted in favour of the eVSP. The innovative ship propulsion system offers high reliability, low wear and low maintenance, principally because it dispenses with a gearbox.

On the *Meteor IV*, the two powerful eVSPs in the stern will be supplemented by a Voith Inline Thruster (VIT) and retractable rudder propeller at the bow. Both Voith propulsion technologies use an integrated permanent magnet electric motor from Voith subsidiary ELIN Motoren.

The decision in favour of the electric propulsion system was primarily dictated by cost efficiency aspects. Thanks to its design, the VSP is in any case much more efficient than comparable concepts. In the eVSP, Voith was able to take this efficiency to a higher level yet again. "This makes vessel operation not just more economic but also more sustainable," stressed Jürgens.

Low noise emissions thanks to excellent hydroacoustics

The propulsion system also demonstrates its sustainability credentials through its low noise emission. As the eVSP works with low speeds – only around 25% that of conventional screw propellers – and does not have a gearbox, it offers excellent hydroacoustics. As a result, the background exposure for marine life due to noise and/or underwater sound is substantially reduced.

This noise pollution has almost doubled worldwide in recent years, in part due to the increasing volume of shipping traffic and the noise from their engines. "The eVSP is one of the first controllable marine propulsion systems on the market to meet the very strict DNV SILENT-R and ICES209 standards. As a result, we are making an important contribution to protecting marine fauna," Jürgens emphasised.

› ABOUT VOITH GROUP

The Voith Group is a global technology company. With its broad portfolio of systems, products, services and digital applications, Voith sets standards in the markets of energy, paper, raw materials and transport. Founded in 1867, Voith today has around 22,000 employees, sales of EUR 5.2 billion and locations in over 60 countries worldwide and thus is one of the larger family-owned companies in Europe.
The Group Division Voith Turbo is part of the Voith Group and a specialist for intelligent drive technology, systems as well as tailor-made services. With its innovative and smart products, Voith offers highest efficiency and reliability. Customers from highly diverse industries such as oil and gas, energy, mining and mechanical engineering, ship technology, rail and commercial vehicles rely on the advanced technologies and digital applications of Voith.

www.voith.com/marine

SKF Marine production site in the Port of Hamburg

Source for both images: SKF

The potential of ocean energy

SKF MARINE Several ocean energy projects are close to commercial reality, offering a promising and reliable source of renewable electricity. SKF is leveraging its expertise in the wind, marine, and hydroelectric sectors to support the development of ocean energy as a key global power source.

Renewable power is now an established part of our energy mix, with wind turbine capacity alone exceeding an incredible 1 TW worldwide. However, as electricity demand continues to rise, new sustainable sources must be found. One answer lies in the entity that covers 70% of our planet: the ocean.

SKF leverages its extensive experience in the wind, marine, and hydroelectric sectors to tackle ocean energy challenges. By applying the technical expertise and innovative skills gained from these synergistic industries, SKF is well-positioned to address the unique demands of ocean energy.

Offshore wind energy has evolved from a renewable niche to a global force, challenging fossil fuel-based power generation and prompting oil and gas companies to adopt it. However, analysts warn that current growth rates of renewable energy won't be sufficient to meet future demand.

With global energy transition investment running well below the level required to achieve net-zero by the 2050s, a concerted effort is needed from governments to stimulate the next cycle of growth in the transition to cleaner energy. Innovative technologies are driving growth and most advanced methods like wave and tidal energy systems are nearing commercialisation, with tidal energy being particularly advantageous due to its predictability and lack of intermittency issues.

The European Union – which has spent EUR 375 million on ocean energy research, development and demonstration in the last ten years alone – aims to deploy 100 MW of ocean energy systems by 2027. Several projects already generate significant amounts of electricity, indicating that ocean energy, supported by private companies like SKF, is poised to become a major source of renewable power.

From concept to reality

Europe continues to expand its installed capacity in ocean energy. Just off the northern tip of Scotland, in a fast-flowing channel of water, the *MeyGen* project has installed four 1.5-MW tidal turbines. These, with power train components built by SKF, have been operating since 2017, delivering over 70 GWh of green electricity. The next phase, adding 59 MW by 2029, will make it the world's largest tidal energy farm. Its eventual goal is a capacity of 398 MW.

MeyGen is one of many ocean energy projects in Europe. In the nearby Shetland Islands, Nova Innovation recently doubled the size of its tidal array; in France two projects will use the Raz Blanchard current between Brittany and Norman-

dy: Normandie Hydroliennes' *NH1* project aims to deploy a 12-MW array of four 3-MW tidal turbines in 2027, while the *FloWatt* project will commission seven 2.5-MW tidal energy turbines by 2026; and Sweden's CorPower is deploying four wave energy converters off the Portuguese coast. This is just a handful of examples.

Industry body Ocean Energy Europe says nearly 12 MW of capacity is already installed across Europe – with another 137 MW in the pipeline by 2028.

All at sea

If ocean energy appears to lag behind technologies like wind power, there is a reason: it is a huge engineering challenge. A tidal turbine that can harvest energy reliably is far more complex – and expensive – than a wind turbine. Being submerged, or semi-submerged, systems are difficult to access and maintain. They must be robust enough to operate in highly corrosive sea water, with only minimal maintenance.

These problems are worth solving because ocean energy offers so many benefits. Tides, driven by the moon's gravity, are predictable and generate significant forces, offering substantial power-generating potential, while waves, generated by wind, are less predictable. Combining tidal and wave power can ensure a consistent output and meet peak winter heating demands.

With its experience in maritime applications and an extensive portfolio of SKF bearings, Simplex seals, SKF stabilisers, lubrication systems and services, SKF has the capability to meet the industry's technological challenges and requirements. In Schweinfurt, Germany, the SKF Group's largest production site, and at SKF Marine in Hamburg, Germany, where SKF's marine business unit is headquartered, SKF products can be customised to individual requirements and combined to create holistic systems to meet specific technical needs.

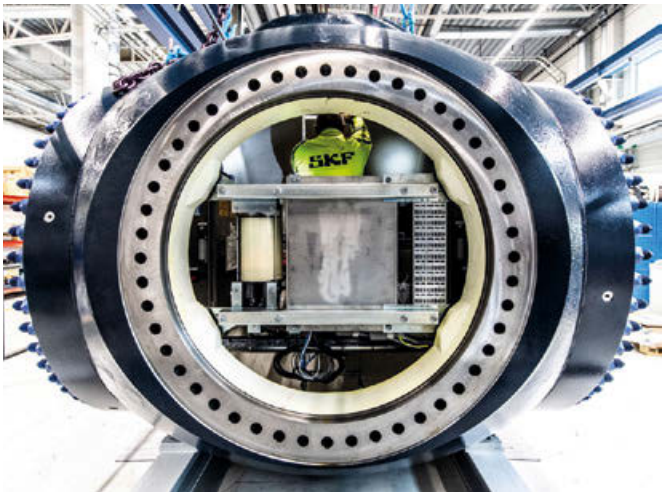
As a result, the company has been a technology partner for several ocean energy projects such as the SEASTAR project, a 4-MW tidal farm of 16 tidal stream turbines in Orkney, Scotland, and, most recently, the Faroe Island Space Program, that is using tidal kites in the Atlantic Ocean outside the Faroe Islands to harness the moon's power for predictable and renewable energy.

Next steps

Ocean energy projects underscore the sector's promise, but scaling up is crucial. This requires ongoing technology innovation, a shift from government to industry leadership, and more private investment.

The EU is on track to meet its 100 MW target by 2027, though reaching 1 GW by 2030 may be ambitious – 2032 is more realistic. Long-term, the industry aims for 100 GW by 2050, supplying 10% of Europe's electricity and creating up to 500,000 jobs. Similar growth in North America and Southeast Asia could make ocean energy a key global power source.

After years of development, the focus now is on near-term goals like launching tidal farms. In time, ocean energy could reach 1 TW of capacity, similar to wind. SKF is ready to support this growth with its end-to-end capabilities and deep industry expertise.



Mounting of tidal turbine at the SKF facility

› ABOUT SKF MARINE GMBH

SKF has a long history of improving the performance and reliability of assets by reducing friction and energy losses. SKF Marine is committed to perpetuating this legacy. Its technology and services enable customers to improve their performance, reduce their environmental impact, while enabling safe and cost-conscious shipping. Founded in 1907, SKF is represented in approximately 130 countries with more than 38 000 employees and 17 000 distributor locations worldwide. www.skf-marine.com

Figure A: The aim is to design an efficient yet silent propulsion device

Tackling underwater noise

MMG In the construction of ship propellers, the requirement to be both efficient and silent at the same time is still contradictory. MMG has launched an intensive research programme to improve the technology of propeller design to overcome this conflict, which has led to an optimal trade-off between an efficient and silent propulsion device.

According to current research, global shipping is a major source of underwater noise, which is leading to intensive work on the issue by IMO working groups. This work will result in global regulations following already published guidelines. But since shipping is by far the most efficient way of transporting goods and strict regulations have continuously been adopted to increase efficiency, the conflict between transport efficiency and the demand to reduce underwater noise becomes clear. Being efficient and silent is still a contradictory design objective.

Due to these physically competing requirements in particular, MMG launched an intensive research programme ten years ago to tackle the challenges in propeller design to overcome this design conflict. The research includes simulation tools to calculate numerically far field noise emissions and understand the effects in real ship operation. Full-scale measurements were conducted to validate the simulation results.

In parallel, numerous projects were undertaken to improve optimisation routines for advanced blade designs following the increased requirements. The ongoing goal was always to reduce noise emissions while maintaining high efficiency. To achieve this, tools had to be found that simultaneously enable sufficiently accurate predictions without increasing the computing times too much for a practical optimisation process.

To attain the necessary accuracy in predictions, the effects involved in noise emissions had to be taken into account in the propeller hydrodynamics calculation. In particular, the propeller's inflow and its effect on the cavitation characteristics had to be realistically represented for the full-scale ship.

MMG continuously improves its capabilities to design silent propellers. Regardless of ship type, whether it is a fishery, scientific, seismic, cruise or even a merchant vessel with specific class notations relating to underwater noise (URN) – MMG will design the optimal trade-off between efficient and silent propulsion device. Due to this additional design effort, the well-known MMG efficiency propeller ESPRO becomes the ESPROsilent.

Within a recent joint industry project, a systematic analysis was carried out to answer one of the main questions in shipping: "What is the efficiency sacrifice for a low noise propeller design?"

With the expertise of optimising propeller designs with regard to high efficiency, a typical MMG propeller design applied to a commercial newbuilding project was selected as a baseline for the investigation. Design changes to reduce URN are restricted to radial blade distributions of characteristic values, such as chord length, pitch and camber.

All design versions have been evaluated with BEM and RANS CFD-codes. The

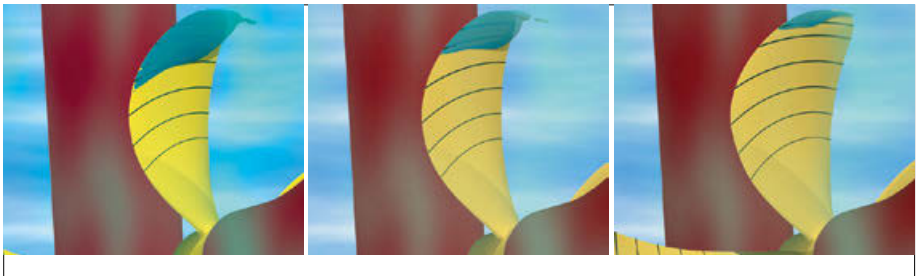


Figure B: Development of different designs with decreased sheet cavitation volume

Ffowcs Williams-Hawkings acoustic analogy is used for underwater noise prediction. Figure B shows the development of different designs with decreased sheet cavitation volume. Selected findings and outcomes of this project will be discussed.

With dedication to filtering the different sources and contributing phenomena for propeller induced underwater noise, the investigations indeed identified the link between propeller-borne noise and progressively decreasing cavitation behaviour, see Figure C.

It can be shown that there is no linear relationship between cavitation volume and radiated noise. Whereas the reduction of cavitation volume to about 50% from the base line design shows only minor effects in the sound pressure level, the slope increases with most significant noise reductions within the last 20% to cavitation-free propeller design.

Noise levels in Figure C are grouped into three frequency ranges. Lower frequencies show highest improvement potential being in the range of the blade passing frequency and therefore closely connected to the cavitation volume. The higher frequency ranges are less reactive to cavitation volume and are understood to be rather dependent on local vorticities, such as tip or hub vortex.

The non-linear behaviour shown in Figure C. raises the question of what is the sacrifice of propeller-induced noise reduction. Once the commercial aspects are added, propeller efficiency must be included in the equation. Obviously, there is a trade-off between the two values efficiency and propeller radiated noise.

As can be seen in Figure C, for a wide range within the evaluation window, noise can be reduced together with a rather shallow behaviour of efficiency losses. But the significant gain in reducing propeller noise becomes more expensive, with the cavitation-free propeller being about 17% less efficient that the base-line design.

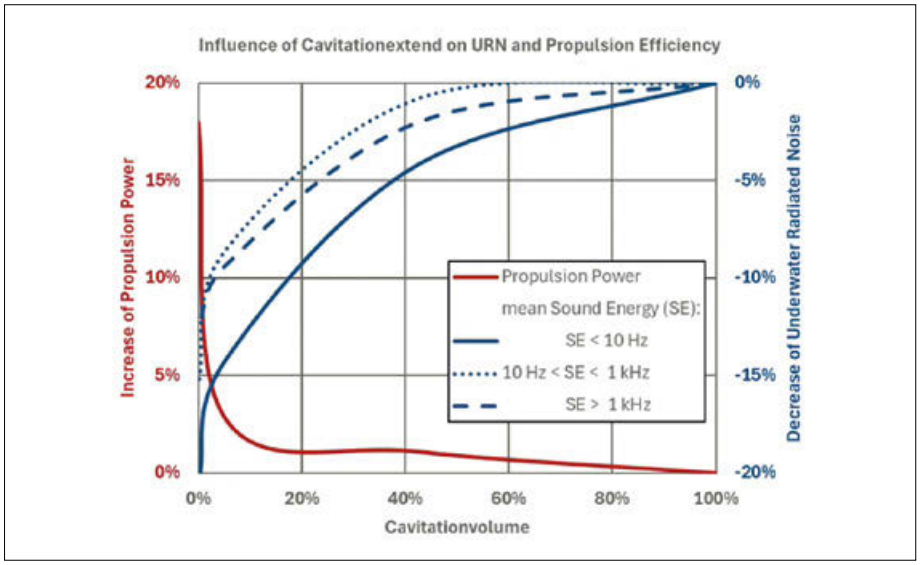


Figure C: The investigations identified a link between propeller-borne noise and progressively decreasing cavitation behaviour

Source for all images: MMG

As the determination of propeller-radiated noise becomes more important, MMG has been investing a significant amount of time and effort into research on propeller emitted noise. In current projects, special attention is given to the cavitating tip- and hub-vortex contribution to the source-level. The focus is set on controlling the higher frequency range by the propeller design.

In parallel, there are investigations about the demands on geometrical quality of propeller blades. As the valid ISO standard still gives flexibility relating to the geometrical details of the propeller blade, the requirement increases in order to ensure that all efforts being put into propeller optimisation are reflected in real-life operation.

The message must be clear: we cannot expect a reduction of underwater radiated noise without ensuring geometrical quality following increased manufacturing standards in order to be sure to get what has been designed. MMG already developed an in-house standard of geometrical quality for propeller blades above the ISO standard in order to deliver what is promised – the ESPROsilent.

› ABOUT MMG

MMG is continually researching innovative technologies and methods. Thus, it guarantees highest standards in design quality and production accuracy for products that are unique worldwide.
Together with specialists and partners, MMG solves complex tasks for the industry and develops comprehensive systems for the world of tomorrow.

https://mecklenburger-metallguss.com/en/

DP-optimised rudder propeller for offshore operations

SCHOTTEL Service operation vessels (SOVs) rely on precise and efficient propulsion systems to maintain their position and manoeuvre safely in extreme offshore conditions. Schottel's new SRP-D thruster, optimised for dynamic positioning (DP), enhances positional accuracy of the vessel and improves operational efficiency through faster thrust allocation and minimised thrust losses.

Service operation vessels (SOVs) ensure the safe operation of wind turbines by securing regular and effective maintenance, while providing the crew on board with comfortable accommodation during multi-day operations. They are often equipped with motion-compensated gangways that allow safe access from the ship to the offshore platform.

This imposes specific requirements on propulsion systems: not only do they have to maintain an exact position for hours on end, but vessels must also be capable of manoeuvring quickly and precisely, even in extreme weather conditions. At the same time, decarbonisation targets in the shipping industry are leading to increasing demands for emissions reduction and energy efficiency.

Highly dynamic thrust allocation

The German propulsion expert Schottel is meeting these growing requirements in the offshore sector with a new rudder propeller optimised for DP use. The SRP-D (Dynamic) is a further improved variant for highly demanding DP operations in SOVs.

The thruster is marked by an additional eight-degree tilt of the lower gearbox and improved propeller acceleration/deceleration times. In combination with a high-speed azimuth steering system with reinforced gear components, the SRP-D enables faster thrust allocation than conventional rudder propellers. Thanks to the shorter response times, the system reacts faster and more precisely to external forces such as wind and currents, thus achieving a higher positional accuracy of the vessel.

In addition, the thruster is characterised by a vertically integrated electric drive motor (LE-Drive) which offers a number of significant advantages. The elimination of the upper gearbox increases mechanical efficiency, reduces fuel consumption and also minimises vibration and noise. In terms of space savings, it scores with a lower installation height and minimal space requirements, as the L-drive does not require a separately arranged motor including its foundation.

SRP-D with a propeller shaft with an eight-degree tilt

Reduced DP footprint and fuel savings

The dynamic properties of the SRP-D have been confirmed several times by external experts. A study examined the effects of thruster response on DP positioning. The simulation was performed on the numerical model of a real SOV equipped with Schottel propulsion systems. Its position-holding capabilities were examined under extreme weather conditions: high winds, strong currents and effective wave heights of 2.5m and 3.2m.

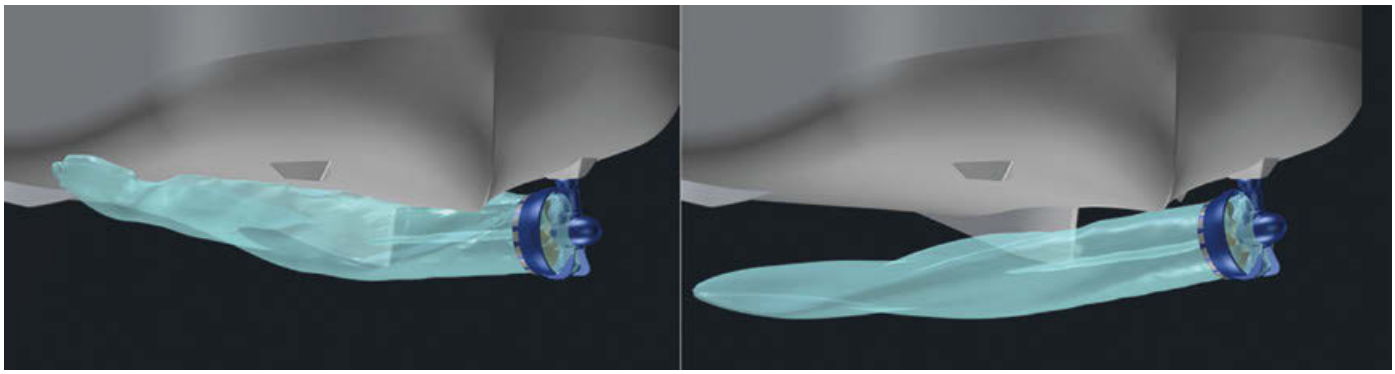
The results of the extensive simulations showed a significantly improved position-keeping accuracy, thus reducing the overall DP footprint. This permits successful gangway landing operations even in more challenging conditions, thus increasing the operational window of the vessel throughout the year. Furthermore, the implemented optimisations are expected to result in additional fuel savings.

Thanks to the faster response time of the propulsion, the vessel can be quickly held in position with only minor corrections being necessary. This prevents major adjustments to position having to be made requiring more power.

98-degree tilted propeller shaft significantly reduces thrust losses

Another independent study focused particularly on propulsion efficiency during thruster interactions. The research was carried out on a model of a commissioning service operation vessel (CSOV) equipped with a Schottel SRP-D 98-degree thruster on starboard and a 90-degree thruster on the port side.

The first part of the study measured the interactions between propulsion unit and hull. It was found that the additional eight-degree downward tilt of the SRP-D propeller shaft could significantly reduce



Due to the additional eight degrees downward tilt of the lower gearbox, the interactions between propulsion unit and hull are reduced. This results in increased thrust efficiency in DP operations and minimises forbidden zones.

thrust losses, both for azimuth variations and thrust variations. For example, CSOVs with 98-degree thrusters experience only 10% thrust losses in transverse direction, compared with 35% with 90-degree thrusters. The study showed that a key factor for the improved system performance is a reduced Coandă effect with the SRP-D.

The second part of the research focused on propeller flow interactions. In this case, the additional eight-degree downward tilt is also beneficial. While 50% losses are observed when the 90-degree thruster is blowing the wake into the second thruster (in-line thrust losses), only 20% thrust losses occur with the 98-degree thruster, enabling a higher remaining force during DP operations.

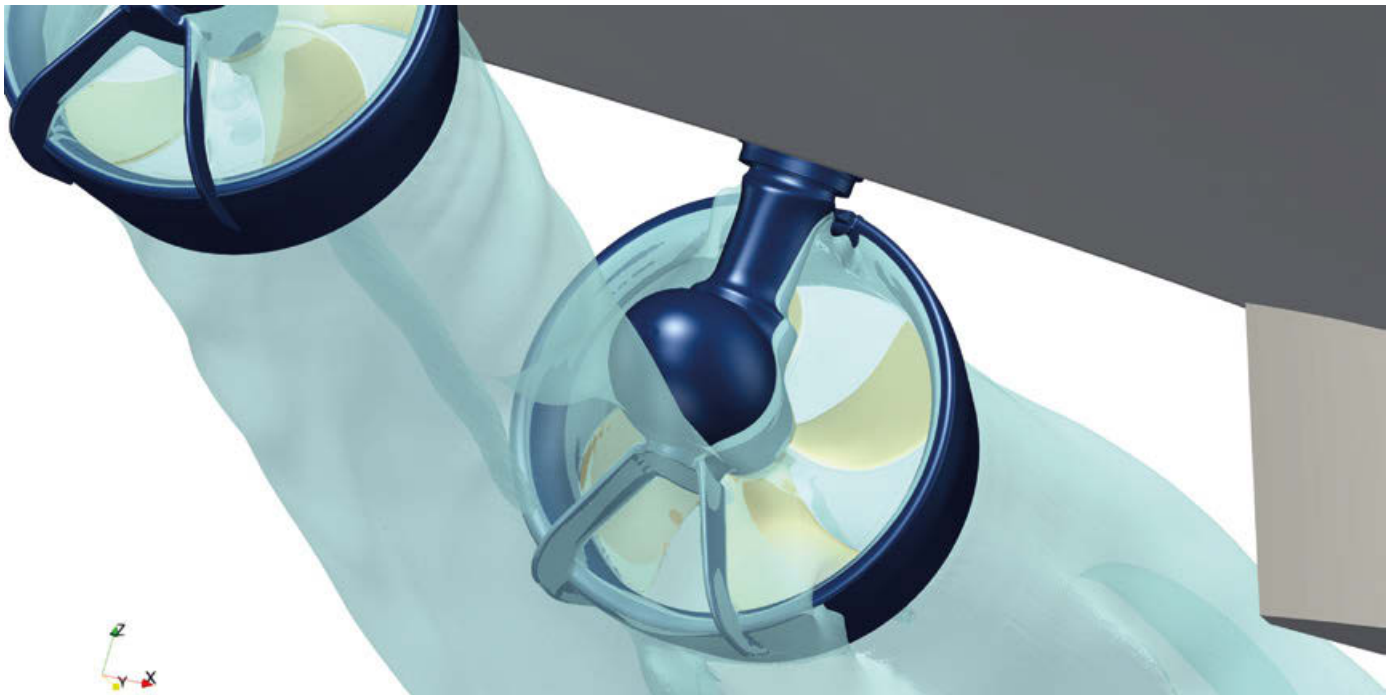
Efficient operation throughout the year

Thorsten Tillack, head of Hydrodynamics and Propeller Design at Schottel, summarised the resulting advantages: "Overall, the SRP-D significantly optimises thrust yield and thrust distribution, since thruster-hull- and thruster-thruster-interactions are minimised. Consequently, the forbidden zones of the thrusters may be reduced, which leads to an additional increase of the DP performance for the vessel.

"Furthermore," he continued, "the optimised thrust output is expected to result in fuel savings. As a result, SOVs operate much more efficiently, extending their operating time throughout the year."

› ABOUT SCHOTTEL

The Schottel Group, with its headquarters in Spay/Rhine, is one of the world's leading manufacturers of steerable propulsion systems for ships and offshore applications. Founded in 1921, the company has been developing and manufacturing azimuth propulsion and complete propulsion systems with power ratings of up to 30 MW for vessels of all sizes and types for 75 years. Around 100 sales and service locations worldwide ensure customer proximity. www.schottel.de



The 98-degree variant induced lower losses at the other thruster than the 90-degree variant and therefore enabled a higher remaining force during DP

Source for all images: Schottel

Maritime environmental protection with ship propulsion systems

PIENING PROPELLER | A specialist in sustainable ship propulsion, Piening Propeller, received approval from DNV (GL) for its controllable pitch propeller systems in which adjustment is carried out completely free of any oils with water hydraulics in 2016.
The oil-free pitching of propeller blades with water hydraulics offers the following advantages:

- no contamination of the seas if a blade root seal is damaged;
- no increased risk of fire in the engine room if the hydraulic medium were to escape under pressure, because it is not flammable;
- service work on the controllable pitch propeller can be carried out in the water;
- no potential environmental pollution from used oil during servicing;
- the hydraulic medium water is considerably cheaper than hydraulic oil and is available worldwide;
- sea water inlet is not critical for the system; the system can simply be flushed;
- no operational area restrictions;
- less effort required to refurbish hubs and blades for servicing after a long period of operation.

The use of water hydraulics in controllable pitch propellers was made possible by using composite materials in the propeller hub where metallic surfaces run against each other as part of the rotational movement during the adjustment process. The composite therefore acts as a self-lubricating intermediate element.
After extensive trials, this patented system was granted the necessary approval for use on ships by DNV (GL) and has also been approved by other classification societies. Since then, Piening Propeller has been constantly expanding the list of applications and references for this special propeller hub design.

Successful applications

Previous applications with two-, four- and five-bladed Piening Controllable Propellers (PCP) in the power range of 350 – 6,000 kW include navy vessels, offshore patrol vessels, mega-yachts, sailing vessels, icebreakers, research vessels, government vessels and dredgers. The last of these is of particular note because these vessels operate most of the time in shallow sedimentary waters and the adjustment system is constantly working as part of the dynamic positioning system. A service life of well over 45,000 operating hours has already been successfully demonstrated for the composite materials.
The 65m-long LNG-powered customs boat *Rügen* was launched recently, for which water hydraulics were specified for the hydraulics of the controllable pitch propeller. The shipyard and customs authorities also chose to use the hydrodynamic expertise of Piening Propeller to implement this extremely demanding project successfully.

ABOUT PIENING PROPELLER

Piening Propeller was founded in Glückstadt in 1929 and is represented worldwide on various types of ships. With design and production in its own factory, Piening Propeller offers complete propulsion systems with propellers (CPP or FPP) and shaft brackets from a single source. The range is rounded off by ZF brand gearboxes. Piening Propeller offers sustainable and environmentally friendly ship propulsion systems not only via controllable pitch propellers with water hydraulics, but also via hybrid propulsion technology, in which the necessary electric drives and control systems are supplied in addition to the corresponding gearboxes. A comprehensive range of services for systems and gearboxes rounds off Piening Propeller's overall product range in which attention is always paid to maritime environmental protection.

www.Piening-Propeller.de

Piening has delivered its oil-free pitch propellers for several projects

Source for both images: Piening

The *MS Ander* is equipped with REINTJES Gearbox Automation

Source: REINTJES

Setting the tone for hybrid and electric drives

REINTJES | Think Outside the Gearbox! This is the motto under which REINTJES is taking a proactive approach to its development of hybrid and electric drives.

The first step was a technical training programme lasting several days at Lake Garda. It was organised by the company's Italian partner. And the focus of the agenda was to familiarise the managing directors and sales staff from the entire REINTJES Group closely with the topic and to convey important basic principles.

Answers were given to three crucial questions during the technical training. How does hybridisation work with REINTJES marine gearboxes? What advantages does further hybridisation of the gearboxes offer? And what about possible delivery scopes?

"Alberto Amici and his team of REINTJES Hybrid Power have put together a strong programme, including expert presentations and discussions. I think that all participants now know exactly what is important in the field of hybrid and electric drives," was how REINTJES managing director Klaus Deleroi summed up the meeting.

The programme focused primarily on providing a wealth of practical insights. During a trip, all participants took a close look at the passenger ship *MS Ander* and its hybrid technology. REINTJES Hybrid Power successfully commissioned the *MS Ander* in 2024 together with a designer and contributed various parts in advance. Among other things, this included the drive system with the electrically driven rudder propeller, the battery pack, the control cabinets and the expertise to ensure that everything was perfectly matched and installed.

"The event was a complete success and showed that REINTJES and REINTJES Hybrid Power shape the future of maritime propulsion technology together," said Deleroi. One of the objectives behind the founding of REINTJES Hybrid Power has already been achieved: to build up a specialised team with a great deal of expertise that can then focus fully on hybrid and electric drive systems. But the competence centre in Italy is not the only milestone for REINTJES in the direction of green drives. Experts in Hameln are also working on exciting developments and projects that also contribute to the conversion of conventional transmissions. One example is gearbox automation. This is a control unit that has been developed in-house and that has been available since last year for direct installation on REINTJES gearboxes.

"Our main aim was to make our transmissions intelligent, so to speak, and to equip them with more functions using a control unit. Previously, the conventional hydraulic clutch control unit only offered the main shift modes "forward" and "reverse"," explained Deleroi.

The REINTJES managing director added: "Gearbox Automation is generally available for almost all of our gearboxes, and in the case of hybrid gearboxes, it is no longer possible to do without as an upgrade automation."

› ABOUT REINTJES

Small and large marine gearboxes from Hameln. Primarily for yachts, ferries and workboats. That is the core competence of REINTJES GmbH. https://www.reintjes-gears.de/

Driving forward autonomous navigation

ANSCHÜTZ As a leading expert in navigation and bridge systems, Anschütz is driving the development of autonomous navigation through various research initiatives and initial customer projects. Following successful demonstrations of autonomous navigation on the Kiel Fjord, development has now entered the next phase, with practical use cases becoming increasingly apparent.

Anschütz develops the system architecture for autonomous navigation systems and remote operating centres, and rule-based automatic collision avoidance systems

The test vessel *MV Wavelab* has been constructed as part of the Kiel CAPTN initiative. Equipped with a complete SYNAPSIS NX Integrated Navigation System (INS), the project focused on the construction of the Remote Operation Centre (ROC) at Anschütz and the development of a 5G-standard communication infrastructure. The remote control and monitoring of the *Wavelab* from the ROC were successfully tested in regular trial runs under a wide range of weather and traffic conditions.

"Over the past two years, the results of our research have become increasingly tangible", said Daniel Sommerstedt, head of Research Projects at Anschütz. "We have made significant progress on our path towards autonomous navigation. Our engagement with users and customers has also been growing enormously, which shows the increased relevance and acceptance of the topic."

Initially starting with manual remote control, the INS now controls motion and manoeuvres of the *Wavelab* through integrated autopilot and speed pilot functionality, for example, by executing the precise track control mode on pre-planned courses. Situational analysis and the maritime picture have been continuously optimised with the help of users and experts. A recent milestone had been the development of a new automatic collision avoidance system (CAS).

The CAS is based on an algorithm that analyses the maritime situation using conventional onboard sensor data to identify potential collision risks with other vessels. In accordance with the Convention on the International Regulations for Preventing Collisions at Sea (COLREG), these risks are continuously assessed and dynamically displayed. If a collision risk is detected, the system automatically calculates safe manoeuvring areas and suggests trajectories, taking into account water depths, sea marks, restricted areas, and other relevant factors.

"The real-world tests in the unique test field of the Kiel CAPTN initiative have given us the opportunity to combine our research laboratory and simulator findings with practical experience and user feedback", said Sommerstedt. "We have continuously gained new insights, which we have been able to incorporate into the optimisation of the algorithm and the simplification of the display."

The fully rule-based COLREG algorithm was developed within the OCUMAR research project. The algorithm proved to be consistently reliable, effective, with reliable parameters, during the tests in various conditions and scenarios.

Target detection and assignment, situation analysis, visualisation of potential collision risks, trajectory calculation, acknowledgement and integration of the motion control system combining trackpilot and speedpilot functioned well together. The automatic CAS has been extensively tested in the Kiel Fjord with more than 150 collision avoidance scenarios under real-life conditions.

"Automating target detection, association and evaluation in a narrow and busy area like the Kiel Fjord proved to be a challenge," Sommerstedt explained. "We have made significant progress on a steep learning curve and will continue to mature the process as part of the CAPTN initiative."

In this next phase, the situation analysis will be further enhanced with camera data. In addition to identifying possible additional objects, intelligent cameras will classify existing objects into categories, thereby verifying the radar and AIS assessments and providing a more complete maritime picture. This way, the CAS will further improve situational awareness and alert navigators to potential collision risks.

This will reduce workload in high-pressure situations and minimise human error. In certain scenarios, it may also allow for a reduced bridge crew or even a periodically unmanned bridge, helping to address the shortage of qualified personnel.

"We are focusing our development on assistance and bridge systems with a high degree of automation that are ready for approval," said Sommerstedt. "The main advantage is that our in-

The unique test field of the Kiel CAPTN initiative with the test vessel *MV Wavelab* is a focal point for research into autonomous navigation

Source for both images: Anschütz

tegrated navigation system is already type-approved and proven, and it is the foundation for our system architecture in autonomous navigation."

SYNAPSIS INS is part of the system architecture, together with other sensors and systems for controlling the autonomous system and the communication infrastructure. It includes key features such as health monitoring, centralised data and alarm management, target handling, and automatic control. In addition, the products offer advanced security features, including compliance with IACS cybersecurity standards UR E26 and E27.

The INS, as a certified standard, provides a framework for incorporating additional requirements and functions in customer-specific projects, such as performing safety and risk analyses and defining various levels of IT security. In autonomous systems, the familiar core of the INS is extended to include automatic collision avoidance functions, integration of optical sensors and dynamic situational awareness, and improved alarm management.

At the same time, potential use cases are becoming more concrete. Besides the assistance systems mentioned above, these include coastal ferries. Unmanned surface vehicles can also be used in the maritime sector, for example to make mine and munitions searches more effective and less dangerous for personnel and equipment, or to secure critical infrastructure near the coast.

"There are many exciting ideas and even very specific projects with customers in which we are already delivering system solutions," said Sommerstedt. "In order to obtain approval for our innovations, we are working closely with the relevant authorities to determine what a real approval process might look like."

Beyond customer projects, research efforts continue. Anschütz remains committed to furthering the development of autonomous navigation systems and sensors through various research projects.

› ABOUT ANSCHÜTZ GMBH

Anschütz GmbH is a leading global manufacturer of state-of-the-art navigation and bridge systems with headquarters in Kiel, Germany, and subsidiaries in Shanghai, Singapore, Panama City, Rio de Janeiro and Portsmouth. www.anschuetz.com

How digital systems can lead to greater efficiency, safety and sustainability in the maritime industry

ZEPPELIN POWER SYSTEMS As a long-time partner for Caterpillar and MaK engines, Zeppelin Power Systems continuously creates systems and applications that make the maritime industry more efficient, safer and more sustainable

Zeppelin Power Systems' comprehensive Customer Value Agreements (CVAs) offer individually tailored modules that allow flexible combinations of services, from regular inspections, maintenance, oil and fluid analysis as well as modules for comprehensive online monitoring.

Through the integration of digital technologies, Zeppelin Power Systems enables more transparent and efficient fleet management. By linking engines, systems and fleets, these assets can be continuously monitored, giving fleet operators a comprehensive understanding of their asset performance and status.

All these systems are designed to be flexible, vendor-independent, and adaptable to both new and existing equipment. By collecting real-time data on key operating parameters such as exhaust and luboil temperatures, engine load, RPM, boost pressure and fuel consumption, operators can make more informed decisions that reduce downtime and optimise fleet performance.

The integration of digital systems is not only about improving operational efficiency – it is also a critical tool for improving sustainability, reducing environmental impact and ensuring compliance with increasingly stringent maritime regulations. Through digital monitoring, fleet operators can track emissions, fuel consumption, and other key metrics that help minimise their environmental footprint while extending the life of engines and other critical components.

One of Zeppelin Power Systems' most significant developments is its digital product Active Equipment Connect (AEC). Torben Seemann, Digital Business Consultant at Zeppelin Power Systems, explained: "With our digital product, Zeppelin Power Systems presents a state-of-the-art, reliable solution tailored to the specific requirements of the maritime industry. The system provides access to comprehensive engine and system operating data, giving operators real-time insight into critical parameters.

"From proactive maintenance and performance monitoring to compliance with stringent environmental regulations, our digital innovations are shaping the technological transformation and future of the maritime industry, enabling more efficient, sustainable and safer fleet operations. By providing fleet operators with the tools and data they need to make informed decisions, Zeppelin Power Systems is setting new standards in operational service efficiency," he declared.

The digital applications enable fleet managers to access key operational data remotely, regardless of location, greatly simplifying processes and increasing operational visibility. The system can be easily integrated into existing fleets, regardless of engine type, age or manufacturer. Its modular design ensures a seamless integration with existing infrastructure, allowing retrofit kits for purely mechanical engines and enabling fleet-wide digital integration.

Real-time monitoring for improved efficiency and safety

One of the most important features of Zeppelin Power Systems' digital products is the ability to capture all key operating data in near real-time. This includes not only engine parameters such as exhaust, coolant and luboil temperatures, load conditions, media pressures, operating hours and fuel consumption, but also equipment data such as temperature, fire detection or sewer systems.

Almost any relevant operational data can be collected and analysed, allowing fleet operators to stay ahead of potential problems and ensure optimal fleet performance. The data collected by this digital system is securely transmitted via cellular networks or the vehicle's existing GSM or satellite communication systems, in compliance with GDPR standards.

All digitally collected data can be viewed by the customer at any time via a web-based customer front-end. The dashboard view provides at-a-glance information and detailed insight into system and engine performance. Engine-related fault messages and oil analysis results from the Zeppelin Oil Laboratory are visualised, and customised alerts can be set based on any of the collected data. This provides a solid basis for decisions that optimise operations and simplify workflows.

If customers are unable to monitor their assets closely, for example due to a lack of specialist staff, regular data monitoring and analysis can be carried out by technically experienced staff at the Fleet Operations Center (FOC) in Hamburg. All digital data is monitored 24/7 at the FOC and, depending on the connectivity system installed, this service can be part of the Zeppelin Power Systems' CVA.

This includes trend analysis, fault monitoring, technical status validation and accurate forecasting. On this basis, customers can increase availability and utilisation, and support lifetime predictions for specific components. In addition, on-site visits by service technicians can be prepared more efficiently and quickly, ideally enabling a first-time fix rate and preventative action to avoid component failures.

Advances in intelligent data use

Zeppelin Powers Systems has developed data algorithms to identify deviations from normal conditions. The algorithms are

developed according to specific customer operational requirements, based on the company's experience and knowledge of engine and power generation systems and data, and using various data analysis tools, including machine-learning and artificial intelligence.

In addition to validation and action by the FOC, customers can be automatically alerted 24/7 when deviations in system operation occur. These offerings continue to evolve and the future possibilities seem limitless.

The role of digital systems for environmental sustainability

With increasing regulatory pressure on the maritime industry to meet environmental standards, digital systems are playing an increasingly important role in ensuring that fleets can operate more sustainably. Seemann emphasised, "The detailed operational data provided by our digital solutions enables fleet operators to meet the growing bureaucratic challenges they face to comply better with regulatory requirements. By making emissions and fuel consumption transparent, the system not only supports compliance, but also improves the overall economic performance of the fleet, often resulting in a reduction in operating costs as a valuable side effect."

Ensure fleet safety with proactive failure prevention

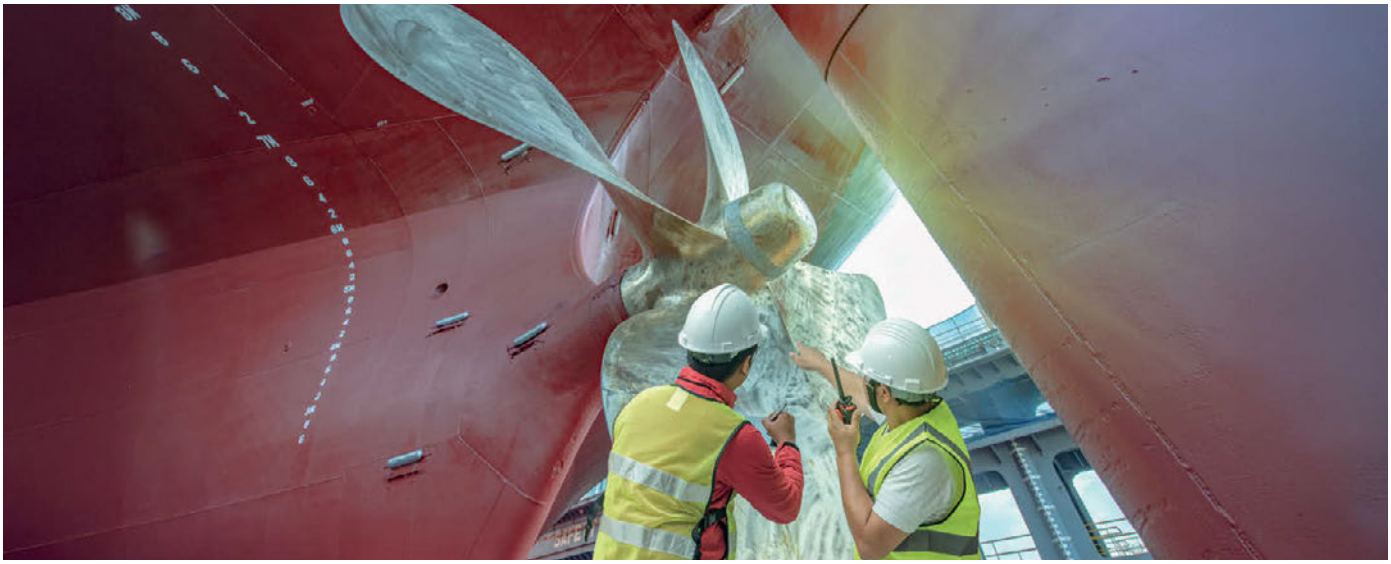
Zeppelin Power Systems is committed to the safety of its customers' fleets. The company's digital systems, particularly through continuous monitoring at the FOC, allow potential faults and malfunctions to be detected and addressed effectively. Proactive fault prevention ensures maximum uptime by identifying and preventing potential faults, which can help reduce fuel consumption and emissions, and extend the life of engines and systems.

This helps minimise the risk of costly downtime and ensures that the fleet is operating at peak performance. It also helps customers meet environmental regulations and operate their vessels and systems more sustainably. Customers get a reliable digital foundation that supports safe, transparent and sustainable operations today and tomorrow.

› ABOUT ZEPPELIN POWER SYSTEMS

Zeppelin Power Systems is one of the world's leading providers of drive and energy systems. The company is part of the internationally successful Zeppelin Group with over 10,000 employees and total sales revenue of EUR 3.8 billion. Zeppelin Power Systems has been the exclusive sales and service partner for Caterpillar engines since 1954. More than 1,000 qualified employees offer customisable, highly efficient and durable system solutions and wide-ranging services for industrial and marine applications, the oil and gas industry, rail vehicles, and power and heat generation. Digital products, system components and ready-made solutions for the treatment of ballast water round off the portfolio.

www.zeppelin-powersystems.com



Together with AEGIR Marine, Bachmann examined abrasion scenarios in ship propulsion units. This included examining the abrasion of components such as bearings and seals in propellers. Source: Bachmann electronic / Adobe Stock

AI-based assistance supports ship and offshore wind industry

BACHMANN ELECTRONIC In the industrial maintenance realm, the shift from reactive and preventive strategies to predictive maintenance marks a significant evolution. This transition is not just a technological upgrade but a fundamental transformation that promises to redefine how we manage the lifecycle of complex systems. For Bachmann electronic, this means harnessing artificial intelligence (AI) to optimise maintenance processes, particularly in the maritime and offshore wind sectors.

Predictive maintenance is a maintenance strategy that aims to perform maintenance exactly when it is necessary, thereby maximising efficiency and minimising downtime. Unlike reactive maintenance, which addresses failures after they occur, or preventive maintenance, which follows a fixed schedule, predictive maintenance uses advanced analytics to predict when maintenance is required. For Bachmann electronic, this means a more cost-effective and reliable maintenance strategy that keeps systems running smoothly and efficiently.

Optimised maintenance strategy

In practice, a mix of maintenance strategies is often necessary. The choice of strategy depends on the type of failure, how early it can be detected, and its criticality to the system.

Bachmann electronic leverages the potential of AI to optimise maintenance processes. AI supports engineers in identifying fault states earlier, allowing more components to be included in a predictive maintenance approach.

Investigating wear scenarios of ship propellers

Bachmann partnered with AEGIR Marine, a leading provider of stern seal and propulsion services, to investigate wear scenarios of ship propellers. Starting with a fully reconditioned propeller, specific parts such as bearings or seals were replaced with worn components during a long-term test. The team identified at what point and with which methods faults could be detected during operation. This data was used to train algorithms, improving the quality of predictions.

Implementing AI-based predictive maintenance is not without challenges. Setting alarm thresholds for automatic alerting is particularly tricky because these thresholds can vary based on operational conditions. It requires expertise to distinguish normal variations from critical anomalies. Bachmann electronic addresses these challenges by developing sophisticated algorithms and training these algorithms correctly.

AI in offshore wind energy

AI can significantly enhance condition monitoring systems (CMS) and structural health monitoring systems (SHM) in the offshore wind energy sector. AI can be used within a CMS, on the server or in the data cloud to improve data analysis and automation. Another possibility is to use classic CMS and combine and evaluate it with supervisory control and data acquisition (SCADA) using AI. SCADA contains a lot of valuable in-

formation, which is currently used in the wind industry mainly for operational technical management.

Quantifying the potential

Benefits of AI in condition monitoring are substantial: according to Bachmann's estimates, AI methods can potentially detect up to 30% more errors. This offers substantial economic benefits by reducing maintenance costs and increasing operational efficiency. For Bachmann, this means a more reliable and efficient wind energy sector, where turbines can operate with minimal downtime and maximum output.

AI-based assistance

Bachmann is currently working on an AI-based assistance system for condition monitoring. Such an AI tool can strengthen the role of personnel by automating routine tasks. It provides more accurate warnings earlier, thereby improving decision-making.

The use of AI in condition monitoring has evolved over the years. Statistical methods have been in use for decades, but are now seen as part of the broader AI landscape. Modern technologies like machine-learning and deep-learning have gained prominence in the past five years. Significant AI pilot projects in machine and plant monitoring started around three to five years ago.

Data quality and sensor integration

Ensuring the security and integrity of data is crucial for maintaining system reliability. The quality of AI outputs is directly dependent on the quality of input data. In many cases, existing sensors and measurement data are sufficient, but sometimes new sensors may be required for specific functions.

Bachmann ensures that data quality is maintained through data cleaning and validation processes, working closely with plant operators to identify and correct any issues. This commitment to data quality ensures that the AI models are reliable and accurate, providing valuable insights that can be acted upon with confidence.

Looking ahead

Paul Ryan, a former Microsoft manager, predicts that in three years, AI will be integrated into almost every system. Bachmann is developing new systems to meet the evolving needs of the industry. AI-assisted systems for Condition Monitoring and Structural Health Monitoring will be a step to stay ahead of the curve.

› ABOUT BACHMANN ELECTRONIC GMBH

Bachmann delivers complete, certified automation solutions for maritime applications and offshore installations to help its global customers create secure and powerful platforms. The automation experts implement state-of-the-art solutions that optimise the operation of turbines, vessels, and entire fleets.
In the wind energy sector, Bachmann is the world market leader for automation systems, and its products are used in over 150,000 wind turbines. https://www.bachmann.info

Energy management system for ships

Source: Noris

Hybrid drives need intelligent energy management

NORIS GROUP Hybrid ship propulsion systems can only achieve their full efficiency with an intelligent energy management system (EMS). This is because traditional power management systems (PMS) are incapable of handling the complexity of modern energy sources, which requires proactive control and optimisation to maximise operational efficiency and environmental benefits. Noris Group offers a customised solution.

Today, ships are usually equipped with a classic power management system (PMS) that serves as the central control system for the alternating current (AC) power supply. It monitors and regulates the power distribution on board. It is often assumed that the PMS can also efficiently control modern drive technologies and make the most of their full potential, but this is a fallacy.

Modern drive concepts no longer rely on a single type of generator, but combine different generators with individual strengths and weaknesses, making the direct current (DC) network increasingly complex. PTI/PTO hybrid drives with battery storage systems and other pioneering technologies are being used more and more frequently, particularly in newbuildings and upgrades. The classic PMS quickly reaches its limits here.

The initial euphoria is quickly followed by bitter reality. Shipping companies invest in innovative technologies to increase the efficiency of their ships, reduce energy consumption and emissions, and fulfil regulatory requirements. However, without an intelligent energy management system, a large part of this potential remains unused and the desired success falls short of expectations because there is no overarching control system that optimally coordinates the various energy sources.

Without intelligent control, hybrid drives remain inefficient

The energy sources are partly regulated by simple means or with the help of the PMS. Questions that may arise include:

- How to decide when to feed the electrically generated energy into the drive?
- What is the best time to charge the battery storage system, and at what C-rate?
- When does it make sense to switch between generator, battery and PTI/PTO drive?

Modern ships can have more than 100 different operating modes – and the control of energy generators and consumers can be just as complex. A classic PMS can no longer perform this sophisticated control and monitoring.

This is where the energy management system (EMS) comes in. It optimises the energy flow between AC and DC grids, controls battery storage and hybrid drives proactively, and automatically adjusts the operating modes. This ensures that the ship utilises the potential of the modern technologies with which it is equipped as efficiently as possible.

The EMS essentially provides fully automatic control of energy sources and consumers that is proactively geared towards operational tasks and manoeuvring situations. It supports the crew on board in their activities and processes, optimising fuel consumption and the load on the various energy suppliers for specific events. This stabilises ship operations in the long term. The EMS is therefore always designed on a project-specific basis for the respective purpose of the ship.

The Noris EMS was developed to fulfil the flexible requirements of different types of ships. It not only scrutinises the classic and modern energy generators and consumers and the current situ-

ation, but also considers the entire period of use of the ship. Range, total drive power, and the energy required for the entire operation based on navigation data, route energy profiles, environmental and weather data also play a role here. Although all this data is available in the various on-board systems, it must be brought together on one platform and analysed for a specific purpose in order to be able to make meaningful recommendations for action, including automatic decisions for operations.

In addition to the specific project-related functions, the Noris EMS also offers standard function modules for common ship manoeuvres. Thanks to the operating mode switches, complex controls for the energy supply can be stored that the operator can activate at the touch of a button, such as:

› Silent mode: whisper-quiet operation thanks to a purely electric drive. In this setting, diesel engines and range extenders are all switched off and the ship runs solely on electric power. This is particularly advantageous in environmentally sensitive areas where pollutant emissions must be minimised.

› Full power: maximum power generation. When the power requirements are high, all generators start as quickly as possible to ensure a reliable power supply. This option guarantees the functionality of the ship even under extreme conditions.

› Charging management: optimum charging at adjustable C-rate. In this mode, the ship can be quickly recharged either via a landing connection or using the onboard power generators. The automatic C-rate allows flexible adjustment of the charging process, while the charging time display provides information for the operator.

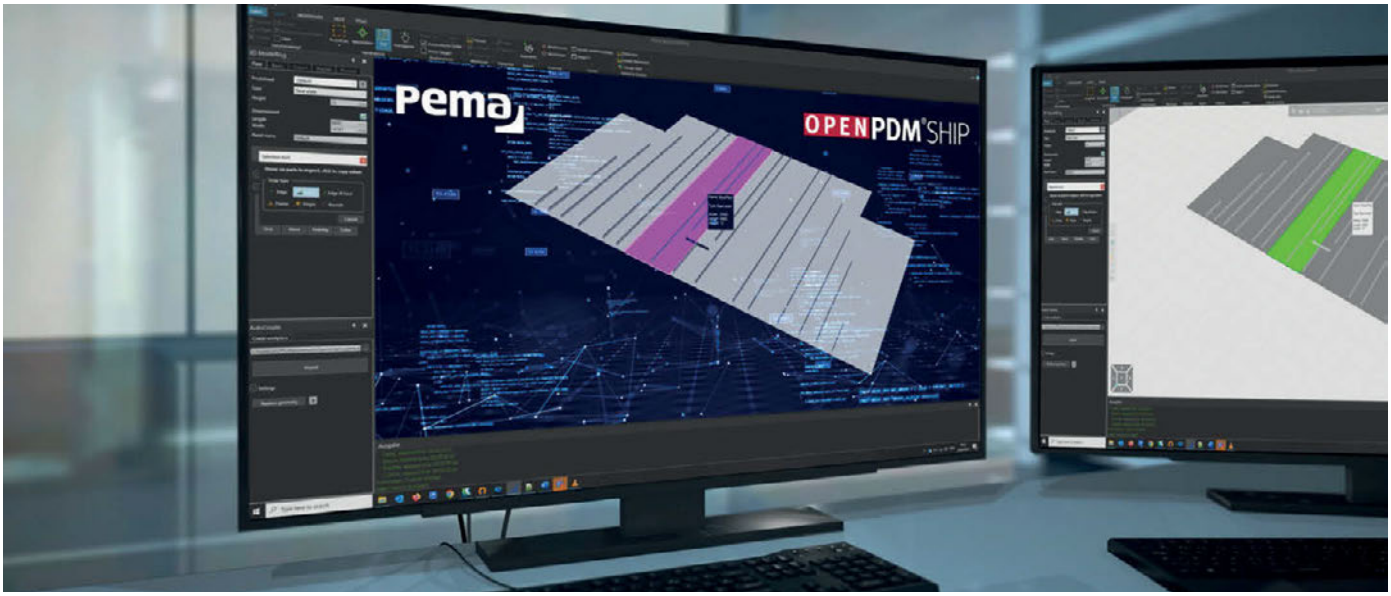
Only energy management makes hybrid drives really efficient

Modern ships offer enormous efficiency potential through the use of hybrid drives and battery storage systems – but these remain unused if there is no intelligent control system behind them. The classic power management system is not capable of managing the complex requirements of a hybrid on-board power system.

Shipping companies that invest in future-proof technologies must ensure that these technologies are optimally utilised. An energy management system is the key to controlling the energy flow as efficiently as possible, automatically adjusting operating modes, and perfectly coordinating energy sources. Only an EMS can enable shipping companies to utilise the full potential of modern ship propulsion systems and at the same time increase operational efficiency and environmental benefits.

› ABOUT NORIS GROUP GMBH

Noris Group GmbH is a leading manufacturer of innovative automation systems and sensor technology for the maritime industry. The company has been developing customised solutions for engines, gearboxes and on-board control technology for 100 years. Its focus is on future-proof and durable solutions for modern propulsion systems that meet the customers' high demands for efficiency and flexibility. With subsidiaries in Rostock, Rotterdam, Singapore and Shanghai, Noris operates worldwide, offering local service and support. www.noris-group.com



Prostep has developed PemaConnect that allows data to be automatically imported into WeldControl Source: Prostep

How to achieve seamless information flows in shipbuilding

PROSTEP IT landscapes in the marine and offshore industries are even more heterogeneous than in other industries. As a result, companies find it difficult to achieve seamless information flows. In particular, there are gaps in the process chain between design and numerical control (NC) programming. Prostep has closed one of these gaps by connecting shipbuilding design software to the Pemamek WeldControl software using the OpenPDM SHIP integration platform.

Shipyards typically use shipbuilding-specific computer-aided design (CAD) systems from Aveva, Cadmatic, Siemens (incl. Foran), Hexagon, Napa, or SSI to design vessels' steel structures. Unlike traditional mechanical CAD applications, these systems are highly feature-based and render the 3D-geometry model based on the design intent. This

spares designers from defining repetitive details like stiffener end cuts or manual cutouts.

Additionally, these CAD models contain a wealth of manufacturing-relevant information, such as weld parameters or shrinkage compensation, which are needed for the NC programming of cutting and welding robots and for controlling the panel lines. The challenge is to extract this information and prepare it in such a way that it can be processed by the machine manufacturers' NC programming systems.

One of the world's leading manufacturers of welding and production automation is the family-owned Finnish company, Pemamek. The company's headquarters are in Loimaa, Finland, with additional subsidiaries in six European countries and the US. They have delivered over 15,000 welding automation systems to customers. Pema products are used not only in the marine and offshore industries, but also in metal fabrication, wind-turbine manufacturing, power generation, the process industry, and heavy engineering.

Pemamek drives its panelines and robotic welding applications with its own WeldControl software, allowing for simple and fast programming of machinery. It guarantees high welding productivity and quality, enabling full downstream integration into the NC machines and real-time process monitoring.

The 3D models for NC programming are designed manually from scratch in Pema's WeldControl software, which is time-consuming and error-prone. A few years ago, Pemamek and Prostep agreed to use the vendor-neutral integration platform OpenPDM SHIP to import the CAD models directly from ship design, including manufacturing information.

OpenPDM SHIP is used to extract design and manufacturing information from the shipbuilding-specific CAD systems. It then converts the content and creates the format required by WeldControl. Based on OpenPDM SHIP, Prostep has developed a system called PemaConnect that performs all necessary steps automatically. Adaptation to shipyard-specific features like profile types, cutouts, or collar plates are performed as part of the implementation process in the customer environment.

PemaConnect ensures a robust transfer of digital model information, including part topology, plate geometry, and profile endcuts, for example. Prostep uses its internal Ship XML format as neutral container. It allows the system-independent representation of part geometry and attributes, including parametricity, topology and assembly information.

The main challenge when transferring data to the Pema software is understanding the complex and highly parameterised information structures of the respective CAD systems and mapping them to the target system. This expert knowledge is one of the unique selling points of Prostep's shipbuilding experts, who have been advising and supporting companies in the marine and offshore industries on the digitalisation of their business processes for more than 25 years.

Originally developed for one of Europe's largest shipyards that builds complex cruise ships – Meyer Turku – PemaConnect is now in productive use at several major shipyards in North America, Australia, and the UK, and discussions are currently underway to add more. The shipyards can use OpenPDM SHIP to improve the consistency of their digital information flows significantly. The automatic transfer of design data to NC machinery not only saves time but also reduces the risk of errors associated with manual redesign for manufacturing purposes.

From the machine manufacturer's point of view, a key advantage of OpenPDM SHIP is that they can offer their customers integration with all leading CAD, PLM and ERP systems without having to develop and maintain countless interfaces. Prostep maintains partnerships with all major system providers in the shipbuilding industry, giving them access to the vendors' native data models and ensuring that the connectors are continuously amended whenever the systems are updated. For this reason, Prostep also entered into a technology partnership with Pemamek. This enables the Finnish company to sell PemaConnect as part of turnkey solutions for its NC machinery installations.

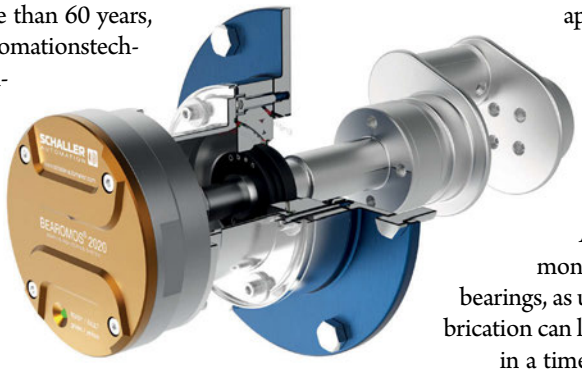
› ABOUT PROSTEP

As a leading vendor-neutral provider of consulting services and software for product lifecycle management (PLM) and application lifecycle management (ALM), Prostep supports manufacturing companies in their digital journey. With OpenPDM SHIP, the company offers the marine and offshore industries a unique platform for integrating their shipbuilding-specific IT systems, which is instrumental for shortening their time to market.

www.prostep.com

The future of condition monitoring on the crankshaft drive

SCHALLER AUTOMATION | For more than 60 years, Schaller Automation Industrielle Automationstechnik GmbH & Co. KG has been developing, producing and selling safety systems for oil mist detection for large diesel, gas and dual-fuel engines, which are used in ships and power plants worldwide. These safety systems help prevent dangerous crankcase explosions and thus reduce the risk of serious consequences for man and machine.

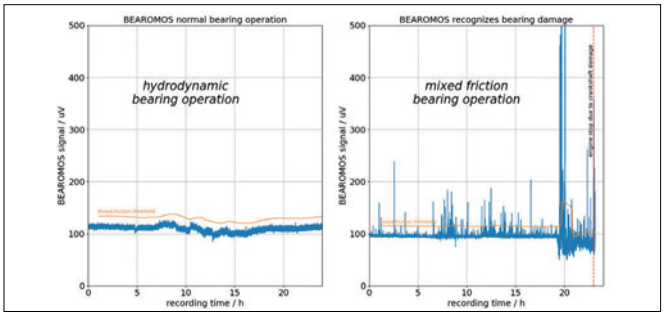


Connection of BEAROMOS to the crankshaft and mounting on the engine wall (blue)

In addition to oil mist detection systems, Schaller Automation develops products for condition monitoring. As part of the company's own future strategy for the "Condition-based Monitoring System" (COBMOS), digitalisation is to be driven forward on the basis of decades of experience in the field of crank drives. This will go so far that in future, decisions and forecasts will be facilitated by algorithms in order to provide even better support for plant and engine operators in the fields of maintenance, servicing and safety.

The company's own COBMOS module plays a central role here, serving as an interface between the available sensors and the customer's control system. The COBMOS module is designed to log the measurement data from the company's own sensor portfolio and to integrate external sensors, if required. In addition, the COBMOS module fulfils the function of an edge gateway and can use a real-time operating system to perform calculations on models that have been created based on machine-learning, for example.

For easy integration of the COBMOS module, a rail module design was chosen, as this allows easy placement and integration in an existing control cabinet and also makes subsequent installation simple. The common communication protocols CANopen, Modbus RTU or MQTT are supported, which makes it easy to implement the connection to the customer's control system. When integrating the COBMOS module via the ethernet interface, a web server application is also available that visualises the status and current measured values of the connected sensors.



Source for both images: Schaller Automation

Detection of engine damage due to a bearing failure caused by insufficient lubrication; left: BEAROMOS signal in normal operating condition of the motor; right: BEAROMOS signal shows several mixed friction events early before the bearing failure, so that an early indication of a damage event is possible.

Simultaneous bearing monitoring of crankshaft's main and big end bearings

A key aspect on the road to COBMOS is the monitoring of the crankshaft's main and big end bearings, as unnoticed bearing wear or faulty bearing lubrication can lead to serious consequences if not detected in a timely manner. Repairs to the crankshaft drive that are necessary at short notice can lead to unplanned and costly downtime or loss of availability.

In this respect, it is desirable to determine bearing wear or detect faulty bearing lubrication so that measures can be initiated at an early stage to prevent major damage. Both damage mechanisms ultimately lead to the failure of the bearing in question by leaving the fluid friction via the increase in mixed friction conditions and the associated rise in temperature.

With the help of the BEAROMOS bearing monitoring sensor, it is possible to detect even the first mixed friction conditions of the crankshaft's main and big end bearings by using an innovative and sensitive measuring system. Using thermoelectric measurement, even very small temperature changes caused by mixed friction can be measured.

In the case of mixed friction, a brief direct material contact between the bearing shell and shaft occurs in the bearing at the beginning. Due to the typically different materials and the temperature difference between the contact materials, a voltage can be measured. Although the temperature differences are initially still small as mixed friction increases, BEAROMOS can detect mixed friction at an early stage thanks to its high sensitivity, so that the operator can be alerted to take action and prevent serious damage.

Simultaneous monitoring of the crankshaft's main and big end bearings on an engine can already be realised with a BEAROMOS, as the change in thermoelectric voltage can be measured at all bearing points on the path from the unearthed crankshaft towards the engine housing. For adaptation to the engine, BEAROMOS can be mounted outside the crankcase at one end of the crankshaft using a crankshaft-specific adapter.

This only requires an opening at the crankcase end, which is often already present due to the design. This simple installation option makes BEAROMOS suitable both for cost-efficient installation by engine manufacturers and for retrofitting to existing engines.

› ABOUT SCHALLER AUTOMATION

Schaller Automation Industrielle Automationstechnik GmbH & Co. KG is a leading manufacturer of safety systems for oil mist detection for large diesel, gas and dual-fuel engines as well as a manufacturer of condition monitoring systems for the crankshaft drive. https://schaller-automation.com/

Resource-efficient lube oil purification for maritime applications

GEA | Designed for the continuous purification of luboil under demanding maritime conditions, the next-generation GEA ecomarine Separator centrifuge meets the growing demands of modern ship management when it comes to reliability, energy savings, and resource efficiency. Engineered for 24/7/365 operation, it is suitable for a wide range of vessel types, and supports shipowners and operators in achieving both environmental compliance and economic performance targets.

Built for reliability in harsh environments

With a robust design engineered for long-term use, the GEA ecomarine Separator ensures stable oil quality by continuously removing water from the lub oil circuit. Unlike conventional filter systems that rely on the frequent replacement of cartridges that are often vulnerable to high water loads, the GEA ecomarine Separator maintains its performance even under fluctuating operating conditions – without the risk of blockages or interruptions.

GEA ecomarine Separator – compact, efficient, and built for 24/7 performance at sea Source: GEA

Energy savings through efficient power use

One of the system's key features is its exceptionally low energy consumption. Operating at just 1 to 2 kW per unit, the separator significantly reduces operating expenses compared with traditional filter-based units. In addition, the system operates at lower separation temperatures, further reducing overall energy consumption and contributing to improved carbon intensity indicator (CII) scores. These energy savings help shipowners comply with current and future environmental regulations while lowering total greenhouse gas emissions.

Resource-efficient design with reduced waste

In addition to energy and operational savings, the GEA ecomarine Separator offers a major reduction in waste disposal costs. Without contaminated cartridges or consumables, the system reduces disposal costs by up to 80% and total ownership costs by up to 50% versus filter solutions. This low-waste operation offers both financial and measurable environmental benefits by significantly reducing material usage and minimising environmental impact.

Simplified maintenance – designed for practical use

Ease of operation and maintenance is another core advantage. The separator features a direct drive system and 360-degree access for easy installation and service. No complex infrastructure is required – there is no need for process water connections or separate sludge tanks.

Maintenance requires only a few seals to be replaced, and the bowl can be quickly cleaned by the ship's crew with minimal effort. A specially designed drive replacement process allows rapid component replacement, backed by an extended two-year GEA warranty that renews with each drive replacement.

Intuitive operation

In a deliberate move towards simplification, the GEA ecomarine Separator operates without a traditional control panel. A single on/off switch controls the system, reducing investment and operating costs while increasing ease of use. The minimal interface also saves valuable space in tight engine room environments.

Fewer components mean fewer potential points of failure, making the system particularly attractive to crews with limited technical training. Standard alarm contacts and integration points are, of course, included.

Optimised for marine spaces

The separator's compact design minimises its physical footprint and allows for easy integration into existing engine room layouts. Unlike filter-based systems that require a continuous supply of replacement cartridges – along with dedicated storage for used and spare components – the GEA ecomarine Separator significantly reduces the space required for operation and spare parts storage. Its streamlined design also simplifies logistics, helping ship operators optimise inventory management.

The separator draws on over 100 years of oil purification expertise, delivering reliable, high-performance operation tailored to marine demands.

› ABOUT GEA

GEA is a leading global supplier of high-performance equipment and technologies for the maritime industry, specialising in fuel and luboil treatment, bilge water processing, and advanced refrigeration and freezing systems. Our centrifuges, compressors, and turnkey solutions meet the strict demands of maritime logistics and environmental regulations, backed by a worldwide service and support network. www.gea.com

Lifinity, solid lubrication, which ensures maintenance-free operation of slewing bearings

Source for all images: Liebherr-Components

Slewing bearings of the future: digital, electric and maintenance-free

LIEBHERR-COMPONENTS Upon the development and production of slewing bearings and slew drives, Liebherr-Components' product segment focuses on advanced technology to meet the growing demand for higher efficiency, sustainability and safety, which industries worldwide are facing nowadays. In maritime applications, reliable and corrosion-resistant components are essential. Liebherr offers innovations, such as bearing clearance monitoring for slewing bearings, electrically-powered slew drives and solid lubrication technology. Each of these is designed to enhance durability and performance in demanding maritime environments.

As in other industries worldwide, the maritime industry is under increasing pressure to reduce its environmental footprint while enhancing efficiency, sustainability and safety. But how can these goals be achieved?

Often, the answer lies in the hidden champions of heavy-duty operations: slewing bearings and slew drives. These essential components play a crucial role in ship and offshore cranes, thrusters, wind-assisted ship propulsion and other maritime applications.

In harsh maritime environments, reliability and resistance are key criteria to ensure that maritime operations remain both sustainable and performing efficiently. To meet these growing demands, Liebherr focuses on continuous innovation and designs its slewing bearings and slew drives to withstand corrosive marine conditions, improve operational efficiency, and enhance safety.

Digital wear monitoring for slewing bearings

Bearing clearance monitoring (BCM) provides a digital tool for measuring wear in slewing bearings. For the operation and maintenance of maritime cranes, BCM offers a possibility to carry out measurements remotely. This minimises the risk of failure and ensures maximum safety for staff. Built-in sensors allow precise measurements of axial and radial wear without requiring technicians to perform manual checks in hard-to-reach areas.

This not only improves safety but also speeds up the monitoring process. Permanently installed sensors enable quick wear measurement via a web app, which can reduce downtime by up to 75%. An upgrade to the BCM can be seamlessly integrated into the customer's system without the need for additional measuring devices or gateways, reducing system complexity and allowing users to analyse measurement data within their own systems.

Electrifying slew drives: efficient and environmentally friendly

The slew drives can be powered electrically, offering clear advantages. They reduce noise emissions and do not require hydraulic oil, which prevents the risk of oil leaks. Electrically-driven slew drives are ideal for applications where no hydraulic systems are used. They offer a clean technology, especially in sensitive environments.

The electric motors are also highly adaptable and can be combined with various gears. Thanks to intermediate flanges, motors can be easily integrated and installed in a space-saving manner. Electrically-powered slew drives excel in precise positioning tasks, as their power control allows for accurate movements.

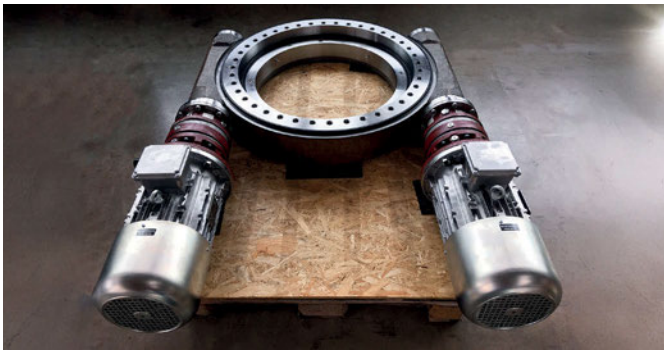
Lifinity solid lubrication: maintenance-free slewing bearings

Liebherr's innovative solid lubrication, Lifinity, eliminates the need for regular relubrication. In this process, a heated polymer-oil mixture is introduced into the heated bearing. As it cools, it forms a stable layer that provides long-term lubrication for the bearing. A major advantage is the significant reduction in maintenance, as regular relubrication is no longer necessary, leading to considerable savings in operating costs and time.

This increases productivity as equipment requires less downtime for maintenance, thus extending the lifespan of machines and boosting overall operational efficiency. Lifinity also reduces the risk of corrosion, enhancing the longevity of the bearing.

Additionally, Lifinity is environmentally friendly: conventional greases and oils can leak and pollute the environment, but with Lifinity, there is no such risk. This technology also meets strict NSF/H1 standards, making it suitable for food-related environments.

By implementing digital measurement, electrification and maintenance-free technologies, Liebherr's component product segment offers advanced designs for slewing bearings and slew drives tailored to the demanding conditions of maritime applications. Whether in ship or offshore cranes, ship propulsion systems or other maritime applications, these future-ready components enhance reliability, reduce maintenance efforts and improve corrosion resistance. They play a vital role in making maritime operations more efficient, safer and environmentally friendly.



This slew drive by Liebherr is equipped with an electric motor

› ABOUT LIEBHERR-COMPONENTS AG

The Liebherr-Components product segment specialises in the development, design, manufacturing of high-performance components in the fields of mechanical, hydraulic and electric drive and control technology. The extensive product range includes combustion engines, injection systems, engine control units, axial piston pumps and motors, hydraulic cylinders, slewing bearings, gearboxes and winches, switchgear, electronic and power electronics components, and software. The high-quality components are used in cranes and earthmoving machinery, in the mining industry, maritime applications, wind turbines, automotive engineering and in aviation and transport technology. Synergy effects with other product segments of the Liebherr Group are used to drive continuous technological development.

www.liebherr.com/components

Real-time measurement of greenhouse gases for EU ETS compliance

DR. FÖDISCH UMWELTMESSTECHNIK AG | With the extractive hot-wet gas analyser system MCA 10 maritime, Dr. Födisch Umweltmesstechnik AG has developed a continuous emission monitoring system that enables precise and real-time measurement of greenhouse gases on ships. This development comes at a crucial time, as maritime transport became subject to the EU Emissions Trading System (EU ETS) in January 2024 and shipowners start to pay for allowances covering 2024 emissions by the end of September 2025. The EU ETS, originally established in 2005 for land-based industries, now includes large vessels over 5,000gt trading in, to, or from EUA waters. While the MRV Regulation (EU) 2015/757 previously required ships to monitor and report their CO_2 emissions, there were no direct financial consequences. This changes with the integration into the ETS, as shipping companies will need to surrender allowances for 100% of their reported CO_2 emissions by 2027. Furthermore, the greenhouse gases methane (CH_4) and nitrous oxide (N_2O) will be added to the system from 2026.

Until now, there has been no other obligation than the measurement of the SO_2/CO_2 ratio to determine emissions. Together with fuel consumption and other factors, the volume of CO_2 emissions is calculated and reported. Based on experience in onshore applications, such as coal-fired power plants, chemical and fertiliser plants, as well as various engine-modelling projects, it can be said that measured emissions could be significantly lower than those calculated through the traditional estimate-based methods.

With online measuring system giving real emissions, the output of CO_2 emissions becomes more transparent and can be charged in a fair way. It may either result in saving CO_2 taxes because the real values are below the calculated ones or promoting an upgrade of the ship to lower its carbon footprint.

There are different manufacturers as well as suppliers for continuous emission monitoring systems installed on ships. The main application as per regulation has been the measurement of SO_2/CO_2 behind scrubbers. Recent developments, however, demand a widening of the monitoring scope due to the ambitious goal of reducing greenhouse gases accompanied by incentives to use alternative fuels.

Source: Dr. Födisch Umweltmesstechnik AG

Hot-wet gas analyser for the maritime industry

Flow, temperature, and absolute pressure monitoring device

Simple in design and robust in application

The MCA 10 maritime is an extractive hot-wet gas analyser system which is characterised by a completely heated gas path regulated at 185°C. The system requires neither an external sample gas pump nor a sample gas cooler for conditioning the sample gas. It is extremely simple in design and robust in application.

The MCA 10 maritime is certified in compliance with MEPC.259(68) and MEPC.340(77) for continuous monitoring of SO_2 and CO_2 in flue gas. Furthermore, according to the performed tests, it is also suitable for the measurement of CO, NO, NO_2, N_2O, NH_3, CH_4, H_2O and O_2 at up to two different sample points. The MCA 10 maritime meets the requirements of Revised MARPOL Annex VI and NOx Technical Code 2008.

For emission trading, however, not only are the pollutants' concentrations important, but the volume flow rates as well. Therefore, the flow measuring device FMD 09 is a perfect match for the system offering three parameters at once – flow, temperature and optionally absolute pressure – for a proper data assessment. The FMD 09 has numerous onshore installations and is being prepared for an offshore trial now.

Just talking about the measurement hardware, however, would not meet the goal yet, as it also requires reporting software to submit the data compliant to EU ETS according to monitoring, reporting, and verification requirements. That can be offered by a third-party cooperation partner.

Conclusion

Understanding greenhouse gas emissions of vessels is increasingly important to meet new stringent environmental regulations. The systems described above allow accurate and real-time emission measurements, which are more precise than predictive models and result in real EU ETS tax amounts.

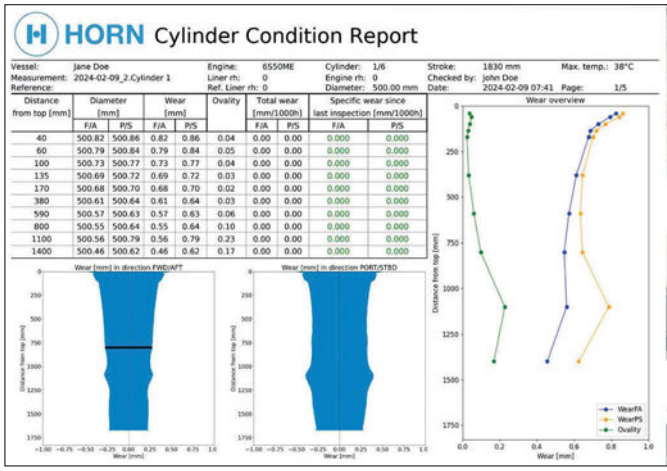
The MCA 10 maritime as a hot-wet multi-component gas analyser is a future-proof alternative compared with existing emission monitoring systems based on cold-dry technology. It offers substantial benefits, and the core technology can be applied for clean gases, before/after scrubbers, before/after DeNOx plants, slip measurements – no matter whether they are onshore or offshore. The system has already demonstrated excellent performance and long-term stability as well as high availability.

By using a customer-friendly dashboard, the traditionally elaborate process of reporting emissions becomes automated, resulting in saving CO_2 taxes now.

› ABOUT DR. FÖDISCH UMWELTMESSTECHNIK AG

Dr. Födisch Umweltmesstechnik AG is a German leader in certified continuous emission monitoring devices with over 30 years of expertise in developing and manufacturing them, as well as a broad offering of customised solutions for clients worldwide.

www.foedisch.de



Automated documentation of wear

CLDM inside the liner

Source for both images: Dr. E. Horn

The new way to cost effective LDM

DR. E. HORN | Liner wear is an important parameter for assessing the condition of a two-stroke diesel engine as a marine propulsion system. According to engine makers' specifications, the wear is currently measured at defined heights in two directions: forward – aft and port – starboard. These measurements are performed manually with a micrometer, which is potentially inaccurate. In addition, the cylinder head must be removed to gain access to the relevant upper part of the liner. In fact, such a measurement is only possible when the piston is drawn for maintenance, which only happens every three to four years.

For economical and optimised engine operation, it is essential to measure the liner wear more frequently, preferably at each piston inspection. Changes to cylinder lubrication, the effects of poor fuels, incorrectly set cooling water parameters, and slow-steaming can all have a significant impact on wear rate in the cylinder. This must be detected in good time so that countermeasures can be taken.

A service provider can be contracted to carry out more frequent wear measurements. This will then be carried out by using contact and non-contact technology. The measuring device is inserted into the cylinder at bottom dead centre through the scavenging air ports and positioned on the piston crown. The piston is then turned and the diameter data is recorded.

The technologies used are laser-based or tactile and are known from monitoring industrial manufacturing processes. For this reason, the demanding operating conditions on board and inside a pre-heated two-stroke engine can only be handled by trained service personnel. In addition, such services have further disadvantages.

Systematic analysis of the liner wear condition is difficult because measurements are taken too seldom and cause-related measurements are not possible. Furthermore, hourly rates and travel by specialists with equipment are costly.

Here the Horn-CLDM is the better solution. This measuring tool is based on Horn's highly accurate and robust distance sensors based on the eddy current principle. Thousands of these sensors have proven their reliability for many years in the well-known Horn bearing monitoring system for two-stroke diesel engines. Mounted in the engine housing, they are constantly exposed to high temperatures, vibrations and lubricating oil.

The Horn-CLDM has a bore-specific calibration and is specifically designed for ease of use by the crew. It allows the engineering personnel to measure the wear of two-stroke liners themselves at any time, independently from shore service and without removing the cylinder head. The device is placed through the scavenging air ports on the piston crown in bottom dead centre. The two sensors are then moved close to the cylinder surface by turning the engine. Diameter data is continuously recorded in forward – aft and port – starboard directions.

The recorded data is automatically analysed and a report is generated by the supplied software. This report is available as a pdf file and can easily be sent or stored on board. Rechargeable batteries provide over ten hours of continuous operation. A history chart allows trends to be identified and action to be taken.

The effect of a parameter variation on the engine operation can be checked in good time and unexpected cylinder-specific deviations can also be detected at an early stage. In addition to these benefits the Horn-CLDM cuts costs and has a payback period of less than 18 months, as no land-based service is required and the condition of the liners can now be determined at any time independently.

Characteristics of the HORN CLDM

- Available for bore size: 350 mm – 980 mm
- Accuracy: About 10 µm
- Operating temperature: 40 – 80 °C
- Ingress Protection Rating: IP65

ABOUT DR. E. HORN GMBH & CO KG

Dr. E. Horn GmbH & Co KG is a leading manufacturer of sensors, displays and safety systems, especially for monitoring medium and large engines and drive systems. www.dr-horn.org

Source: Rittal

For the first time, Rittal now includes DNV-tested cooling units for maritime applications in its product portfolio under the name Blue e+ Dynamic. In addition to the usual EMC compatibility testing for ships, the units' vibration resistance and safe operation when tilted were tested.

Cooling units for maritime applications

RITTAL When seas are rough, ship passengers often become ill – but shipboard technology suffers, too. Wave motion and, above all, vibrations from a ship's engine can cause serious problems for systems and components – they may, quite literally, fall apart. That is why Rittal has further developed its Blue e+ range of cooling units for maritime applications and made them seaworthy. The units were thoroughly tested at Phoenix Testlab GmbH according to DNV guidelines. This also makes them an attractive option for dynamic applications on land.

A mere glimpse into the engine room shows that space on a ship is at a premium and there is little room for new technology. Even so, new systems sometimes need to be installed there and that can mean retrofitting equipment, such as scrubbers – the exhaust gas cleaning systems that stricter environmental legislation now calls for.

Once installed, the equipment has a lot to contend with – vibrations from the diesel engine, motions due to the swell of the sea, heat and damp conditions. These all put a huge amount of stress on the electronics.

The issues also affect the cooling units for enclosure climate control, as Ralf Schneider, head of Solution Sales Cooling at Rittal, explained. "Vibrations cause cooling compressors and other heavy components installed in cooling units to start vibrating violently – and before long, coolant lines are torn out and mountings are destroyed," he said. The reason for this is that cooling units are normally developed for static applications rather than dynamic ones.

"Compressors installed in a conventional configuration with vibration damping so they don't disrupt sensitive equipment such as the spindles of machine tools in industrial operations can have the opposite effect at sea. They can really 'shake things up' and cause a whole load of other problems," Schneider explained.

Testing and certification

To offer cooling solutions to the growth market of ship outfitting, too, Rittal decided to focus on further develop of its Blue e+ range of cooling units for dynamic applications and have them tested and certified for maritime use. Schneider described the process involved.

"We'd already had shipping approval for our AX and VX25 enclosures and the Ri4Power power distribution system for some years, but we didn't have it for our cooling units. However, one of our customers wanted to have their complete systems certified, including our cooling units," he said. Making cooling units seaworthy and getting the associated certification is anything but trivial. There are a number of large classification societies – and shipowners and outfitters have different preferences, depending on the sector involved. Moreover, each supplier has developed different certificates, depending on whether a piece of equipment is to be used on the bridge, in the engine room or on deck. Rittal opted for certification by classification society DNV.

The certificate covers tests involving vibrations, climatic fluctuations, and inclination. It also includes EMC (electromagnetic compatibility) emissions testing – both the radiation of emissions and immunity to them.

To make the cooling units seaworthy, the Rittal developers started by strengthening the mountings for the components, such as the compressor, and the connections for the pipework. And they also changed the layout of the pipework in the unit. To ensure that the design changes would comply with requirements, Rittal initially tested the units in its QA lab. This is where pre-compliance tests reflecting the technical requirements for certi-

fication are carried out for specific cases such as shipping classification.

Rittal then commissioned the independent Phoenix Testlab in Blomberg to carry out the final DNV tests. Lars Diedrichs and his team are responsible for environmental testing at Phoenix Testlab.

"To test vibration resistance, we first conducted a sine sweep test through a defined range of frequencies. This enabled us to see whether resonances occur. Next, we carried out a broadband random vibration test across the entire frequency range. The test piece was vibrated for 2.5 hours in each spatial axis, i.e. for 7.5 hours in total," he explained. After the vibration test, the test pieces were put in the climate chamber and subjected to a number of temperature cycles, sometimes with high air humidity, too.

For "dynamic" applications

Next, the inclination test, i.e., the ship's movement, was simulated. And then the final stage of testing was EMC measurements, including both EMC emissions and EMC immunity. It initially came as a surprise to discover that EMC requirements in shipping are significantly stricter than in industry. The reason for this is that radio communications on ships are a top priority.

As Diedrichs pointed out: "A ship is a self-contained system. There's not much room on the cable trays and you don't get the same clean electrical isolation as you do in an industrial system, so the requirements are much stricter." Units in the 1.0, 1.6, 2.0 and 2.6-kW output classes were tested. Volume production of these DNV-tested units – the Blue e+ Dynamic range – started in early 2025.

Besides the enhanced reliability, cooling units offer a big cost benefit. Although the units cost more than the standard versions, they are much cheaper than alternatives such as air/water heat exchangers. These options would require pipework retrofitting, with all the outlay that entails," Schneider said.

There are other possible applications, too. "Dynamic loads don't just occur on ships. I'm thinking of crane systems, where an enclosure also travels on the crane trolley. We've also already received requests for an airport baggage handling system. Although a normal cooling unit can generally withstand these conditions, there's still a chance it might not. But a unit that has coped with the tough DNV tests won't have any problems in that kind of environment."

› ABOUT RITTAL

Rittal is a leading global supplier of enclosure systems, automation and infrastructure with its industrial, IT, energy and power, cooling and service units. Rittal, Rittal Software Systems (Eplan, Cideon) and Rittal Automation Systems (RAS, Ehrt, Alfra) combine their hardware and software expertise to streamline, optimise and digitalise processes across the entire value chain for our customers including their IT infrastructure – from control and switchgear construction, machine building and the energy sector to the maritime industry. www.rittal.com

Maritime lighting that meets every demand

WISKA | Whether floodlights which stay cool and navigate brighter, multipurpose luminaires that make everyday life easier, lighting that has been developed for use in hazardous areas or searchlights with precision and power – when it comes to maritime lighting, the products from Wiska are versatile and can be installed above and below deck.

Its latest lighting design novelty is a light-emitting diode (LED) searchlight. This searchlight exemplifies a commitment to high-end quality, performance, and durability, addressing the growing demand for modern LED lighting in the maritime sector.

Its casing adds a new development to the familiar Wiska octagonal design. The light intensity reaches 2 x 1,700,000 cd in searchlight mode, with a luminous flux of 2 x 8,000 lm for the searchlight and 2 x 18,000 lm for the floodlight, ensuring unparalleled illumination. The Wiska LED searchlight is complemented by an advanced remote-control unit designed to maximise functionality and ease of use.

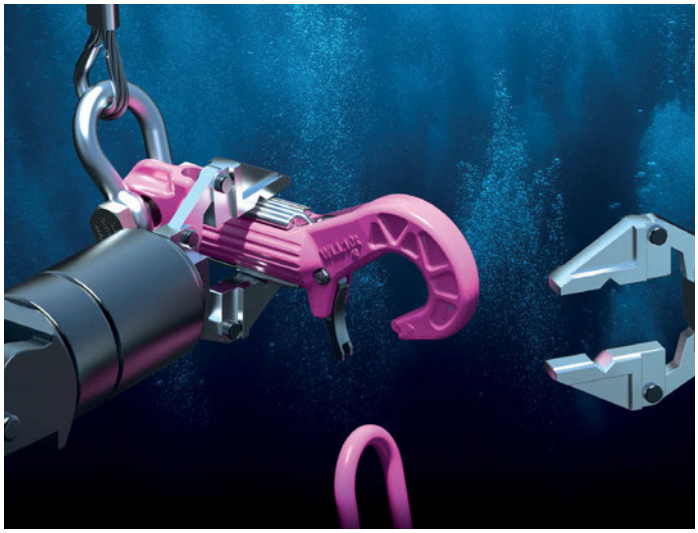
Another highlight is the LED Floodlight 5010 High Lumen Output. This powerful LED floodlight has a high lumen output, providing exceptional brightness and power that ensures clear visibility even in the darkest and most challenging conditions. Available in both 1 x 220 W and 2 x 220 W configurations (440 W total), the floodlight offers flexible power options to meet specific lighting needs.

With a remarkable lifespan of 100,000 hours, the LED Floodlight 5010 offers long-lasting performance that significantly reduces maintenance and operational costs. The floodlight is equipped with a separate ballast unit with DALI D4i standard which improves the energy efficiency and longevity of the floodlight system while offering a safe and easily accessible maintenance option.

The Wiska LED searchlight Source: Wiska

› ABOUT WISKA

Founded in Hamburg in 1919, Wiska is one of the leading manufacturers of electrical equipment, lighting products and CCTV video surveillance for electrical trade, industry and shipbuilding. The company operates its own research and development facilities and production plants adjacent to its German headquarters. Its global sales network of representatives and subsidiaries ensure a quick and personal onsite customer service for you. The Wiska Group today employs over 320 people worldwide. www.wiska.com



The lever mechanism of the ROV-Hook (left) is designed in such a way that its locking mechanism cannot be opened by one-sided impacts or blows. Instead, the hook can only be released by operating two levers in parallel, either by hand or, below water, by the ROV manipulator (right).

Source for both images: RUD

Special hook optimises lifting and positioning via ROV

RUD KETTEN A hook system for maritime applications that virtually eliminates load snagging and load shedding underwater and can be easily and quickly attached and detached via a remotely operated vehicle (ROV) is called the Rud ROV-Hook. Developed in close collaboration with underwater installation specialist Subsea 7, the hook is already being used in a wide range of applications.

The submarine movement of loads is one of the most demanding tasks in lifting technology. Subsea lifting and positioning operations are a technical challenge due to poor visibility, strong waves and unpredictable currents, as well as difficult terrain profiles, high water pressure at great depths and the difficulty of controlling loads due to buoyancy.

In order to lay pipelines and submarine cables, foundations for drilling platforms and offshore wind turbines, or salvage wreckage and sunken cargo economically, these extremely material- and manpower-intensive operations must be completed as quickly as possible. However, it is all too easy for this economic requirement to conflict with the technical need for safe lifting and positioning.

If the necessary care is not taken because of time pressure, valuable goods can be damaged or even irretrievably lost in the darkness of the deep sea. The economic loss may then be even greater than the economic benefit that would have been achieved by the desired time gain.

Fast and safe lifting has been limited until now

For their lifting and positioning operations, contractors specialising in offshore construction are therefore dependent on technologies that can ensure fast and safe subsea movement of loads. This also applies to the lashing method and in particular the hooks to which the loads are normally attached.

These hooks are often attached and detached manually above water, but under water by the manipulator of an ROV. However, experience has shown that there are always two critical moments when using them.

One of these is the submarine handling of the hook by the ROV, which is relatively cumbersome because many conventional hooks can cause considerable loss of time. Ultimately, these time losses can add up to such an extent that they threaten the cost-effectiveness of the operation. Having hooks that are easy to use anywhere, any time – even where there is no natural light and where underwater lights are required – is what many contractors prefer.

Load snagging and load shedding are the biggest risk factors

The second, and often more problematic, moment of hook release regularly occurs during the underwater movement of the load. If the hook comes into contact with other underwater objects – such as foundation structures, parts of buildings or wrecks, or even natural rock formations – a conventional hook may get caught on the object or open unintentionally as a result of contact. In the former case, the load movement is at least interrupted; in the latter case, the load may even be shed, resulting in total loss.

Occasionally, both can be seen in combination – when the hook first gets stuck, then tilts as a result of lost lifting rope tension, and finally opens by hitting the ground or other objects. Contractors who are regu-

larly involved in submarine lifting and positioning operations are well aware of these load snagging and load shedding phenomena. As a result, many of them have long been looking for hooks that minimise both risk factors and allow reliable and efficient handling by an ROV.

Special hooks overcome common deficits

With this in mind, Rud, a German specialist in lifting and lashing equipment, has worked closely with the British underwater installation specialist Subsea 7 to develop a hook that almost completely eliminates snagging and shedding and can be easily and quickly attached and detached via a ROV. Consistently rounded and designed without protruding parts, the Rud ROV-Hook minimises the risk of snagging on other objects, thereby ensuring the most continuous underwater movement possible.

More importantly, the design prevents the hook from opening accidentally: the hook's safety latch is firmly locked when closed and only opens outwards, preventing it from being pushed in even by a strong external force. In addition, a double safety catch on the lever side prevents the locking mechanism from being unlocked by touching the side of the lever mechanism.

The Rud ROV-Hook can only be unlocked by simultaneously squeezing two opposing release levers – either by hand or, under water, by the ROV manipulator. When the levers are released again, the safety latch closes automatically.

All common submarine applications covered

With a manipulator-friendly design for optimum grip, the ROV-Hook minimises the time required for submarine attachment and detachment, enabling safe lifting and positioning even under great time pressure. The hook, which can be used with all standard ROV manipulators including the 'grabber', is available in two versions with a maximum working load limit (WLL) of 10 or 25 tonnes and can be used without restriction at depths of several thousand metres. It can withstand ambient temperatures ranging from -20°C to +200°C and has a fourfold safety against breakage, ie., it can withstand four times the officially specified maximum load in extreme cases.

These features enable the ROV-Hook to cover all common subsea applications, providing a safe and effective system for lifting and positioning operations on a wide front. Users also benefit from the hook's integration into the Rud Digital World. Each ROV-Hook is equipped as standard with an RFID transponder with an individual identification number. By reading this number via the NFC function or the Rud BUDDYtron app, product information such as labelling, WLL, or operating instructions can be viewed directly in the field. In addition, the individual identification number can be used to manage test results conveniently.

Already used in numerous areas today

The ROV-Hook is already used in a wide range of applications. While development partner Subsea 7 uses the hook primarily for subsea pipeline construction, many major ROV operators and subsea exploration specialists are using it worldwide in a range of applications.

It can be used, for example, to position long baseline transponder frames for high-precision surveying and in the construction of underwater foundations for drilling platforms. It can also be used for laying foundations for offshore wind turbines or laying submarine cables, as well as for salvage operations or scientific testing.

In all these fields of application, the ROV-Hook ensures safe lifting and positioning, saves time by straightforward attachment and detachment, and improves safety and process efficiency. In doing so, it makes a significant contribution to the cost-effectiveness of the application, while proactively resolving the potential conflict between time pressure and technical safety requirements.

› ABOUT RUD KETTEN RIEGER & DIETZ GMBH U. CO. KG

Rud Ketten Rieger & Dietz GmbH u. Co. KG, founded in 1875 by Carl Rieger and Friedrich Dietz in the Swabian city of Aalen, has more than 1,700 employees in more than 120 countries generating an annual turnover of over EUR 250 million. At locations, among others in Germany, Australia, Brazil, China, India, Romania and the US, the family business, alongside lifting technology, also manufactures lashing technology and anti-skid chains, as well as hoisting chains and conveyor systems. The company's Erlau brand also manufactures tyre protection chains and property furnishings for indoor and outdoor areas. www.rud.com

Rotary cup burners promote environmentally friendly shipping

SAACKE methanol burner in use – a step towards climate neutrality in shipping
Source: SAACKE GmbH

SAACKE GMBH | A specialist in industrial firing technologies, Bremen-based SAACKE GmbH is further expanding its market share in the shipping industry. This success is based on the technological development of the SKVJG-M and ROTONOX rotary atomiser burner series, which have proved to be powerful systems for the use of methanol as a marine fuel.

Due to the low flashpoint of methanol, special technical requirements apply to its use on board ships, which are regulated by the IGF Code. The SKVJG-M DLF and ROTONOX rotary atomising burners fully meet these requirements and offer a firing capacity of up to ten tonnes of steam per hour. For higher capacity requirements, the proven DDZ pressure atomising technology is suitable.

A key advantage of the new burner series is the flexible installation position: in addition to the classic lateral mounting, a top-fired installation is now also possible. In addition, SAACKE supplies safety-relevant methanol valve units (MVU) and switchgears for burner and boiler control for every ship. These valve units are designed to be housed in separate, force-ventilated enclosures that are equipped with gas detectors and exhaust fans. This ensures safe handling of the methanol.

The new SAACKE burner systems also offer various operating modes. They can be operated not only with pure methanol (MeOH), but also with marine gas oil (MGO) or low-sulphur heavy fuel oil (LSHFO). Changing between these fuels is easily carried out by stopping the burner.

The burner systems have been thoroughly tested in a test firing system and have convinced, among others, the Jinling Shipyard (Yangzhou) Dingheng Co. in their latest tanker orders. The burners can be installed on both thermal oil heaters and steam boiler systems.

Thanks to optimised design, use in small boilers with a firing capacity below 1 MW is now possible. This means that SAACKE covers a wide power range and also offers suitable installations for smaller ships.

For safe and efficient control, SAACKE relies on a failsafe PLC system. This works as a stand-alone control unit that can be integrated into existing automation systems. In addition, online diagnostics enable early fault detection and optimise maintenance.

The electronic compound control also enables safe, efficient and low-emission operation with various fuels such as MGO, HFO, HVO and methanol. It meets the requirements of the International Association of Classification Societies (IACS) and integrates a modern monitoring and analysis unit based on a Siemens system.

In addition, SAACKE provides a Remote Diagnostic Service (RDS) that enables remote monitoring, analysis and parameterisation of the firing systems. This contributes to operational reliability and allows for quick remote troubleshooting.

The importance of low-emission propulsion concepts for shipping continues to increase. To achieve the climate targets of the International Maritime Organization (IMO), which aim to make shipping climate-neutral by or around 2050, alternative fuels such as green methanol are a promising option.

“Our technology is IMO-compliant and meets the highest safety standards. All electrical components of the methanol firing system are explosion-proof,” said Dennis Lühr, Director Global Sales & Boiler Repairs at SAACKE.

SAACKE has extensive and long-standing experience in handling alternative and green fuels, including bio-oil, fish oil, methanol (MeOH), biomethane, ethane, LPG, hydrogen and ammonia (NH_3). Since the early 1990s, the company has been supplying not only boiler systems for all common fuels but also burners for methanol marine systems, and will continue to provide technological solutions for more environmentally friendly marine propulsion systems in the future.

› ABOUT SAACKE GMBH

SAACKE GmbH is one of the world market leaders in combustion technologies for industrial and maritime applications. The medium-sized family-owned company was founded in 1931 and employs a total of around 1,100 people, including more than 400 engineers and technicians. It has production sites in Germany, Croatia, China and Argentina, as well as a worldwide service and sales network. The headquarters and research and development division are located in Bremen. www.saacke.com

Ongoing innovation in ballast water management

ALFA LAVAL | PureBallast 3 Ultra, a significant development in Alfa Laval PureBallast 3 technology, was launched in June 2024. The new ballast water management system (BWMS) delivers outstanding performance, energy efficiency, and streamlined installation, making it a preferred choice for many newbuild vessels. "PureBallast 3 Ultra showcases Alfa Laval's dedication to innovation in ballast water treatment, with a focus on energy efficiency, digital integration, and environmental protection," said Tobias Döscher, Head of Global Sales, Business Development, and Marketing, Alfa Laval PureBallast. "The system not only meets the current demands of maritime regulations but also prepares for future challenges, ensuring that our customers are well-equipped for tomorrow's needs."

Enhanced capabilities in demanding conditions

With tightening environmental regulations in the maritime industry, PureBallast 3 Ultra is engineered to handle challenging water quality conditions and has unmatched biological disinfection performance in any type of water: fresh, brackish or marine, including water at sub-zero temperatures. The system's innovative filter design effectively reduces the risk of clogging and enhances operational reliability. Improved backflushing capabilities, powered by an upgraded gear motor, ensure consistent system maintenance, even in demanding water conditions.

Additionally, the optimised UV reactor sizes contribute to a reduction in power usage by up to 19%, supporting Alfa Laval's commitment to sustainable maritime operations. Remarkably, the system operates at just 50% of its potential operating power in many conditions yet can ramp up to full power when needed to maintain effective treatment in more challenging waters.

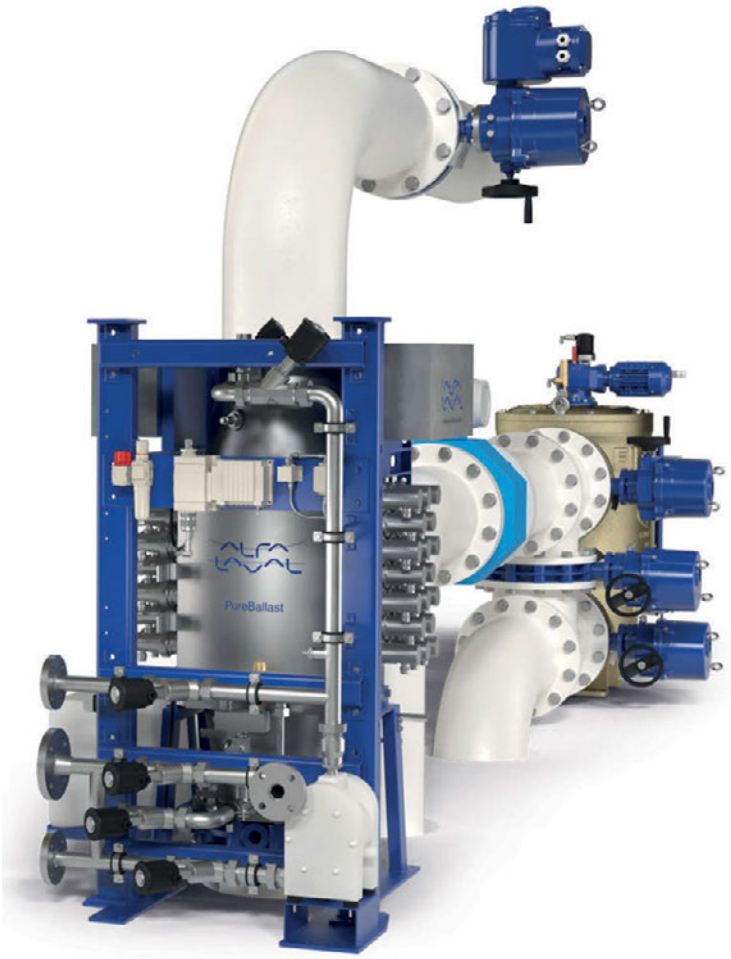
Easy installation and comprehensive global support

Designed to overcome the space and time constraints typical in shipbuilding, the PureBallast 3 Ultra system is straightforward to install. Its compact and integrated design, including the Cleaning-In-Place (CIP) unit and pressure monitoring device within the UV reactor module, greatly reduces the installation footprint and complexity. Moreover, Alfa Laval's global support network offers accessible, expert assistance to ensure smooth operations and maintenance globally.

As the maritime industry focuses more on stringent BWMS compliance – especially with the upcoming concentrated inspection campaign (CIC) in September 2025 – vessel operators need reliable support to meet all regulatory standards. Alfa Laval stands as a steadfast partner throughout the vessel's lifecycle, providing not only technology but also comprehensive support and knowledge.

Advances in digitalisation and remote monitoring

In line with digital transformation trends in the industry, PureBallast 3 Ultra is equipped with a field gateway that facilitates connectivity, ready for integration with the PureBallast Connect platform. Alfa Laval PureBallast Connect is a secure digital service portal that provides crucial information from Alfa Laval PureBallast systems, accessible anytime, anywhere. The remote access to BWMS data allows operators to enhance uptime, streamline operational workload, and improve fleet performance.

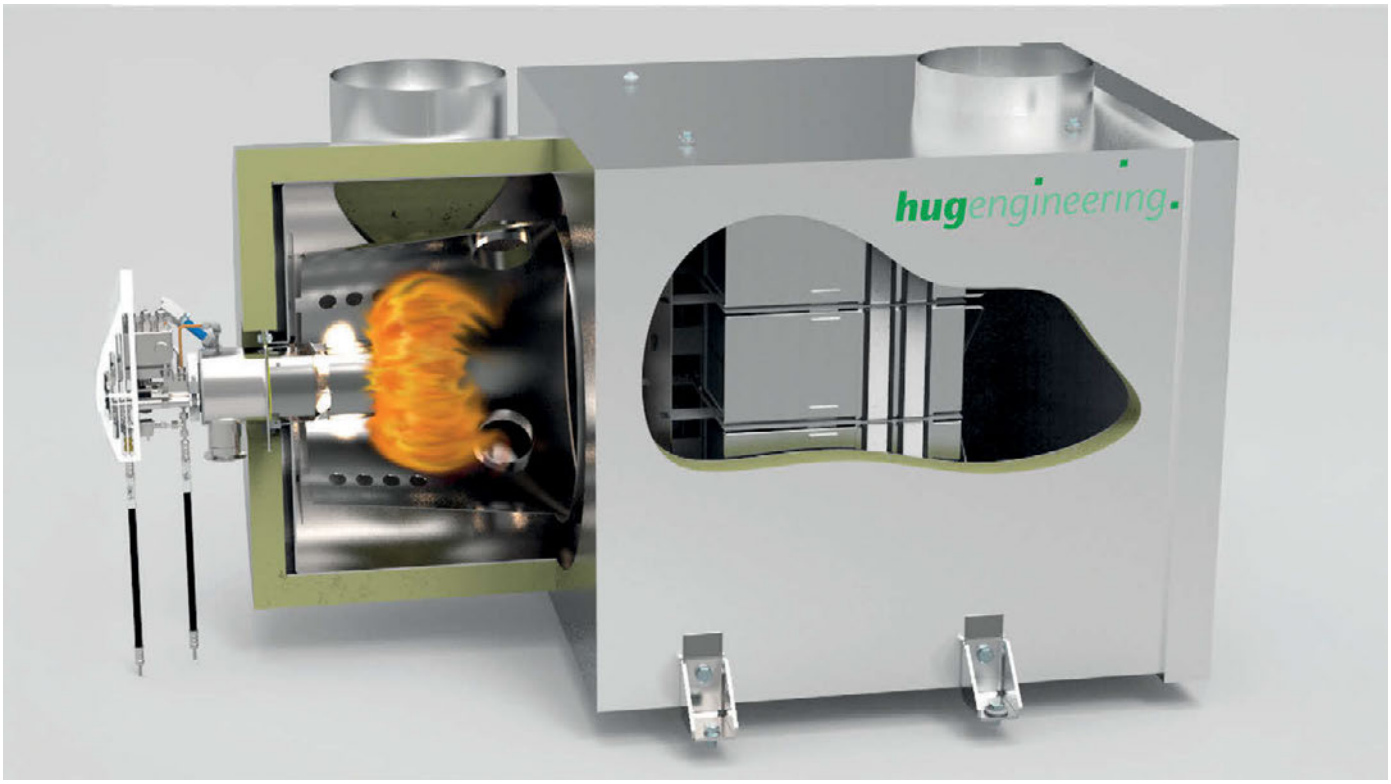


Alfa Laval PureBallast 3 Ultra ensures cleaner, safer ballast water for a sustainable future Source: Alfa Laval

"Reflecting on the past year, PureBallast 3 Ultra is at the forefront of the ballast water management sector," said Döscher. "Our commitment to continuous innovation and customer support redefines industry standards and ensures we are a dependable partner for the long haul."

› ABOUT ALFA LAVAL

Alfa Laval is dedicated to maximising resources and innovating essential industries with its customers, aiming to provide energy, food, and clean water while decarbonising the marine fleet. Founded 140 years ago, the company operates in 100 countries, employs over 22,300 people, and reported annual sales of SEK 66.9 billion (EUR 5.8 billion) in 2024. www.alfalaval.com/marine



Actively regenerating particle filter system for ultra-low particle emissions independent of the engine fuel type and operation profile – available for high- and medium speed engines

Source for both images: Hug Engineering

Ultra-low emission vessel technology

HUG ENGINEERING | Marine operations – even when using non-fossil fuels – can significantly impact air quality and human health, especially in coastal areas. While onshore emission regulations for combustion engines advanced steadily over the past decades, international marine emission regulations are progressing at a slower pace.

As of today, nitrogen oxide (NOx) emissions are covered by International Maritime Organization (IMO) regulations IMO Tier III and IMO Tier II for Environmental Control Areas (ECAs) and outside, respectively. However, in comparison with onshore regulations, the allowed NOx emissions are still higher; for other exhaust pollutants there are currently no requirements at all. Due to the health and climate impact of soot, the IMO is also now focusing efforts on defining future emission regulation for black carbon (BC).

Local shipping emission regulations in Europe introduced comprehensive pollutant regulation in EU Stage V. Besides NOx and other gaseous pollutants, particle mass and particle number emissions were defined: for large engines these strict limits require the installation of a particle filter – independent of the fuel.

Recently, marine applications exempted from EU Stage V requirements have been gaining attention in achieving these ultra-low emission levels. The development is driven by customers' demand for reduced emissions, particularly for passenger and workboat applications. Classification societies consequently introduced voluntary ultra-low emission notations to confirm the accomplishment of such state-of-the-art emission performance. Hug Engineering launched exhaust particle filter systems for marine applications in 2005. Luxury yachts were the first applications to see environmental, health and comfort benefits when installing particle filter systems on board – today these vessels are never built without particle filters.

Half a decade ago, Hug Engineering provided an aftertreatment system for the first medium-speed engine certification according to EU Stage V. The result is that engines running in heavy duty industrial work vessel applications now have the possibility to transfer from burning residual heavy fuel oil generating emissions of related toxins, to onshore best available technology emission control performance levels. Such ultra-low emission systems can also be combined with advanced sound abatement technology integrated into the exhaust aftertreatment system, realising not only reduced air but also low sound emissions.

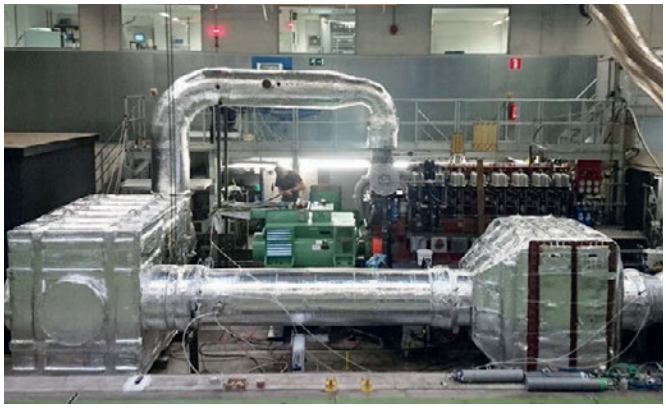
The particle filter removal efficiency defined for particle number or black carbon emissions is certified to be >97%, thereby clearly eliminating any visible soot smoke. The particle filter systems have not only been installed for fossil distillate-fuelled engines, but also for biodiesel as well as for LNG, methanol and even hydrogen dual-fuel engines. Hence, the systems are future fuel-proof, but also the use of traditional marine distillate fuels with up to 0.5 % sulphur content is possible to ensure fuel flexibility.

Installation of an advanced NOx removal system based on selective catalytic reduction (SCR) technology also provides the possibility to optimise engine tuning. Due to the fundamental NOx-efficiency trade off, engines can be set for minimum fuel consumption, while the higher NOx raw emissions are dealt with by the SCR system. In consequence, engines with low fuel consumption and unprecedented low emissions are now possible.

One of the strengths of Hug Engineering is the possibility to work with any engine provider. The systems are not restricted to newbuild projects, but include retrofit projects for operators who would like to take advantage of being acknowledged for improvements in terms of emission profiles.

Integration of exhaust gas aftertreatment equipment into existing vessels can be challenging, but the modular arrangement of the functional components in the product portfolio in combination with various reactor shapes has proved successful in retrofit projects. Support by Hug Engineering doesn't stop with hardware delivery. Due to the company's international footprint, support is ensured from certification over maintenance to upgrading during the entire vessel and system lifetime.

While the future of large engines in marine applications is certain, the fuels will change in the future. However, even bio- and synthetic fuels will produce exhaust emissions from the combustion process. But advanced exhaust gas aftertreatment technologies will ensure that emissions are reduced to ultra-low levels for the benefit of the environment and health.



Combined particle filter and SCR system for ultra-low emission vessels, certified according to EU Stage V for medium-speed engines

› ABOUT HUG ENGINEERING:

Hug Engineering has been a leading global supplier of low-emission solutions for more than 40 years, producing emission control systems for large engines used in mobile (yacht, workboat, rail) and stationary (power generation, data centre, greenhouse) applications. As one of the few manufacturers in the world, Hug Engineering develops, designs and produces all key components in-house and is setting new benchmarks in the area of exhaust gas aftertreatment. www.hug-engineering.com

Class acceptance test of shipbuilding valves

HEROSE | Classification acceptance tests are well prepared and conducted at HEROSE. No valve leaves the factory untested. The classification societies demand additional tests in the presence of an inspector. The inspector 's class approval confirms the proper function and safety of the component.

Twenty-four stability and cryogenic tests in two days

Nadine Schlichting organised the class approval in September 2024. All documentation for the valves to be tested had to be available and interlinked. Also the valves themselves had to be assembled in good time and then be available for Class approval in the approval area and in the HEROSE test facility. A certain inspection lot of the complete order was presented to the classification society in consultation with the customer.

For each test, Schlichting was provided with the requirements for the material and the test, and then assigned the acceptance numbers. Altogether 24 tests were prepared for the two days. She also ensured that test reports concerning dye penetration, X-ray and ultrasonic tests were available.

Tested technology for a standardised testing process

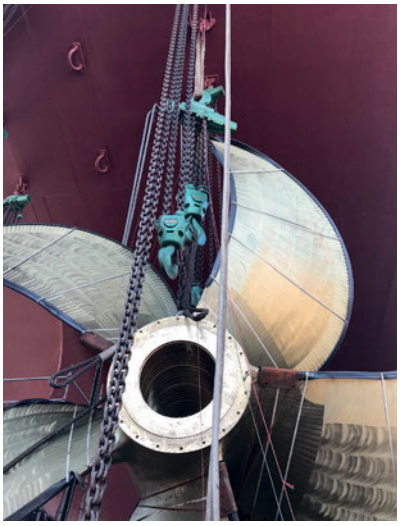
In the test field at HEROSE, Timo Konrad and Daniel Obaseki connected the first three test specimens to the testing device and used liquid nitrogen to cool them down to minus 196 °C in the tanks. In the case of the big DN 150 valve, which weighs around 250 kg with the test device, the cooling down process started at 6.00 am. It takes time for the entire valve body to cool down. This is quicker with the smaller models.

The valves to be tested are put into a device with a defined torque. Helium is used as the test medium. The valve is then tested in a cryogenic environment over defined time intervals. A fitted actuator is shielded in such a way that it is not affected by the cryogenic nitrogen and remains functional. Once the test is complete, the test object is brought back to ambient temperature.

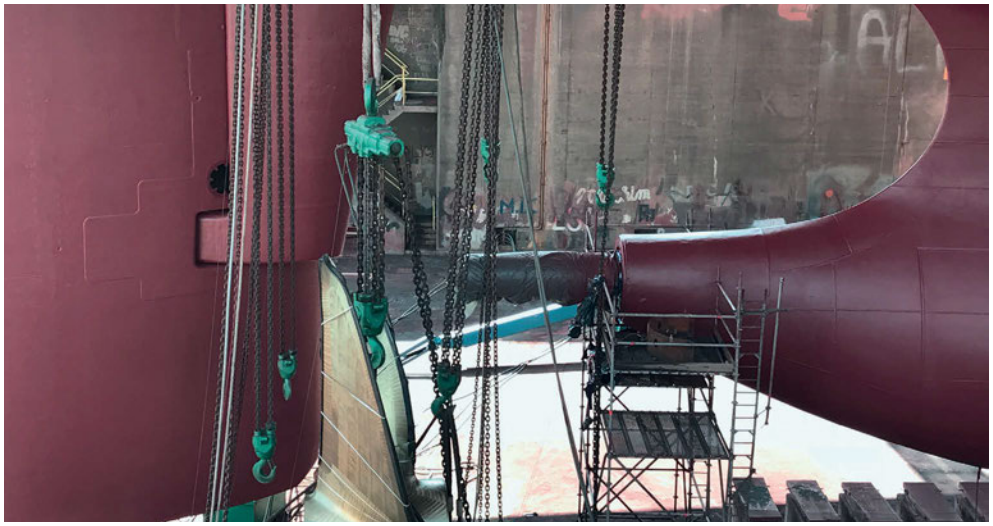
Inspector Adinan Isacai from classification society RINA attended the recent testing process. The valves that were being tested are part of a delivery for two ships that will be powered by LNG: a vehicle and passenger ferry that will be built in Italy, and a cruise ship that will be built at Meyer Werft in Papenburg. After the successful class inspection, all valves and fittings receive the stamp of the classification society through the inspector's marking stamp.

› ABOUT HEROSE

HEROSE ensures safety in the handling of technical gases, vapours and liquids. No less than 150 years of experience in the development, manufacture and distribution of valves with a high degree of innovation as well as modern production with certified quality management make the company one of the world's leading manufacturers and suppliers of valves and safety valves for cryogenic technology, for small-scale LNG applications and safety valves as well as DIN EN standard valves for general industrial applications. HEROSE supplies its innovative and durable products to more than 80 countries. www.herose.com



Ship propeller installation with JDN hoists in drydock



Final positioning of the ship propeller, assisted by the precise and sensitive control of JDN hoists

Source for both images: J.D. Neuhaus

Reliable and efficient lifting systems for the shipbuilding and maritime industry

J.D. NEUHAUS | Building, repairing and maintaining vessels in shipyards around the world take place in challenging environments, where lifting heavy and complex components must be carried out within confined, often corrosive spaces. At the same time, shipbuilders must adhere to strict safety regulations and tight project schedules. To ensure precise load-handling and maintain high efficiency, reliable lifting tools are essential.

Lifting equipment as key factor in shipyard operations

Lifting technology is indispensable for shipbuilding and maintenance, enabling the efficient execution of essential tasks. One of the most critical applications is the assembly and disassembly of ship components. Whether handling propellers, rudder blades, or entire engine rooms, shipyards require highly flexible lifting tools that allow precise positioning of extremely heavy loads, often in restricted spaces.

Similarly, transporting hatch covers and other heavy metal components demands specialised lifting devices that enable quick and safe movement. Another key challenge is the construction and extension of ships, where large hull sections must be lifted, joined together, or further processed. These tasks require lifting equipment that combines strength, precision, and reliability.

To meet the high demands of the shipbuilding and maritime industry, J.D. Neuhaus (JDN) offers state-of-the-art pneumatic lifting equipment that provides reliable, safe, and efficient lifting operations. These systems are fully CE-certified, ensuring compliance with all relevant safety regulations.

Their robust construction allows for continuous operation in the toughest conditions while guaranteeing high durability and reliability. Designed for maximum precision, the company's pneumatic hoists enable shipyards to lift and position even the heaviest components, such as hull sections, propulsion systems, and engines, in confined spaces within millimetre accuracy.

A key advantage of JDN's lifting technology is its modular design, which allows for quick replacement of parts without disrupting ongoing work. This is particularly important in environments where continuous operation is required. By utilising advanced pneumatic hoists from J.D. Neuhaus, shipyards can significantly reduce the time needed for lifting operations while maintaining the highest level of workplace safety.

The ability to move heavy loads with efficiency and precision makes JDN systems a preferred choice for shipyard and shipboard applications. Their reliability, operational efficiency, and compliance with safety standards help shipbuilding companies enhance productivity, reduce costs, and improve overall safety – ensuring long-term success in this highly demanding industry.

› ABOUT J.D. NEUHAUS

The J.D. Neuhaus Group, founded in 1745 and headquartered in Witten, Germany, is a global leader in pneumatic and hydraulic hoists, cranes, and system solutions, serving customers across 90 countries and 70 industries. With a focus on innovation, sustainability, and digitalisation, the company offers high-quality products tailored to various sectors, including shipyards and maritime. J.D. Neuhaus operates with a strong commitment to sustainability, using green energy in production and striving for minimal resource consumption, while maintaining a legacy of excellence and a customer-centric approach in all its operations.

https://www.jdngroup.com

The healing power of pain

HYDAC FILTERTECHNIK | The holistic "Innocycle Technology" concept from HYDAC Filtertechnik addresses conserving resources and extending the service lives of hydraulic media and components.

Dr Timo Lang is a realist and a good observer. When the head of Technology and Application Development at HYDAC talks about "learning from the customer's pain", he also knows how important it is to consider the "healing" effect of possible negative changes.

"You just have to listen carefully to understand it. It's not uncommon for customers to come to us because they have a problem; a machine isn't working, they're getting downtimes instead of performance and batch numbers, and maintenance costs are rising and rising", Dr Lang said. "It is helpful to give a precise diagnosis of the causes of the pain and to work with the customer to develop a holistic treatment."

Customer pain can be as varied as their specific fields of application. "When it comes to resource consumption, costs and sustainability in mobile construction machinery, for example, tanks that are too large are increasingly giving customers headaches," explained Lang. "And when it comes to the important topic of oil, it's all about monitoring its quality, service lives and the best possible filtration. It can quickly become a problem child if you're not careful."

He refers to three examples that repeatedly raise questions:

› During filtration, the existing pressure is normally reduced and must be restored after filtration, which is energy-intensive. How can the pressure difference be reduced as much as possible, i.e. the pressure be kept higher?

› Oil has a low conductivity. In conventional filters which use glass fibres it is practically non-existent. As a result, the oil flowing through them increases the electrostatic charge and sometimes even triggers flying sparks and fire hazards. How can these dangers be prevented?

› When it comes to problems with machines, even manufacturers' experts sometimes reach their limits. Not everyone can be a specialist in everything – so whose reliable expertise does the expert trust?

There are many issues that can become a problem. The holistic "Innocycle Technology" concept from HYDAC Filtertechnik addresses these issues. Innocycle Technology contributes to improving sustainability: on the one hand, the focus is on conserving resources; and on the other hand it is on extending the services lives of hydraulic media and components.

"When it comes to tank space optimisation, our motto is: as few resources as necessary – as long a service life as possible," said Lang. The smaller the tank, the lower the weight, required oil quantity and costs.

This has practical advantages. Conserving resources and a longer service life help save costs and reduce the CO_2 footprint, and the potential savings for the materials and resources used can be as high as 80%, Lang explained.

The simulation tool, tank reduction unit, virtual fluid lab (VFL), and the fluid care portal (FCP) are the key, interlocking modules that make up Innocycle Technology. "Special installation space requirements and a strong focus on cost optimisation call for radical adjustments to the machine architecture", Lang added.

HYDAC's Sustainmicron is an innovative filter Source: Hydac

The Innocycle Technology begins with the simulation tool. It is an important basis for decision-making in terms of the tank design and the necessary filtration process. The Air-X technology developed for this purpose is characterised by high-quality filtration performance and additional active air separation and oil drying. This leads to the desired reduction in tank size, reduces the amount of hydraulic oil required and extends the service life.

"Monitoring the filter using our intelligent virtual fluid lab, a smart remaining service life sensor, is a further step. Whether it's monitoring possible system changes, analysing machine operation or indicating when a filter change is required – the VFL keeps an eye on everything," Dr Lang explained.

The Innocycle Technology circle would not be complete if it did not also include the offer of continuous oil analysis and online monitoring in the FCP. The aim here is to prevent premature oil replacement. Thanks to Innocycle Technology, clients have an overview of the overall oil condition and machine condition and can be offered the right technical recommendations/fluid maintenance solutions based on solid data.

› ABOUT HYDAC

Founded in Saarland in 1963 as "Gesellschaft für Hydraulikzubehör" (Company for Hydraulics Accessories) and run as a family company, HYDAC now has 50 international subsidiaries, roughly 500 sales and service partners, 14 product lines and more than 11,000 employees worldwide. www.hydac.com

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Advanced sealing system unveiled

FOUNDATIONS | A new advanced sealing system, IRIS, for Airtight Platforms has been launched by Jebel Ali-based Trelleborg Marine and Infrastructure. The seal has the potential to replace welded steel landing rings which are traditionally used in monopiles and transition pieces. The new alternative is significantly cheaper and will reduce wind farm foundation installation costs and, in the longer term, the levelised cost of energy generated at offshore wind farms.

Source: Trelleborg Marine & Infrastructure

A rendering of Trelleborg's newly launched sealing system, IRIS, installed in an airtight platform inside a monopile

IRIS' advantages include significant reductions in costs associated with primary steel, welding, and engineering, alongside lower maintenance, and operational expenses. Its streamlined design also advances ease of installation, saving both time and resources. In a statement, Trelleborg said that by addressing key cost and operational challenges, the company is aiming to support the rapid growth of the offshore wind sector while enabling developers to maximise their return on investment.

The company's business unit president, Richard Hepworth, said: "We recognise the challenges facing the offshore wind industry and are committed to driving its sustainable, long-term growth in every aspect while ensuring economic viability. Our new product exemplifies this commitment, providing a long-lasting and reliable solution without compromising on performance."

Hydrogen fuel 'a viable solution'

Following the completion of a one-year trial phase in 2024, partners FRS Windcat Offshore Logistics and 50Hertz Transmission have agreed to extend the trial-period of the CTV *Hydrocat 55* off the coast of Rügen for another year

HYDROCAT 55 | A successful twelve-month trial of hydrogen as fuel on the crew transfer vessel, *Hydrocat 55*, has been extended by partners FRS Windcat Offshore Logistics, an offshore logistics operator, and 50Hertz Transmission, an electricity grid operator. The vessel is Germany's first hydrogen-powered dual-fuel crew transfer vessel and will continue to operate with power from 50Hertz Transmission, serving various offshore wind farms in the German Baltic Sea. During its first year of logistics support for offshore substations, the vessel reduced carbon dioxide emissions by 18 tonnes as a result of operating on locally produced green hydrogen. The plan is to continue operations using the green fuel which is supplied in the port of Sassnitz-Mukran.

The *Hydrocat 55* propulsion system, developed by CMB.TECH, consists of an advanced dual-fuel hydrogen system. In the event that hydrogen fuel is not available, the vessel's engines can be switched over to diesel-only operation. However, the partners' aim is to use hydrogen as much as possible as the principal fuel, thereby reducing emissions in offshore logistics and support.

Tim Kunstmann, FRS Windcat Offshore Logistics managing director, commented: "We are very happy to extend our partnership with 50Hertz. The results of the one-year trial have demonstrated that hydrogen as a fuel is a viable solution for the offshore sector."

His colleague, Willem van der Wel, also a managing director of the company, emphasised the benefits of the project. "The *Hydrocat 55* proves that innovation and climate protection can go hand in hand without compromising performance and reliability. We thank 50Hertz for their trust in this innovative technology and their close cooperation."

FRS Windcat Offshore Logistics GmbH, a joint venture between FRS Offshore GmbH & Co KG and Windcat, has more than 20 years' experience between them in the offshore logistics sector and carry out a large and increasing number of weekly transfers. Project partner 50Hertz operates the grid in northern and eastern Germany and includes the federal states of Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt, Thuringia and the city states of Berlin and Hamburg.

Motion compensation

SUBSEA APPLICATIONS | Norwegian Subsea has released upgraded versions of its motion reference unit (MRU) technology specifically designed for sonar-based applications. The new system is based on the same technology that is used in wave radar and helideck monitoring, but the new technology now incorporates pitch and heave data, in addition to heading and velocity. It removes dependency on real-time kinematic (RTK) or global navigation satellite systems (GNSS).

The new MRU lineup was showcased at Ocean Business 2025 in April Source: Norwegian Subsea

Norwegian Subsea's calibration-free, maintenance-free MRU platform has been designed for 'plug-and-play' compatibility with sonar systems including multibeam echosounders, interferometric sonars, side-scan sonars, sub-bottom profilers, and forward-looking sonars.

Norwegian Subsea CEO, Fredrik Dukan, said: "With our updated MRU portfolio, we're offering marine surveyors and other subsea professionals the same proven performance our customers in wave radar and helideck monitoring have relied on for years, now optimised for demanding hydrographic surveys. It's the next logical step in our mission to make high-end motion compensation more accessible, robust, and reliable across the marine and offshore spectrum.

Immersion suit designed for women

PROTECTIVE EQUIPMENT | Viking Life-Saving Equipment has unveiled the first immersion suit designed for women working in offshore wind energy. The Viking YouSafe™ Cyclone is the latest addition to a range of personal protective equipment designed for the female form as the number of women employed as seafarers, pilots, and technicians in the marine and offshore industries continues to climb.

The female-fit immersion suit is made with the same materials and to the same CE/ISO standard as the male version. Common features include compatibility with standard offshore harnesses, durable neoprene cuffs and neck, retro-reflective piping for increased visibility in poor light or darkness, and a maintenance free zip.

The shape of the female suit has been designed for shorter torsos, different hip and chest proportions and a larger range of smaller sizes that avoid the risk of snagging on fixtures and fittings. Viking said that the design also offers a high level of comfort and enhances the safety of women when stepping or jumping on and off platforms, climbing towers, or moving around the nacelle. The suit includes integral braces holding suit pants for free leg movement when climbing and enables the top part to be taken off for extra freedom of movement.

The design comes after Viking's close dialogue with women working in the offshore wind industry. The company then tested prototypes in a day-long session with Ørsted, Siemens and Vestas in the UK.

Source: Viking

The female-fit YouSafe™ Cyclone CTV suit

Bettina Kjærgaard, Viking's global sales manager, Offshore Wind, commented: "Bringing Cyclone to market has been a joy because we have worked with customers whose competitive position did not stand in the way of our common goal to deliver a safety necessity and level the playing field for women working offshore. Their response in spreading the word has also been phenomenal."

Ørsted's senior HSE manager, PPE and TMSE, Lasse Hansen, said: "As a young industry, offshore wind offers a huge opportunity to change attitudes in the workplace, and to encourage the diversity, equity and inclusion women are entitled to expect. Ørsted has identified female-specific PPE as part of the critical infrastructure we need for women to work safely offshore today and a necessity to attract more of them into this industry. We were delighted to work with Viking as one of our key safety solution providers to take a significant step in the right direction."

Wave energy plant to become UK's largest

AGREEMENT | Sweden-based clean energy firm, CorPower Ocean, has signed an agreement to build a 5-MW wave energy plant at the European Marine Energy Centre (EMEC) in Orkney, Scotland. The project, which will have 14 wave energy converters (WECs) designed for 15 years of operation, will become the UK's largest wave energy facility when it comes on stream in 2029. It will be connected to the Scottish grid via EMEC's *Billia Croo* wave energy test site.

Source:CorePower Ocean

The wave energy converter features a 9m diameter spherical composite hull

The WECs consist of a 9m diameter composite spherical hull which drives the movement of the power take-off system from passing waves. CorPower Ocean's WaveSpring technology amplifies the motion and power capture in normal sea states, and has a built-in storm protection system that locks down in extreme conditions.

Scotland's deputy first minister, Kate Forbes, announced the project at a Glasgow energy conference. She told delegates: "With its abundant natural resources and unrivalled experience in marine renewables, Scotland is in a prime position for the development and deployment of tidal stream and wave energy to further add to Scotland's renewable energy mix … This new project will create skilled jobs in Orkney, support a developing supply chain while reinforcing Scotland's global leadership in marine renewables."

CorPower's head of Business Development, Anders Jansson, commented: "We are thrilled to be back at EMEC to build the first commercial wave farm. EMEC and Orkney offer significant know-how and an established supply chain, reducing risk and cost for the project. The UK's renewable auctions will be key in providing a route to market for the *Billia Croo* project."

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A proper reporting can help meet sustainability goals

Source: Achilles

Supply chain transparency is a business opportunity, not a compliance burden

REPORTING Companies are now recognising the necessity of better reporting and considering how a collaborative approach can help, writes Dr Paul Stanley, CEO of Achilles, a Scottish company that provides supply chain due diligence to enable organisations to improve performance, enhance compliance and meet sustainability goals

Transparency regulation is taking a step back across the European Union, but shipping companies globally are still embracing supply chain due diligence as a business imperative.

Vessel owners and operators in the EU were some of the first to come under pressure from clients and investors to comply with ethical sourcing programmes and to report on labour practices and human rights in their supply chain. This was driven in no small part by national and regional regulation which aimed to codify best practice into law.

Even with lawmakers apparently ready to slow down timelines for EU directives, interest is growing here and across the Middle East and Asia – regions which are not subject to direct regulation – to adopt an approach that prioritises transparency.

The reasons why owners continue to engage with transparency initiatives like Achilles are more than a prosaic desire to look good, though investors are increasingly interested in interrogating underlying business practices. For shipowners, understanding and engaging with their supplier community is simply good business. Supply chain disruptions translate into substantial costs and using the Achilles platform to track supplier performance provides measurable time and efficiency savings.

Understanding the supply chain

From ports and shipyards to suppliers, shipowners and operators, organisations are increasingly seeking data on how their partners perform in terms of financial stability, governance, labour standards, human rights and environmental protection. Vessel operators had already begun to address this with more attention but there exists a need for these often internal dialogues to evolve from an arm's length view to recognition of the near-term risks.

Even where national legislation does not require detailed reporting, there is a growing desire to align with the prevailing trend of smarter, more efficient operations. This increased awareness also reflects the emergence of the issue of reputational risk, particularly thanks to investigations by the media, non-governmental organisations and intergovernmental organisations. For some parties in the industry, the desire to look closely at their supply chain is tempered by the understandable concern about what they may find. Audits conducted by Achilles have uncovered troubling conditions at construction and repair facilities in the Middle East and Asia. Facilities in these regions commonly employ migrant labour recruited through agencies and abuses have included debt bondage, passport retention and even forced labour.

In some cases, companies are paying lip service to the issues. Many have a modern slavery statement on their website and they probably believe this indicates they are taking the issue seriously. A well-drafted modern slavery statement should run to 20 or 30 pages, but sometimes they are merely two pages. Highlighting the issue in a July 2024 publication, maritime lawyers Norton Rose Fulbright noted that: "The maritime shipping industry remains an area of high modern slavery risk given the vulner-

abilities of seafarers, recognised as among the most essential yet vulnerable working populations in our global economy. These vulnerabilities are exacerbated by the fragmentation of regulatory oversight among flag states, limited visibility of conditions on board, complex supplier arrangements and practical limitations on effective enforcement of working standards."

Improving visibility

The truth, as anyone familiar with the shipping industry knows, is that standards vary widely, whether by flag state, vessel operator, port or inland carrier. Some sectors, including fishing fleets, have become regular targets for activists concerned about the treatment of workers based on historic issues of abuse.

It can be easy to underestimate the due diligence required for supply chain reporting across a large fleet. What appears a simple process can quickly become unwieldy. Internal and external audits are a continuous source of pressure and stress both for suppliers and buyers – in part because of a lack of agreed standards.

The vast majority of companies employ a manual process for the supply of stores and spare parts using spreadsheets, since legacy purchasing systems do not support the full breadth and width of the data sets required, including sanction checks. Often the forms designed to gather information from suppliers include poor levels of data quality, lack detail, or contain no questions about environmental performance or labour practices.

Service providers are typically asked to disclose supply chain data many times by different clients. In a cost-sensitive trading environment it makes little sense to duplicate this effort, wasting both time and money.

Even some of the largest companies are not doing as well as they might. But by sharing data with a neutral third-party platform such as Achilles there is an opportunity to improve reporting for buyers and suppliers alike.

By recognising the scale of the challenge, this can be done in a collaborative way that generates a wider industry benefit. The Achilles approach pools the process of auditing suppliers, saving time and administration costs for owners.

Next steps

To help owners and operators understand the regulatory landscape and work towards best practice, Achilles recently brought together a group of leading Hamburg shipowners and managers for a frank and open discussion on their challenges. The companies involved represented some of the region's most innovative operators and asset managers. They were keen to hear how to improve the supply chain management process and achieve compliance with future regulation. That Achilles is gaining increasing momentum with shipowners and suppliers at the point when timelines for regulation are slowing down demonstrates a broader transition taking place.

Taking steps that demonstrate commitment to transparency principles prepares an organisation for future regulations. In the meantime, it enables shipping companies to enhance risk management and improve the financial sustainability of their business.

Supporting safety and efficiency with data-driven decision-making

REMOTE INSPECTION The evolution of remote inspection technologies is redefining how class and regulators verify compliance, writes Matthew Tremblay, ABS vice president, Global Offshore

The safety that is expected in the maritime supply chain depends on all its components working properly. From commodity producer or manufacturer to carrier and end user, all assets must be built, operated and managed with safety in mind. It is clear, therefore, that state-of-the-art audit services must stretch beyond operators of vessels, facilities and equipment, to a wider range of parties across the breadth of the supply chain for equipment and materials manufacturing.

To support this end-to-end approach, remote inspection applications, ranging from component design and manufacture, through to construction and in-service maintenance are evolving at a rapid pace. The evolution of the technology to make this happen – and how it can be applied in remote inspections – signals a major transition in how the industry is addressing the monitoring and integrity of assets regardless of location.

Just as importantly, the technology is generating more detailed insight than was once possible with the human eye. This represents a step change in how these services are attracting the interest of more operators globally.

Remote impetus

The impetus for ABS to re-evaluate long-standing business practices came in part from the pandemic. Restrictions on physically attending assets for inspection spurred demand for remote surveys and audits to augment the traditional survey experience by allowing surveyors to perform a range of actions without being physically present while still simultaneously capturing all survey and audit requirements.

Access to remote surveys and audits facilitated business continuity, particularly during challenging times that could create scheduling conflicts or personnel or logistical issues. Remote inspection technologies help reduce direct human intervention on site and in dangerous situations, which is enhancing a safety-first approach with the adoption of tools, software, and systems that improve safety, performance, and operating costs for the client.

The ability of these technologies to navigate through complex and dangerous environments, access restricted spaces, and perform inspections with precision and agility was comprehensively proven. This dramatically reduces risk and, in the longer term, cost, by reducing human intervention and automating maintenance inspections. Advances in image recognition from deep-learning techniques have made it possible to create a high-fidelity model of the world around an asset.

Overcoming objections

Remote inspection suffered initially from the perception of being less effective than an in-person survey of an asset on station. However, the process has evolved from simply replicating what is carried out on board to identifying and assessing a broader set of data to make more informed compliance and safety related decisions.

The availability of higher bandwidth, lower-latency connectivity thanks to low earth orbit internet connectivity, supported by cloud-based data storage means the industry is able to leverage a wider range of data in real time. Remote inspection is now a tool in the larger toolbox of data-driven verification. This includes the use of both transactional data such as maintenance, condition monitoring results, inspection records and time-series data from sensors, and health monitoring approaches. ›

Remote inspections simplify the lives of both owners and surveyors Source: ABS

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This evaluation of a broader set of data means the new remote way of working can actually be more comprehensive and effective. It also saves resources compared with a traditional in-person visual examination and testing.

Meeting challenges

Confronted by daily challenges, complexities, uncertainties and opportunities, it is easy to lose sight of a simple fact: companies that fully assess their risks are better able to manage them strategically. Delivering effective remote inspection services with the support of independent expertise from companies like ABS is vital to sustaining asset safety and efficiency.

Joint ventures and collaboration with technology developers, which introduce valuable core inspection and maintenance competencies into businesses, are beginning to redefine industry perceptions of safety, and foster important dialogue about sustainable energy supply and demand issues. These challenges can then be tackled collaboratively.

These programmes are particularly valuable when seen alongside industry trends. A maturing shipping fleet – particularly in the dry bulk sector – has the potential to introduce new risks without close attention to asset maintenance and component health.

ABS is also seeing a greater number of assets change hands more frequently. In its simplest terms, this can be a change of personnel, right through to a new organisation inheriting new assets. Both these cases are examples of where remote technologies can help.

From proactive to reactive

The economic implications of adopting remote inspection technologies are profound. Beyond the direct cost savings, the early detection of failures through enhanced monitoring can prevent extensive damage and downtime, further optimising the financial viability of marine and energy assets.

The ability to conduct thorough inspections remotely means that maintenance can be potentially proactive rather than reactive, which is less costly and more efficient for the operator and their teams. This cuts mobilisation costs and helps reduce risks associated with offshore travel.

Remote inspection technologies are the primary catalyst for transitioning from traditional human-resourced maintenance to real-time risk assessments and insights, which is more cost-effective and allows second-by-second assessment of an asset's integrity. This enables maintenance responses based on actual needs rather than forecasts. It reduces downtime for the operator, the supply chain, and engineers or surveyors.

However, the ultimate goal of remote technologies is not to remove employees from inspection operations entirely, but to use technologies as a way to inform decision makers more efficiently without the need to be physically present on board thanks to, for example, sensor technologies.

Sensor systems are evolving and their application across transport, infrastructure and other assets is expanding and accelerating. They now meet the demands of expanded remote inspection technologies, the need to cut costs, and to ensure efficiencies are met safely.

Supporting applications

ABS is at the forefront of the development and application of remote inspection technologies. The classification society is helping companies execute inspections swiftly, accurately, and with minimal disruption to operations.

Clients have told ABS what a difference the remote inspection services have made to their operations since they were first introduced. Recent projects indicate how the scope of new remote inspection services can be applied and have shown the benefits of adopting this approach more widely as alarms and alerts for critical assets.

ABS originally took the decision to launch its remote offshore surveys officially as far back as 2018 following a lengthy period of testing and evaluation. It has since taken the decision to extend its range of technologies to provide more choice and flexibility for how clients manage their survey requirements.

ABS's Operations Support Center (OSC) is the global hub for management of remote surveys, staffed with trained and qualified surveyors ready to connect to assets and perform remote surveys. The rapid expansion of asset connectivity and remote inspection technologies enables the OSC to serve as a core function in ABS' approach to class surveys.

New component added to tackle inaccurate data

FLEET INSIGHTS | Danish ship performance specialist, Danelec, has unveiled a new Data Quality Module as a new component in its Fleet Insights product. Although sensors are now an essential feature in supporting shipowners and operators in tracking asset performance and assuring compliance with tightening regulations, a significant percentage of them do not work properly, the company said in a statement.

Danelec cites research that demonstrates that up to 30% of critical sensors, measuring metrics such as speed through water, are not accurate. Without reliable checks, operation teams can waste a lot of time manually cleaning data, the company said, introducing delays and inconsistencies into decision-making.

The margin for error will become steadily more critical in the years ahead as fuel regulations, in particular, require careful performance monitoring. Danelec pointed out that FuelEU Maritime has introduced a new range of data reporting requirements, and the results of the IMO's recent mid-term measures meeting in London will require yet another raft of ship performance data monitoring.

Danelec CEO, Casper Jensen, said: "There is a growing realisation that more data isn't always better, especially if its quality cannot be trusted. Our new Data Quality Module equips shipowners with automated validation and monitoring of sensor data, unlocking the full potential of high-frequency insights without compromising trust or accuracy. Fleet managers can now monitor real-time sensor availability, detect anomalies, and receive alerts on potential issues before they impact performance, compliance, or the bottom line."

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