Jul 14th 2022 | Issue 1921

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MARINE EDITORIAL CONSULTANTS

A WEEKLY PUBLICATION COVERING THE SHIPREPAIR YARD, SHIPREPAIR, CONVERSION AND MAINTENANCE INDUSTRIES.

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VIEWPOINT

DNV has presented Arcadia Shipmanagement with a certificate recognising its vessel ***Aegean Myth*** as the first vessel globally to have a SEEMP III manual. The Ship Operational Carbon Intensity Plan or SEEMP Part III, is part of IMO's strategy to reduce shipping's GHG emissions and a verified SEEMP Part III must be kept on-board from January 2023.

The SEEMP Part III, or Ship Operational Carbon Intensity Plan, was finalised with the latest amendments to MARPOL Annex VI and the associated Guidelines at MEPC 78 last month. It requires ship owners and operators to monitor, report and verify CO_2 emissions annually for all vessels larger than 5,000 gt. It is a ship-specific document, a dynamic and regularly updated three-year implementation plan describing how a vessel will achieve the required Carbon Intensity Indicator (CII) over the next three years, with yearly targets, procedures for self-evaluation and improvement, and a corrective action plan in case of an inferior rating.

"We are very proud to be the first shipping company to have received approval by the world's leading classification society, DNV, for our fleet's SEEMP Part III, starting with our Aegean Myth vessel," said Dimitrios Mattheou, CEO of Arcadia Shipmanagement, "At Arcadia we are committed to providing safe, sustainable, and reliable transportation of oil by sea. Initiatives like this broaden the values of safety and environmental excellence by implementing effective management systems to comply with incoming regulations to consistently achieve reliable and environmental incident-free performance. This approval by DNV marks the first milestone for smooth compliance with IMO's requirements. We would also like to thank Alpha Marine Consulting PC for supporting us in SEEMP Part III preparation."

"DNV congratulates Arcadia Shipmanagement on being the first company to receive SEEMP Part III approval," said Ioannis Chiotopoulos, Senior Vice President – Regional Manager SE Europe, Middle & Africa, DNV Maritime. "It demonstrates their willingness to ensure that their vessels are out in front, in terms of both regulatory compliance and their sensitivity to the environment. In addition, to have been able to complete the SEEMP Part III preparation and approval so quickly after MEPC shows great teamwork and the effectiveness of our new digital tools. The CII will require more of the shipping industry in terms of data collection and sharing. At DNV, we have invested in developing our competence and services for this new regime, including developing a set of digital solutions that will make compliance as simple and transparent as possible for our customers."

DNV recently released the free SEEMP III Generator tool for DNV customers. The system can propose energy efficiency measures and help vessel operators reach the required CII. It can also help to reduce paperwork and can be used by both ship managers and third-party consultants working on behalf of DNV DCS customers.

SHIPYARDS

ASRY:

Bahrain's Arab Shipbuilding and Repair Yard Company (ASRY) has celebrated the successful and safe delivery of a major conversion project, ASRY delivering the project before the agreed scheduled time. This project involved converting World's Carrier Corporation's crude oil tanker to a Floating Storage and Offloading (FSO Vessel).

The 160,004 dwt, 2001-built ***Teli***, the former ***Cap Diamant***, arrived in Bahrain during June 11th the project being completed in a very short time. When she sails from Bahrain, she will be stationed on the Etame Marin field, offshore Gabon, the field operated by Houston-based Vaalco Energy. She is a replacement for the existing BW Offshore-owned FPSO ***Petroleo Nautipa***, which has been operating on the Etame Marin field for Vaalco since 2002.

The Cap Diamant prior being converted to a FSO and renamed Teli

ART SHIPYARD:

Turkey's ART Shipyard, part of the Besiktas Group, is reporting a busy period over recent months. As an improving shipyard globally, ART Shipyard has secured more than 45 projects for the first half of 2022 from various shipowners for different vessel types and sizes. During the first half of this

Halcoussis' bulk carrier ***Lorentzo*** in ART Shipyard

year, ART Shipyard repaired a wide range of ships such as tankers, LPG tankers, containerships, bulk carriers and ro/ro vessels.

Repeat business remains a major focus in ART's strategy and first half of 2022 it has completed contracts from customers such as Maersk Tankers, Borealis, Dynacom, Fleet Management and Synergas.

ART recently repaired the 38,877 dwt crude oil tanker ***Maersk Kalea***, which was the first project from Maersk Tankers, the ship in the yard for her fourth special survey. ART also welcomed Uni-Tankers' 11,347 dwt chemical/oil products tanker ***Tasing Swan*** for her third special survey, cargo tank coating repairs and Alfa Laval BWM System installation.

ART also welcomed three ships from Italy's Synergas during the first half of this year. These included the 4,026 dwt LPG tanker ***Syn Turais***, the main work on the vessel being the installation of an OceanGuard BWM system, retrofitting work and her third special survey.

Other recent projects have included Medlog's 30,453 dwt containership ***Med Samsun*** (fourth special survey and an Optimarin BWM system installation), Bernhard Schulte's 34,604 dwt bulk carrier ***Lila 11*** (second special survey, CH treatment and Techcross BWM system installation), Z&G Halcoussis' bulk carrier ***Lorentzo*** (fourth special survey, CH treatment and Techcross BWM installation), Navigazione Montanari's 39,999 dwt chemical tanker ***Valle di Nervion*** (fourth special survey), K Ships' 23,407 dwt bulk carrier ***Bereket*** (fifth special survey, CH treatment and Bsky BWM system installation) and Sealife's 27,365 dwt bulk carrier ***Lady Moon*** (standard drydocking, hatch cover repairs, steel work and Optimarin BWM system installation).

ART Shipyard is carrying out repairs on-board Wilhelmsen Ahrenkiel's 37,882 dwt containership ***AS Constantina***. The work scope includes third special survey items, hatch cover repairs, steel work and Alfa Laval BWTS installation. Another on-going project is Borealis Maritimes 41,996 dwt containership ***Bomar Praia*** for silicon paint application and Erma First BWM system installation.

Other recent projects include Fleet Management's 14,355 dwt chemical tanker ***FMT Urla*** (afloat repairs including Alfa Laval BWM installation), Nordic Hamburg's 35,866 dwt bulk carrier ***Nordic Oslo*** (second special survey, CH treatment and Alfa Laval BWM installation) and Anglo-Eastern's 37,838 dwt general cargo vessel ***Glenpark*** (first drydocking).

At the time of writing, ART Shipyard continues to fill up its order book with special projects. These include Gulmar's 46,683 dwt bulk carrier ***Sanita S*** (third special survey and 50 tonnes of steel renewal), Synergas' 4,115 dwt LPG tanker ***Syn Zaura*** (fourth special survey and Oceanguard BWM system installation), Diligent Holdings' 35,278 dwt bulk carrier ***Bliss*** (third special survey and Erma First BWM installation), Blue Seas Shipping's 56,056 dwt bulk carrier ***Freedom Line*** (fourth special survey, CH treatment and Techcross BWM installation), Allseas' 23,677 dwt bulk carrier ***Alethini*** (regular drydocking and Erma First BWM installation) and Fleet Management's 14,368 dwt chemical tanker ***FMT Bergama*** (afloat rep[airs and BWM system installation).

SEMBCORP MARINE:

Singapore's Sembcorp Marine has completed the handover of the second of three identical battery-operated ro/pax ferries to Norwegian ferry operator Norled. Based on the proprietary design of Sembcorp Marine's wholly-owned subsidiary, LMG Marin, the zero-emission vessel

will be capable of operating at a service speed of 10 knots, powered by lithium-ion batteries which are charged using green hydro-electric power. The ferry can also run on a combined battery-diesel hybrid backup mode when required. The third ro/pax ferry is scheduled for completion at the end of 2022.

Optimised to meet Norled's operational requirements, the ferry named ***Dragsvik*** is equipped with energy-efficient features including quick-connection shore charging plugs, auto-mooring and auto-cross capabilities, efficient hull, propulsion and heat recovery systems as well as minimised hotel and auxiliary load solutions.

The 82.4 m long multi-deck, double-ended ferry is designed for the safety and comfort of passengers and crew, with the capacity to carry 300 persons as well as 80 cars or a combination of up to 10 cars and 10 trailer trucks.

The ***Dragsvik*** will eventually join ***Hella***, the first sistership built by Sembcorp Marine, currently in operation on Norled's shortsea Hella-Vangsnes-Dragsvik connections. ***Hella***, which sailed off from Singapore in March 2022, successfully commenced service in May 2022. Both ferries will augment Norled's sustainable fleet of innovative zero-emission vessels and contribute to maritime decarbonisation.

LMG Marin Managing Director Torbjorn Bringedal said, "We are heartened to witness the application of our proven zero-emission design and hydro-electrification technology in the second battery-operated ro/pax ferry built by the Group. The vessel has been optimised to meet Norled's green operating requirements and will contribute

The second zero-emission battery-powered ro/pax ferry designed and built by Sembcorp Marine for Norled

to the firm's sustainable fleet operations when it goes into service."

Tan Heng Jack, the Company's Head of Specialised Shipbuilding, said, "We are pleased to mark the sailaway of Norled's second zero-emission ro/pax ferry which will be deployed in Norway following completion. We look forward to continuing our close partnership with Norled on the third ro/pax newbuild in the series."

Wong Weng Sun, Sembcorp Marine President & CEO, added, "Sembcorp Marine is well-positioned to support the global shift towards a greener and low carbon future with our strong track record and diversified capabilities in offshore renewables, new energy and cleaner O&M solutions. This latest ro/pax ferry project is a testament to our demonstrated capabilities to harness green technology and to provide sustainable products and renewable energy solutions for our customer and the industry."

The ***Atlantic Corsair*** in Dunston Shiprepair

DUNSTON SHIPREPAIR:

After two weeks, the process to remove years of old paint from the 764 gt museum ship ***Arctic Corsair*** and the ***Spurn Lightship*** is now complete, the work carried out by Hull's Dunston Shiprepair. The Arctic Corsair was built in 1960 and converted to a museum ship in 1999. The ***Spurn Lightship*** was built in 1921 and has been restored as another museum ship.

A primer was added to protect the ships before they were re-painted. Dunstons will now get the vessels ready to go back to their wet berths for

restoration to continue.

The restoration of the two ships is part of HullMaritime, a locally led project funded by the council and The National Lottery Heritage Fund.

DDW:

Last week Torvold Klaveness' CEO Engebret Dahm was in Dubai' Drydock's World overseeing installation of the Becker-Mewis Duct on-board the 83,600 dwt bulk carrier ***Barracuda***. As the first CLEANBU to receive the technology, this concludes the installation on-board all classes of vessels in this class of the Klaveness fleet and will be fully rolled out across the fleet over the next two years.

He Said, "With the CLEANBUs still only one - three years old, we are excited to discover these new ways of upgrading and increasing efficiency on already modern and efficient vessels."

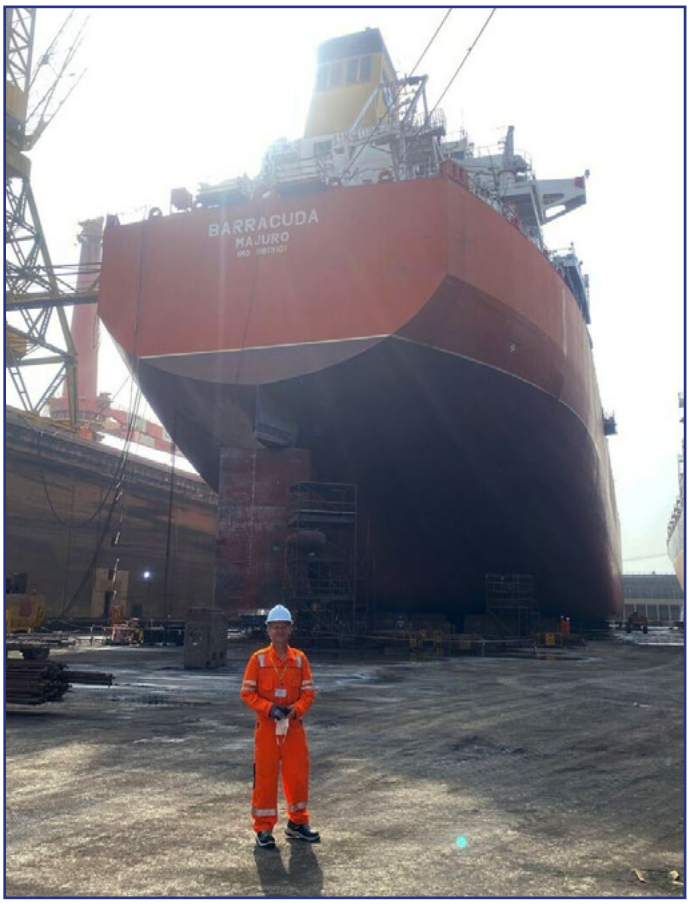
During April this year, Klaveness Combination Carriers (KCC) concluded key strategic agreements for an energy efficiency retrofit on two of its modern vessels, including the installation of an air lubrication system and shaft generator. The contracts include options for introducing the same installations to a further nine vessels.

Together with KCC's previously announced energy efficiency initiatives, the concluded measures aim to reduce fuel consumption and carbon emissions by almost 20% when compared to performance as newbuilds. Enova, the Norwegian government enterprise promoting the transition to a low emission society, has granted up to approximately US$1m in support of the installation on one of the vessels.

The initiative includes a contract with Silverstream Technologies for installation of an innovative new version of Silverstream's proven air lubrication system, the Silverstream System. The system releases a carpet of microbubbles that travels the full length of the flat bottom of a vessel, reducing friction between the hull and water.

Additionally, a contract has been entered into with Finland's WE Tech Solutions for the installation of WE Tech's shaft generator. The shaft generator will produce electric power from the rotation of the propeller shaft, supplying power to Silverstream's air lubrication system and other ship systems. The combination of the Silverstream System and WE Tech's shaft generator significantly improves the overall energy efficiency of the initiative.

Engebret Dahm stands proudly in front of the ***Barracuda*** in Dubai Drydocks



The installations will be made on one CABU II class vessel and one CLEANBU class vessel during their next scheduled drydockings where the vessels are also scheduled to be equipped with Becker Marine System's Mewis duct, silicone anti-fouling and welding seam fairing. As part of the contracts with Silverstream and WE Tech Solutions, KCC has received options to bring the same installation to an additional two CABU II and seven CLEANBU vessels.

Engebret Dahm, CEO of KCC, commented, "The contracts concluded with Silverstream

Technologies and WE Tech Solutions are important milestones in KCC's energy efficiency program, this will deliver sizable cuts in carbon emissions from KCC's fleet over the next years and further strengthen our lead as the lowest carbon shipping provider in the dry bulk and tanker markets."

The total project costs for the two vessels, including design and shipyard installation, are estimated to be approximately $7.0m. The awarded grants from Enova are estimated to reduce cash investments to around $6.0m, which will be fully financed by equity raised in November 2021 dedicated to KCC's energy efficiency program.

MACHINERY

YASKAWA/THE SWITCH:

The EDCB and EBL are now standard building blocks in our marine drive offering, enabling our DC-Hubs to perform at the highest standards of efficiency and reliability. "With microsecond range response, both devices provide maximum system protection and ride-through capability," says Head of Product Line High Power Converters, Teemu Heikkilä.

The EDCB is integrated within inverter modules inside the DC-Hub, increasing redundancy within the hub by detecting, cutting and disconnecting any critical fault in 10 microseconds. That is much faster than the millisecond range response of a conventional fuse. Selectivity reduces fault duration and isolates any damaging effect to just the affected module, ensuring the least possible energy disruption.

"As well as protecting against inverter module failure towards DC links, the EDCB also dampens oscillations towards DC links by dedicated inductance in series of active components. The EDCB allows each module to work independently and also facilitates charging, as you can charge the inverter module capacitor through it with no need for any other device. It makes the system solution much simpler with fewer components and connections," says Heikkilä.

The EDCB provides complete protection with ride-through capability. The risk with using conventional fuses in DC set-ups, which is mostly still the case, is that the entire DC link and associated functions will trip if the fuse goes. "With

Teemu Heikkilä heads up the Product Line Drives for Yaskawa Environmental Energy / The Switch

EDCB, the DC link will not drop in voltage, and the power will stay on, keeping the ship running," says Heikkilä.

To Heikkilä's knowledge, there is no competing solution in the market. Fuses are the competition. "Fuses are fine for AC systems, but with the move to DC distribution, things are very different. Unlike in AC systems, the fault current in DC distribution does not have zero crossing, so protection devices need to perform at a whole new level. Our concept is based on semiconductors and fast current measurement. In other words, it is a measured data-based fast and predictable protection," he says.

EDCB technology can be utilised in other applications, such as in protection of large battery systems. As batteries get larger, the energy content increases, and so does the short-circuit current rating. The challenge is that existing marine DC systems are not designed to handle this high short-circuit current. "To limit the amount of battery short-circuit current, you can use the EDCB to effectively block the current, providing both protection and safety by not releasing short-circuit current to the system. We are working on a new electronic protection device to limit DC short-circuit currents to enable implementation of large batteries, but also optimise system cost."

Whereas the EDCB is integrated within the DC-Hub, the EBL connects multiple DC-Hubs in a vessel's DC distribution system to isolate faults and ensure redundancy. Ultra-rapid splitting of on-board grids in microseconds, regardless of the type of fault, ensures the other DC-Hubs are not affected. The EBL also allows vessel systems to share energy between DC-Hubs in normal operations. "With EBL ultrafast performance, it is possible to operate breakers closed in normal operation, which optimises energy flow and, therefore, fuel consumption."

EBLs also guarantee selectivity between DC-Hubs if a major fault occurs, rapidly disconnecting them to isolate the fault. Allowing each DC-Hub to work independently creates complete redundancy, securing power availability for safe and seamless operations. "The EBL also allows a ring network topology to be set up, which ensures redundancy no matter how large a system is."

Although perfectly suited to the stringent demands of dynamic positioning (DP) vessels, any ship type from ferries to tankers can benefit from this technology to unlock efficiencies, savings and increased reliability. "At a time when the industry is focusing on using and producing environmental energy in the most sustainable manner, it's the perfect solution for shipowners looking to optimise operational uptime, cost control and sustainability."

Heikkilä adds that future flexibility in terms of energy sources is a key investment consideration for owners right now. "You can combine an additional DC-Hub with an EBL to allow existing systems to handle all kinds of loads and potential new power sources such as fuel cells, solar panels and wind generators. It's an important ingredient to make ships ready for the future energy mix."

The EBL was first piloted on North Sea Shipping's 12,705-dwt advanced offshore construction vessel ***North Sea Giant*** (built 2011), which was converted to hybrid propulsion in 2019. The energy storage system (ESS) supplied by Corvus Energy forms part of the ship's DP3 power management system, providing spinning reserve power to all parts of the ship instead of having to keep fuel-hungry gensets running. The battery set-up features three separate power units, each with a The Switch DC-Hub, and

six generators in total.

To fulfill DP3 power demands, the EBL features two insulated-gate bipolar transistors (IGBTs) effectively connected in series – one in the positive and one in the negative line – with completely independent drive and control. In case of a hidden failure, the EBL guarantees that a short-circuit current is interrupted before any damage occurs. "Pairing the vessel's DC-Hubs with our EBL allows each unit to work independently. Isolating faults protects the entire operational system, providing redundancy if one unit fails or even in case of hidden failure. By rapidly connecting and disconnecting energy sources from one another, including batteries and engines, they can be optimised for efficiency. This eliminates the need to run the ship's three power units during all operations, saving on long-term fuel costs and reducing emissions."

More recently, the EBL has also been ordered as part of the company's comprehensive delivery – including DC-Hubs and permanent magnet shaft generators – being integrated into Berg Propulsion's diesel-electric direct-drive solution for a bulk carrier under construction in China for a Canadian owner.

Heikkilä reveals that Yaskawa Environmental Energy / The Switch is also close to finalising its latest-generation single drive and DC-Hub package. The solution was successfully piloted on Hagland Shipping's 4,699-dwt general cargo ship ***Hagland Captain*** (built 2012), which was converted to battery hybrid propulsion last year. A second pilot involves a series of 5,000-dwt eco-friendly bulk carriers under construction for Norwegian owner Misje Eco Bulk in Sri Lanka. The first is set for delivery early this year.

The ships feature Wärtsilä's fully integrated hybrid solution, enabling the vessels to enter and leave harbour, and perform cargo operations, with zero emissions. "These projects are hybrid DC-Hubs with multiple energy sources, which enable energy-efficient operation with fully electrical mode. Our new-generation product is optimised for DC distribution with multiple sources and consumers," says Heikkilä.

Larger vessels with two shaft lines require two DC-Hubs to ensure redundancy if one line or drive goes down. Heikkilä says the company is ready to deliver the full offering from next year. "The market is much more active now than last year, so we look forward to expanding the business," he concludes.

MHI-MME:

Japan's Mitsubishi Heavy Industries Marine Machinery and Equipment Co., Ltd (MHI-MME) marked the 10th anniversary of steering gear license agreement with Jiangsu Masada Heavy Industries. Jiangsu Masada is a manufacturer of marine machinery, such as steering gears, deck cranes, and deck machineries. The company was founded in 2005 in Nantong city, Jiangsu province, China.

MHI-MME concluded a license agreement for Rapson slide type steering gear in February 2012. Jiangsu Masada has an especially high sales record to state owned shipbuilders, such as the CSSC Group's Chengxi Shipyard and Huangpu Wenchong Shipbuilding, and the China COSCO Shipping Group's COSCO Shipping Heavy Industry (Yangzhou), as well as to leading private shipbuilders in Jiangsu province, including Jiangsu Hantong Ship Heavy Industry, Yangzijiang Shipbuilding, New Times Shipbuilding, and Nantong Xiangu Shipbuilding. Production of steering gear through this license agreement have exceeded a total of 460 units to date.

The annual production of steering gears under this license agreement in recent years has been around 50 units, but with the recovery in new shipbuilding market in China and Jiangsu Masada's steady receipt of orders, we expect to see more than 140 units produced in 2022. This will be a year of a big leap forward in sales.

Going forward, MHI-MME will keep developing its good relationship with Jiangsu Masada, and continue to move forward while continuing to co-operate to enable the provision of even better products and services.

LNG

GTT:

France's GTT has announced the signature of a major contract for its Smart shipping solutions, GTT Digital, to equip more than 30 vessels of a major player in the shipment of liquefied gases within two years.

This contract includes the deployment of sensors, automatic data collection systems and intelligent software to manage and optimise the energy and environmental performance of the vessels. The contract also provides a periodic consulting support of GTT Digital's experts to perform customised data analysis and produce dedicated operational reporting.

For several years, GTT Group, through its 'Smart Shipping' solutions, has been supporting the maritime industry in its digital and energy transformation by allowing shipowners to monitor in real time the emissions of their vessels in order to limit its environmental impact.

Philippe Berterottière, Chairman and CEO of GTT, declared, "We are delighted to sign this significant contract for our Smart Shipping technology, GTT Digital, which contributes to making maritime transport greener. This partnership underlines GTT's ability to provide innovative turnkey solutions that adapt to the needs of each shipowner and operator, including real-time decision support for crews on-board and on-shore."

Meanwhile, GTT has announced that it has received, in the second quarter, an order from China's Jiangnan Shipyard for the tank design of three new LNG tankers. As part of this order, GTT will design the tanks of the vessels, which will offer a cargo capacity of 175,000 m3 each and will be fitted with the Mark III Flex membrane containment system, a technology developed by GTT.

Deliveries of the vessel are scheduled for the third quarter of 2025 and the second quarter of 2026.

OFFSHORE

EST-FLOATTECH:

Holland's EST-Floattech opened a dedicated German office in Hamburg in August 2021. Staffed with two sales managers and a technical project manager, this decision is now really paying off its sustainable, safe and reliable battery solutions are in demand in Europe and also in Asia. In addition to inland waterways and government projects, the first of several upcoming orders for offshore wind vessels has now been placed.

Less than a year after its opening, the Hamburg office can celebrate a success - at the beginning of June 2022, a customer from Southeast Asia ordered the delivery of a battery pack for an offshore wind support vessel. "Of course, I am very pleased that the founding of the Hamburg company is paying off so quickly," emphasises Marc Mühlenbeck, Sales Account Manager. "Further orders are about to be signed."

This order is just one example of how EST-Floattech has established itself in the market. Since its foundation in 2009 in the Netherlands, the company has grown continuously and is one of the leading suppliers of lithium-polymer battery systems. The number of customers and projects has increased significantly in recent years, which is why 'EST-Floattech GmbH' was founded in August 2021. Working in the Kallmorgen Tower, which is located in the immediate vicinity of Hamburg's HafenCity, Josefin Klindt and Marc Mühlenbeck (sales) and technical project manager Frank Gawehns are combining their experience for these projects. The team looks after the German-speaking market, incl. the DACH region. The Italian, Polish, Danish and Southeast Asian markets will also be served from Hamburg, showing the current diversity and growth in hybrid and electric propulsion needs. All other countries are served from the Dutch HQ.

EST-Floattech's more than 200 projects worldwide, including in Germany, include the zero-emission ferry operated by SFK (Kiel), which has been in operation since 2021, and numerous river cruise ships operated by Viking. Customers and crew of the two fire-fighting boats ***Dresden*** and ***Hamburg*** of the Hamburg fleet are also satisfied with the battery system from EST-Floattech after more than 200 days in operation. Last, but not least, there's the Elektra, the first-ever hydrogen propelled pusher, sailing either in hydrogen-electric or full electric mode.

In addition to the proven and already widely used battery module 'Green Orca 1050', certified by DNV and also complying with the BinSchUO and ES-TRIN rules, the High Energy NMC, High Power NMC and High Energy LFP of the new OCTOPUS series are almost ready for deployment. In close collaboration with system integrators, shipyards, design agencies and engine suppliers, the team is committed to further growth, both as to production and knowledge-sharing, to facilitate its goal of zero-emission shipping.

The EST-Floatech team in Hamburg

ALTERNATIVE FUELS

ULSTEIN VAERFT:

Norway's Ulstein is looking to take its revolutionary Thorium powered vessel concept from the drawing board to the deep blue sea. Is this the solution that industry, and society, have been searching for to enable a truly sustainable maritime future? Everything about the launch of ***Ulstein Thor*** was unexpected.

The vessel concept, a 149 m 3R (Replenishment, Research and Rescue) design with a Thorium Molten Salt Reactor (MSR), took the industry, and wider society, by surprise. Its unveiling unleashed a wave of global media coverage, spilling over beyond the trade press onto news platforms like CNN, kick-starting countless conversations about the future of Thorium as one of the most viable sources of clean energy for deep sea shipping.

Ulstein's Chief Designer Øyvind G. Kamsvåg said, "I think we'd been operating in a bit of a bubble," he says, from Ulstein's base in the spectacular surroundings of Ulsteinvik on the west coast of Norway. "We were excited, of course, but had no idea it'd take off in this way – that other stakeholders, from maritime and beyond, would seize on the potential and huge commercial and environmental opportunity here."

"I think the timing has been absolutely critical. I mean we've been thinking about Thorium and nuclear vessels since 2008, but we didn't know if the industry was ready. Now, clearly, it is! So, how can we take this from the drawing board to operation as a key enabler for a sustainable maritime industry? That's the next, critical step... and we're not alone in being keen to move forwards."

Kamsvåg's reference to the concept as a "a key enabler" is one of the aspects that supercharged interest in what was almost immediately recognised as so much more than a standalone vessel concept. At the time of its launch, Ulstein presented the idea as a way to charge an all-electric cruise ship concept, ***Ulstein Sif***, demonstrating its commercial viability. However, its potential was seen to stretch far beyond that, as Kamsvåg now reveals.

"***Ulstein Thor*** has a superpower" he says. "And there's a multitude of applications and operational capabilities where that can be utilised. Beyond the zero emissions and remote replenishment, research and rescue functionality, the vessel's reactor could be used as an emergency power

The ***Ulstein Thor***

supply for regions hit by natural disasters, epidemics, or conflicts.

"Similarly, it could be utilised as part of society's renewable energy mix and compensate for fluctuating power supplies – e.g., from offshore wind parks – by supporting grid networks. The huge power capacity available could also be utilised for producing alternative fuels, or synthetic fuels through a CO_2 refinery, or for delivering shore power at ports.

"And all that functionality is before we even get on to the different vessel types where ***Ulstein Thor*** can either be used to recharge all-electric ships, or integrated MSRs can be housed within vessels as the primary power source."

Ulstein is renowned within its niche for delivering innovations that shift industry paradigms. The most obvious are the X-BOW and the X-STERN - sloping designs that glide through the oceans to deliver greater operability, comfort, operational functionality and energy efficiency. June saw the company sign its first contract to design TWIN X-STERN offshore wind CSOVs (construction service operating vessels) with dual-fuel methanol engines: an agreement that shows how Ulstein takes an effective, step-change approach on the path to a zero emissions future.

"We always design with the best solution in mind for the application," Kamsvåg notes, "but we're guided by our vision to create tomorrow's solutions for sustainable marine operations. That's driven all our innovations – from the X-BOW to hybrid and electric solutions – and ***Ulstein Thor*** is clearly connected to that creative 'red thread'."

CSSC:

The new vessels leaving GSI shipyard, part of China State Shipbuilding Corporation (CSSC), are the 274 m, 157,300 dwt ***Greenway*** the world's first LNG dual fuel Suezmax tanker built for Singapore's Eastern Pacific Shipping. The second newbuilding is the 49,990 dwt tanker ***Stena Pro Marine***, the second methanol-fuelled ship ever built in China following the delivery of her sistership the ***Stena Pro Patria*** in June.

The ship was handed over to Proman Stena Bulk, a joint venture between Sweden's Stena Bulk AB and Switzerland's Proman. Another sistership is due to be delivered later this year and three more have been ordered to the same design.

GSI vice president William Zhou said delivering the vessels is a high watermark for the company in building state-of-the-art alternative fuelled ships, "This is one of the best periods in GSI's history," he said. "I would like to pay tribute to all our team and suppliers here at GSI who have worked so hard with our clients Eastern Pacific and Stena Proman to deliver these magnificent ground-breaking vessels. The building of the ships sends a hugely positive message to the international maritime industry that GSI shipyard is at the cutting edge of building alternative fuelled ships. These are some of the most innovative propulsion systems in the world and we are proud to be changing the shipping industry for the better, working with our customers, to help make shipping greener. It is our passion and we are driven to play our role in leading the future of green propulsion building some of the biggest ships in the world right here in China."

Mr Zhou said GSI has already established itself as a prolific builder of dual-fuelled ships, with 32 among its references, including its current orderbook. However, although he said the company has gained experience from building LNG ships, he said building the first methanol-fuelled ships and the first dual fuel suezmax "is an incredible achievement for us."

Mr Zhou said when the ***Greenway*** is propelled in LNG mode it can reduce CO_2 emissions about 23%,

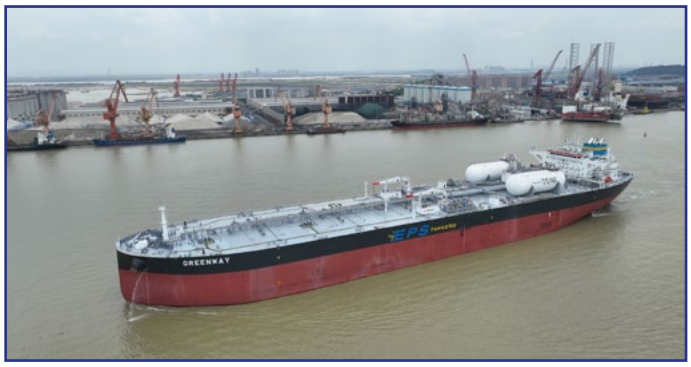
NOx emissions about 90%, and particulate matter and SOx emissions by 99%. He said the engine is a MAN B&W 6G70ME-C10.5-GI HPSCR (Tier III) and is driven by a high pressure LNG system with fuel gas piping design pressure up to 350 bar, and test pressure up to 525 bar. Mr Zhou added that the ***Stena Proman*** fleet ships can go a long way to showcasing how methanol can be deployed safely and at low cost.

"The systems are less complicated than those of LNG and LPG-fuelled vessels," he said. "As soon as classification societies drafted rules on using methanol as fuel, GSI began to get involved and it is wonderful to see the first two ships built and delivered. We did a huge amount of research on methanol in advance of this project communicating with equipment manufacturers and class. We expect to see many more shipyards embracing methanol ships now, but we are very proud to be one of the first. Again I would like to thank Proman, Stena, our team, MAN engines as well as the class society DNV for all they are doing to make this bold ship design and fleet a reality."

Mr Zhou said GSI will continue its drive to embrace the future of fuels supported by a new team of 100 of the 'brightest and best' young graduates just recruited to work in the GSI owned Marine and Technology Research Centre. The new centre was set up in March in the Nansha District of Guangzhou, an area known for high-tech investment.

"We have some of the best shipbuilding facilities in the world at GSI and we are constantly looking to strengthen our infrastructure and

The 57,000 dwt ***Greenway*** the world's first LNG dual fuel Suezmax tanker built by GSI shipyard in China for Eastern Pacific Shipping



most importantly our team," he said. "We want to become the best in the world at building green ships and we want to work with more ship owners in Europe, Asia and around the world committed to decarbonising. Our team is looking at not just methanol but also ammonia, bio-methane and hydrogen. We believe these will all have their place in the future and GSI is at the cutting edge of developing these technologies, having secured AiPs from class societies."

GSI has built, or is building, a total of 32 dual fuel ships including two LNG propulsion ro/pax vessels, two LNG propulsion Suezmax tankers, 14 LNG propulsion LR2 tankers, eight LNG propulsion PCTCs and six methanol propulsion MR tankers. More projects are under discussion. GSI shipyard covers an area of 3m m^2, with two large docks, four berths, one 900-ton gantry crane and four 600-ton gantry cranes.

STENA BULK:

Proman Stena Bulk, a joint venture (JV) between a leading global methanol producer Proman and Stena Bulk, has announced that its second methanol-powered newbuild tanker, ***Stena Pro Marine***, has been delivered. The announcement reaffirms Proman Stena Bulk's early commitment to the maritime industry's low-emission methanol pathway, following delivery of the ***Stena Pro Patria*** last month.

The growing momentum behind methanol-powered vessels across the shipping industry in recent weeks highlights methanol's key advantage as a globally available cleaner marine fuel: its proven net-zero pathway allows shipowners to invest in vessels that are already future-proofed.

As well as enabling immediate GHG emissions reductions, CO_2 emissions can be steadily reduced by blending increasing quantities of low-carbon and renewable methanol in the coming years, without any changes to engines or wider infrastructure.

Stena Pro Marine entering normal operation is

The ***Stena Pro Marine***

another statement of intent to the market that it is not only possible, but more importantly, it is operationally effective to use methanol as a marine fuel today, with methanol already available at over 120 ports world-wide, including all major bunkering hubs.

Both 49,990 dwt IMOIIMeMAX dual-fuel mid-range (MR) tankers were built at China's GSI. ***Stena Pro Marine***, like ***Stena Pro Patria***, is expected to consume 12,500 tonnes of methanol/annum. The use of methanol on-board virtually eliminates local pollutants including SOx and Particulate Matter (PM), cuts NOx emissions by 60% and reduces CO_2 emissions by up to 15% on a tank to wake basis versus conventional marine fuels.

Anita Gajadhar, MD of Proman Shipping, Marketing and Logistics, said, "Vessels such as the ***Stena Pro Marine*** demonstrate to shipowners and policymakers that the industry can take proactive and immediate steps on the decarbonisation pathway.

"Proman and other producers are ramping up investments in low-carbon methanol technologies and renewables projects to meet rapidly expanding customer demand. As regulators continue to propel much-needed maritime decarbonisation, including the EU's 'Fit for 55' legislative package, these vessels underline the importance of a regulatory framework that relies on one certification methodology for alternative fuels and accurate emission measurements of all fuels, including reduced carbon-intensity fossil-origin products, which play an important early role in accelerating the switch to cleaner fuels and enabling the pathway to net-zero."

Erik Hånell, President and CEO of Stena Bulk added, "We're proud to be able to add Stena Pro Marine alongside Stena Pro Patria to our fleet with this delivery announcement. We truly believe that these vessels are not only a step forward for MR tanker design but are also a clear statement of intent to the market. They showcase our confidence in methanol as an important and viable solution for the future of sustainable shipping."

Alongside pioneering the methanol tankers, Proman and Stena Bulk are also committed to supporting the development of frameworks for methanol uptake in shipping. The JV will continue to invest in methanol as a marine fuel and support legislation and regulations that drive methanol's viability today while continuing to develop production and infrastructure for tomorrow.

KOREAN REGISTER:

A methanol dual fuel 300,000 dwt VLCC has received an AIP from Korean Register (KR). As more of the world's leading shipping companies place orders for vessels that use methanol as a dual fuel, interest for methanol as a ship propulsion fuel is growing.

Methanol is considered to possess high potential for commercialisation because it offers fewer technical difficulties than LNG and relatively less toxicity than ammonia. Methanol can be stored in a liquid state at room temperature, similar to bunker oil, making it easier to store and transport compared to LNG, hydrogen and ammonia, which turn into liquid state at –162°C, -253°C, and –34°C respectively.

The methanol dual-fuel VLCC, which was developed under a joint project between KR and Hyundai Heavy Industries (HHI), is powered by methanol and marine gas oil (MGO). HHI has developed the vessel so that the methanol fuel tank can be placed in either the open deck or the cargo area and KR has verified the safety and suitability of the vessel's design, ensuring it complies with domestic and international regulations.

At present, the proportion of LNG-fuelled vessels

continues to increase due to the fuel's mature technology and supply infrastructure, but further transition to decarbonised alternative fuels is needed as strengthened greenhouse gas emission regulations come into force.

Although most methanol produced today is derived from fossil fuels, the proportion of e-methanol [1] is expected to increase as its fuel supply sources continue to expand, making it a much more competitive next-generation marine fuel along with green ammonia.

This AIP is the latest step in KR's development of renewable fuel technology and the classification society will continue to provide technical support to clients to help them achieve decarbonisation, developing technologies for 'greener' fuels, including methanol and ammonia.

BALLAST WATER MANAGEMENT

TECHCROSS:

South Korea's Techcross, a manufacturer of BWM systems, announced on July 1st that it would move its Japanese office located in Fukuyama to Osaka.

The Techcross BWM system has already been installed on more than 1,000 Japanese ships, occupying the largest market share in Japan. Techcross explained that its office has moved to the Osaka area, where transportation is convenient, for quick and thorough customer response, as it is expected that there will be more ship management requests and after-sales service issues from ships that have installed the system.

In addition, long-term resident engineers were

The Techcross Japan Office

dispatched from the Korean head office, and based on this - Techcross is focusing on training local after-sales service partners as well as nurturing new engineers, aiming for perfect localisation of after-sales services.

Since the Techcross Japan Office is located near Osaka Station, where one can quickly move anywhere in Japan, it is expected that it will further contribute to customer satisfaction.

OUTFITTING

MJM MARINE:

Northern Ireland's MJM Marine has been awarded a multi-million-pound contract with Marella Cruises, for significant refurbishment work on-board ***Marella Discovery***. Engaging MJM to deliver the project, ***Marella Discovery*** will undergo the multi-million-pound outfitting of its cabins and suites, with works scheduled to take place in November 2022 whilst in drydock in the Cádiz yard of Navantia Shiprepairers, Spain.

Having recently worked with the cruise operator aboard Marella Explorer supplying antimicrobial lighting solutions for public restrooms, in partnership with VYV, MJM presents another major milestone in the on-board installation of the VYV technology, with its introduction to the wet units within the ***Marella Discovery*** cabin refresh project. The innovative and sustainably conscious antimicrobial applications enable MJM to supplement stringent on-board measures with further antimicrobial coverage within the cabin spaces, offering an additional layer of protection for passengers and crew to sail safely and securely with a new standard of environmental wellness.

Gary Annett, CEO of MJM Marine said, "Our team here at MJM are delighted to be partnering with the team at Marella Cruises for the outfitting of the cabins and suites on-board ***Marella Discovery***. We are continually adapting and enhancing our offerings to match the new ways of operating in the cruise industry, post pandemic. Through our partnership with Vyv, we can present solutions to Marella that facilitates safeguarding measures alongside the delivery of our bespoke turnkey outfitting expertise, all without compromising on the quality and craftsmanship synonymous with our company values."

"Teaming up with MJM Marine and Germany's LightPartner Lichtsysteme creates a winning partnership for playing an important role in the wellness and sustainability measures implemented on-board Marella cruise ships by helping to satisfy the demand for demonstrable environmental wellness features," noted Colleen Costello, CEO of Vyv.

"Once installed, our overhead lighting technology works non-stop to protect the environments passengers and crew frequent from many common germs, so they can cruise without worry."

The ***Marella Discovery*** cabin and suite refurbishment contract further provides a unique opportunity to aid the growth of both MJM and the local economy, as the company announce a significant number of new job prospects, particularly in the Newry, Mourne and Down area

The ***Marella Discovery***

where MJM Marine are headquartered.

Gary added, "We are very proud of our company heritage in Northern Ireland and as we continue to expand our diverse portfolio of large industry clients and projects, such as Marella Cruises' ***Marella Discovery***, we are delighted to present more opportunities back to the community, adding to the multi-skilled and accomplished MJM workforce that consistently deliver the highest calibre of outfitting on-board every project."

PAINTS & COATINGS

APC:

USA-based Advanced Polymer Coatings (APC) is reinforcing its position as the prime protective tank coating company in Turkey's maritime sector after signing a major multi-ship deal to recoat ten tankers with Turkish ship management firm Chemfleet.

The deal was struck at Chemfleet's Istanbul office by APC's global marine manager, Captain Onur Yildirim, and its Turkey marine manager Captain Koray Karagoz. Captain Yildirim said APC now holds 80% of the Turkish marine coatings market having coated and repaired more than 450 vessels since establishing in the country in 2001.

He said the new contract follows a third special survey of the chemical tanker fleet, which takes place after APC's MarineLINE tank coating system had been in place for 15 years. Captain Yildirim said at this point, the tank coating needs to be recoated to maintain its performance. The fleet ranges from 6,000 to 15,000 dwt tankers and the work will be undertaken at a collection of Turkish shipyards.

"We are absolutely delighted to win this deal with our long-time customer Chemfleet," he said. "It shows rather than look for alternatives, the customer is happy with how MarineLINE is performing following 15 years of robust service and dedicated support from our team in Tuzla. We have built an understanding of Chemfleet's vessels and its requirements, and that team approach is key to building strong relationships. It is an exciting project which will see our team apply 45,000 m^2 of MarineLINE into the tankers."

Captain Yildirim said the Chemfleet deal marks a strong period for APC in Turkey, with a collection of other projects also struck in June to recoat a further eight vessels for a range of

The ***YM Mercury***, which will be coated with APC MarineLINE

Turkish ship owners. In total, the deals will see 18 vessels recoated with MarineLINE. The recoating agreements follow two new-build deals in Turkey announced in May. The projects will see APC apply MarineLINE to two chemical tankers - the 8,000 dwt ***Basaran Bayrak***, being built for the Ceksan shipowner at its Ceksan shipyard in Tuzla, and the 6,000 dwt ***Sedat Basak***, being built for Atako Shipping and its partner Nakkas Shipping at the Gisan shipyard also in Tuzla.

"As the shipping industry evolves and adapts we are seeing demand for MarineLINE increase in Turkey and other key export markets," he said. "MarineLINE is well known and established for its robust qualities. But other new factors are starting to come into play. Charterers are increasingly involved in choosing the tank coating and they want a coating that can perform and cope with a wide variety of chemicals over a sustained period. In addition, operators are turning to MarineLINE

for its ability to help cut carbon emissions and fuel costs. This is because less hot water is required for wall washing and tank cleaning compared to other types of coating. This immediately cuts the fuel use required for heating vast amounts of water. In addition, we can play our part in seafarer welfare by reducing the amount of time required in confined spaces for cleaning. All these benefits are combining to refresh the appeal of MarineLINE to the latest demands of the market."

APC reports it now accounts for more than 12% of the global chemical tanker coating market with 700 ships coated world-wide with MarineLINE. In 2021 APC reported one of its most successful years of trading coating 56 ships equating to over 750,000 m^2 of MarineLINE applied.

SUBSEA INDUSTRIES:

Over the last few months the rudders and running gear of different types of vessels were given an Ecoshield protective coating at yards in France, Turkey, the Netherlands, Finland, Namibia, the US and China. These ships include container vessels, ro/ro ships, chemical tankers, a ferry, a tug and an icebreaker.

Most of the ships belonged to different owners. Some of them were new customers, others returning ones. The returning customers had seen first-hand that Ecoshield solved the problem on their other rudders and wanted the same protection for the rest of their fleet. The new ones saw the excellent result obtained by other owners and chose Ecoshield to prevent corrosion and cavitation damage from reoccurring.

In the last couple of years sister company Hydrex has noted a substantial increase in the number of enquiries for underwater rudder repairs. This shows the need for a cost-saving and lasting solution.

Ecoshield can be used to protect all running gear

If a rudder is not given the proper protection against cavitation and the resulting erosion and corrosion damage, there can be major financial consequences for the owner.

Ecoshield puts an end to this - by removing the existing paint layers and applying the coating system on running gear we can break the never-ending cycle of painting, suffering damage, having to perform extensive repairs in drydock followed by a full repainting, again and again. Ecoshield gives a very thorough and lasting defence for a ship's entire service life. No repaint will be required during drydocking. At most minor touch-ups will be needed.

With time at a premium in drydock, the speed of application of Ecoshield is a further advantage. Ecoshield's flexibility makes it easy to adapt the application schedule to the rest of the activities at the shipyard or drydock in a way which does not interfere with them. Overcoating time can be as short as three hours. With the right planning, grit blasting and application of the two required layers can be performed in just one day.

Besides offering rudder protection Ecoshield is also suitable for thrusters, azimuth thrusters, azipods, thruster nozzles, thruster tunnels and other underwater ship gear which needs special protection from corrosion. The extra strength coating protects these areas for the service life of the ship. There is no need for recoating or major repair. For this reason several of the vessels treated recently had their thrusters, thruster tunnels or nozzles coated with Ecoshield as well as the rudders.

Evidence of the success of the coating is the number of companies that began by coating one rudder experimentally and have ordered Ecoshield for the running gear on other ships after seeing

the results in service. Most have plans to convert their entire fleet. Shipowners who have previously applied Ecoshield to rudders on ships in service are specifying the coating for the rudders and other underwater gear on their newbuilds.

Ecoshield comes with a ten-year guarantee. It is the only coating known to fully protect a rudder from all cavitation damage.

SERVICE AGREEMENTS

MACGREGOR:

MacGregor, part of Cargotec, has signed a five-year service agreement with Norway's Color Line. This agreement is an extension to previous contracts between MacGregor and Color Line and now includes all vessels in their fleet together with their Norwegian and Danish terminals. The contract is effective from now until 2027.

In the scope of supply there are two annual inspections (the pre-dock and "preseason") of the ro/ro equipment and steering gears on seven vessels and five linkspans for a period of five years. In addition, maintenance activities are specified for each vessel.

With these annual inspections, Color Line will have full knowledge of the technical status as well as maintenance cost of the equipment on-board the entire fleet and the linkspans.

"We have always had a very good relationship and collaboration with MacGregor. This new service agreement between Color Line and MacGregor will give us the security we need and the ability to plan for detailed maintenance over the next five years," says Andre Thoresen, Director for Marine Operations, Color Line.

A Color Line ferry in port

"We are proud of the high level of collaboration we have had with Color Line over many years. This third consecutive service agreement between Color Line and MacGregor proves that our relationship is close and solid," says John Carnall, Senior Vice President, Global Services Solutions, MacGregor. Color Line has a high focus on critical equipment and, together with MacGregor, they are now able to continue to secure the uptime for their fleet and linkspans."

UNDERWATER REPAIRS

HYDREX:

Boud Van Rompay, Hydrex founder and CEO, came from a background of very successful cave diving, perhaps the most dangerous form of diving there is. He had survived more than his share of narrow escapes. But some of his close friends had not been so fortunate. The memory of seeing the parents of two friends after both had suffered fatal accidents in 1972 remains with him to this day. When it came to other people's lives, Boud was determined not to take any risks.

Baud van Rompay

"When I founded the company in 1974, my first action was to write a safety manual," he recalls. "It covered all aspects of diving, commercial underwater work, how to manage divers, the size of the teams, what equipment to use, what to do, what not to do. When you're dealing with a team or a group, you need sensible rules that everyone can study and apply, so that you have a common agreement."

"Having and studying the rules and taking the whole job and the procedures seriously, prompts the individual in the team to become better and better with regard to safety," Boud continues. "The result for us has been almost 50 years without a serious accident."

Boud feels that if a company has a poor safety record, it comes from irresponsibility, lack of clear rules or lack of respect for the rules. At Hydrex, concern about safety runs through the entire

company, not only with the divers.

Dave Bleyenberg was a Hydrex diver for eight years before becoming a Technical Services Officer responsible for arranging the jobs and overseeing their successful execution. "Comparing safety at Hydrex with other companies, we are at the highest level," he says. He attributes this to a number of factors. Not cutting any corners on equipment is one. "If you look at our equipment, it's new," he says. "If we have any doubt, it will be replaced. When you go into a company's depot and look at the shelves, you know immediately."

Another key factor is the divers, individually and as a group. Obviously the divers have to be qualified, but there is more to it than that. "We have created a solid group here at Hydrex and the individual's safety depends on this being maintained. You can have a good diver but if he doesn't fit into the group here, it's a risk to the group's safety so we will not hire him."

Safety always takes precedence over financial or commercial considerations. "We won't take a risk because of commercial or time pressure," says Dave. "That is firm policy."

Personnel and equipment

Toon Joos, Chief Diver, has been with Hydrex for close to 20 years. In addition to acting as Team Leader on jobs, he is overall responsible for training the divers. "We have never had a major accident," he says. "It's down to selection, training and experience and the attitude of the divers who are willing to work safely. Having state-of-the-art, well-maintained equipment is also very important. It is a point of pride for Hydrex."

Koen Smouts, Technical Preparation Officer, is in charge of the depot and purchasing and maintaining all Hydrex's equipment including workboats, trucks and vehicles as well as diving gear. Everything is in its place, operational, clean and ready to deploy. His sense of order and his care for the equipment strikes you immediately when you walk into Hydrex's Antwerp depot. "Part of my work every day is training the divers on the equipment, how to care for it and maintain it, how to work together as a team to repair something on site if it is broken," says Koen. "When I train them, I also always tell them why it needs to be a certain way." This all contributes majorly to the company's safety record.

Clément Pâquet, Lead Diver is another veteran who has been diving for Hydrex for almost as long

A Hydrex diver in action

as Toon Joos. "I have always felt safe as a diver here," he says. "We try to keep the situation under control always, not leave things up to other people. When you have things in hand yourself, you can be sure it's going to turn out properly. We have a discipline. If you know what you are doing, you can eliminate the risks. This comes mostly from experience."

On any job he goes on, Clément usually has the role of Team Leader. He goes on-board to meet with the Chief Engineer and Chief Officer and ensure that safety measures are in place on the ship and that no one is going to turn the bow thruster on accidentally when they're working in the thruster tunnel, for example. Then he holds a short meeting with the entire team and makes sure everyone knows what they will be doing.

The attitude of management is important. "Management doesn't push us, so we always have the time to do things safely and correctly," says Clément. "It's not always easy, because sometimes we are working on a tight schedule, but if something is not safe, we do not start."

Henri Allard is a First Diver who came to Hydrex in 2016 after working at another dive company. "I feel very safe as a diver here."

"Everybody is concerned about maintaining the dive helmets and equipment in general, doing checks and yearly maintenance. If something is broken it gets reported immediately. I also feel safe as far as the other team members are concerned. Except for the student divers, I can rely on everybody. And the student divers just need to learn – they rely on me." Henri makes sure that the divers he is responsible for are properly equipped and that procedures are followed. "That's my responsibility as First Diver. I hear from freelancer divers that Hydrex is one of the safest companies

to work for. We are known for having the best equipment and that Hydrex is safety-conscious and efficient."

Manuel Hof is in charge of quality control and compliance at Hydrex, "We have a Safety Assurance System. This includes VCA external certification which is local to Belgium and the Netherlands. We also have our own diving standards and procedures. The maintenance of diving gear is really strict. The main point is to avoid accidents, not wait until there is a problem and then see how we can solve it."

In addition to the lengthy list of requirements, on-board safety measures, training of the divers, pre-dive checks and equipment maintenance checks, Manuel explains, "It's really important that management, team leaders and the person responsible for the depot, really encourage the divers to work in a safe way. If they don't set the example, then the other divers will not follow the rules as, apparently it's not that important."

One of the main reasons for Hydrex's enviable safety record is the attitude that pervades the group from top to bottom that safety is a chief concern. Another important factor is the willingness to work together to follow the rules that have been developed from experience over the years.

Hydrex has recently carried out a double underwater stern tube seal repair on a ro/ro ship berthed in Port of Burnie, Tasmania. The ship was suffering from an oil leak, making an on-site repair necessary. Using two flexible mobdocks simultaneously the team was able to carry out the entire operation on-site and underwater, saving the owner an expensive and time-consuming trip to drydock.

After arriving on-site, the diving team first set up a monitoring station next to the vessel. The operation then started with a thorough underwater inspection of the stern tube seal assemblies. After the inspection the divers cleaned the assemblies and installed both flexible mobdocks. By doing this they created a dry underwater environment so that they could work in drydock-like conditions.

The exact same procedure was followed on both stern tube seal assemblies. The split ring was first disconnected and brought to the surface to be cleaned. After cleaning the entire assembly, the Hydrex divers removed the first seal and replaced it with a new one which was then bonded. This was done in co-operation with the supervising OEM technician. The procedure was repeated with the other three seals. A successful operation was concluded with leakage tests, the removal of the flexible mobdocks and the reinstallation of the rope guards.

Despite the remote location of the ro/ro vessel, the Hydrex technical department was able to make all practical logistic arrangements and organise a mobilisation of the equipment very swiftly. In the recent past they have carried out several operations in Australia, including repairs on this ro/ro ship's sister vessel.

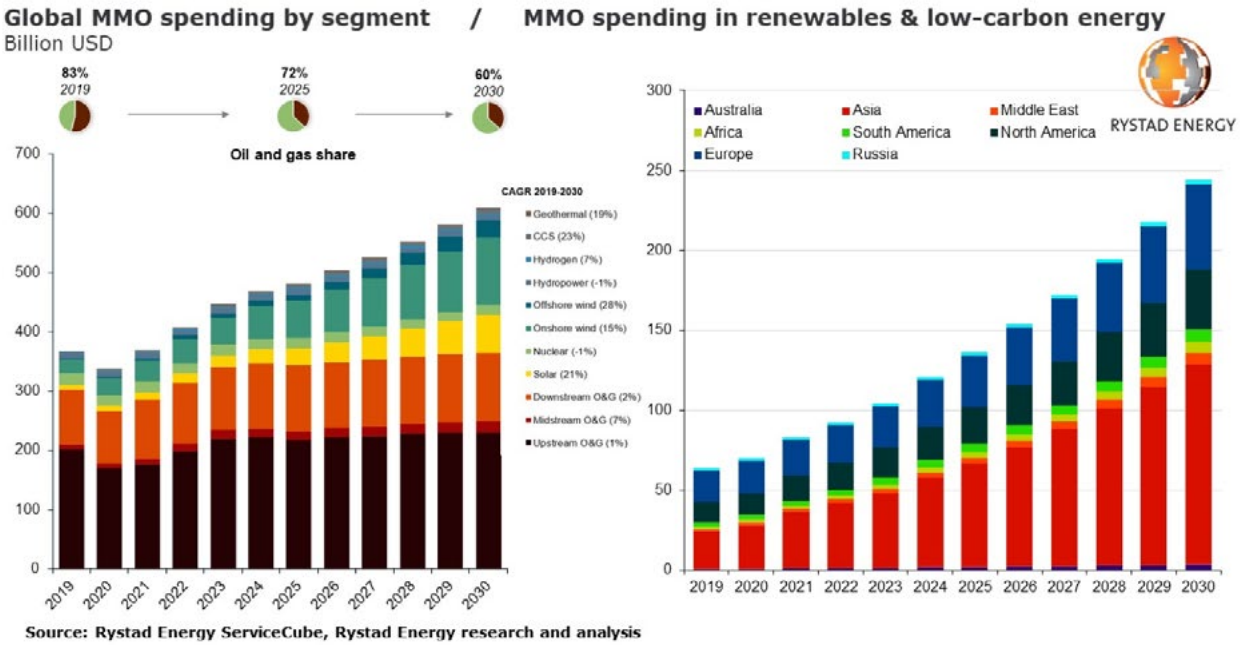
Because all the required material is ready to be transported at all times, no time was lost making preparations. This allowed for a timely arrival of the team in Tasmania with everything needed to successfully complete the job. With Hydrex organising everything from start to finish, the owner did not have to worry about making any arrangements for the repair. After the seals had been successfully replaced he could sail his vessel to her next stop free of oil leaks.

FEATURE

ENERGY TRANSITION AND SECURITY CONCERNS TO SPUR MMO MARKET:

In 2019, prior to the disruption caused by COVID, the annual maintenance, modification and operations sector (MMO) of the oil and gas market was worth an estimated US$367bn, according to Oslo-based consultant, Rystad Energy. In analysis carried out recently, Rystad said that the $63bn contribution to the total figure from the renewables and low-carbon energy sector in 2019 is likely almost to quadruple by 2030 – to $244bn. This would represent just over 40% of the total $600bn market by then, up from an estimated 17% in 2019.

Commenting on the figures, Ulrik Eriksen, an energy services analyst at the Oslo company's, said, "With the rapid adoption of renewable and low-carbon energy infrastructure expected by the end of the decade, there will be ample opportunities for MMO players to take advantage. The suppliers who can adapt quickly and service the maintenance needs of these growing industries will be in pole position to seize a significant portion of this expenditure towards 2030."



Source: Rystad Energy ServiceCube, Rystad Energy research and analysis

Many repair yards are engaged directly or indirectly in the oil and gas MMO sector - work typically includes mobilisation of vessels and rigs, modifications, conversions, routine surveys, maintenance, and related upkeep of assets. The use of drones to survey ships remotely has developed rapidly through the difficult days of the pandemic and is also widely used in the energy sector. The technology can easily be adapted and used for offshore wind facilities, Rystad said, pointing to other synergies which can apply just as easily to the renewable and low-carbon service sectors as to

traditional oil and gas.

The projected surge in non-fossil fuel MMO expenditure is likely to be driven mainly be growth in solar, wind, geothermal, and carbon capture and storage (CCS), Rystad said. The maintenance market in the solar sector is likely to increase by more than 500% over this decade, the analyst forecast, and is expected to be worth more than $64bn in 2030, up from $12bn in 2021. A significant volume of this is likely to involve floating technology. Meanwhile, the onshore and offshore wind markets are also forecast to see a rapid increase in MMO spending – up from about $39bn in 2021 to $143bn by 2030.

The geothermal and CCS sectors are expected to expand significantly in the balance of this decade, providing new opportunities for maintenance operators, Rystad said. However, as emerging technologies, they will be much smaller in quantum. The analyst forecasts that MMO spending on CCS could rise close to $7bn from last year's $1bn, while the smaller geothermal sector could reach $1.6bn in MMO spending by the end of the decade.

Rystad expects Asia to be the main driver of global growth in renewables and low-carbon energy MMO spending, accounting for $125bn, more than half of the global market. Meanwhile, expenditure in North America in 2030 is forecast to hit $37bn and the European market could exceed $53bn. The firm does not specifically mention energy security, probably because it would be impossible to gauge its impact on future energy markets at this time.

However, as European countries scramble to find new supplies of any type of energy available today – including some sources of power that were off the table at the beginning of this year including coal and, in some countries, nuclear power – fresh investment in most sources of energy are likely to rise, but with a clear emphasis on sustainable power for the future.

ON WATCH

Korean Register (KR) has announced that Cho Hyungmin, Principal Surveyor of Ship & Offshore Technology Team, has been elected the next Chair of the IACS Hull Panel. His appointment was announced at the 85th International Association of Classification Societies (IACS) Council Meeting in London, UK and underlines KR's growing technical skills in the area of hull structures. His three-year tenure starts on January 1st 2023.

The Hull Panel is one of IACS core technical working groups and oversees the development of rules, regulations and guidance related to hull structure including Common Structural Rules (CSR) and Goal-Based Ship Construction Standards for Bulk Carriers and Oil Tankers (GBS).

Mr. CHO was elected with the overwhelming support of IACS member societies representatives, having shown his expertise and leadership through his contribution to IACS as a project manager of the CSR-H project team. He has also served as a member of project teams dealing with hull structural issues.

Ocean Network Express (ONE) held a vibrant ceremony to mark the opening of its new ONE Green Office in Singapore during early July. Designed and conceptualised as an educational, interactive and collaborative space for green initiatives, the new office, where ONE's global Green Strategy Department and South Asia regional headquarters are now based, is an extension of ONE's Global Headquarters.

Senior Minister of State for Finance and Transport, Chee Hong Tat, was the Guest-of-Honour at the event said, "We are fully committed to strengthening Singapore's position as a Global Hub Port and International Maritime Centre for all players in the ecosystem to thrive and succeed. We are appreciative of the opportunity to partner ONE throughout their journey – from when they

started operations in Singapore, until today, as ONE expands their footprints here in decarbonisation, manpower development and maritime innovation and digitalisation. We look forward to continuing this close partnership with ONE and industry partners, as we scale greater heights together."

Kicking off the opening ceremony, ONE's CEO Jeremy Nixon said, "ONE, and your representative companies, and the Singapore Government are all playing their part in this important joint endeavour and commitment to long term sustainability.
Global Healthcare specialist ***VIKAND***, has appointed Dr. John Howe as Medical Director to lead the company's healthcare programme in the commercial shipping and yachting sectors.

Dr. Howe joined VIKAND directly from the telemedicine sector, having successfully launched a virtual consultation platform to over six million patients in India. While there, he managed the recruitment of medical professionals and set the standards in clinical quality assurance.

Prior to that, he founded and operated a number of clinics in Kazakhstan and his maritime experience comes from having served three years as a shipboard physician with two industry-leading cruise lines.

Lloyd's Register (LR) has appointed Chakib Abi-Saab to its newly created role of Chief Technology and Innovation Officer (CTIO). Abi-Saab, who was previously with Bahri (formerly known as the National Shipping Company of Saudi Arabia) as its Chief Technology Officer, joins LR with considerable expertise in technology and digital enablement from both maritime and the oil and gas industry.

Before his time with Bahri, Abi-Saab held executive roles at ship management company OSM, offshore energy provider Bumi Armada and Oil and Gas Services provider Baker Hughes. The new position of CTIO will see the merging of the Chief Technology Officer and IT roles, aligning the executive leadership team as LR accelerates its transformation and supports its innovation activities focussed on maritime digitalisation.