SHIPREPAIR & MAINTENANCE

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1ST QUARTER 2024

DUAL FUEL RETROFITS

METHANOL PROJECTS GAIN MOMENTUM

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ENVIRONMENTAL RETROFITS PRESENT YARDS WITH HUGE OPPORTUNITY

The potential gains from major environmental upgrades are significant, but shiprepair yards may have to speculate to accumulate in this context

The pace of environmental retrofits has ramped up significantly in recent months as shipowners seek compliance with EEXI and CII regulations, and as they implement their own in-house strategies for achieving net-zero carbon emissions. This trend is visible worldwide to the point where in many locations the majority of drydockings now include significant elements of energy and/or emissions reduction technology as part of the work schedule, some of which are large scale in nature.

One good example is the ferry *Viking Cinderella*, which has recently returned to service between Helsinki and Stockholm after a major makeover at the Turku Ship Repair yard in Finland. The Viking Line vessel, which was previously painted white, has had its sides painted bright red at the shipyard in Naantali, where its interiors underwent an extensive refurbishment. But also included was a package of investment in technical upgrades that will reduce the vessel's carbon dioxide emissions by an estimated 2,500tonnes a year.

Among a number of technical upgrades was installation of so-called Elogrids, produced in Finland, to reduce water resistance while the vessel is operating, and the installation of the LeanMarine system to optimise engine output and propeller steering.

Dani Lindberg, sustainability manager at Viking Line, said: "Renewal and maintenance of our vessels throughout their life cycle are an important part of our sustainability work. With these modifications now carried out, *Viking Cinderella*'s annual carbon dioxide emissions will be cut by 5%, and at the same time the remaining useful life of the 35-year-old vessel will be extended."

Embracing new technology in retrofit schemes is also gaining momentum, particularly using wind power and alternative fuels such as methanol. In recent weeks Oldendorff and Norsepower have announced an agreement to use Norsepower rotor sails to further reduce CO_2 emissions on a bulk carrier, *Dietrich Oldendorff*. The vessel is to be outfitted with three 24m x 4m Norsepower rotor sails by mid-2024 at an as yet to be confirmed shipyard.

In another example of the growing popularity of wind-powered retrofit options Carisbrooke Shipping is joining forces with GT Green Technologies and the University of Bristol to utilise a £3.7 million grant from the UK Department for Transport (DfT) to install a 20m AirWing, a wind propulsion solution designed by GT Green Technologies, on one of its general cargo vessels.

The surge in alternative fuel retrofits has been highlighted also by several recent contracts in this sector. CMA CGM has, for example, signed a deal with the Beihei Shipyard in China to retrofit a number of its 9,300TEU class container ships to run on methanol, becoming the latest container operator to invest in this type of dual-fuel technology. The US-based container ship operator Matson Navigation meanwhile has signed a contract with Cosco Shipping Shipyard (Nantong) for the 2019-built 3,600TEU capacity *Kaimana Hila* to enable the vessel to use LNG as fuel. Last year the yard completed a similar dual-fuel retrofit on a sister ship.

The use of hydrogen as an alternative fuel is also gaining some traction as evidenced by an announcement from the Greek shipowner Seanergy Maritime that it will provide one of its existing, conventionally fuelled Capesize vessels as the demonstrating vessel under the EU-funded Safecraft project. The vessel will be retrofitted to utilise hydrogen as the main energy source for electric power generation and also a portion of the vessel's propulsion requirements and, therefore, to reduce reliance on conventional fuels.

Seanergy will oversee the feasibility study and the retrofitting of the equipment in cooperation with American Bureau of Shipping, among others, to physically demonstrate this technology's applicability to the existing maritime fleet.

The rise in the scale and complexity of environmental retrofits is both an opportunity and a challenge for shiprepair yards worldwide. Those that have the capacity and facilities to accommodate this work stand to reap substantial rewards. But equally they have to invest not just in physical infrastructure but in the workforce skills, design capacity and process capabilities to make a substantial leap up from 'normal' maintenance and repair work that has been their 'bread and butter' over decades. Fortune will favour the brave, but those yards willing to take the calculated risk of investing now could well reap significant benefits in the years to come.

But there is another message that is loud and clear. Shiprepair yards will play a crucial role as shipping strives to meet demanding net-zero targets and combat the industry's harmful effects on global warming. ■

THE FERRY *VIKING CINDERELLA* AT TURKU SHIP REPAIR IN FINLAND WHERE IT RECEIVED A PACKAGE OF TECHNICAL UPGRADES TO REDUCE CARBON EMISSIONS

NEWS

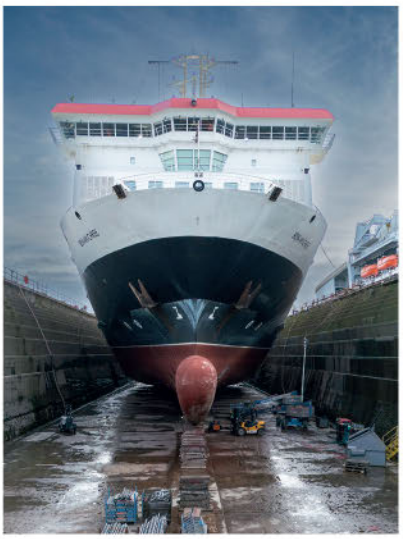
UK

SIGNIFICANT UPTURN FOR CAMMELL LAIRD

The Birkenhead-based shiprepair yard Cammell Laird has reported significant growth towards the end of 2023. In the last two months of 2023 alone, the UK North West facility welcomed more than 11 vessels for ship repair works, including new and returning customers.

Cammell Laird now operates as part of the wider APCL Group of shipbuilders and shiprepairers, which has helped the movement of vessels across all four facilities within the group. Notable late 2023 visitors included the ferry *Royal Iris of the Mersey* for annual maintenance work, which featured overhauls of both rudders, the pulling of both shafts, new seals and steelwork inserts on its hull. Other vessels to dock included Isle of Man Steam Packet Company's *Manannan*, the Boskalis dredgers *Deo Gloria* and *Freeway*, the tugs *Svitzer Pembroke* and *Svitzer Surrey*, Calmac's *Lord of the Isles* and the offshore support vessel *Vos Patriot*.

Mike Hill, managing director of Cammell Laird, says: "Over the past few months we have seen significant growth and dock utilisation as well as having multi-ship, multi-year framework agreements in place with several customers. It was a fantastic end to 2023 and we look forward to welcoming further vessels in 2024."



SHIP REPAIR VOLUMES AT CAMMELL LAIRD OVER THE LAST FEW MONTHS OF 2023 WERE 50% HIGHER THAN IN THE EQUIVALENT PERIOD OF 2022

COATINGS

TOUGH COATINGS CHOICE

Taiwanese dry bulk shipowner Wisdom Marine Group has selected Nippon Paint Marine's Neoguard Toughness coating to provide anti-abrasion and corrosion protection for 10 of its vessels. This coating is designed to reduce the need for costly maintenance and lengthy downtime and its easy cleaning properties also allow for quick and efficient turnaround between cargos, further contributing to reduced maintenance and repair work, Nippon Paint Marine states.

NEOGUARD TOUGHNESS WAS USED TO COAT A BULK CARRIER HOLD IN JUST FOUR DAYS

Wisdom Marine Group needed a fast turnaround in drydock and set a deadline for the cargo hold application of Neoguard Toughness to be completed within five days. The coating was used to coat an entire cargo hold in just four days, enabling the vessel to get operating again ahead of schedule.

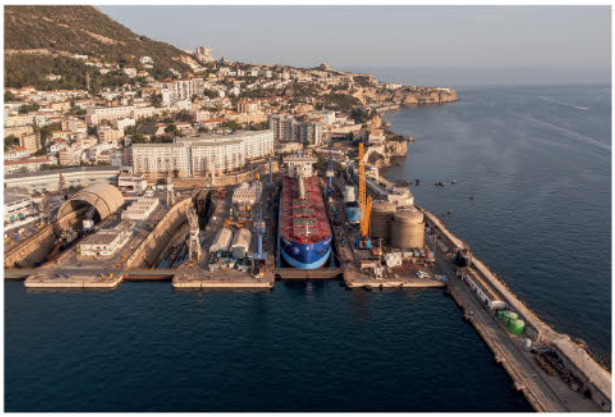
As a dry bulk shipowner, it is also vital for Wisdom Marine Group to protect its vessels from mechanical damage to its holds from abrasive cargoes and high impact loading procedures, which can lead to corrosion and structural failure. Wisdom Marine Group required a coating that would provide robust and long-term corrosion and abrasion resistance to ensure both the goods in the cargo hold and the vessels themselves were protected as the bulk carriers carry out their daily operations.

"We were assessing the market for a high-performing marine coating that would enable us to protect our bulk carriers from corrosion and mechanical damage. Nippon Paint Marine's Neoguard Toughness stood out to us" says Wisdom Marine Group.

COATINGS

GIBDOCK EXTENDS SUSTAINABILITY SKILLSET

Towards the end of 2023 the Gibraltar yard Gibdock hosted the Vulica Shipping Company-owned bulk carrier *Donald M James* for a 30-day project which brought a first opportunity to work with a new type of graphene-based coating from GIT Coatings. The 229m ship entered Gibdock's No.1 Dock for extensive works, including renewal to cargo holds, piping, thrusters, tail shafts and rudders, as well as new coatings.



GIBDOCK HAS HAD ITS FIRST EXPERIENCE APPLYING A GRAPHENE BASED COATING SYSTEM

GIT's hard foul release coatings are claimed to have had a breakthrough year in 2023, partly due to graphene's impact resistance and the absence of biocides and ultra low VOC content, but also because their smooth finish minimises drag and cuts ship emissions.

Richard Beards, managing director, Gibdock, says that the *Donald M James* project fully aligned with the yard's strategy for supporting owners to retrofit, apply and integrate solutions that benefit ship efficiency and sustainability.

"Gibdock continues to seek out work that enables decarbonisation in shipping," he says. "In this case, we renewed our relationship with Wilhelmsen Ship Management, which approached us on behalf of the owner to take on our first graphene-based coatings project. Yards need to be flexible and ready to offer customers the full range of options, whether their priority is alternative fuels, energy saving, emissions abatement or carbon capture."

Gibdock's focus on sustainability has been strengthened under the ownership of Balaena, the UK-based engineering company which took over the yard in 2022. Gibdock has since added to its ultra high-pressure water systems for hull cleaning; has its own reverse osmosis plant to supply industrial-grade water; and recently extended its shore power connections for ships in the yard to include three 360Hz frequency converters as part of broader investments in its electricity network.

CRUISE SHIPPING

CARNIVAL AND ABB SIGN AZIPOD MAINTENANCE DEAL

ABB and cruise ship operator Carnival Corporation have signed a 15-year agreement that covers maintenance of Azipod XO propulsion systems, under which ABB experts will be available round the clock to support the vessels' crew, using remote diagnostics and condition monitoring software. The owner will be able to accumulate data about Azipod propulsion performance, making spare part management and dry dock planning increasingly predictable and cost-efficient, ABB states.

ABB secured its first Azipod propulsion order for the Carnival Cruise Line ship *Carnival Elation* in 1995, and after selecting the solution for a second Fantasy class vessel, Carnival Corporation has gone on to specify Azipod propulsion for more than 40 vessels for its various cruise brands.

CARNIVAL IS EXPECTED TO BENEFIT FROM GREATER PREDICTABILITY AROUND MAINTENANCE COSTS AND SPARES PARTS PLANNING

SUSTAINABLE RETROFITS

VALE COMMISSIONS ROTOR SAIL RETROFITS

Brazilian mining giant Vale is to install five rotor sails from Anemoi Marine Technologies on board a 400,000dwt ore carrier, owned by Omani shipowner, Asyad.

The agreement between Vale and Anemoi will see five 35m tall, 5m diameter, cylindrical sails installed on the vessel. The rotor sails will be installed on Anemoi's bespoke folding deployment system, whereby the sails can be folded from vertical to mitigate impact on air draught and cargo handling operations. The installation work is expected to be completed in the second quarter of 2024.

This latest project from Anemoi follows the successful retrofit of three rotor sails on board an 82,000dwt Kamsarmax bulk carrier in June 2023. Initial data harvested from the vessel to date suggests more than 10% average annual savings can be achieved.

In another development showing growing interest in wind power retrofits, the container shipping group Ocean Network Express (ONE) is working with Dutch company Econowind to test two containerised wind assist devices, known as VentoFoil containers, installed on *Kalamazoo*, a 1,036TEU feeder vessel. A trial began in January 2024 and will run for approximately six months to assess the long-term viability of wind propulsion as a sustainable shipping solution.

PROPULSION SYSTEMS

WÄRTSILÄ TO UPGRADE HAFNIA TANKERS

Technology group Wärtsilä will supply its EnergoFlow and EnergoProFin solutions for 10 oil and chemical tankers owned by Hafnia. The combination of the two Wärtsilä systems is designed to ensure an optimised water flow over and after the propeller, thereby improving propulsion efficiency considerably. The project will be carried out over a two-year period for the 10 vessels. The first retrofits will take place before the end of 2024.

EnergoFlow is a pre-swirl stator designed to create an optimal inflow for the propeller, reducing fuel consumption and emissions in all operating conditions. The EnergoProFin is an energy saving propeller cap with fins that rotate together with the propeller, reducing the energy losses created by the propeller hub vortex, increasing overall propulsion efficiency and reducing underwater noise.

INDIA

COCHIN YARD COMMISSIONS SHIP REPAIR FACILITY

India's ship repair capabilities have taken a big step forward with state-run Cochin Shipyard opening a new ship repair facility, built on 42acres of land leased from Cochin Port Authority. This has been equipped with a 6,000ton shiplift and transfer system suitable for handling vessels up to 130m in length and 26m in beam, which is capable of the simultaneous repair of six vessels, thereby enabling the facility to undertake repair up to 84 ships in a year.

The new facility will help boost India's ship repair capacity by some 25% the yard claims. It is expected to cater for the needs of both locally based vessels and international vessels calling at Indian ports that require repair and maintenance support. The repair facility's ship lift and transfer system was sourced from a consortium of IMG, Germany and Syncrolift, Norway.

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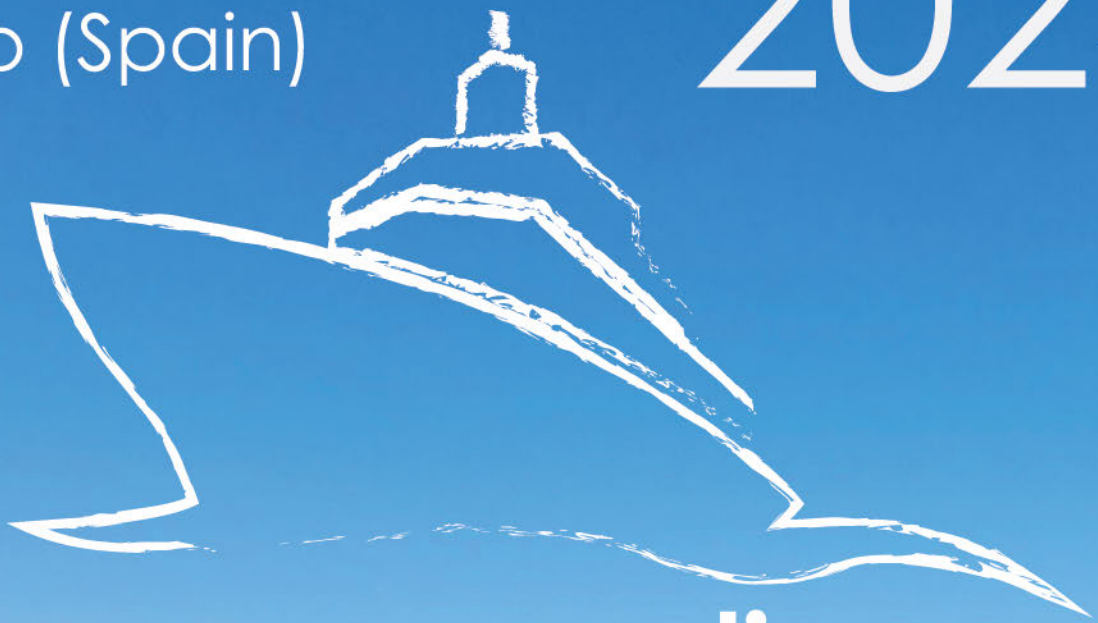

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UNDERWATER MAINTENANCE

MULTIPLE UNDERWATER STERN TUBE SEAL REPAIRS

Recently teams deployed by the Belgian company Hydrex performed underwater seal replacements on five vessels in just over a month. The company's diver/technicians travelled for repairs to Spain, then to Belgium, next on to Trinidad and Tobago, then to Colombia and finally back to Spain. By using flexible mobdocks, all the repairs could be performed on-site and the ships did not have to go to drydock, the company states.

On four of the five vessels oil leaks were the reason for the operation. These were caused by ropes and nets that got tangled in the stern tube seal assembly. The same procedure was followed for each repair. Taking advantage of the Hydrex flexible mobdock technique, the teams were able to carry out the repairs on-site and underwater.

WELDING WORK ON A ROPE GUARD IN TRINIDAD AND TOBAGO

SOUTH AMERICA

CHILE YARD PROJECT WIN FOR SYNCROLIFT

Astilleros y Maestranzas de la Armada (ASMAR) has awarded Norway-based Syncrolift the tender for the basic engineering design of a 5,000tonnes shiplift and transfer system at its shipyard in Talcahuano, Chile. In addition, international engineering firm Royal Haskoning DHV will conduct a separate engineering scope for civil and maritime works in the harbour area as part of a consortium with Syncrolift.

The letter of award includes an option for the delivery of a Syncrolift shiplift and ship transfer system. This contract is valued at approximately US$24 million and is subject to final investment decision by ASMAR.

The shipyard in Concepción Bay in Talcahuano is ASMAR's main shipyard. The facility performs maintenance, repair, upgrading and refit work to both navy and commercial units of up to 96,000dwt and, in addition, the building of navy and commercial vessels of up to 50,000dwt.

The award in Chile follows a number of new contract wins during the past year for Syncrolift, including both upgrades and newbuild shiplift and ship transfer systems to shipyards in Dubai, India, Vietnam, Indonesia and Europe. These confirm its position as the world's leading manufacturer of shiplifts and transfer systems.

CRUISE SHIPPING

FLEET-WIDE MAINTENANCE DEAL EXTENDED

Wärtsilä and Carnival Corporation have signed a one-year extension to an agreement covering maintenance, technical support, optimisation and fuel saving solutions for 57 cruise ships within the group's fleet. The arrangement will now continue to March 2030.

COSTA FORTUNA, ONE OF THE 57 CRUISE SHIPS COVERED BY THE WÄRTSILÄ PERFORMANCE AGREEMENT

By optimising the performance and efficiency of the ships' Wärtsilä engines, fuel consumption is reduced. As such, the programme is considered a key element within Carnival Corporation's strategy to reduce greenhouse gas emissions generated by its cruise shipping operations.

In addition to the supply of scheduled and unscheduled spare parts, the Wärtsilä agreement includes technical advisory services for major overhauls, technical audits, crew training, equipment monitoring, technical support and a tailored fuel savings programme.

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DRYDOCKING

NEWPORT SHIPPING MAKES RAPID PROGRESS

The last 12 months have been "a magnificent period" for Newport Shipping, the UK-based company reports. In 2023 Newport carried out 36 drydocking projects at its Tuzla Bay yard in Turkey, with other projects being completed at partner shipyards in China and the rest of the world.

There has also been an increase in the number of ballast water treatment systems (BWTS) projects that have been completed. Over the past year, Newport Shipping carried out 10 BWTS installations onboard vessels. Other work carried out the company included 571tonnes of steel work for various projects.

Newport Shipping was established in the UK in 2011 and is active globally with drydocking, retrofit, repair and conversions in 15 yards with 38 docks. Collectively they are capable of handling approximately 2,500 repairs annually of a wide range of vessel classes and sizes.

UNDERWATER MAINTENANCE

UNDERWATER SERVICES FIRMS JOIN FORCES

A merger between the underwater services division of the MIE Group and H & S Diving Consulting (H & S), an underwater services company based in Durban, South Africa, is expected to create one of the leading players in this specialist segment within the maritime industry.

The new joint venture will be located in Limassol, Cyprus, and will operate under the H & S brand, with Rudi Havenga at the helm, and new hires Christopher Kyriacoudes and Harry Hadjiyerou, previously of Norden, coming in to manage the business development and commercial operations respectively.

All underwater services that were previously managed by the MIE Group will be transitioned to the newly established entity.

PROPULSION SYSTEMS

SCHOTTEL MODERNISES CROATIAN FERRY

Last year the Croatian ferry *Krk* operated by the national Jadrolinija shipping company was retrofitted by Schottel to cater for a new route with stronger winds and currents. For this purpose, the open propellers of the *Krk*'s thrusters were replaced with new optimised propellers and fitted with Schottel VarioDuct SDV45 nozzles. The thruster upgrade comprised a mixture of overhauls and modernisation in accordance with the time schedule of the vessel's planned maintenance cycle.

The thrusters were dismounted and reinstalled in Croatia by Schottel's partner, Alfa Marine, while the conversion work on the thrusters themselves was carried out at the Schottel service workshop in Spay, Germany.

A cost saving of around 50% was achieved by overhauling the existing thrusters, including the transportation costs to Germany, as opposed to purchasing new ones, Schottel states.

The results of the *Krk*'s modernisation are said to "exceed all of Jadrolinija's expectations". The ferry is responding more accurately to steering manoeuvres and the autopilot makes fewer corrections thanks to the much-increased course-keeping stability. In addition to the vessel's increased course-keeping stability, the new nozzles also ensure smoother operation of the thrusters.

THE CROATIAN FERRY *KRK* WAS RETROFITTED TO CATER FOR A NEW ROUTE WITH STRONGER WINDS AND CURRENTS

INSPECTIONS

REMOTE THICKNESS MEASUREMENT BY DRONE

Global Drone Inspections (GDI) has now added the Skygauge drone to its range of marine sector capabilities. By adding airborne robotics, GDI can now take ultrasonic thickness measurements of large uncoated and painted surfaces, such as corrugated bulkheads and web frames.

The company says the technology has been proven, with certain limitations on the areas that can be reached, in demonstrations with four major classification societies.

"GDI has the equipment and the skills needed to take valuable measurements efficiently and safely in conjunction with approved thickness measurement suppliers," comments David Knukkel, GDI's CEO. "Working in conjunction with approved thickness measurement suppliers does not change the process of liability, validation of measurements, and reporting. GDI considers the drone to be a new additional tool which wirelessly supports the work of the engineer."

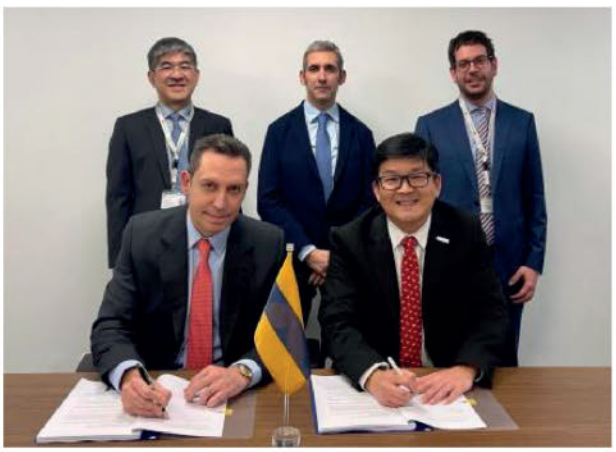
Under the new service offered by GDI. The thickness measurement engineer remains responsible for validating measurements by executing a proper calibration and judging the accuracy by looking at the full A-scan. The engineer will report the values as usual within the different formats of each individual classification society.

One of the key characteristics of the Skygauge drone is the fact that complete alignment with the contact surface is not required. The drone aligns itself by arranging an equal cup pressure of 20Nm to the surface. Furthermore, artificial aids based on LIDAR assist the operator in estimating the alignment and movement to the next measurement position. The system's software provides continuous measurements and delivers an indication of the accuracy of the readings as well as a final reading.

SKYGAUGE DRONE WITH THICKNESS MEASUREMENT PROBE

LNG CARRIERS

LNG CARRIER CONTRACT FOR SEATRIUM



ALEXANDROS POLITIS-KALENTERIS, DEPUTY CHIEF OPERATING OFFICER, TMS CARDIFF GAS AND ALVIN GAN, EXECUTIVE VICE PRESIDENT, REPAIRS & UPGRADES, SEATRIUM, SIGN THE STRATEGIC PARTNERSHIP AGREEMENT FOR LNG CARRIER REPAIRS AND UPGRADES IN GREECE

Singapore-based Seatrium has secured a contract with TMS Cardiff Gas for repairs and upgrades to its fleet of LNG carriers. The favoured customer contract covers the refit of 17 LNG carriers in Singapore, with joint planning, information and experience sharing. The two companies will also jointly work towards achieving targets in the areas of Quality, Health, Safety and Environment (QHSE), cost efficiency and timely deliveries, which are considered key indicators of high-quality LNG refit maintenance.

TMS Cardiff Gas, a corporation with offices in Greece that was formed in 2011, has already worked with Seatrium on three LNG refits, says it sees the Singapore-based yard operator as a long-term partner with a very strong track record in the specialised field of LNG carrier repairs and upgrades. It adds that it confident that this newly forged partnership will benefit both organisations in the planning and execution of drydocking work in a safe, timely and cost-effective way.

NORTH AMERICA & CARIBBEAN

MULTIPLE MAJOR PROJECTS DELIVERED BY VIGOR

Vigor Group yards in Oregon, Washington State and Alaska have been kept busy with a wide range of projects in recent months

THE PORTLAND SHIPYARD'S FLOATING DOCK WAS USED FOR AN EMERGENCY REPAIR TO THE CRUISE SHIP *CARNIVAL PANORAMA* TOWARDS THE END OF LAST YEAR

While Vigor Group yards undertake a significant amount of work for US governmental agencies, including the US Navy and US Coast Guard, the company has handled some interesting commercial projects as well in recent months.

One of the most significant is the contract to convert up to three large Washington State Ferries vessels to operate on hybrid electric power. At the same time as converting these ships to run in a more environmentally friendly way, Vigor will update the vessels' aging propulsion systems and extend their life expectancy,

Vigor started work on the first of the three ferries, *Wenatchee*, at its Harbor Island yard in Seattle last September. The vessel is expected to remain with Vigor until the summer of 2024 when it will return to service. Vigor expects to commence converting the Washington State Ferries *Tacoma* in the second half of 2024 and, if approved, the third in the series, *Puyallup*, will follow in 2025.

Carnival Cruise Line also recently selected Vigor to undertake a major emergency repair on the *Carnival Panorama* which spent a month at the company's Portland yard. The facility, which has the largest floating dock in North America and is thus well suited for cruise ship work, was able to successfully address propulsion system issues which had adversely impacted vessel reliability and cruising speed.

US Navy work for Vigor over the past year has included a three-year long modernisation of the USS *Chosin* at Harbor Island. This was one of the largest, longest and most complex projects in Vigor's history, involving around two million man hours of work.

Vigor has also undertaken a nine month programme of work on the USS *Michael Murphy*, which was

THE USS *TULSA* AT SWAN ISLAND AFTER ITS UPGRADE AND MAINTENANCE PERIOD

VIGOR IS TO CONVERT THREE OF WASHINGTON STATE FERRIES LARGEST VESSELS TO RUN ON HYBRID ELECTRIC PROPULSION SYSTEMS

completed in Pearl Harbour, Hawaii, while its Swan Island yard in Portland finished a 13-month docking of the USS *Tulsa*, which returned to service in October 2023. This involved a comprehensive painting and repair of the underwater hull, adding new decks, cleaning and painting fuel tanks and general maintenance and repair activity. Vigor also replaced USS *Tulsa*'s diesel service generator, the first time this had been undertaken on a US Navy vessel of this class.

More work for the US Navy is underway. USS *Cape St. George* and USS *John Paul Jones* are currently undergoing maintenance at Vigor's Harbor Island facility.

The US Coast Guard is another regular customer for Vigor yards and work was completed on the cutter USCGC *John McCormick* late last year, returning it to service ahead of schedule. The US$3.65 milion contract represents the first non-emergency maintenance project awarded by the Coast Guard to the company's Ketchikan Shipyard in Alaska since 2011. This was also the first time a vessel of USCGC *John McCormick*'s class has been serviced at Ketchikan. The vessel spent around two months at Vigor's Alaska shipyard for an extensive maintenance programme, including work to its propulsion systems and hull coatings.

In addition to USCGC *John McCormick*, Vigor continues to conduct time critical work for the Alaska Marine Highway System at Ketchikan Shipyard. The yard has recently finished maintenance work on the ferry *Kennicott* and is now working on *Columbia*, which is due to be completed in February. ■

SEASPAN LOOKS TO BUILD FURTHER ON STRONG SHIPREPAIR PERFORMANCE

A big investment project is now underway to boost capacity at Vancouver Drydock

WORK TO THE DREDGER *FRPD-309*, INCLUDING THE INSTALLATION OF A BALLAST WATER TREATMENT SYSTEM, WAS ONE OF THE MOST NOTABLE JOBS HANDLED AT VANCOUVER DRYDOCK IN 2023

The Canadian Seaspan Shipyards group enjoyed a strong final quarter of 2023, handling a wide range for vessel types, including cruise ships, naval vessels and barges.

The Vancouver Drydock completed blast and paint work, and installed a new ballast water treatment system onboard the *ATB-65-10* barge and the tug *Vision*, which visited between September and October last year. This was the first installation of a BWTS at the yard for several years and the company says the project was completed smoothly as a result of a significant amount of pre-fabrication and pipework.

Other recent visitors included the BC Ferries' *Queen of Cowichan*, which stopped for blast and paint repairs, and mechanical work over a month-long stay during November and December. The Vancouver yard also welcomed two Canadian Coast Guard vessels, CCGS *Sir John Franklin* and CCGS *Sir Wilfrid Laurier*. The latter is currently in the yard for an extensive project due to be completed this April. The work scope includes the replacement of three 42tonne engines, alongside general repairs, hull blasting and paint work.

Looking ahead to March this year, the Vancouver Drydock team is planning for the arrival of an unusual 400ft (121.9m) long vessel, *Hannah*, for blasting and paint work. Owned by Northline Seafoods this is the first floating salmon processing plant in North America.

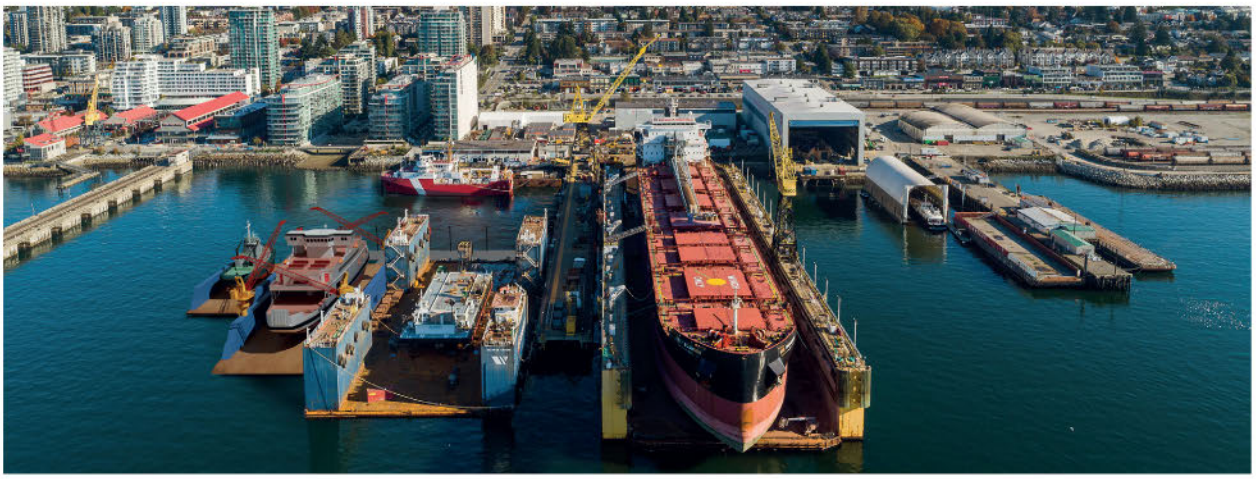
Overall in 2023 Vancouver Drydock completed a total of 37 ship repair and maintenance projects, with a wider range of vessels than in 2022, and an "exceptionally high" drydock occupancy rate. "Although the number of vessels at the yard was similar to that recorded in 2022 and 2023, the nature of the projects evolved towards more comprehensive vessel life extensions and highly specialised repairs," says Paul Hebson, vice president and general manager.

Highlighting that trend was a notable project carried out in the first half of 2023 at Vancouver Drydock, involving the dredger *FRPD-309*. The team at the yard focused on steel repairs, replacing and repairing the bottom hatches, and replacing several hopper bulkheads in the tanks, as well as some minor mechanical work on the propeller hub and propeller blades. "This was the first time this uniquely complex vessel had visited the dock for planned maintenance," says Hebson. "Collaboration between our welders, mechanics and pipe fitters made the month-long project a success," he adds.

Another yard in the group, Victoria Shipyards, received two large cruise vessels towards the end of 2023, *Disney Wonder* and *Carnival Panorama*. The second of these (BWTS) arrived in November to have its funnel removed and returned a few weeks later for it to be reinstalled. The vessel had been booked into another yard, in Portland, Oregon, but was too high to pass under one of the bridges on the way. The vessel was rerouted to Victoria, to lower its overall height, before returning for the funnel's restoration.

Buoyed by strong performance over the past few years, Seaspan is making some significant investments in infrastructure at the Vancouver Drydock, to help better serve the needs of customers in the Pacific North West. This includes a drydock expansion that will include two new floating drydocks, a new operations building and

A MAJOR PROGRAM OF WORK IS CURRENTLY UNDERWAY ON THE COAST GUARD VESSEL *SIR WILFRID LAURIER*



AN AERIAL VIEW OF THE VANCOUVER DRYDOCK WITH COMPUTER GENERATED IMAGES SHOWING THE NEW DRYDOCKS AFTER THE EXPANSION PROJECT

an upgrade and extension of the current careen deck to enhance its capabilities. The company received the necessary approvals from the Vancouver Fraser Port Authority (VFPA) in October last year. Construction work is now underway and the facilities are expected to be completed by late 2024.

The expansion of the yard, which comes in response to Vancouver Drydock operating at, or near, capacity for several years, is expected to increase Seaspan's capacity for ship repair projects by about 30%. The investment project includes extending Seaspan's water lot by 40m and the addition of the two new, smaller drydocks and a floating work pontoon to the west of the two existing drydocks.

"With significant projects such as the CCGS *Sir Wilfrid Laurier* already underway and ongoing developments in the expansion of the yard, there is anticipation that the positive trend for Vancouver Drydock observed in 2023 will continue in to 2024, and beyond into 2025. As a high tempo repair and maintenance yard, our skilled teams look forward to continuing to serve vessels operating in and around the Pacific North West region in particular," Hebson concludes. ■

GBSL LAUNCHES MAJOR INFRASTRUCTURE INVESTMENT PROGRAMME

One of the biggest shipyards in the Caribbean region is acquiring new floating docks to capitalise on robust market conditions and exploit emerging opportunities in the cruise and commercial shipping sectors

For Grand Bahama Shipyard Limited (GBSL), the past year has been very busy, with the return of cruise ships, as well as a healthy number of tankers, containerships and other vessel types, including a drill ship. Overall dock occupancy was in excess of 90%, GBSL reports, as business bounced back strongly after being adversely impacted by the pandemic.

Prospects are bright for 2024 as well, with a similar level of dock occupancy anticipated. "The coming year looks set to be another busy period for the yard, although ongoing infrastructure upgrades mean we have to contend with some limitations in terms of berth space," says CEO David Skentelbery. "We do have the opportunity to carry out some afloat works at alternative berths within Freeport harbour, should the requirement arise," he adds.

GBSL is benefitting from a relative high level of forward bookings, with around 65% of revenue targets accounted for at the start of the year.

Skentelbery explains: "There are no significant projects that we would term out of the ordinary, or worthy of special mention, but once again we are seeing a good mix of vessel types, which means we are not over dependent on any one sector. One of our aims for the year ahead is to increase the use of the facility and the adjacent harbour for more in-water surveys and afloat repair works. We benefit greatly from deep, extremely clear clear water in Freeport, which makes it an ideal location, just off the main shipping routes, for a quick port call for inspections or repairs."

While GBSL is active across a range of vessel types, cruise shipping remains a key element of its workload, and over the past year it has welcomed more vessels of this type post-Covid. However, overall, cruise shipping now represents no more than 30% of the business, as the yard has picked up work in other sectors.

"We benefit greatly here from repeat customers as they see benefits in terms of our turnaround times and pricing," says Skentelbery. "We make a point of competing on safety and quality of service and of course a robust environmental management system to protect what are some of the most beautiful waters in the world."

A major programme of infrastructure investment, in excess of US$500 million, is just getting underway at the yard. GBSL has ordered two new floating docks from China, with lift capacities of 130,000tonnes and 93,000tonnes respectively, which will allow the yard to dock not only the world's largest cruise ships, but also larger tanker types and LNG carriers. Along with the new floating docks, which will enter service in January and September 2026, GBSL is undertaking pier extensions, workshop upgrades and some minor changes to the layout of the yard.

"Our aim is to regain our position as the world's leading cruise ship repair facility, but also to increase our capability to diversify and serve the wider ship repair market. Once the investments are completed we will have the three largest docks in the region, and already have bookings for both cruise and commercial vessels though to 2028," says Skentelbery. ■

THE DRILL SHIP *DEEPWATER ATLAS* ALONGSIDE AT GBSL FOR REPAIRS LAST YEAR

DETYENS LOOKS FORWARD TO STRONG YEAR AHEAD

The Charleston, South Carolina, shipyard has got off to a flying start in 2024, with plenty of forward bookings already confirmed

THE DETYENS SHIPYARD IS EXPERIENCING HIGH LEVELS OF DOCK OCCUPANCY WITH FORWARD BOOKINGS THROUGH TO APRIL THIS YEAR

The past year was another busy one for the US Coast Detyens Shipyard. "It was certainly a good year for us. There were some slow periods when the docks were not completely full, but overall the volume of work was higher than it was in 2022," says Brad Kerr, sales and marketing director.

The majority of activity was made up of fairly standard shiprepair and maintenance projects, although the yard proved its worth in handling some emergency repairs, including vessels that had suffered grounding damage. There was also a strong upturn in ballast water treatment system installation projects, as owners that had delayed booking this type of environmental refit work rushed to ensure compliance.

The split between government and commercial work was a healthy balance, with around 60% of the yard's workload coming from governmental bodies, such as the Maritime Sealift Command (MSC) and the US Maritime Administration (MarAd). However, there was a good pipeline of commercial vessels in 2023, both for locally based Jones Act ships and international clients, including Netherlands-, Japan-, Canada- and Cyprus-based owners.

"Within the shiprepair sector, the US is becoming more competitive with respect to other regional options, such as yards in the Caribbean and Mexico," Kerr explains. "Shiprepair projects tend to be awarded on the basis of quality, time and cost and we believe we can deliver effectively on all three of these considerations, enabling us to attract both intentional and domestic owners."

Detyens has got off to an "excellent" start to 2024 as well. All the Detyens Shipyard docks were full as of the beginning of February and are fully booked until mid-April, with a mix of projects including work for the SpaceX drone ship JRTI, heavy-lift craft, a new skeg for a sugar barge, three vessels for the National Oceanic and Atmospheric Administration (NOAA), a cable-layer and a crane boom overhaul for a Bobo class vessel operated by MSC. "We are seeing brisk bookings into late Spring, and some owners are approaching us with regard to 2025 bookings, which is a very encouraging trend. Normally we are used to very short term advanced bookings, often measured in days rather than weeks, so to get bookings months ahead is a positive development," says Kerr.

Detyens continues to invest in the shipyard, upgrading yard infrastructure, including electricity and water provision to the quayside to meet customer requirements. The company is also planning to deepen one of its repair quays to the north side of the yard, allowing it to handle vessels up to 760ft (231.6m) long and 30ft (9.14m) in draught. The company is furthermore investing in its human resources, with an extensive apprenticeship scheme in place to recruit younger workers into the profession. ■

DUAL & ALTERNATIVE FUEL CONVERSIONS

MAN PRIMESERV BUILDS UP DUAL FUEL RETROFIT PORTFOLIO

The company now has projects for more than 50 vessels either confirmed or as options, the vast majority of which envisage dual fuel running on methanol

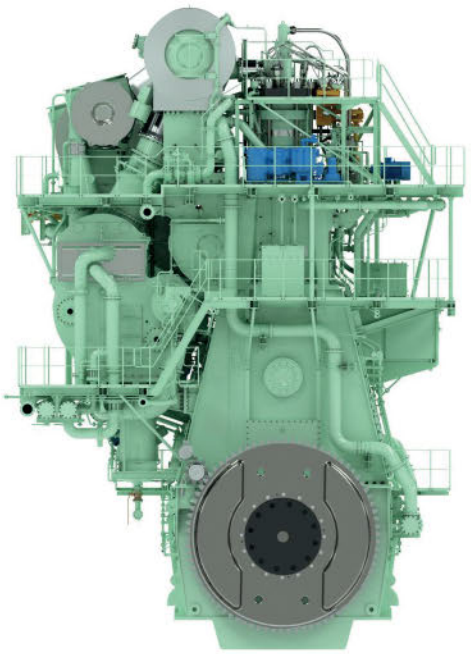
At present MAN PrimeServ's retrofit project pipeline is very much about converting existing engines to operate on alternative fuels. Over the past year the company has secured contracts for over 40 engine retrofits, the majority of which will be converted to run on methanol, with the leading vessel segment being containerships. Overall, the company estimates that these contracts could save more than 3 million tons of CO_2 annually, if owners operated their vessels purely on alternative fuels.

One of the containership contracts has come from US-based Matson Navigation Company, which will convert the main engine aboard the 3,600TEU, 2019-built *Kaimana Hila* from a MAN B&W S90ME-C10.5 unit to a dual-fuel ME-GI engine capable of running on LNG. In doing so, it is exercising an option contained in a contract it signed with MAN in June 2022 to perform an identical conversion on a sister ship, *Daniel K. Inouye*.

Two LPG carrier vessels operated by Tianjin Southwest Maritime have been scheduled for retrofits by the COSCO Shipping Heavy Industry shipyard in Guangdong, China. In this case MAN B&W 6G60ME-C engines fitted to the *Gas Libra* and *Gas Scorpio* will be retrofitted to dual-fuel MAN B&W 6G60ME-LGIP units capable of running on LPG. The two vessels are scheduled to enter drydock in early 2024.

The past year has seen a rapid acceleration in the uptake of methanol engine conversion contracts, with AP Moller Maersk leading the way. The carrier has signed a contract with MAN PrimeServ for the retrofit of the main engines on 11 container vessels equipped

XIAODONG GUO, MANAGING DIRECTOR OF COSCO HEAVY INDUSTRY SHANGHA AND MICHAEL PETERSEN, SENIOR VICE PRESIDENT AND HEAD OF PRIMESERV DENMARK, SIGNING THE CONTRACT TO CONVERT COSCO CONTAINER SHIPS TO RUN ON METHANOL AS FUEL



MAN ENERGY SOLUTIONS HAS DEVELOPED THE ME-LGIM DUAL-FUEL ENGINE TO RUN ON METHANOL AS WELL AS CONVENTIONAL FUEL

with MAN B&W 8G95ME-C9.5 units. These will be retrofitted to dual-fuel MAN B&W 8G95ME-LGIM10.5 type engines capable of operation on fuel oil or methanol. The first Maersk vessel will be retrofitted in mid-2024 and MAN PrimeServ says this will also be the first ever methanol retrofit performed on a two-stroke engine.

Also in the containership segment, Seaspan and Hapag Lloyd will be converting an initial 15 vessels from MAN B&W S90-type engines to dual fuel ME-LGIM engines capable of running on green methanol. This agreement includes 45 optional engine retrofits, making it the biggest programme of its kind at present.

Towards the end of last year COSCO Shipping Heavy Industry shipyard in Shanghai signed a contract with MAN for the methanol retrofit of four main engines on COSCO Line's Camellia and Virgo class vessels, rated at 13,800 and 20,000TEU respectively. Currently equipped with single fuel MAN B&W 11S90ME-C10.5 engines, the vessels will be retrofitted to dual-fuel MAN B&W 11S90ME-LGIM10.5 units capable of operating on fuel oil or methanol. The contract also includes an option for the retrofit of an additional nine vessels from the carrier's Virgo and Pisces classes, all of which are 20,000TEU capacity. The first COSCO methanol retrofit is expected to take place in the second quarter of 2025, and will feature S90-LGIM engines, making them the first vessels to utilise this new technology developed by MAN Energy Solutions.

Another, yet undisclosed, container operator has also contracted with MAN to undertake a methanol convection retrofit with LGIM technology. So far two main engine conversions involving large containerships have been confirmed, with an option of eight more on the table.

In each of these dual fuel conversions, potentially now for over 50 ships in total, MAN PrimeServ will deliver a comprehensive package of support to the projects. This includes the necessary research and development, engineering, procurement, delivery, installation consultancy, testing and commissioning consultancy, engine recertification and project management.

KLAUS RASMUSSEN, HEAD OF PROJECTS AND PUMP VAPORISER UNIT (PVU) SALES, MAN PRIMESERV

MAN PrimeServ is extremely upbeat about prospects for dual fuel engine conversions. "There are around 4,500 vessels that could be refitted tomorrow to alternative fuels, although realistically the potential is limited to the 2,000 vessels that consume the most fuel," states Klaus Rasmussen, head of projects and pump vaporiser unit (PVU) sales. "Converting those however would reduce CO_2 emissions by around 80 million tons a year, which would be equivalent to approximately 9% of global maritime emissions."

There are still some constraints that would have to be overcome to achieve such a level of dual fuel engine retrofits. The most significant is fuel availability, with the need to develop new and more complex supply chains for alternative fuels a high priority. According to Rasmussen: "Owners need to engage more and commit to volumes to secure a reliable supply of alternative fuels in the future."

Interestingly, MAN does not see shiprepair yards proving to be a bottle neck. "We know that is a claim that has been made but it is not a consideration we recognise," says Rasmussen. "However, repair yards will have to upgrade their skills in engineering and planning if they are to be able to deliver projects in accordance with owners' demands. That work is in progress with the support of MAN PrimeServ, which has developed various documents and procedures that will assist conversion projects at repair yards."

Looking to the future, MAN PrimeServe is carrying out several R&D projects focused on operating dual-fuel engines more effectively after a large retrofit project. These initiatives range from adding generators to the main engines to optimising the turbocharger set up to cope with the slow steaming mode that vessels are predominantly operating under now. ■

SUPPORTING INDUSTRY FRONT RUNNERS ON THE PATH TO ALTERNATIVE FUEL RETROFITS

With the market for fuel conversion and retrofit projects expected to grow significantly over the next few years, Alfa Laval is exploring innovative ways of supporting customers

As the shipping industry accelerates its drive to use alternative fuel types through retrofits to ships in service, to achieve decarbonisation, Alfa Laval is gearing up to provide relevant technical solutions in partnership with industry stakeholders. The company's FCM Methanol fuel supply system has for example recently been selected by container ship giant Maersk for a pioneering retrofit to enable the 15,000TEU capacity *Maersk Halifax* to operate on methanol as fuel. The company says this is a "significant achievement" that "underscores the feasibility of retrofitting ships with the necessary equipment for methanol-based propulsion".

Alfa Laval will support the retrofit project, due to take place in mid-2024, with the installation of an FCM Methanol low-flashpoint fuel supply system (LFSS) that will allow the vessel to operate on green methanol with dual-fuel capabilities. The retrofit will involve adding a new fuel line for methanol alongside the traditional fuel line, in the process overcoming challenges relating to existing space constraints and a tight time schedule. According to Viktor Friberg, head of marine separation & fuel supply systems at Alfa Laval: "The project with Maersk gives us a unique opportunity to take up a new challenge – retrofitting our equipment for methanol use for the first time."

In another important step forward in terms of converting vessels to operate on methanol, Alfa Laval has signed an agreement with leading engine manufacturer, MAN Energy Solutions, to develop a methanol fuel supply solution for four-stroke engine retrofits. It is expected that, as a result of this partnership, the first MAN four-stroke engine types will be capable of retrofit to run on methanol from 2025.

In the new venture, Alfa Laval will provide the FCM Methanol LFSS itself, as well as the control system, fuel valve train and auxiliary functions such as the purging system. It will initially design and build a prototype at its facility in Monza, Italy, before delivering it for testing on a methanol engine at MAN Energy Solutions facilities in Augsburg, Germany, in early 2024.

As well as methanol, biofuels are a current and accessible fuel option that can help shipping companies decarbonise. Alfa Laval claims to be the first on the market to address this with a biofuel-optimised separator as well as upgrades for existing units. The new biofuel-ready separators follow extensive research at the Alfa Laval Test & Training Centre in Aalborg, Denmark and cooperation with ISO and engine industry association CIMAC.

Biofuels are already in widespread use, and ISO is looking to incorporate them into the 2024 revision of

A THIRD-GENERATION VERSION OF THE ALFA LAVAL FCM METHANOL TECHNOLOGY

ISO 8217. Nevertheless, they can be prepared in various ways and differ widely in their characteristics, both from conventional fuels and from each other. Because of differences in density, moisture absorption, and other elements, they demand additional care when it comes to fuel storage and treatment.

To ensure optimal biofuel separation, Alfa Laval has modified both internal bowl components and the separator software. This, it says, makes setting up for different biofuel blends or conventional fuels a simple parameter change.

According to Friberg: "Retrofitting solutions to accommodate new fuels, thereby enabling the engine to operate on alternative fuels, is a complex task that requires expertise and experience. Ensuring compatibility between existing infrastructure and the new fuel or technology is crucial for successful fuel conversion and retrofit projects, and thorough testing and validation are essential to ensure the effectiveness and safety of fuel conversion."

Alfa Laval is not only working on alternative fuel projects to reduce environmental impact in the retrofit market. The company is also active in developing energy-efficient technologies to install on existing vessels. This includes the fluidic air lubrication system Alfa Laval OceanGlide for which a number of retrofit agreements have been signed recently. This includes one with Singapore's Kumiai Navigation that will see one of the operator's LPG carriers retrofitted, while a similar contract has been signed with Odfjell Ship

A COMPUTER-GENERATED IMAGE OF A WALLENIUS CAR CARRIER FITTED WITH AN OCEANBIRD WING SAIL

Management for installation onboard a chemical carrier. Furthermore, Alfa Laval has ongoing installations for OceanGlide involving a Newcastlemax bulk carrier, an LR2 type tanker, a MR2 tanker, a product tanker, a ro-ro ship and an LPG carrier.

The company is also putting effort into developing technology suitable for retrofits that can improve energy efficiency onboard and hence reduce fuel consumption. One example is the AQUABlue E2 freshwater generator that can either allow for slow steaming while producing the same amount of freshwater, or produce the same amount of freshwater and use the saved waste heat for producing energy onboard.

In addition the Alfa Laval E-PowerPack converts waste heat directly into clean electrical power, reducing fuel costs. Based on Organic Ranking Cycle (ORC) technology, the unit is designed to be compact and easy to install, and can make use of a wide variety of gas and liquid heat sources onboard.

Last, but not least, Alfa Laval is in the process of driving marine decarbonisation through wind energy. Oceanbird, a joint venture between Alfa Laval and Wallenius, can be used on both existing and new vessels, and either in wind-assisted or full sail configurations. While still in the developmental stages, Alfa Laval believes this technology has the potential to play a "substantial" role in the global effort to combat climate change. The first vessel with a full scale wing sail prototype will sail in 2024, and the ambition is to have the first vessel with a full set of six Oceanbird wing sails ready in 2027. ■

WÄRTSILÄ PROGRESSING FERRY CONVERSION PROJECT

Stena contract highlights the engine manufacturer's growing influence in the methanol engine conversion sector

THE WÄRTSILÄ 32 METHANOL ENGINE

Since last year Wärtsilä has been working closely with the ferry operator Stena Line on a contract for the conversion of some of its vessels to operate on methanol, as part of a broader decarbonisation strategy. The project involves modifying fuel supply systems, engine adaptations and integration with existing ship systems. Wärtsilä will supply a range of components including instrumentation, valves, pump units and automation as part of these projects.

Following on from the conversion of the *Stena Germanica* to run on methanol eight years ago, which also involved Wärtsilä technology, these latest conversions are scheduled to take place in 2025. Once installed they will ensure Stena Line's compliance with the Carbon Intensity Indicator, FuelEU Maritime and IMO 2050 GHG reduction targets.

In addition, in the past year Wärtsilä has also announced cooperation with Royal Caribbean Group and the Chantiers de l'Atlantique to convert two Wärtsilä 46F engines to allow Celebrity Cruises' new ship to utilise methanol as fuel. This marks the first-ever such conversion for this particular engine type, the company notes.

Looking to the future Wärtsilä has developed a number of new technologies to help facilitate vessel conversion and retrofit projects. Noteworthy advancements include the versatile Wärtsilä 25 engine, capable of operating with diesel, LNG and liquid biofuels, as well as being adaptable to carbon-free fuels such as ammonia, and the Wärtsilä 32 methanol engine. The company has also broadened its methanol-burning capabilities by introducing another four methanol engines to its portfolio.

Furthermore, throughout the Wärtsilä diesel engine portfolio, covering both new engines, as well as those currently in operation, Wärtsilä is developing corresponding methanol retrofit capabilities. Methanol upgrades are either available or under development for the Wärtsilä 31, Wärtsilä 32, Wärtsilä 46F, Wärtsilä 46TS and Wärtsilä ZA40S engines, while the Wärtsilä 20 engine series can be ordered with methanol combustion capabilities.

Wärtsilä has also introduced retrofit solutions such as Fit4Fuels and Fit4Power, which are designed to enhance engine efficiency and extend emissions-compliant lifetimes. "Our ongoing research and development focuses on achieving true fuel flexibility, with our Fit4Fuels platform converting two-stroke diesel engines for future fuels, and the Fit4Power radical derating retrofit providing mid-life engines with optimised performance to meet changing emission targets," says Giulio Tirelli, director, business development at Wärtsilä Marine.

Wärtsilä envisions a growing market for fuel conversion and retrofit projects in the next few years. According to Tirelli: "Increasing demand for fuel conversion technology, enabling different vessel types to run on dual fuels and alternative fuels to help meet emissions reduction targets, is essential to ensuring alignment with current and future regulations. The main constraints lie in the diverse challenges of modifying vessels running on traditional fuels while factors such as existing fuel types, load profiles, certification and safety requirements contribute to the complexity of these projects."

The company is further developing various new engine technologies to assist with meeting decarbonisation goals, including engines capable of running on alternative low carbon and zero carbon fuel. Tirelli says: "We are continuing to invest in developing and delivering further dual fuel and alternative fuel products to enable smooth retrofit planning and implementation for existing vessels across the world's fleet. We aim to ensure a smooth and efficient pathway for our customers towards a decarbonised future." ■

GIULIO TIRELLI, DIRECTOR, BUSINESS DEVELOPMENT AT WÄRTSILÄ MARINE

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Principal Guest & Speaker

Mr Arsenio Dominguez

Secretary-General

International Maritime Organization

Mr. Arsenio Dominguez was elected Secretary-General of the Organization by the 129th session of the IMO Council in July 2023 for a four-year period beginning 1 January 2024.

The election was endorsed by the IMO's Assembly at its 33rd session in December 2023. Mr. Arsenio Dominguez (Republic of Panama) is the tenth elected Secretary-General of the International Maritime Organization.

Prior to starting his position as Secretary-General, Mr. Arsenio Dominguez Velasco was a Director of IMO's Marine Environment Division. He joined the IMO Secretariat in 2017, first as Chief of Staff to the Secretary-General, Kitack Lim, before being appointed in 2020 as Director of the Organization's Administrative Division.

His maritime career began in 1996 as a port engineer at Armadores del Caribe in Panama before moving to become a Drydock Assistant Manager at Braswell Shipyard.

In 1998 Mr. Dominguez Velasco moved to London to join the Panama Maritime Authority as Head of the Technical and Documentation Regional Office for Europe and North of Africa. He went on to represent Panama in a variety of roles at the organization, culminating in 2014 with his appointment as Panama's Ambassador and Permanent Representative to IMO until 2017.

Between 2014 and 2017, Mr. Dominguez Velasco chaired IMO's Marine Environment Protection Committee (MEPC), and in 2015 he chaired the Technical Committee of the 25th session of the IMO Assembly. Prior to this, between 2010 and 2014, he chaired the Maritime Security – Piracy and Armed Robbery Working Group under the auspices of the organization's Maritime Safety Committee.

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SCANDINAVIA & THE BALTIC

BLRT GRUPP CONTINUES TO EXPAND BALTIC REPAIR FACILITIES

The arrival of a new floating dock, due to be commissioned in Tallinn this year, underlines the group's continued commitment to develop and grow its ship repair capabilities

CONTAINERSHIP, MSC *MANDY III*, IN DOCK AT THE WESTERN SHIPREPAIR YARD IN KLAIPEDA

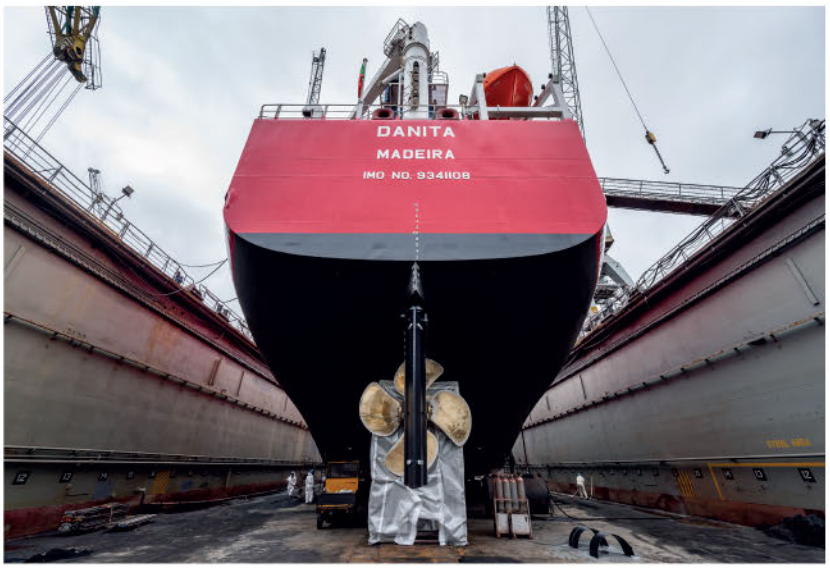
BLRT Repair Yards, which operates facilities in Estonia, Lithuania and Finland, last year further consolidated its position as one of the leading providers of ship repair and retrofit services in the Baltic Sea region. Overall, the company, which has six repair docks, including the largest floating dock in the Baltics and one of the largest drydocks in Northern Europe, now handles over 270 vessels a year, a figure that is likely to rise still further with the arrival of a new 180m-long floating dock in 2024.

One of the most notable repair projects handled by BLRT Repair Yards last year was the comprehensive maintenance of the MSC *Mandy III*, a 237m-long container vessel, which was docked at the Western Shiprepair facility in Klaipeda in late 2023. The project involved an extensive package of repairs, including the replacement of 123m tons of steel in the cargo holds and ballast tanks, the installation of an ICCP system and overhauls of the vessel's valves and ballast pumps. Other elements of the work scope included renewing the stern tube seal and the rudder pintle bearing, as well as installing a reefer socket safety protection system.

A highlight of 2023 for BLRT's Tallinn Shipyard was the installation of a Damen Air Cavity System (DACS) on a 115.5m-long cargo vessel, *Danita*. This air lubrication system, designed to reduce fuel consumption by up to 15%, and hence CO_2 emissions, through lowering water resistance, was the result of a collaboration between the team at BLRT Repair Yards, Damen and the Estonian-based shipping company, Amisco, with the project supporting Amisco in achieving the required CII rating for operating in the Baltic Sea.

Another significant project for the group was a major upgrade of the flotel *Isabelle*, which underwent an extensive environmental systems refurbishment, largely carried out by BLRT Repair Yards before its planned arrival at a new site in Canada in early 2024. As part of the project, Tallinn Shipyard constructed and installed a boat landing platform, weighing around 15,000kg, while another member of the group, Finland's Turku Repair Yard, served as a docking site and undertook underwater hull and superstructure painting, the inspection and repair of overboard valves, minor piping and steel works and surface treatment of the heeling and grey water tanks.

Overall, BLRT says that 2023 was marked by a greater focus on sustainability and performance enhancement related work. "Shipowners sought not only aesthetic improvements but also efficiency and environmentally friendliness in their fleets," explains Andrejus Babachinas,



A DACS AIR LUBRICATION SYSTEM WAS INSTALLED ON THE CARGO SHIP *DANITA* WHILE DOCKED AT TALLINN SHIPYARD

CEO. "We did our best to play a significant role in this, as demonstrated by the application of silicone paint to various types of ships, including general cargo vessels, tankers, reefers and fishing boats," he says. The company also notes that its group of yards have made increasing use of high-pressure cleaning technologies during vessel maintenance work to reduce environmental impact.

BLRT Grupp is continuing to invest in its shiprepair yards' equipment and infrastructure to enhance their capabilities and competitiveness. "The focus is on adopting innovative solutions and technologies that align with the evolving needs of the maritime industry, particularly with regard to strengthening sustainability and efficiency," says Babachinas.

Over the past year, for example, the company has invested in the Blastac 900 VMB dust-free grit blasting system, which offers cleaner surface preparation, smoother paint applications and reduces the spread of harmful particles. The technology is particularly efficient on vertical surfaces, BLRT Repair Yards observes, and cleans up to Sa3 standards.

Other investments include a renewed and more spacious service station for marine safety appliances in Klaipeda; and the purchase of a 50ton crane that will be primarily used for transporting Panamax-type vessel hatch covers. The longer crane arm will make it possible to lift hatch covers directly from the ship while moored alongside the berth and move them to the production area, close to the workshop, where they will be treated and repaired, thereby greatly streamlining the ship repair process.

As indicated, the biggest investment for the year ahead will be the acquisition of a 180m-long floating dock, able to handle vessels up to Handymax size, for Tallinn. The 30m-wide dock is being built in Turkey at the Hat-San shipyard, and is expected to be operational before the end of 2024.

"These enhancements are part of the BLRT Grupp's ongoing investment programme which has seen over €75 million spent over the past five years, to expand our facilities and resources and better serve shipowners," Babachinas adds. ■

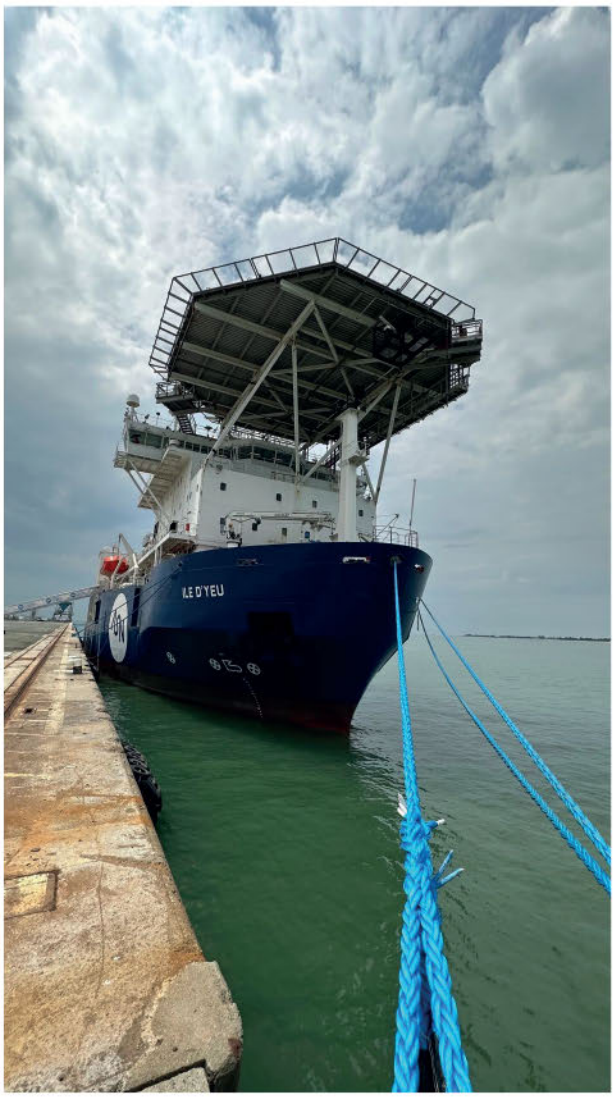
A NUMBER OF SILICONE PAINT APPLICATIONS WERE MADE LAST YEAR BY BLRT, INCLUDING ONE TO THE HARTMAN SEATRADE-OWNED *ARCTIC ROCK*

CONVERSION PROJECTS GIVE REMONTOWA A BOOST

One of the strongest performing sectors for the Polish yard Remontowa over the past year has been ship conversion, with a number of large scale projects of this type carried out in this period

Amongst the biggest projects completed during 2023 at Remontowa was the conversion of the *Ile d'Yeu*, a former pipe-laying vessel, into a cable ship to lay and repair underwater fibre optic links, fitting it with equipment for constructing and maintaining submarine transmission networks.

The yard also extensively upgraded the Norwegian Coastal Express ferries *Polarlys* and *Trollfjord*, renewing their passenger spaces and modifying them to operate with significantly reduced emissions. During their stay in the yard they received Selective Catalytic Reduction (SCR) systems to reduce nitrogen oxides in the exhaust gases; new exhaust gas boilers; a new waste treatment plant; and a new bulbous bow section to reduce fuel consumption.



ONE OF THE BIGGEST PROJECTS COMPLETED BY REMONTOWA IN 2023 WAS THE CONVERSION OF THE FORMER CABLE LAYER *ILE D'YEU*

In addition, the Swedish ferries *Stena Nordica* and *Stena Vision* underwent conversions at the yard, expanding and upgrading passenger spaces on board. Notably *Stena Nordica* left Remontowa with a new 100tonnes superstructure and "beaver tail" weighing nearly 60tonnes on the stern, designed to improve navigational safety, as well.

In December last year Remontowa also completed the conversion of another pipe-laying vessel into a cable layer for an undisclosed client. After conversion, the vessel can lay energy cables between wind turbines and transformers at offshore wind farms. As part of an extensive work scope Remontowa installed a new deck on which the cable carousel and other components were arranged, while foundations for a ROV were prepared, and docking facilities installed to ensure safe interaction with tugs and OSVs during cable laying work. The vessel was also shortened by several metres and underwent an intensive class survey.

In the early part of 2024 Remontowa completed the modification of the ro-ro vessel *Ville de Bordeaux*, which transports Airbus aircraft parts, to enable it to operate using wind power, by installing the foundations for three wing sails. The project was ordered by Louis Dreyfus Armateurs and lasted several months.

Environmental retrofit work has also been on the up at Remontowa. During 2023 the yard retrofitted several vessels with Mewis Duct propulsion units and equipped 30 vessels with ballast water treatment systems of varying types. Additionally, between January 2023 and January 2024 the yard installed 12 scrubbers on seven ships, making it one of the most active yards in the world with this type of environmental retrofit work.

On the ferry *Robin Hood* Remontowa installed four scrubbers weighing 200tonnes each, two in each of the two funnels, while on two more ro-ro vessels, *Tulipa Seaways* and *Acacia Seaways*, two 9m-high scrubbing towers were installed on board. Other vessels receiving scrubbers included the gas carrier *Kapellen*, the container ships X-Press *Mulhacen* and X-Press *Godavari*, and the ferry *Finnstar*.

To speed up the scrubber installation process Remontowa prepares suitable steel structures, and even entirely new funnels, with the system components installed inside, before the vessel arrives. The company's design office, Remontowa Marine Design,

FINNSTAR WAS ONE OF A NUMBER OF SHIPS TO RECEIVE EXHAUST GAS SCRUBBERS DURING THEIR STAY IN THE YARD LAST YEAR

prepares detailed documentation in advance, enabling the installation to be done quickly, often at the same time as a standard overhaul.

"Shipowners are increasingly opting to retrofit their fleets with scrubbers or BWMS and selected energy saving devices during a single stay. Such a complementary service is gaining momentum, with more and more ships leaving Remontowa compliant with the EEXI and CII requirements," says company spokesperson Grzegorz Landowski.

Conventional repair work also held up well, with the yard repairing 161 vessels in total during the year, underlining its position as one of the busiest shiprepair yards in the region. The company handled a wide range of vessel types, including bulk carriers, container ships, crude oil/product/chemical tankers, car carriers, ro-ro ships, ro-pax ferries, cruise ships, project cargo ships, gas carriers, dredgers, geotechnical vessels, cable lay vessels, offshore wind support vessels and reefer ships.

Last year was also notable for the fact that Remontowa carried out an extensive amount of work to upgrade and modernise the shipyard, including investments aimed at further reducing energy consumption and boosting productivity. These included replacing lighting with LED lights, the purchase of new machinery such as automatic welding units, profile bending machinery, CNC units and a hydraulic press. Production yards, including the hatch cover repair facility, were also upgraded, increasing the allowable working load limit to 2tonnes per square metre, while engines and control systems were replaced on several quay and dock cranes.

Looking to the future Landowski is very upbeat about the yard's prospects, especially in the environmental conversion and retrofit segments. He points out: "It has been estimated that around 70% of the world's fleet of over 100,000 ships is still waiting for energy saving solutions. Of course, some of the older tonnage will be scrapped, but the role of ship repair yards in decarbonising shipping is crucial. We believe that many of those vessels still in operation, especially in the Baltic, are in our range, creating considerable opportunities." ■

THE RO-RO SHIP *VILLE DE BORDEAUX* HAS BEEN FITTED WITH WIND SAILS DURING A LENGTHY STAY AT THE YARD

DFDS *ACACIA SEAWAYS* IS ONE OF SEVERAL SHIPS TO RECEIVE A SCRUBBER SYSTEM AT THE YARD

REGIONAL DEMAND TRENDS BENEFIT SWEDISH YARD

Repeat customers from the Baltic region have kept Oresund Drydocks relatively busy over the past 12 months

LAST MARCH ODD CELEBRATED 20 YEARS OF SHIP REPAIR ACTIVITY, MARKING THE ANNIVERSARY OF THE FIRST VESSEL, SCANDLINES' *ASK*, DOCKING AT THE YARD IN 2003

One of Sweden's leading shiprepair yards, Oresund Drydocks (ODD), reports a very high level of dock occupancy last year, with the expectation that 2024 will also generate good business levels for the yard.

"We benefitted from work from several key customers, including a number well-known to us from previous years, who had enough foresight to make early reservations for their docking slots in what was a busy year for us," says Sven Asberg, sales manager.

Notable dockings toward the end of 2023 included the *Lysvik* and *Lysbris* from Godby Shipping, both of which included ballast water treatment system installations. *Stena Nautica* was also drydocked for a few weeks in December for a class renewal.

"A trend that we have seen over the past year is the growing interest in fuel saving upgrades and environmentally friendly solutions such as silicone painting, electric conversions and the installation of wind sails, and similar technology," says Asberg.

Early 2024 has also seen some notable dockings at the Oresund yard, with the ro-pax *Finlandia* coming in for class renewal, including modifications to its rudders and steering gear. Solstad Offshore's *Normand Vision* was another early year visitor, for class renewal and crane modifications.

"We are optimistic about prospects for the year ahead and we anticipate that fuel saving and other environmentally friendly solutions will come into play even more than in previous years," Asberg explains. "Also we expect to see growing demand from the increased wind generation and cable laying activities in the Baltic, both of which will trigger requirements from specialist vessels for maintenance and repairs at our yard," he says.

ODD remains committed to the further expansion and upgrading of the yard, which is a critical asset for the local maritime sector. "Over the last few years we have made regular investments in order to become a modern, efficient shiprepair yard, and will continue to do so. In the year ahead we will make further investments in a number of areas, but largely with a focus on human resources," says Asberg.

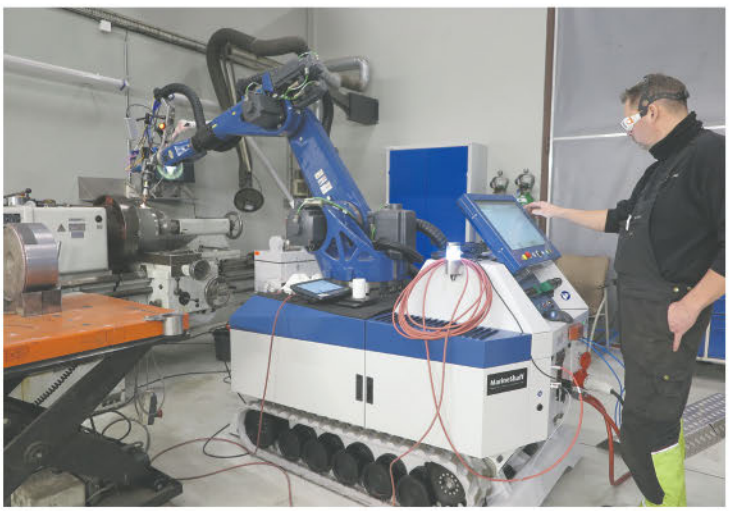
For some time ODD has been planning to invest in a new graving dock, to accommodate the larger vessel types now operating in the Baltic Sea region. "The past year has been a year of progress towards the new dock, which we are all waiting for. Hopefully we will have some news to report in the next few months," adds Asberg.

ODD operates on a 100,000m^2 site, with two drydocks and 800m of repair quays, supported by 35,000m^2 of covered workshop space. Crane capacity alongside the quays is 180tons, and 200tons inside the workshop. ■

REPAIR TECHNOLOGY

MARINESHAFT STEPS UP LASER CLADDING INVESTMENT

By using this advanced repair technique, propeller components subject to breakdowns, wear and corrosion related damage which might otherwise not be repairable can be returned to service, says the Danish specialist



MARINESHAFT'S NEW LASER CLADDING MACHINE WORKING ON A THRUSTER LINER

MarineShaft has used laser cladding repair techniques at its urgent repair workshop in Hirtshals, Denmark, for the past seven years. Recently the company has invested in a second robotic laser cladding unit, and more equipment is on its way.

The company's new equipment has a longer range, and it is easier to move around due to its track design. The new unit's robot arm can also lift 45kg of equipment, compared to the older unit which has a 10kg capacity.

As well as the additional cladding unit, a new laser lance will arrive shortly at the MarineShaft workshop, and this will require more lifting capacity. With the new lance, MarineShaft will be able to repair damage on the inside of parts such as large couplings and cylinders, as its reach is approximately 700mm, even though the new lance can fit into items as small as those with a 170mm opening.

"With laser cladding we can repair damage on key parts that were previously impossible to repair with regular welding techniques, or were not allowed by classification societies," says senior project manager, Peter Pallesen. "The main advantage of laser cladding is the lower heat input to the material, while it also offers shorter repair times, as post-weld heat treatment can be avoided after laser cladding, reducing delivery time by several days," Pallesen adds. "With laser cladding, it is also possible to apply a material that provides a harder surface, thereby extending the strength and lifespan of the item," he continues.

Currently MarineShaft has class approvals to use laser cladding on stainless steel, carbon steel, bronze and cast iron and can use the technique to repair propeller shafts and equipment, rudder stocks and assemblies, stabiliser fins, gear and thruster components, among other items.

A numerically controlled robot arm is used, providing more geometric options for material application compared to a mechanical feed, as in a lathe, which only allows the material to be applied in a continuous string. The technique ensures very precise and accurate welding, with the surrounding areas unaffected by the minimal heat impact.

Laser cladding is performed with various types of powder, depending on the material and purpose, including bronze, Stellite 21 and Inconel 625. According to the company all powder types adhere completely to the base material and have been thoroughly tested by Force Technology.

"Our laser cladding equipment is in daily use in our workshop," says Pallesen. "The new piece of equipment will free up capacity, which is essential for a company like ours, where many tasks are related to breakdowns and where the job should ideally have been completed yesterday! Another important reason for this purchase is to provide more repair possibilities through the equipment's enhanced capabilities," he concludes. ■

PETER PALLESEN, SENIOR PROJECT MANAGER

FPSO CONVERSION

DRYDOCKS WORLD SET TO COMPLETE FPSO *ATLANTA* PROJECT

Complex refurbishment and upgrade underlines the Dubai's yard's prominence in the FPSO segment

THE FPSO *ATLANTA* NAMING CEREMONY IN DUBAI IN DECEMBER 2023

Last December the latest FPSO conversion project carried out by Drydocks World in Dubai, FPSO *Atlanta*, was officially named, prior to its expected delivery to Yinson Holdings in the first quarter of 2024. The yard has a long track record in the FPSO segment, but this project, to upgrade a vessel, previously the tanker *OSX-2*, into an FPSO tailored for extended service in the Atlanta field in the Santos Basin offshore Brazil, was one of the most complex yet. The project's tight 18-month deadline added an additional layer of challenge.

"Drydocks World's work on the FPSO *Atlanta* serves as a testament to our expertise in handling complex FPSO refurbishment and upgrade projects. We demonstrated an ability to navigate technical challenges, adhere to strict regulations, and effectively manage complex logistics that played a pivotal role in the project's overall success," says to Rado Antolovic, CEO.

The scope of work encompassed production engineering, procurement, steel renewal, piping upgrades, tank coating, equipment upgrades and commissioning, all executed to meet ABS Class standards and designed to prolong operational life, while adhering to environmental standards.

A particular aspect of the project was the incorporation of new technologies, involving the adaptation of existing systems from the *OSX-2* to meet the stringent requirements of the new FPSO. Notably, FPSO *Atlanta* boasts a carbon management system with a closed flare and fuel gas inertisation, positively contributing to emissions reduction. Beyond emissions reduction, the captured heat from the production process can efficiently fuel vessel operations. Additionally, future deployment of Direct Air Capture (DAC) and Carbon Capture, Utilisation, and Storage (CCUS) technologies that actively remove carbon from the air, provide options for further storage or utilisation.

To surmount the demanding timescale challenges, Drydocks World says it implemented efficient work processes, incorporating streamlined planning, prefabrication and modular construction techniques. "A collaborative approach, marked by joint problem-solving and proactive communication with the client and various stakeholders, ensured seamless project alignment and close collaborations, ultimately leading to the successful completion of the project," Antolovic adds.

The FPSO *Atlanta* refurbishment and upgrading project undertaken by Drydocks World stands out as one of the largest ventures yet for the shipyard. This distinction is evident not only in terms of vessel size but also in processing capacity. The converted FPSO now features an impressive production capacity of 50,000 barrels per day, coupled with a substantial storage capacity of 1.25 million barrels. These figures underscore the

magnitude of the project, marking it as a significant accomplishment for the shipyard.

"The successful completion of the FPSO *Atlanta* refurbishment and upgrading serves as a powerful showcase of our unparalleled capabilities and expertise in managing highly complex projects. This accomplishment not only enhances the shipyard's reputation but also positions us as an attractive choice for potential clients and projects in the future," says Antolovic.

Other technologies on FPSO *Atlanta* include an advanced spread mooring system, ensuring flexibility and stability during field operations. This is designed to enhance the overall manoeuvrability and operational resilience of the vessel, contributing to its adaptability in diverse offshore conditions.

The refurbishment and upgrading elements of the project also involved the integration of modernised processing modules, enhancing the efficiency and reliability of oil and gas processing onboard. These updated modules contribute to improved operational performance, ensuring the FPSO meets the industry's evolving standards for productivity and reliability.

A standout success of the FPSO *Atlanta* refurbishment and upgrading project was the remarkable safety record achieved by Drydocks World. Antolovic observes that: "With nearly seven million man-hours and zero lost-time incidents, we have underscored our unwavering commitment to fostering a secure working environment. This achievement not only attests to the yard's dedication to safety but also highlights our ability to execute large-scale projects without compromising the well-being of our workforce."

The FPSO *Atlanta* project is certainly testament to Drydocks World's prowess in FPSO refurbishment, upgrading and conversions. Beyond the impressive safety record and adherence to accelerated timelines, it solidifies the yard's position as a leading player in the industry.

"The ability to navigate complex projects, embrace challenges as opportunities, and consistently deliver exceptional results positions Drydocks World as a reliable and proficient partner for similar projects in the future. The success of FPSO *Atlanta* is not merely a project milestone but a reflection of Drydocks World's enduring commitment to excellence in the field of FPSO conversions," Antolovic concludes.

FPSO *Atlanta* is the latest in a series of offshore conversions and upgrades carried out by the Dubai shipyard. Recently Drydocks World completed a major refurbishment and conversion project for FPSO *Firenze*, which is now redeployed off the coast of Côte d'Ivoire in West Africa. The fast-tracked project was carried out within 15 months for Saipem, Last year, the company also converted two Liquefied Natural Gas (LNG) vessels to boost production off the coast of the Republic of Congo.

The deployment of the *Tango* Floating Liquefied Natural Gas (FLNG) and *Excalibur* Floating Storage Unit (FSU) vessels, in collaboration with Antwerp-based Exmar and Italian energy company Eni, marks a significant milestone in the ongoing Congo LNG project. The project is a world first, joining two vessels by using a spread mooring system designed and patented by Exmar. The newly combined assets complement each other to gather, liquefy, store and offload LNG from Eni's Marine XII block, situated offshore from Pointe Noire in the Republic of the Congo.

Also, as part of DP World's collaboration with Aker Solutions, the yard has a joint venture to upgrade, refurbish and electrify FPSO *Petrojarl Knarr*. The FPSO will be redeployed at the Rosebank field development in the United Kingdom offshore sector and the upgrade work will allow it to be kept in the field for 25 years without drydocking.

Drydocks World Dubai has also begun work on the FPSO *Voyager Spirit*, a partnership between Altera and ENI Côte d'Ivoire, which will involve a major upgrade of the vessel. The FPSO is destined for service in the Baleine light oil field offshore Côte d'Ivoire. ■

FPSO *FIRENZE* WHICH WAS COMPLETED FOR SAIPEM LAST YEAR

SEATRIUM DELIVERS LATEST FPSO CONVERSION

The Singapore-based yard operator continues its long-term partnership with Modec

SEATRIUM HAS RECENTLY DELIVERED FPSO *LÉOPOLD SÉDAR SENGHOR*, SENEGAL'S FIRST FPSO, TO MODEC AND WOODSIDE

Seatrium, created last year from the merger of Keppel and Sembawang's Singapore yard operations, has a well-established track record of Floating Production Storage Offshore (FPSO) conversion and modification, dating back to its first project of this type back in 1981. The company has recently delivered its latest conversion, FPSO *Léopold Sédar Senghor* for Modec, which will be deployed by Woodside Energy (Senegal) in the Sangomar Field Development, which is the West African country's first offshore oil development.

The FPSO was previously a VLCC and was converted by Seatrium, under contract from Modec, into a FPSO suitable for the conditions of the Sangomar Field. The converted FPSO will be capable of processing 100,000 barrels of crude oil a day, 145,000 barrels of water injection a day and will have a minimum storage capacity of 1.3 million barrels of crude oil.

Seatrium's scope of work included topsides integration, as well as support for the onshore commissioning of the FPSO.

Soichi Ide, president and CEO of Modec Offshore Production Systems (Singapore) pays tribute to the contribution made by the yard. "This has been a demanding project in terms of both technical and execution complexity. The challenges were compounded by the Covid-19 pandemic, but we remained fully committed to safety and quality throughout the entire process, achieving over 21 million hours without a lost time incident (LTI)," he says.

FPSO *Léopold Sédar Senghor* reinforces Seatrium's standing as one of the world leaders in the conversion, modification, and completion of FPSOs. It also marks its 20th major project for Modec, building on a partnership forged over decades of collaboration.

Seatrium has now commenced work on another Modec FPSO earmarked for Brazil, FPSO *Bacalhau*. The vessel's hull recently arrived at the company's yard in Singapore and work onboard is underway.

Seatrium has also undertaken several other notable offshore conversions including a Floating Storage and Regasification Unit (FSRU), *Energos Celsius*, for New Fortress Energy (NFE), again for deployment offshore Brazil. FSRU *Energos Celsius* will have a nominal regasification capacity of 750 million standard cubic feet per day (mmscfd), up to a maximum capacity of 1,000mmscfd.

This follows the delivery towards the end of last year of another converted FSRU, *Alexandropolous*, to Gas-Fifteen, a subsidiary of Gas Log LNG Services. The 155,000m³ LNG carrier is the first FSRU conversion to operate under the Greek flag and will be deployed in the Mediterranean off the coast of Greece.

THE FIRST FSRU FOR GREECE, *ALEXANDROUPOLIS*, COMPLETED NEAR SHORE TESTING AT SEATRIUM BEFORE SETTING SAIL

Another highlight of recent months for Seatrium was the delivery of its second Floating Liquefaction (FLNG) vessel conversion for Golar LNG. *Gimi* was converted from a 1975-build Moss-type LNG carrier, and will have a 125,000m² capacity. It is designed to operate on site for 20 years without the need for drydocking. ■

THE GOLAR FLNG CONVERSION *GIMI* LEAVING THE SEATRIUM YARD

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MODEC PIONEERS TECHNICAL REPAIR AND INSPECTION SOLUTIONS

The Japanese company is collaborating with technology leaders to facilitate and enhance repair and inspection works to FPSOs and FSOs

MODEC AND TERRA DRONE ARE WORKING TOGETHER TO DEVELOP DRONE-BASED INSPECTIONS OF FPSO STRUCTURES

Modec, working together with Toray Industries, has developed a carbon fibre-reinforced plastic (CFRP) patch technique for repairs to Floating Production Storage and Offloading (FPSO), and Floating Storage and Offloading (FSO) systems. FPSO and FSO repair services provided by Modec will utilise this CFRP patch technique for pitting corrosion repairs starting later this year.

In an important step forward, the American Bureau of Shipping (ABS) has now approved this technique for repairing areas with diameters of up to 300mm that have suffered damage from pitting corrosion.

FPSO and FSO maintenance must take place without interruption to oil and gas production. "Accordingly, developing a repair technique that facilitates the efficient deployment of materials and equipment offshore and does not involve hot work is vital," the company states. These considerations prompted Modec and Toray to jointly develop a vacuum-assisted resin transfer moulding (VaRTM) process for CFRP repairs in 2020, with ABS approving the application of CFRP to steel to restore its mechanical strength.

While Modec says this was "excellent" for repairing large corrosion areas, this process was found to be "less suitable" for pitting corrosion repairs. The new CFRP patch technique is, Modec suggests, "a more straightforward and more effective solution in such cases. It only requires bonding prefabricated CFRP patch flat plates over pitting corrosion, thereby reducing the amount of work required and improving lead times."

This technique further eliminates the need for vacuum pumps and other equipment and streamlines the process of transporting reinforcement materials and construction tools on board. Moreover, it ensures minimal disruption in oil and gas production because it avoids the need for hot work.

Together with Toray, Modec says it will cater to the diverse corrosion repair needs of FPSO and FSO operators by offering the in-situ VaRTM technique for extensive repairs and the CFRP patch technique for localised repairs. The two companies say they will continue to develop repair technologies for these vessels to "promptly address market needs while tackling environmental and other social issues to contribute to a sustainable economy."

In another significant initiative, Modec and Tera Drone have completed the drone-based hull thickness measurement of a crude oil storage tank of the FPSO *Cidade de Mangaratiba*, operated by Modec offshore Brazil. This measurement method has recently been approved by ABS for use in the FPSO sector, for the first time.

The inspection of traditional crude oil storage tanks poses significant occupational safety and health concerns, as it involves confined space entry and working at up to 30m heights. Moreover, these inspections typically require inspectors to manually record approximate measurement points on paper. Therefore, it is difficult to measure the exact same points within each regular inspection, making it challenging to maintain traceability of the measurement points.

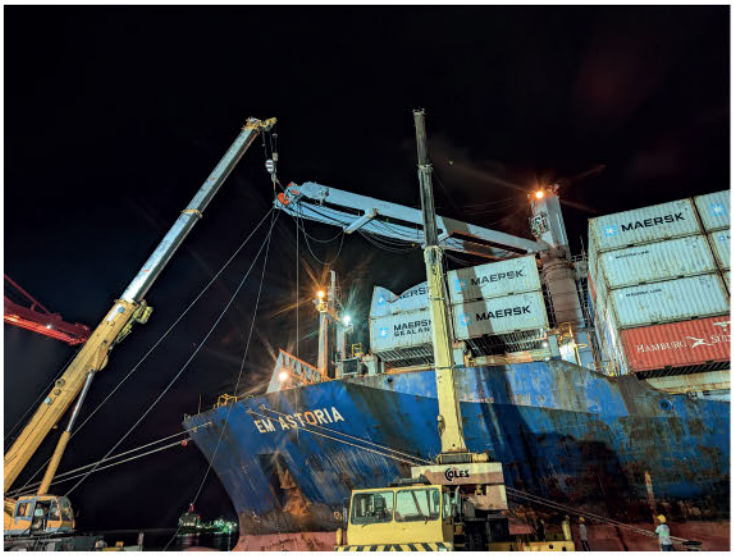
Using Terra Drone's Terra UT Drone, which comes equipped with ultrasonic testing capabilities for non-destructive testing, inspectors can now operate the drone from a safe area inside the tank. This eliminates the need to work at height and ensures a safer inspection process. Furthermore, the drone enhances the inspection process by capturing video images and acquiring 3D point cloud data, significantly improving the traceability of measurement points.

Modec and Terra Drone have already completed a second inspection on FPSO *Cidade de Angra dos Reis*, located approximately 300km off the coast of Rio de Janeiro. The two partners say they will will continue to apply this method to regular inspections on FPSOs to build a track record and further develop the technology. ■

SHIPBOARD MAINTENANCE & RIDING SQUADS

COLOMBO YARD SEES SIGNIFICANT INCREASE IN AFLOAT WORK

The Sri Lankan yard operator is allocating specialist resources for afloat repairs in three different locations, to good effect



THE COLOMBO DOCKYARD TEAM RESPONDED RECENTLY TO A REQUIREMENT TO REMOVE A DAMAGED JIB CRANE FROM A CONTAINER SHIP WHILE IN COLOMBO PORT

Colombo Dockyard, which has set up a dedicated afloat repair and repair response capability in recent years, reports that in 2023 its afloat repair sector business performed "exceptionally well", exceeding previous years numbers and the original targeted projections.

"Given the positive market conditions over the year, shipowners invested in repairs at reliable repair locations to ensure proper services are provided for the vessel's continuous operations, with minimum downtime," Darshana Chandrasekera, assistant general manager (ship repair business), says.

Colombo Dockyard has strengthened its capabilities at three key afloat service locations, focusing on Trincomalee, Hambantota and Colombo. The service stations in Trincomalee and Hambantota were particularly active during 2023, with several significant projects handled at these locations. As a result, investment is being made to a establish a new workshop facility in Hambantota to cater to the increasing demand, while the yard's Rapid Response and Afloat Repair Services (RRARS) team has also been strengthened to undertake the higher levels of work.

Key recent projects in recent months have included work to a 330m-long tanker which had incurred shell damage at the forepeak of the vessel. The RRARS team offered a solution to the owner and it was decided to carry out the repair at Trincomalee port. The team connected a crane barge to the vessel which functioned as a repair berth for the entire repair period. All the material, including machinery, steel and equipment, was stored on the barge. As the repair location of the damaged shell was 9m above the sea level, a scaffolding team erected a hanging stage to carry out the repairs. The vessel underwent 5tonnes of steel shell plate and internal repairs, all of which were carried out under classification society surveillance.

Another significant recent project concerned the container ship *EM Astoria* at Colombo port. The vessel's jib crane had disconnected from the jib foot bearing flange and had fallen on a container during cargo operations. The vessel was not able to sail out in that condition, so it was necessary to remove the crane jib as other vessels were waiting for the terminal space. Colombo Dockyard was called to attend to this urgent matter and the yard team was able to unload the crane jib safely within 36 hours by using two mobile cranes, amongst other equipment. After removing the jib, the damaged crane unit was transported to Colombo Dockyard by a tugboat for the necessary repairs.

During the second half of the year Colombo Dockyard undertook a range of afloat ship repair projects in Hambantota. These included work to *Pavo Brave* – propeller and shaft repairs; *Grace* – stern tube aft seal inspection and repairs; *LPG Leonora Kosan* – main engine overhaul; *APJ Uma Kismat* – tank top steel repair; *Captain Mike* – stern tube aft seal renewal and *Chitral* – propeller repairs.

"RRARS is dedicated to delivering prompt and efficient repair services, and ensures vessels in need of immediate attention receive swift solutions. With expertise spanning key locations, RRARS is a vital asset, embodying Colombo Dockyard's commitment to excellence in maritime emergency repairs," Chandrasekera adds. ■

BUSY YEAR FOR SEATEC AS IT ADAPTS TO NEW MARKET CONDITIONS

Environmental considerations are influencing the type of work SeaTec's ship repair teams are being called on to perform

SEATEC HAS BEEN ABLE TO DEPLOY SHIPBOARD TEAMS WITH MULTIPLE TYPES OF EXPERTISE TO MEET CUSTOMER REQUIREMENTS

One of the leading global providers of shipboard repair and riding squad services, UK-based SeaTec, has seen a strong upturn in demand over the past year, as vessels have returned from layup during Covid and have thereby required a range of repair and refit services. As a result, the company, part of the V.Group, reports that 2023 was one of its busiest years on record.

"We have been seeing more demand for full turnkey projects, and this is a trend that will continue through 2024 as well," says Tino Rizzo, managing director of SeaTec. "Rather than choosing a different company for every job, customers are asking us to tender for all their requirements, including mechanical, electrical, automation, data, system integration and procurement work," he adds.

SeaTec also reports receiving more requests for engine overhaul support at sea. "This is being driven by a hesitancy from vessel owners to go back to a manufacturer when there is an issue. We provide this service, and it is an area which has huge opportunities for growth," says Rizzo.

New technologies, and the need to comply with stringent environmental and decarbonisation regulations, are also having an impact on the scope of work undertaken by SeaTec. In particular, the introduction of mandatory EEXI and CII mean an increasing number of vessel owners are looking for support and solutions to help them meet their new obligations.

"Sensor installations are an example of significant growth areas which require a considerable amount of manpower and coordination," says Rizzo. "While there are a number of technology companies that can provide these sensors, we are seeing an increase in vessel owners asking for our support in the installation and maintenance of sensors, together with integrated data monitoring systems."

The company has also been called upon to install and implement new technology onboard to meet demand for greater energy efficiency and to meet new regulatory requirements. Projects for 2023 included power meter system design, installation and integration for 65 vessels; over 200 engine and shaft power limitation (ShaPoLI) projects; more than 100 ballast water treatment systems; and a growing number of scrubber refits.

Large projects of note included advanced wastewater management systems, shore power connections and fuel meters. For example, SeaTec oversaw a range of major refit and technical upgrades to Crystal Cruises' vessels *Crystal Serenity* and *Crystal Symphony* in 2023, and these included 'cold ironing', enabling the ships to connect to shore power.

Decarbonisation and environmental regulations will be a key driver for SeaTec in the year ahead. "With an increasing need to comply with a wide range of regulations, companies are turning to us for advice, support, and solutions," Rizzo says.

He considers SeaTec especially well placed in this context, as it possesses the geographical reach, technology, and capability in-house to fulfil a wide range of client requirements. Rizzo concludes: "We can deploy teams with a variety of skills to fulfil the requirements of a project, from start to finish and some projects may require five or six colleagues, all with different expertise. We are embracing complexities and continuously coming up with innovative solutions for all our customers." ■

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Since the inaugural conference in 2019, the annual event has attracted a high level of interest in the maritime community. Attending speakers and delegates span the technology companies, academia, ship owners and industry associations. Over 100 delegates gathered at the IMO HQ for the Wind Propulsion 2023 Conference to hear presentations from companies including MOL; bound4blue; Anemoi Marine Technologies; Norsepower; Wärtsilä; RISE; Bureau Veritas Solutions M&O; MARIN and many more.

The 2024 conference agenda promises to bring those attending fully up to speed with recent technological, design and policy developments, and cast the minds of attendees into the future landscape for wind propulsion technology.

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In December 2024, the International Maritime Organization (IMO) will host 109th session of the Maritime Safety Committee (MSC) where the Maritime Autonomous Surface Ships (MASS) group will meet again. The Royal Institution of Naval Architects and the Danish Society of Engineers (IDA Maritime) are organising the 3rd Autonomous ship conference on 20-21 November 2024 ahead of the IMO meeting.

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ENVIRONMENTAL RETROFITS

MOMENTUM GATHERS BEHIND ONBOARD CARBON CAPTURE AND STORAGE RETROFITS

Technology to enable the reduction of emissions from ships is emerging with support from classification societies, including ABS

By **Hamid Daiyan**, sustainability manager, ABS

The potential of onboard carbon capture and storage (CCS) retrofits to reduce emissions from shipping is subject to ever-growing interest from the shipping industry. As vessel operators seek to comply with current and future regulations and achieve long-term climate goals, carbon capture promises to play a key role.

One of the key drivers to this is the presently limited availability of low carbon fuels, which is pushing the industry to consider all options for lower emissions beyond energy efficiency measures.

Regulation continues to shape the process. Recent International Maritime Organization (IMO) meetings have considered submissions on this topic and an Intercessional Working Group (IWG) has been established to consider these proposals.

Class has a key role to play in supporting the move to utilise CCS in a maritime setting. ABS for example is currently working with vendors and shipowners to understand how this emerging technology can be adapted and absorbed into the maritime industry, its implications for vessel design and operations and its likely impact on carbon emission reduction.

Existing CCS technologies are largely employed in shore-based applications. These technology platforms need to be adapted for shipboard application and in such a way that balances effective performance against capital expenditure (capex) and operational expenditure (opex) as well as additional fuel consumption.

Onboard CCS reduces greenhouse gas emissions from ships by capturing and storing the carbon dioxide produced onboard. This can be done either before or after the combustion process, using different methods and the captured carbon can be stored onboard in different ways, depending on the technology used.

HAMID DAIYAN, SUSTAINABILITY MANAGER, ABS

There are two potential onboard carbon storage methodologies. These are liquefaction, when CO_2 is compressed and cooled to form a liquid, which can be stored in tanks or cylinders onboard and can be transferred to shore facilities or other vessels; and mineralisation, when CO_2 reacts with minerals to form solid carbonates, which can be stored in containers.

ABS initiatives

ABS is dedicated to supporting the decarbonisation of the shipping industry and advancing the development of onboard carbon capture as one of the potential solutions. We have been working with several global shipping organisations on joint development projects to showcase the safety and feasibility of using onboard CCS.

ABS is taking a technology-neutral approach, working with vendors and stakeholders across the supply chain, to provide Approvals in Principle and New Technology Qualifications to validate concepts and encourage full scale pilots. We expect the first systems to be potentially available later this year.

Additionally, ABS is collaborating with universities and research institutes to explore the potential of various carbon capture technologies for marine and offshore applications. ABS has established a set of guidelines to direct the maritime industry on how to apply carbon capture technology. These guidelines also comprise an optional 'CCS-Ready' notation for vessels, based on their level of preparation or readiness for future installations.

The 81st meeting of the Marine Environment Protection Committee (MEPC) this March will see the topic of carbon capture for shipping on the agenda, with debate likely on the application of systems in retrofits to existing vessels. The deliberations of the IWG should be considered during this meeting and by this stage it is possible that results from full-scale industry projects will also be available as a commentary on the regulatory development process.

Though the technology is still in development for maritime applications, the demand from shipping

FEASIBILITY STUDIES COVERING THE RETROFIT OF CCS ON BOARD EXISTING VESSELS ARE BEING CARRIED OUT BY SEVERAL INDUSTRY PLAYERS, INCLUDING WÄRTSILÄ. SOURCE: WÄRTSILÄ

for applicable and certified systems means that widespread adoption is possible by 2030. This adoption path assumes that the storage and processing ecosystem expands at a similar rate, and both depend on the speed of regulatory development. To achieve the IMO's stated aim of net zero carbon emissions by 2050, uptake of onboard carbon capture technology will need to be consistent, with rules governing its application in place to drive rapid adoption.

Wider stakeholder engagement

The evolution of the carbon value chain to include carbon capture and storage onboard ship, as well as its transport at scale for sequestration, will have a large and sustained impact on the shipping industry's stakeholders, including ports, bunker suppliers, and fuel producers.

The capture of carbon dioxide from the vessel's propulsion system will require a storage arrangement that can be connected to port facilities for 'de-bunkering' or transfer of the captured carbon to portside storage. This may include direct connections at the berth or could feature the development of a new class of small, dedicated vessels like today's bunker fleet built to handle the shipping of liquefied CO_2 (LCO_2) to storage or processing facilities.

What is not clear is which ports or marine locations will become centres for carbon storage and how they will manage this process. Ports will need to be intimately involved in the development of the supply chain as they could be the site both of storage and fuel production from LCO_2.

Other factors that operators need to consider include the fact that vessels with CCS onboard may need to have offtake agreements in place for the LCO_2, including facility certification and a legal framework covering the transfer of responsibilities.

There are several challenges associated with onboard CCS, which include the high cost and complexity of the value chain, which involves multiple actors and stages such as capture, storage, transport, injection, and monitoring of CO_2. Each stage has its own technical, operational, and safety requirements that require attention.

The value chain that will handle and store ever larger volumes of carbon is still in the development phase, and large-scale storage and processing capacity will be required. For onboard CCS to scale sufficiently, the shipping industry will need to collaborate with other stakeholders to establish the required infrastructure and agreements.

Stronger regulation is also needed to create a long-term pathway against which owners can invest. Additionally, the public's perception and acceptance of CCS will be influenced by their awareness and understanding of the benefits and risks of the technology, which therefore must be well communicated. ■

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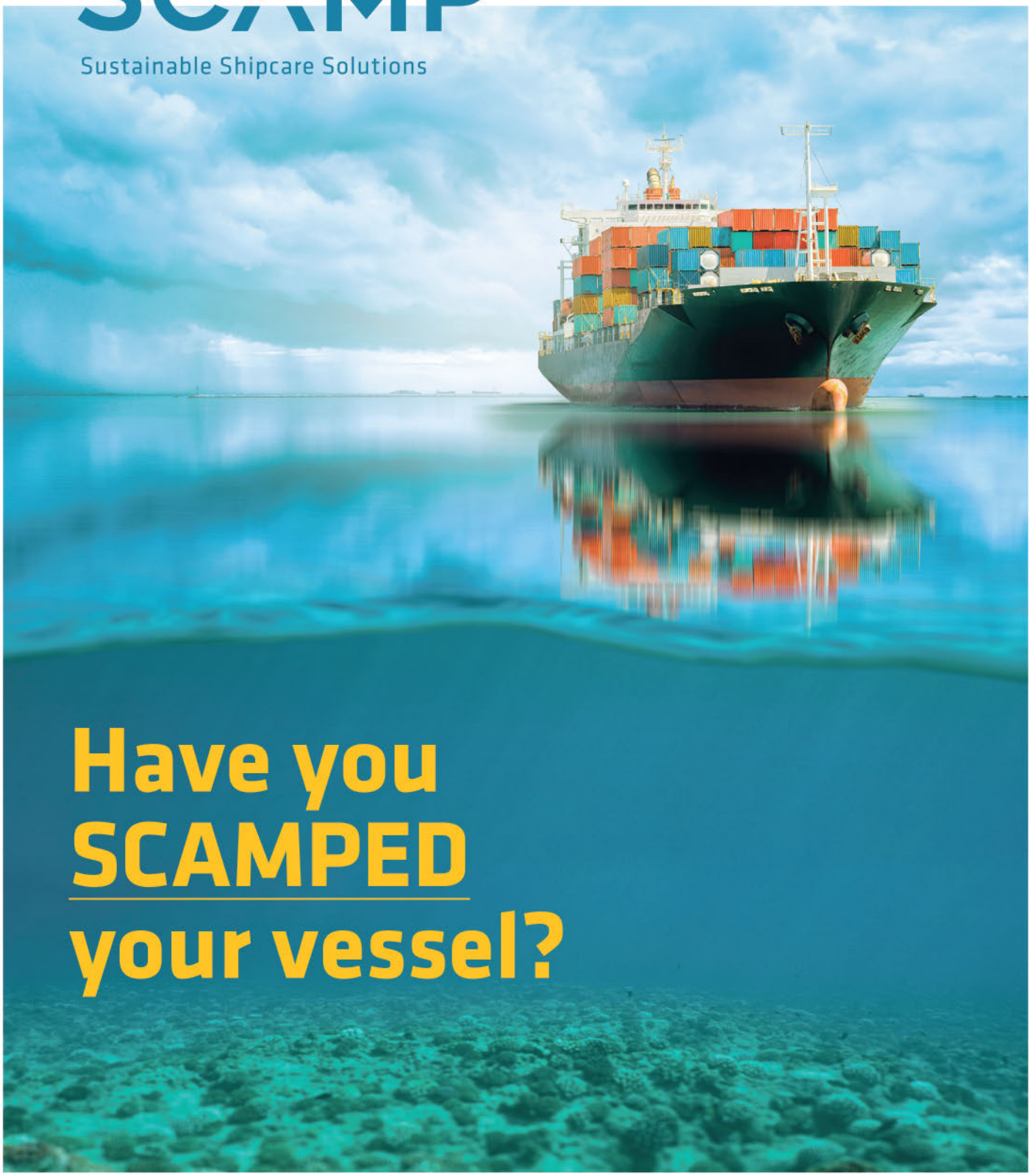

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