2ND QUARTER 2024

SHIPREPAIR & MAINTENANCE

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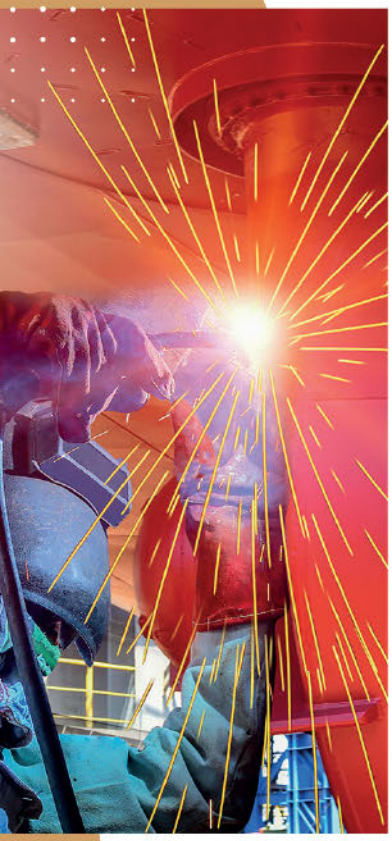

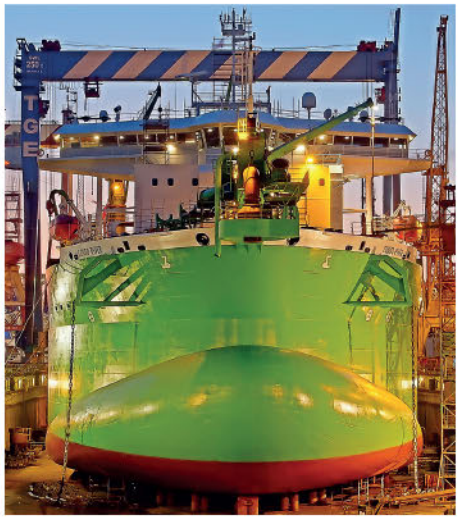

Industrial Projects

Ship Building

Ship Repair & Conversion

Offshore Oil & Gas Vessel

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SHIPREPAIR & MAINTENANCE

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ESG ISSUES COMING TO THE FORE IN SHIP REPAIR SELECTION

Shipowners should be careful about Environmental, Social, and Governance (ESG) risks when selecting repair or recycling yards, leading Norwegian marine insurer Gard has warned. In a recent report Gard highlights the growing importance of taking ESG issues into account when commissioning repair and conversion projects.

The company says it is responding to increased public focus on environmental standards as well as working conditions at shipyards all around the world. It suggests media reports have exposed poor health and safety conditions, labour rights violations, and environmental damage at some yards, raising concerns about the human rights and sustainability impacts of ship repair and ship recycling.

Shipowners that are in the process of contracting with repair and recycling yards will in future be able to benefit from specific guidance from Gard, making it easier to identify potential risks and to choose the best option. According to the company: "Ultimately, the decision which yard to contract sits with the shipowner, but additional ESG information can be useful in the decision-making process and can also be used in the shipowner's own sustainability reporting."

Issues flagged by Gard include poor health and safety standards, increasing the risk of accidents and injuries; the lack of the necessary health and safety training and proper personal protective equipment; companies with a large number of temporary/contract workers, increasing the risks of labour rights violations and exploitation; lack of effective monitoring of recruitment and employment agencies; and toxic spills and water pollution causing adverse effects for seafarers, dockworkers and local communities.

Gard is now advising all shipowners that are conducting repairs to investigate which standards potential yards adhere to and whether they are certified to meet specific ESG targets. It is recommended that an invitation to tender or a single request for a repair quotation should include a questionnaire with a request for the bidder to report their status on: Quality Management System (QMS), such as ISO 9001 or equivalent; Environmental Management System, ISO 14001 or equivalent; Health and Safety Management (HSE), such as ISO 45001, OHSAS 18001, ILO Safety and health in shipbuilding and ship repair, or equivalent; Corporate Social Responsibility Policy, ISO 26000 or equivalent; and the company's Code of Conduct relating to anti-corruption, bribery and money laundering.

Clients with H&M insurance on Nordic Marine Insurance Plan (NMIP) terms will have the right to be compensated for reasonably incurred extraordinary costs resulting from specified ESG considerations in the choice of contractor for repairs, Gard states. However. it suggests: "ESG factors may be a decisive factor when comparing offers that are otherwise equal or close to equal."

SHIPOWNERS ARE INCREASINGLY GOING TO ASK FOR EVIDENCE OF SHIPYARDS' ESG COMPLIANCE, FOR EXAMPLE THROUGH INVESTMENTS IN MORE ENVIRONMENT FRIENDLY ULTRA-HIGH PRESSURE (UHP) HYDRO-BLASTING SYSTEMS. SOURCE: EVERETT SHIP REPAIR

One would hope that is the case, although price is still the overwhelmingly most important determining factor for many owners, one suspects, in selecting yards to carry out repairs. Nonetheless the level of importance being attributed to environmental factors by owners, through their investments in retrofitting and upgrading their existing tonnage, would make it logical to specify yards that can show they are able to meet demanding environmental standards and are committed to reducing their own environmental impacts and meet net zero targets.

Shiprepair yards are going to have to be able show and provide evidence of environmental compliance and not just say so. While this will not always be easy it is not an insurmountable challenge.

Commitment to social and governance issues is an area where the subject perhaps becomes more murky and 'political' for owners. After all many shiprepair yards are located in areas where democracy is not paramount and social and labour rights are not, charitably speaking, a high profile for host governments. While there seems to be a high degree of unanimity between shipowners and shipyards around the need to meet the 'E' in ESG, the other two letters in this increasingly widely bandied about acronym do not have the same degree of common adherence or understanding.

It would be interesting to see if in future some shipowners decide to divert ships away from certain shiprepair yards and countries because of concerns over, for instance, human rights or equalities policies within these facilities and their host communities. While one doubts that it will ever happen in reality, it is a noble goal that should be aspired to if the 'S' and 'G' in ESG are to mean anything. ■

NEWS

FPSOS

FPSO REPAIRS USING SPS

METALOCK ENGINEER CARRYING OUT AN FPSO REPAIR USING SPS TECHNOLOGY

Metalock Brasil recently carried out two Sandwich Plate System (SPS) repairs on two different floating production storage and offloading (FPSO) units located in the Santos Basin, in the state of Santa Catarina. SPS serves as an alternative repair method to conventional steel renewal techniques. It utilises the existing corroded or worn plate as one side of a steel composite panel, consisting of a new top plate and an elastomer core. The resulting composite permanently restores or enhances the strength of the original structure.

One application was performed on the lower structure of the FPSO vessel's storage tank to restore the corroded areas of the bottom plate and reinstate its original strength. In addition to preventing future corrosion of the plate, Metalock says its improved strength ensures the long-term integrity of the lower hull structure.

Metalock Brasil was also called upon to repair corrosion in an explosive atmosphere in a cargo tank on another FPSO. The repair, carried out without hot work, using SPS, was conducted on-site, inside the tank. Once the application of SPS was completed, the exposed upper surface of the existing plate was completely enveloped in elastomer core material and will no longer degrade, Metalock states.

ENVIRONMENTAL RETROFITS

DAMEN AND CGM CGM COLLABORATE ON VESSEL MODIFICATIONS

Damen Shipyards and French shipping group CMA CGM are working together on an extensive project that will ultimately result in around 10 of the French company's vessels receiving significant modifications to improve fuel efficiency by more than 10%. The upgrades, which include the installation of bulbs on the bows of the vessels, will take place at Damen Shiprepair Dunkerque (DSDu) and Damen Shiprepair Amsterdam (DSAm). Up until now, CMA CGM has been using shipyards in China and occasionally in the Middle East, but this agreement marks for the first time its use of European yards for these complex modifications.

A total of nine stops by CMA CGM vessels are scheduled for this year, five at DSDu and four at DSAm. Three of these will be for the installation of bow bulbs, with the first being on the LNG-fuelled container feeder ship *Polar*. The 120tonnes bulb has been fabricated at DSAm and will be fitted there shortly. The remaining two vessels to relieve bow bulbs will be the *Arctic* and *Aurora*.

As part of the package of works, Damen is also offering a propeller upgrade, modifications to the propeller nozzle and silicone paint for these vessels. Three of the vessels will also be equipped to access shore power, thereby reducing their emissions when alongside in ports that offer the service.

DAMEN AND CMA CGM ARE TO COLLABORATE ON INCREASING VESSEL EFFICIENCY

FPSO CONVERSION

SHANGHAI YARD DELIVERS YINSON FPSO

In early April this year, CHI (Shanghai), a subsidiary of COSCO Shipping Heavy Industry, undertook the naming of the *Maria Quiteria*, a VLCC to FPSO conversion project, for Yinson Production.

Maria Quiteria is the first FPSO conversion project, covering repairs, life extension, modifications, integration and commissioning, undertaken by CHI (Shanghai). The FPSO is equipped with an exhaust gas heat steam power generation system, which uses a special high-pressure steam pipeline to collect and transmit the waste heat steam for power generation. The design aims to improve energy efficiency and reduce carbon emissions by an anticipated 120,000 tons of CO_2 per year.

The FPSO will be chartered by Petrobras, and after delivery it will be directly towed to the Jubarte oil field in the northern part of the Campos Basin off the southeastern coast of Brazil to carry out submarine fixation, pipeline connection and other oil production preparations. CHI (Shanghai) claims that overall this is world's shortest conversion cycle, from start of works to deployment, for this type of FPSO.

FPSO *Maria Quiteria* is Yinson Production's third FPSO destined for Brazil, following FPSO *Anna Nery*, which has been operating for Petrobras since May 2023, and FPSO *Atlanta*, which is expecting first oil in summer this year after sailing away from Dubai Drydocks in March this year.

VIP GUESTS ATTENDING THE NAMING CEREMONY OF THE CONVERTED FPSO *MARIA QUITERIA*

Yinson Production's chief executive, Flemming Grønnegaard, says: "FPSO *Maria Quiteria* incorporates state of the art technologies to reduce emissions and increase efficiency, setting new standards. These technologies, together with our ability to complete the asset on time, are showcasing our innovative design capabilities and project execution excellence once more."

SINGAPORE

SEATRIUM STRENGTHENS MARKET POSITION

Singapore-based Seatrium has secured a series of major contracts with an aggregate value of S$350 million (US$259 million), to be completed by the end of 2025, reinforcing its position as one of the global market leaders in the vessel repair, upgrade and conversion segments. The wide range of complex contracts secured by the company include the upgrade and conversion of floating storage regasification units (FSRU), life extension and remediation works for floating production systems, LNG carrier repairs, cruise ship repair and refurbishment and offshore and naval works.

These contracts include the conversion of three LNG carriers into FSRUs for Karpowership, with an option for a fourth project. The conversion work involves installing a regasification skid, as well as other supporting systems such as cargo, utility, spread-mooring, offloading, electrical, and automation systems. Scheduled to commence in the second quarter of 2024, this contract extends Seatrium's track record of FSRU conversions for Karpowership, which have to date included the *Karmol LNGT Powership Africa*, *Karmol LNGT Powership Asia* and *Karmol LNGT Powership Europe*.

Seatrium has furthermore been contracted to undertake maintenance and upgrade work for a floating production storage and offloading (FPSO) vessel, FPSO *Pyrenees Venture*, for MODEC Management Services. Also scheduled to commence in the second quarter of 2024, the vessel is expected to be re-deployed back into production off the coast of Western Australia on completion.

In recent weeks, contracts have been signed for retrofits to a series of 10 cruise vessels for Carnival Corporation and Royal Caribbean Group in 2024. These include six cruise ships operating under Carnival's various brands – *Diamond Princess, Pacific Adventure, Carnival Splendor, Carnival Panaroma, Coral Princess* and *Noordam* – as well as four cruise ships from the Royal Caribbean Group

ALVIN GAN, EXECUTIVE VICE PRESIDENT, SEATRIUM REPAIRS & UPGRADES, AND GOKHAN KOCAK, CHIEF TECHNICAL OPERATIONS OFFICER, KARADENIZ HOLDINGS, SIGNING THE CONTRACT FOR THE YARD TO CARRY OUT THREE FSRU CONVERSIONS

– *Navigator of the Seas, Spectrum of the Sea, Quantum of the Seas* and *Celebrity Millennium*.

Also booked in for this year are repairs to *Hakuryu 5*, a semi-submersible drilling rig from Japan Drilling, and a series of LNG carriers which will be drydocked for Hyundai LNG Shipping of South Korea.

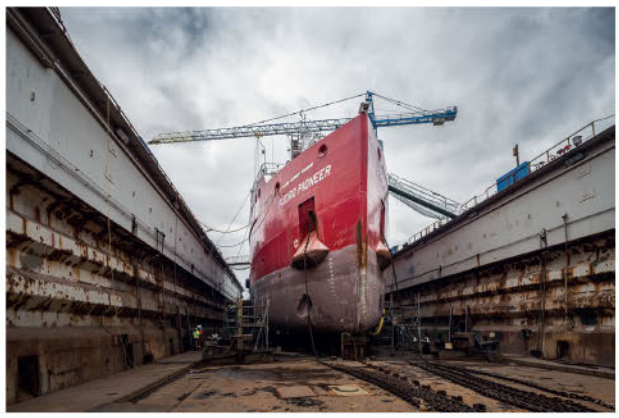
Seatrium has additionally secured the world's first full-scale, turnkey carbon capture and storage (CCS) retrofit from Solvang ASA, Norway. The installation of a 7MW Wärtsilä CCS system will be carried out on Solvang's 21,289m^3 ethylene carrier *Clipper Eris* and is scheduled to commence in the third quarter of this year. The project will use amine cleaning technology to capture 70% of the CO_2 in the exhaust gas from the main engine. Seatrium's scope of work includes basic design, detailed engineering, procurement, upgrading of electrical and automation systems, as well as the integration of a carbon capture and compression/storage system.

ALTERNATIVE FUELS

METHANOL ENGINE INSTALLATION PLANNED

Geo survey vessel *Fugro Pioneer* is now ready to be equipped with methanol engines after the conversion of several key components on board. This vessel was converted at a yard in the Netherlands as part of the Fugro-led consortium Methanol as Energy Step Towards Emission-free Dutch Shipping (MENENS) project with a grant from the Netherlands Enterprise Agency (RVO).

The recently completed modifications to the *Fugro Pioneer* allow two of its four original engines to be replaced by methanol engines, ensuring services can still be offered in regions where green methanol is not yet available. The delivery and installation of the methanol capable engines are expected in the second half of 2024.



FUGRO PIONEER HAS BEEN READIED FOR METHANOL CONVERSION

CLASSIFICATION

LR ADVISES ON LNGC TO FSRU CONVERSION

Lloyd's Register (LR), China Petroleum Pipeline Engineering (CPP), COSCO Shipping and CyGas are currently working together on a project to convert the LNG carrier SS *Galea* to a floating storage and regasification unit (FSRU), to be named *Etyfa Prometheas*, at the COSCO Shanghai yard.

The FSRU is owned by CPP and will be operated by CyGas, which is responsible for the import, storage, distribution, transmission, supply, trade and management of natural gas in Cyprus, at the port of Vassilikos. The terminal infrastructure at Vassilikos is in its final stages of construction and is set to be connected to the FSRU within the next three to six months.

As part of the conversion process, LR acted as adviser, project managing the conversion to ensure the FSRU meets safety, quality and efficiency requirements. Moving forward, LR will provide further support throughout the vessel's operational life.

Sau Weng, president, Lloyd's Register Greater China, says: "This is a significant conversion project and is the first of its kind to be performed by LR for COSCO Heavy Industry. Conversions of LNG carriers to FSRUs are complex projects and the safe management of the project's overall efficiency marks a milestone for all stakeholders involved."

LR HAS BEEN PROVIDING TECHNICAL ADVICE ON THE *ETYFA PROMETHEAS* CONVERSION AT COSCO SHANGHAI YARD

DUAL FUEL

MORE CONTAINER SHIP METHANOL CONVERSIONS ON THE WAY

Hapag-Lloyd and Seaspan Corporation have entered into a partnership agreement to retrofit and convert five 10,100TEU container ships powered by conventional MAN S90 engines to dual fuel engines capable of operating on methanol. Following the engine retrofits, the vessels will continue to be on long-term charter from Seaspan to Hapag-Lloyd.

Torsten Holst Pedersen, chief operating officer of Seaspan, comments: "Retrofitting must be an integral part of the strategy if the container shipping industry wants to deliver on its decarbonisation targets."

The vessels scheduled for retrofits are the *Seaspan Amazon, Seaspan Ganges, Seaspan Thames, Seaspan Yangtze* and *Seaspan Zambezi*. The retrofit is expected to take approximately 80-90 days per vessel starting in the first quarter of 2026. The total investment is estimated at around US$120 million for the five units.

AIR LUBRICATION RETROFIT

OCEANGLIDE SELECTED FOR BULK CARRIER PROJECT

Rio Tinto has selected the Alfa Laval OceanGlide fluidic air lubrication system to retrofit a Rio Tinto-owned bulk carrier vessel, to assess the potential application of this energy saving technology across its fleet. Introduced in 2023, Alfa Laval OceanGlide is said to have generated considerable interest from shipowners seeking to address energy efficiency and emission challenges.

According to Alfa Laval, OceanGlide reduces specific drag from 50–75%, which means significant propulsion power savings, lower fuel consumption and reduced CO_2 emissions.

The system requires no structural modifications, except for three to five hull penetrations of a maximum DN150. This ensures easy adaptation to existing classification certificates without necessitating any major changes or conversions, making it ideal for retrofitting as well as for newbuilds. The fluidic bands, designed with a low profile and no moving parts, can be configured underneath the ship at any shipyard "with ease".

LNG CARRIERS

SILVERSTREAM COMPLETES FURTHER LNG RETROFIT

Maritime clean technology specialist Silverstream Technologies has completed another retrofit of its air lubrication technology on a large LNG carrier at Seatrium's Admiralty Yard in Singapore. The retrofit was completed in just 30 days and is the eleventh retrofit of the Silverstream System that the company has delivered worldwide.

The Silverstream System releases a carpet of air to reduce the frictional resistance between the hull and the water, cutting average net fuel consumption and GHG emissions by 5-10%.

Silverstream reports that it is now receiving repeat orders within framework agreements across LNG and other segments based on the technology's independently verified performance and the system's track record of successful retrofit installations.

SILVERSTREAM HAS RETROFITTED A LARGE LNG CARRIER

PROPULSION SYSTEMS

PROPELLER REPAIR SOLUTION WINS TRIPLE CLASS APPROVAL

A damaged propeller can lead to reduced performance, increased fuel consumption and overload the ship's engines. Cropping is one solution, but tends to be only temporary and requires re-work by welding on new blade materials in a workshop. Furthermore, reducing the propeller blade surface can result in loss of efficiency and reduced sailing speed.

To avoid these risks and offer customers an alternative, Underwater Propulsion Engineers (UPE) has joined forces with propeller specialist Plug & De Boer to develop a hydraulic press for the cold straightening of bent propeller blades. Recent underwater straightening operations have led to approvals from classification societies Lloyd's Register and NKK. Moreover, a procedure for underwater propeller cropping as a temporary repair has also been approved by ABS.

Prior to any repair, a detailed inspection followed by a repair proposal plan is submitted to the stakeholders for approval. Then two diver technicians, communicating with each other and the surface team, position and use the hydraulic tool in such way that the hydrodynamic balance and efficiency of the propeller is restored to its maximum. A propeller repair specialist from Plug & De Boer guides and supervises the operations.

According to UPE this repair method is possible for excessively bent blades and is considered not only a permanent repair but a very good alternative to cropping, where blade tips are simply cut off. While cold straightening always holds the risk of cracking or breaking during the repair process, UPE states: "With the experience of our team and our partners, this risk is reduced to the absolute minimum."

UPE's specially designed cold straightening propeller repair tools, nicknamed Pacman, are located in the Netherlands (Rotterdam) and the Americas (Panama), but can and have been utilised all over the world.

WIND PROPULSION

CHEMSHIP WIND-PROPELLED TANKER RETROFIT

Rotterdam-based Chemship's *Chemical Challenger* is claimed to be the first chemical tanker in the world to be equipped with sustainable wind technology, following a retrofit. Four 16m-high aluminium wind sails from Econowind were installed on board the 134m-long vessel.

The VentoFoils create a direct wind surface of 180m^2, with smart vacuum technology quintupling the force of the wind, creating a gross wind surface of 900m^2. Chemship expects to achieve an average CO_2 reduction of 10% with these wind sails.

CHEMSHIP HAS RETROFIT INSTALLED ECONOWIND'S VENTOFOILS ON *CHEMICAL CHALLENGER*

SHAFT-LINE REPAIRS

LONG-TERM INVESTMENT STRATEGY PROVES ITS VALUE FOR MARINESHAFT

MarineShaft has upgraded its capabilities to ensure it can meet customer requirements particularly for larger propulsion system components. The Denmark-based company MarineShaft specialises in repairing and manufacturing propeller equipment and rudder systems. This year the company celebrates its 20th anniversary and is looking to build on the positive achievements of 2023, which was its busiest and most successful year to date.

MarineShaft's customers include shipyards, ship management specialists and shipping companies, among others, and most orders come from abroad, mainly due to MarineShaft's unique niche in repairing bent propeller shafts and rudder stocks through cold straightening with full-class approval.

In recent years there has been a substantial amount of investment made by the company in expanding not just the company's workshop space in Hirtshals, but also extending the range of equipment deployed there. These recent investments have been particularly prompted by the trend for rudders, propellers and shafts to get larger, as vessel size increases.

Among the major expenditures has been a doubling of the area of one of the company's three workshops. An expansion of 1,400m^2 to approximately 3,000m^2 was completed in 2021 to accommodate a much larger, newly purchased lathe, enabling MarineShaft to turn shafts up to 27m long.

Simultaneously, crane capacity was doubled to 200tons, and MarineShaft has since installed a new custom-build hydraulic press with 8,000tons pressure capacity, capable of straightening shafts up to 1.5m in diameter.

"We haven't even seen shafts that big yet, but we want to assist even the largest vessels, so we are preparing ourselves for that eventuality," says Lisa Hjermitslev, chief commercial officer.

THE COMPANY HAS INVESTED IN A LATHE THAT CAN REPAIR PROPELLER SHAFTS UP TO 27M IN LENGTH

The company believes it now has "probably" the largest capacity in the world for this type of repair job. However the focus has not just been on boosting the size of propulsion system units it can accommodate, but also on speeding up repair times.

"When a rudder breaks or a shaft becomes misaligned, the shipowner is interested in getting the ship back to sea as soon as possible. So things need to move quickly," observes Hjermitslev. This requirement is behind MarineShaft's latest investment, a newly acquired 3D scanning unit that enables employees to scan and precisely measure dimensions, for example, of propeller blades, cones and rudder stocks, with a handheld 3D laser scanner.

"This allows us to offer our customers a service that means that, wherever the ship is, we will come out, perform a scan and send the data back home, so our workshop personnel can machine the component to fit precisely, which saves a lot of time for the customer," says Hjermitslev. "We recently took it out on its first job in China, where we saw very good results. While it is still in the startup phase, it is something we expect a lot from," she adds.

MarineShaft has also recently acquired another laser cladding system, which is performing "exceptionally well". Having two laser cladding systems means it can ensure it has capacity for urgent requests, and most of its laser cladding repairs are related to breakdowns where fast action is crucial.

In recent times, MarineShaft has also increased its workforce and has hired new personnel both in the workshop, service engineers for on-site repair jobs, and administrative personnel. In total, the company now has over 85 employees. The company reports that demand for on-site repair services is growing and its team of service engineers now travels worldwide for all kinds of on-site repair tasks. Due to this growing demand, MarineShaft has invested in additional mobile machinery in recent years.

"We are committed to offer our clients a complete package of repair solutions," says Hjermitslev. "Based on recent history, we maintain high hopes and confidence in the future," she adds. ■

PALUMBO HAS BEEN INVESTING TO BOOST CAPACITY AT ITS RIJEKA SHIPYARD IN CROATIA

MEDITERRANEAN

PALUMBO GROUP FULL OF OPTIMISM

This year has got off to a flying start for the leading Mediterranean repair network

The Italy-based Palumbo group, which operates shipyards in Malta, Naples, Messina, Rijeka, Marseille, Savona and Ancona, reports a first quarter of 2024 that gives it every reason for optimism for the rest of the year.

"All our shipyards have been full since the beginning of the year. This tells us that, despite the challenges, we are managing to maintain our quality of workmanship, and demonstrate high levels of commitment and flexibility, to retain trust with existing clients and gain opportunities with new ones," states Luka Hrboka, head of sales.

Palumbo offers a wide range of services at its network of Mediterranean and Adriatic shipyards, including ship repair, conversion, retrofitting and new buildings, for a wide range of commercial vessel types as well as yachts. During 2023 and so far in 2024, cruise ships and passenger vessels accounted for a significant amount of the workload.

"Over the last year our track record is impressive, and we successfully completed many large, extensive and demanding projects. Our main challenge was to find the capacity to deliver all the potential projects," Hrboka adds. "We worked a lot with our steady regular clients, and we are happy that we have been able to turn them into long-term partners that are like reliable anchors in the tumultuous seas of business," he continues.

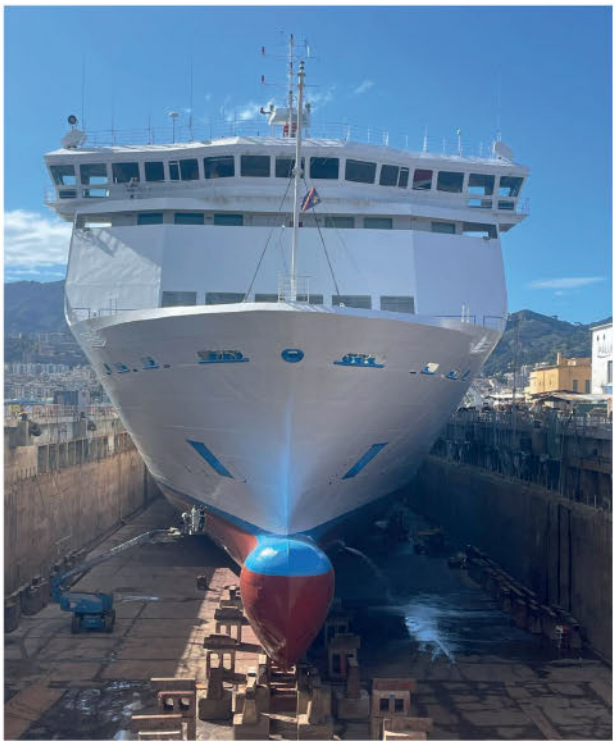
Environmental related work is still high on the agenda, although Palumbo has seen a decrease in demand for scrubber and ballast water treatment system installations, an area where it has become one of the regional market leaders. "Most of the shipowners who were required or planned to have these retrofits have now had them installed onboard their ships," says Hrboka.

Palumbo is continuing to invest in new resources. maintaining a skilled workforce as well as enhancing its technical and operational capabilities. One of the biggest investment projects has been the purchase of a new floating drydock for its Naples shipyard. Measuring 230m x 38m in dimension, it will increase the ability of the Naples Dry Dock, a joint venture between La Nuova Meccanica Navale and Palumbo Group Naples, to carry out major repairs. The new dock arrived in Naples in late April and is expected to be operational by the end of this summer. The investment in the new dock is reported to be around €40 million.

Another major project has been the extensive renovation and upgrading of Dock 11, which at 260m in length and 53m wide is the largest dock at Palumbo's Rijeka shipyard in Croatia. On top of this, the group has been investing further in ultra-high-pressure water blasting equipment, new cranes and hall renovation work across its shipyard network.

"One area where we are very focused is safety. We are constantly investing in systems and equipment to enhance our performance in this context," Hrboka says. ■

RO-RO AND RO-PAX FERRIES ACCOUNT FOR A SIGNIFICANT AMOUNT OF THE PALUMBO GROUP'S WORKLOAD



THE MOBY LINES FERRY *VINCENZO FLORIO* WAS RECENTLY DOCKED AT PALUMBO MESSINA YARD FOR A PACKAGE OF WORK THAT INCLUDED HYDRO BLASTING IN PREPARATION FOR A SILICONE PAINT JOB

GROWTH MOMENTUM SUSTAINED AT GIBDOCK

No sign of any slowdown as the yard experiences healthy demand across a wide range of vessel types

GIBDOCK HAS SEEN HIGH LEVELS OF DEMAND ACROSS MULTIPLE MARKET SEGMENTS

Gibraltar shipyard Gibdock enjoyed a very positive year in 2023, sustaining the heathy growth in repair and maintenance activity seen the year before. Managing director Richard Beards says: "It was an extremely good year for us with high levels of drydock utilisation and a nice spread of vessels.

"The offshore vessel segment came back strongly, with several repeat customers returning and at one point we had four offshore vessels in the yard simultaneously, which shows we are on our way to reclaiming our position as the yard of choice for offshore vessel repairs in the Mediterranean. There was also a steady stream of naval and commercial vessel work over the course of the year, while our traditional ro-ro and passenger ferry market similarly performed well," he continues.

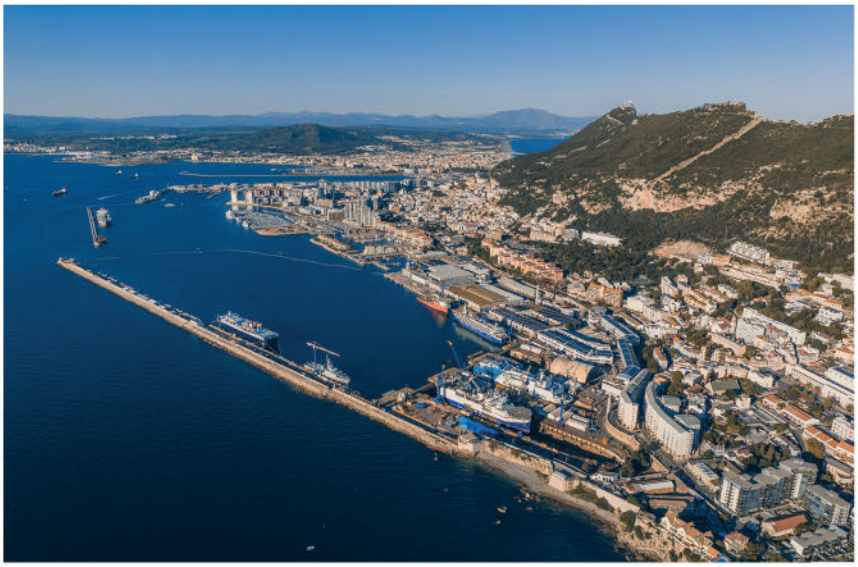
The majority of projects handled by the yard last year were mostly standard drydockings and alongside repairs, although in recent months there has been an upturn in more substantial work scopes, including some with relatively large steel renewal requirements. The yard is also undertaking regular environmental upgrades, with both scrubber and ballast water treatment system installations featuring, albeit less so than in recent years as regulatory deadlines are passed.

Owners are still looking at ways of reducing environmental impact, including applying more advanced coating systems. Gibdock has been involved in several such projects, including the bulk carrier *Donald M James*, for Vulica Shipping Company. The 229m-long vessel entered the yard in the last quarter of 2023 for a 30-day project that included the application of a new type of coating from GIT Coatings. The vessel also underwent an extensive package of other works while in the yard, including cargo hold renewals, and work to piping, thrusters, tail shafts and rudders.

The GIT hard foul release coating is designed to reduce drag and cut emissions. Gibdock's coating team applied the XGIT-FUEL topcoat to the ship's vertical sides, with XGIT-PROP applied in three layers to the propeller after grit blasting. John Taylor, operations director, says: "This was our first graphene-based coatings project, but our team took it in their stride. The *Donald M James* was redelivered on time and on budget and GIT inspectors indicated that the work was carried out to exceptional standards."

The first quarter of 2024 has seen a similar pattern emerging, with the yard continuing the positive business trajectory set in 2023. Beards says: "We have continued to grow this year much as we did last and the outlook for the rest of the year is very positive. We have several interesting projects in the pipeline and the order book is healthy indeed."

He continues: "We are seeing that owners are looking to take care of their assets and ensure that they



NOW OWNED BY BALAENA, THE YARD IS FOCUSING INVESTMENT ON REDUCING ENVIRONMENTAL IMPACT

operate efficiently, cost-effectively and in a sustainable manner over the longer term. As a result, the average repair budget allocations for vessels are at healthy levels and we are seeing the benefits of that trend."

Another positive trend that Gibdock highlights is that owners are booking vessels in for drydocking further in advance to ensure confirmed slots. This is providing the yard with greater security as to workflows and enables better long-term planning. Prior to 2022, the lead time between initial enquiry and drydock visit was typically 30 to 40 days. In 2022 the average was around 60 days, in 2023 it was 76 days and over the first quarter of 2024 it has reached an average of 91 days.

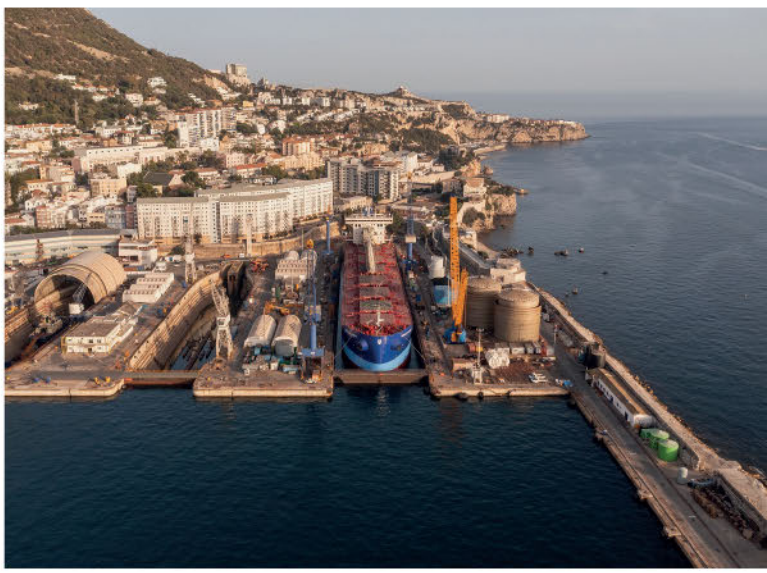
Beards says: "This is a significant lengthening in lead times over the past two years, which we welcome, although it can present challenges in managing back-to-back dockings, if unexpected work scopes arise and the vessel requires an extended stay. But it is a nice problem to have."

Now part of the Balaena Group, Gibdock's investment focus is largely on enhancing the environmental sustainability of its operations. Currently its biggest capital project is the installation of a 60Hz shore power plant aimed at enhancing Gibdock's ability to provide cold ironing services to vessels in the yard. Taylor says: "Work is now well underway and the project is around 60% completed, so we expect it will be fully operational by the end of the year. The new shore power facility will replace an older, fairly antiquated one with a system that will be better able to meet the needs of our clients, and protect the environment, for years to come."

Gibdock is also investing in more electric yard vehicles, replacing diesel ones, and has also invested in environmentally responsible ultra-high pressure water systems for hull cleaning. The yard additionally now has its own reverse osmosis system to supply industrial-grade water.

Supported by Balaena, Gibdock continues to support the wider maritime economy and in particular the development of relevant skills within the local area. The latest example of this was the provision of a fire response simulator training facility, sponsored by Balaena and manufactured at Gibdock, which is now in use at the University of Gibraltar's Maritime Academy.

Looking forward, Gibdock is highly upbeat about prospects not just for 2024 but extending into 2025 as well. Beards concludes: "Most European yards have been busy over the past 18 months, largely as a result of post-Covid disruption at Chinese yards, which in turn led to a cascade effect of projects being displaced elsewhere. Now, however, Chinese yards have caught up and are more or less back to normal, but we are still seeing good levels of demand. This suggests the underlying fundaments of the business we are in are very sound and certainly there is no sign of a downturn on the horizon as yet." ■



THE *DONALD M JAMES* IN DOCK AT GIBDOCK LAST YEAR, WHEN IT RECEIVED AN INNOVATIVE COATING SYSTEM

BIG INCREASE IN REPAIR AND REFURBISHMENT ACTIVITY AT FINCANTIERI YARDS

While the Mediterranean remains the core focus for the group, there are plans to offer repair and upgrade services across a wider geographic area in future

THE CRUISE SHIPS *CRYSTAL SERENITY* AND *CRYSTAL SYMPHONY* AT FINCANTIERI TRIESTE LAST YEAR

Collectively Fincantieri shipyards achieved significantly higher values in terms of their repair and refurbishment activities in 2023 compared with the previous few years. The increase in revenue from this part of the group's business was largely the result of a number of complex, high-value projects that were undertaken in the cruise and offshore sectors.

The positive momentum has continued into the current year. "Considering the results achieved last year, especially for cruise vessel work, we are very optimistic about a positive outlook for the repair and refurbishment sector," says Andrew Toso, senior vice president, Fincantieri Services. "A large number of drydock slots are already booked up, and there are indications of a further increase in overall demand for our facilities in both Palermo and Trieste in 2024. The level of enquiries is high, and we are currently participating in the bidding process for a number of interesting refit and repair contracts," he adds.

Amoungst the most significant contracts completed last year by Fincantieri were the refitting and modernisation of the *Crystal Serenity* and *Crystal Symphony* at its Trieste yard. During the five month-long parallel modernisation programme, the hotel areas of the vessels were significantly upgraded, while onboard systems were modernised to increase the ships' operational life. The programme of works ended with standard drydocking activities prior to their return to service in July and August.

On both ships three decks were radically transformed, with the installation of 100 new suites and guests rooms, all of which are significantly larger than the 230 units they replaced. Additionally 100 suites were modernised without changing their size.

The work to *Crystal Serenity* and *Crystal Symphony* also enhanced their environmental sustainability, and the schedule of work included upgrades to the wastewater treatment and energy recovery systems in particular. Importantly also, the hulls were treated with an advanced silicone paint system formulated to reduce friction and improve fuel consumption.

"Fincantieri has several important ongoing initiatives to reduce environmental impact and is actively participating in the energy transition to future generation, greener ships. Our role in the context of shiprepair and upgrades is to assist cruise operators to implement various new technologies on their existing ships and support them with our services to maintain an efficient fleet which meets today's stringent standards," says Toso.

Fincantieri is now looking at ways of improving and expanding the range of services it offers in terms of repair, refurbishment and conversion, including the provision of engineering and project management expertise to support turkey solutions for extensive work scopes.

"Large refurbishment and conversion projects are of course the most demanding and we have been involved with several programmes of this type, both directly at our own yards and through providing assistance to owners and operators for projects carried out at other shipyards. Internally we have the skills needed to cover most of the technical requirements associated with works on a majority of vessels. However specialist local subcontractors are also available to enhance our capabilities and increase capacity," says Toso.

One of Fincantieri's strategic aims is to expand operations further in the repair and refurbishment sector, by offering a wide range of services, including feasibility studies, design work, project planning, procurement, engineering, supervision and project management. The intention is that these services will be provided not just in the Mediterranean, but across a wider range geographic locations.

"We are extending the availability of relevant services far beyond our own Italian yards, including support provided in the USA through our base in Miami," says Toso. "Fincantieri Services USA is developing its own capabilities by providing cruise ship operators with quick responses to their specific requirements, including ship inspections and onboard repair and refurbishment activities," he adds. ■

UNDERWATER REPAIRS & MAINTENANCE

SCRUBBER OVERBOARD REPAIR TECHNIQUE GENERATES MULTIPLE PROJECTS

The Wärtsilä group's underwater repair and maintenance division is achieving success using patented techniques and technology

WÄRTSILÄ UNDERWATER SERVICES DIVER IN ACTION

Wärtsilä Underwater Services, formerly Trident, has been undertaking a wide range of underwater repair projects in recent months. These have included pipe-in-pipe scrubber overboard repairs, utilising the company's patented method designed to repair damaged overboard pipes in an efficient way and with permanent results.

Developed together with Maersk, this solution is exclusive to Wärtsilä and involves the installation of an acid-resistant GRE pipe fixed in mild steel pipe that significantly reduces chance of corrosion. This is considered best suited to large systems and provides a "good long-term solution".

The company has also undertaken a number of significant propeller repairs, installing anti-singing edges, and carried out work to a semi-submersible offshore unit including in-water survey and removal and installation of all the thrusters on board.

Other notable projects so far this year have seen a Wärtsilä Underwater Services team called out to Algeciras, in the South of Spain, for an emergency underwater seal exchange. By using its Flexdam hyperbaric habitat system the company was able to create the dry conditions required for the repairs.

"Our team successfully removed and cleaned the housing rings of the seal assembly, sealed the shaft, and thoroughly inspected the liner. They then installed the new seals which were bonded and pressure tested," says Wiliam Winters, managing director.

A dive team was also recently called out to a job in Antwerp, Belgium. This time, the team was tasked with a seal overhaul. After an initial assessment and documentation of the current state the ropeguard was removed and the FlexDam was installed.

Once this dry environment was established and secured the Wärtsilä Underwater Services technicians disassembled the seal housing, meticulously documenting all steps. The old seals showed unusual damage which was probably caused by a foreign object. After cleaning and evaluating the liner condition, all seals were replaced by in-situ bonding of new lip rings, after which the housing and intermediate rings were re-assembled. Upon completion of a successful pressure test the FlexDam was removed and ropeguard was re-installed.

The company continues to invest to enhance its global capabilities, and in recent times the focus has primarily been around improving safety, as well as expanding the Defence Maritime Solutions (DMS) side of the business. The company has for example invested in portable, flyable emergency decompression chambers to enable its dive teams to support clients quickly and safely in remote locations. A new dive station specifically for DMS work has also been opened up, to support the naval business in particular, while the company has further fine-tuned the pipe-in-pipe repair process to meet evolving customer requirements for this type of repairs. ■

'THINKING IN THE WATER' PAYS OFF

One of the world's leading commercial diving companies, Subsea Global Solutions' (SGS) ongoing focus on training and skills development has enabled it to execute several notable and highly challenging projects in recent months

Over the past few years, SGS has seen a steady growth in enquiries and 2023 continued that trend with a healthy mix of underwater maintenance and repair projects. Rick Shilling, executive vice president, technical services, says: "At SGS we continually invest in training that encourages our technicians to 'think in the water' for solutions to complex repairs. This mindset and culture, combined with the skillsets of our diver technicians, allows complex projects to be completed to the full satisfaction of our client base."

Several recent notable projects highlight this commitment. In one, an offshore vessel with dynamic positioning (DP3) capability required an exchange of its large demountable azimuth thrusters. This included the removal of all the thrusters, their overhaul and final refitting.

AN OFFSHORE VESSEL THRUSTER ON ITS WAY UP FOR OVERHAULING, UNDER THE SUPERVISION OF AN SGS DIVER-TECHNICIAN

Tim Duncan, commercial director – offshore markets, notes: "We perform this type of work regularly for a wide range of clients, but what made this project especially noteworthy was the pioneering of a process to enable the dry replacement of the thruster steering seals which is normally only possible in drydock. This meant we were able to provide a turnkey solution for the whole propulsion system for the new owner taking over the vessel, providing them peace of mind and improved efficiency in accordance with OEM specifications."

SGS also delivers what it described as a "F1 pitstop like service" for vessels on tight schedules and which is planned with owners in advance. In this approach overhauled and reconditioned thrusters are prepared prior to a vessel's arrival and exchanged one-by-one, or in pairs, depending on the system layout. The newly demounted thrusters arrive at an SGS facility for overhaul for the next matched vessel. By working this way with manufacturers and class, SGS typically exchanges six DP3 units on drill ships in less than two weeks at specific sheltered anchorages.

In another notable project, a commercial shipowner reached out for help for a vessel that had incurred substantial grounding damage. This included a heavily damaged propeller, partial loss of the rudder horn, rudder damage and a bent main tail shaft. The lack of availability of a local drydock and the cost of towing to a drydock in a suitable location made drydocking the vessel impossible. Shilling says: "Based on our extensive experience doing these types of repairs, we submitted our proposal, applying our 'thinking in the water' mantra to the problem at hand. Then our technical services team, together with our in-house project managers, prepared a detailed plan, which was accepted by all the relevant stakeholders, including the vessel owner, class, manufacturers, and insurers."

A special customised cofferdam, to encase the area surrounding the damaged rudder horn and permit main shaft reinstallation, was fabricated and fitted on the vessel at the pierside layberth by SGS diver technicians. Meanwhile onshore repairs to the rudder itself were undertaken, and in the cofferdam the damaged rudder horn was repaired permanently with the installation by welding of a newly cast steel section of the rudder horn. This required SGS to qualify a new DNV weld procedure to attain class approval for the rudder horn repair section installation. Thereafter the cofferdam was removed,

INSTALLING NEW PROPELLER BLADES, AFTER THE COFFERDAM HAS BEEN REMOVED

THE REPAIRED RUDDER HORN WITH NEW SHAFT INSTALLED

manufacturer-approved reinstallation of the rudder was then completed, and new blades fitted, prior to final checks and testing.

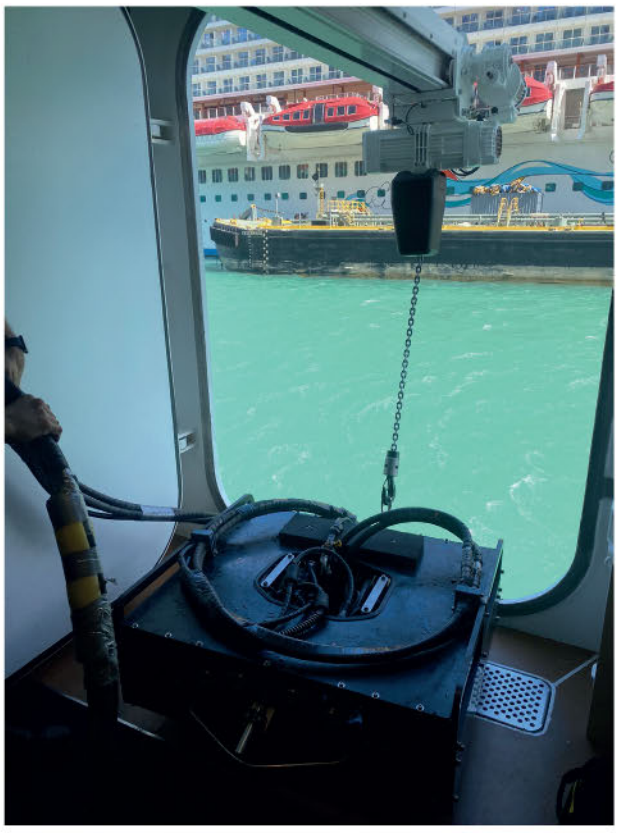
One of the trends that is most influencing the underwater ship services market is climate change and the global drive to achieve net zero. Shilling says: "The addition of the EU Emissions Trading System (ETS) and focus on CII/EEXI has sharpened ship operators' attention on the services we offer and that has triggered a proliferation of new agents offering the underwater services of commercial diving companies. This means that it's not uncommon to receive multiple source enquiries for the same job! We invested years ago in an effective system to process and coordinate enquiries across our offices, now on five continents, and this operational structure has recently shown its advantages, as the market adjusts to its new normal."

There has also been a greater market-wide focus on biofouling solutions, with ETS adding another motivator to the mix. As Shilling points out: "Underwater technology and investment interest continues to grow in providing solutions and there is much learning underway across the industry. An array of ROV hull cleaning products is appearing, many promising great things, but not always delivering."

He continues: "As a full-service underwater solutions provider, we are also engaging in ROV technology that complements our diver technicians, and the hull cleaning Ecofriendly Cleaning ROV (ECO-CROV) from SGS is busy gaining local port authority approvals and seeing multiple deployments, as is our Portable CROV system, which can be flown into the destination required, literally in a suitcase."

In the cruise sector, New Zealand's Ministry of Primary Industries (MPI) arguably leads the world in biofouling inspection protocols, which is a very high bar to pass, and SGS is especially proud of its team's achievements in checking, cleaning and getting approved every cruise ship enrolled in its underwater fleet management service program. This is especially notable as it encompasses more than 70% of the cruise fleet visiting New Zealand.

SGS has a skilled technician base of over 200 divers and ROV operators that are full time employed in 14 hub locations across five continents, supported by numerous working partnerships worldwide. Shilling concludes: "As an organisation, 2023 did not see any new locations added to our owned office network. However, with thousands of projects completed in over 250 ports worldwide in 2023, we have a wide trusted partner network that we wish to thank them for their continued support and cooperation." ■



A PORTABLE CROV UNIT BEING DEPLOYED VIA THE SIDE SHELL DOOR OF A CRUISE SHIP

HALF A CENTURY OF KEEPING VESSELS OUT OF DRYDOCK

As it celebrates 50 years in business, Hydrex has recently mobilised teams to perform a wide range of hull repairs on different vessel types

Having had a highly active 2023, the first quarter of 2024 has also proved busy for Antwerp-based Hydrex, which has deployed its diver technicians on numerous projects, including several that required shell plating repairs. "Market conditions have been good for us in 2023 and so far 2024, and this is a trend we have been experiencing for an extensive period now," says company founder and chief executive Boud van Rompay. "If constant quality is delivered, customers remain loyal. Even if the shipping market fluctuates, they know that our service is dependable. Carrying out reliable work is what counts."

In one recent project, when a tanker suffered a leak in the starboard side sea chest of its engine room, Hydrex sent a team to the ship's location in Rotterdam to carry out an insert repair. At the request of the class surveyor, an NDT specialist was arranged to take thickness measurements of the starboard sea chest from inside the engine room. These measurements showed that the damage inside the sea chest was more widespread than had been presumed. With the result of this inspection, a complete repair plan was devised by Hydrex in cooperation with the ship's crew and the classification society.

The sea chest was emptied of water and opened and the affected plating was then cut away. Hydrex diver/welders worked in shifts to fit and weld the two insert plates, which was done with class approved full-penetration welds. When the installation was complete, a successful NDT test was carried out by an independent surveyor, enabling the class representative to give his approval for the repair.

In another project, a fully loaded 180m bulk carrier suffered grounding damage in Las Palmas, Spain. An underwater repair was needed so that the vessel could sail to its unloading destination safely. Days after being contacted, a Hydrex repair team was on-site and ready to carry out this operation.

The first step was to remove a cofferdam that had been installed during a previous failed effort to repair the damage. Once this was done Hydrex diver/technicians installed two doubler plates over the affected areas of the flat bottom. This allowed the owner to continue the ship's voyage and unload its cargo.

In Santander a 115m-long LPG tanker needed to have a new insert installed on a damaged section of its flat bottom. Hydrex was contacted and asked to design and install a special mobdock. This would allow a nearby shipyard to perform the repair underwater in drydock-like conditions while the ship was berthed outside the yard.

The mobdock was constructed at the shipyard following

ONE OF HYDREX DIVERS WELDING A 45TON COFFERDAM IN PLACE

WELDING WORK ON A ROPE GUARD DURING A PROJECT IN TRINIDAD AND TOBAGO

a design plan provided by Hydrex R&D department and when it was finished it was installed by a Hydrex team. According to Hydrex: "The LPG tanker could continue its schedule without having to wait for a drydock space to become available, much to the satisfaction of both the owner and the shipyard that performed the repair."

Besides designing and installing tailor-made mobdocks, Hydrex teams can also perform the actual insert repair. An example of this was an operation performed in Palm Beach, USA, on a ro-ro vessel.

The ship had suffered corrosion damage to the aft starboard side shell plating. As the damage was situated in the turn of bilge it was essential that the mobdock was modified to fit perfectly over the rounded shape of the hull.

After the mobdock was installed, the frame covering the damage was removed. This allowed the team to cut away the damage and the surrounding area. A new insert plate was then positioned and welded following a class-approved procedure. An independent inspector carried out ultrasonic tests and the repair was approved by the classification surveyor who was present during the operation.

Another notable recent project involved a 170m-long container ship, for which Hydrex divers removed the bow thruster and reinstalled it two months later after it was overhauled. This was done during two port calls in Zeebrugge, without having to go to drydock.

The divers' first action was to take off the external thruster tunnel grids to provide access for removal of the unit. Next padeyes were welded inside the tunnel to hoist the thruster unit up and down.

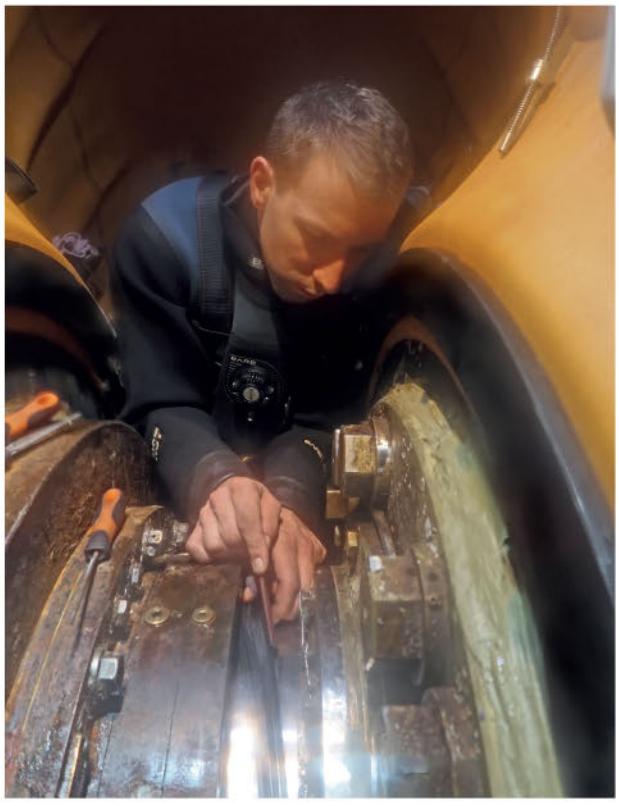
The next step was to secure the gearbox with hoisting equipment. The team then disconnected the unit from the engine room and removed it from the thruster tunnel. It was then brought to the surface and transported the unit to Rotterdam to be overhauled.

Two months later Hydrex picked up the thruster again and brought it back to Zeebrugge during the ship's next stop in the port. As the thruster was fully assembled and prepared, it could be installed in its entirety without the need to create a dry environment in the tunnel as is required when the blades are installed separately. Hydrex diver/technicians lowered it into the water and brought it into the thruster tunnel. The team secured the unit and connected it to the engine room. The operation ended with the removal of the padeyes and the reinstallation of the thruster tunnel grids.

In recent months Hydrex diver/technicians have carried out scrubber overboard pipe repairs on tankers, ro-ro ships and container vessels in Belgium, the Netherlands, and Germany. In total, 10 corroded pipes were replaced on six ships while clad welding repairs were done on two vessels. In all cases the pipes were protected with Ecospeed, produced by Hydrex's sister company Subsea Industries.

Earlier this year, in a notable achievement, Hydrex undertook five underwater stern tube seal repairs in a single month, travelling to Spain, Belgium, Trinidad and Tobago, Colombia and finally back to Spain. By using flexible mobdocks, all the repairs were performed on-site and the ships, which included a yacht, a ferry, a ro-ro vessel, a general cargo ship and a tanker, did not have to go to drydock.

Hydrex was established 50 years ago in Antwerp and in 2024 celebrates half a century in business. Van Rompay says: "We continue to invest in the research necessary to keep evolving the available repair techniques, along with continual training and development of our engineers and diver/technicians. This is done to offer customers the most efficient solution, whether the required services simply involve the inspection of a vessel's external condition and any required maintenance work, or highly technical major repairs and replacements of a ship's external underwater equipment and machinery." ■



A DIVER-TECHNICIAN WORKING INSIDE A FLEXIBLE MOBDOCK

REMOTE INSPECTION & SURVEY TECHNOLOGY

BV ACCELERATES UTILISATION OF REMOTE INSPECTION TECHNOLOGY

The classification society has undertaken several pilot projects to demonstrate the benefits of drone-based inspections

In pursuit of innovative ways to support its clients and the broader marine and offshore sector, Bureau Veritas (BV) has adopted a range of remote inspection techniques (RIT), including the utilisation of aerial drones.

BV Rule Notes NR467 and NR445 guide and encourage the use of RIT, including aerial drones and remotely operated vehicles (ROVs), to perform global visual inspection (GVI), close visual inspection (CVI), thickness gauging and other non-destructive tests (NDT) within the class scope, carried out by certified BV service suppliers. To further enhance its operational capabilities and safety, BV has recently invested in aerial drones and provided training to its surveyors for their operation.

One particularly notable associated innovation from BV is the development of Augmented Surveyor, an automatic anomaly detection and localisation tool powered by artificial intelligence (AI) and machine learning. Since its inception in early 2020, BV has further enhanced and expanded the capabilities of this tool through rigorous testing, proof-of-concepts and pilot surveys.

According to Sumit Paul, project manager, remote inspection techniques for Bureau Veritas Marine & Offshore: "The ability to precisely localise anomalies or suspected areas is paramount for facilitating further investigation, planning maintenance activities and monitoring their progression." He adds: "With the development of LiDAR (Light Detection and Ranging) surveying payloads mounted on drones, complemented by the BV Augmented Surveyor tool, automatic localisation of anomalies can now be achieved, marking a significant advancement in the future application of remote inspection techniques."

The risks associated with confined space entry, diving operations and rope access during inspection are well known. Despite the development of new rules, guidelines, standard operating procedures, and checklists aimed at mitigating risks in the maritime industry, incidents resulting in fatalities still occur. To address this ongoing challenge, remote inspection technology has emerged as an alternative solution for conducting inspections in a comparatively safe manner. "While such technology does not entirely eliminate the need for confined space entry, it significantly reduces its scope by minimising the number of confined spaces or tanks requiring human entry and the duration spent in such potentially risky environments," Paul points out.

In addition to enhancing safety, the utilisation of robotic inspection technology alongside the BV Augmented Surveyor tool offers a few other benefits, including the creation of 3D digital models of inspection findings; faster access to inspection data; more efficient repair planning and preparation leading to time savings; and the provision of superior quantitative and qualitative data for data-driven decision-making.

"While the benefits of drone usage in surveys are evident, challenges arise, particularly in managing the substantial volume of data generated, including videos, images and LiDAR. The data holds valuable insights, but evaluating it can be arduous, time-consuming and resource intensive. This is where AI technology becomes pivotal," Paul says.

According to Paul it is important to note the distinction between inspections utilising RIT and remote surveys. "In RIT inspections, the presence of a surveyor on board is mandatory, with the BV-certified service supplier operating under direct supervision. However, in remote surveys, the

THE USE OF DRONES FOR REMOTE VESSEL INSPECTIONS IS EXPECTED TO CONTINUE TO INCREASE IN FUTURE, BV BELIEVES

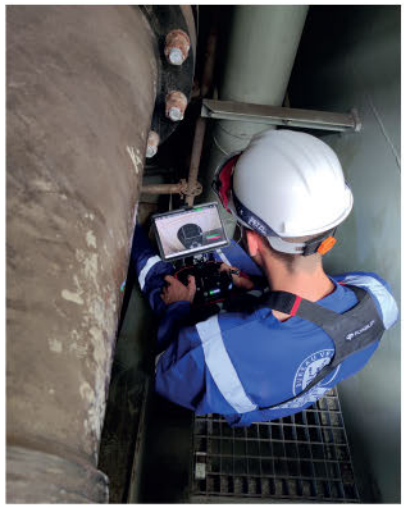
presence of a surveyor on board is not required," he explains.

The adoption of RIT systems in the marine and offshore inspection industry is expected to grow significantly in the next few years, driven by continuous technological advancements. BV has recently conducted several surveys utilising RIT with its own surveyors operating aerial drones, and these have demonstrated significant benefits.

On a container ship class renewal survey, a comprehensive inspection of all 40 ballast tanks and void spaces was successfully conducted using an aerial drone. Thickness gauging was also performed in a ballast tank, meeting the BV class rule requirements for the second class renewal cycle.

Using drones enabled the inspection of 40 confined spaces without the need for human entry. Minimal to no ventilation was required, reducing energy consumption, and saving time, while there was also a reduction in resource allocation by assigning just one junior crew member, compared to the conventional necessity of at least two crew members accompanying the attending surveyor.

In another project, for an offshore FPSO, two ballast tanks were inspected using an aerial drone operated by a BV surveyor. The entire inspection process was conducted without human entry, and the processing and analysis of all videos, images and LiDAR data was automated using the BV Augmented Surveyor tool. The generation of 3D digital models for each tank was also undertaken automatically.

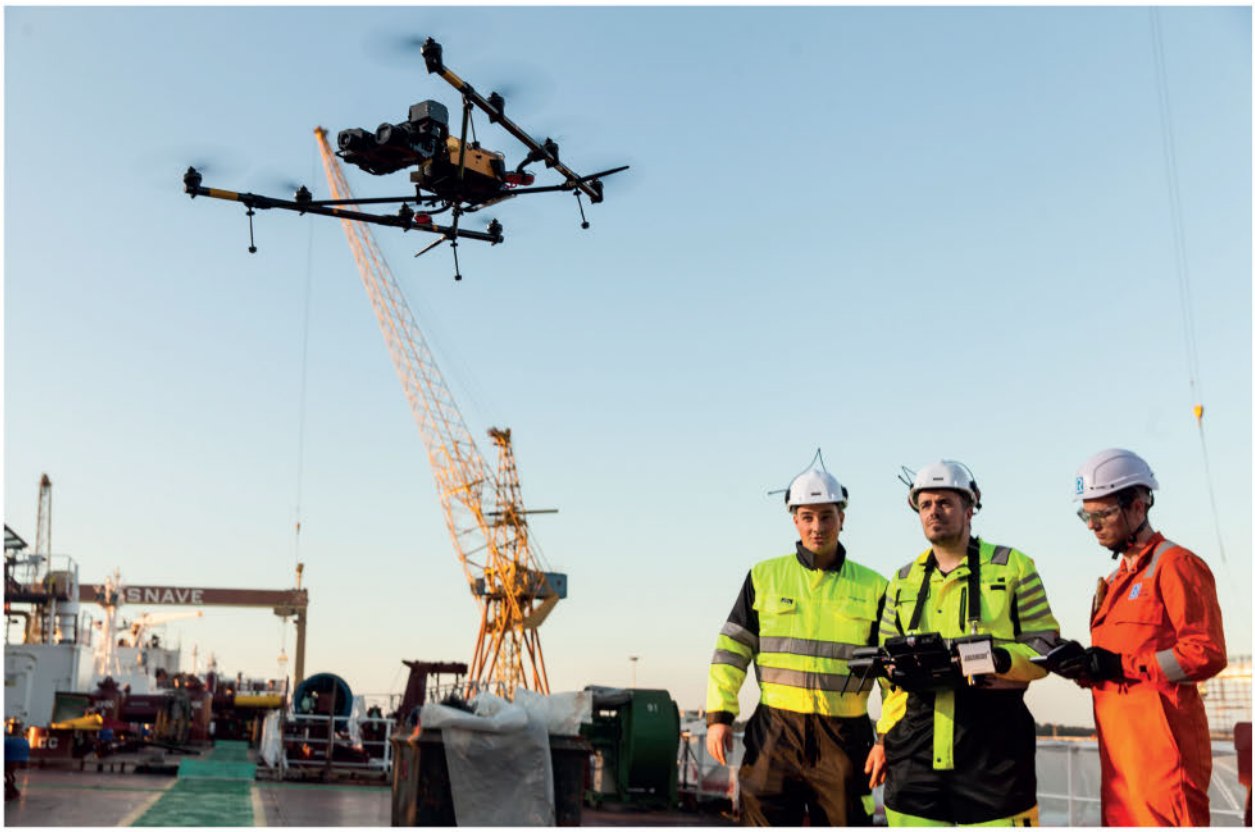


BV SURVEYOR USING A DRONE TO REMOTELY CARRY OUT A BALLAST WATER TANK INSPECTION

"Over the past year, there has been a noticeable increase in enquiries about, and demand for remote inspection methods, particularly from the offshore industry. While the maritime sector is still in the early stages of integrating this technology, there has been a proliferation of proof-of-concepts and pilot projects and it is anticipated that the utilisation of these technologies will continue to grow in the foreseeable future," Paul concludes. ■

REMOTE SURVEY DEMAND PEAKS FOR LR

Around 30% of all LR surveys are now being carried out remotely



A DRONE BEING USED DURING A SHIPBOARD SURVEY

The Covid-19 pandemic saw a huge shift in attitudes towards remote work, with the capability to conduct remote surveys becoming an essential part of classification services to the maritime industry. Lloyd's Register (LR) has continued its drive towards this tech-driven future with the opening of a dedicated digital survey centre in Chennai, India. Established late last year, the newly formed Global Digital Survey Centre (GDSC) manages LR's remote surveys across the Americas, South Asia, Australasia, the Middle East and Singapore.

The GDSC, supported by regional digital survey centres, is considered to be at the forefront of LR's expansion in terms of remote survey capability. According to Srikanth Saripaka, LR Digital Survey Team leader: "Safety remains the number one priority for surveyors, but where appropriate, remote surveys are shown to be just as effective as in-person surveys. The reduction in travel, accompanied by fewer operational disruptions, streamlines the service for shipowners and LR surveyors, offering agility and flexibility for vessels in remote or difficult to access locations."

Another primary benefit of these more efficient remote surveys is that it allows asset owners and managers to conduct more frequent inspections. This, LR suggests, leads to a more comprehensive understanding of a vessel's condition and any degradation.

Drones are increasingly being utilised by LR to help to significantly speed up the process of an in-water survey, as part of its remote survey programme. Saripaka says: "Traditionally remote surveys conducted using drones were carried out on fixed offshore assets in remote areas, but now, however, we can use drones to carry out inspections of a vessel's hull and associated components. These types of surveys are particularly well suited to Azipod-powered vessels without a propeller shaft, which are common in the passenger ship sector."

LR became one of the first classification societies to accept remote operated vehicle (ROV) inspections for periodical In-Water Survey (IWS) and UWE surveys of commercial passenger vessels with a successful classification survey in Puttgarden, Germany, carried out by Stein Maritime Consulting in 2023 using a Blueye Pro underwater drone.

The Norwegian underwater drone system was able to inspect the vessel's outer hull and its associated components to verify seaworthiness. As a result of the successful survey, LR awarded an IWS Statement for Passenger Ship Safety Certificate renewal. At the time

SRIKANTH SARIPAKA, LEADER OF LR'S DIGITAL SURVEY TEAM BASED IN CHENNAI, INDIA

Wojtek Nazar, LR's senior surveyor for Northeast Germany, commented: "Remote surveys allow shipowners and operators to obtain agile certification for their vessels, saving on costs and time. At LR we see a future where these efficient ROV surveys are widely used, alongside the traditional and thorough hull inspections which have been carried out by divers for decades."

Using the ROV for the in-water survey took just under four hours in this specific example and saved the operator 50% of the survey costs compared to conventional survey methods utilising divers.

Even though the pandemic is now past, LR reports seeing an increase in demand for remote surveys, with a consistent climb in remote survey requests. This reached a peak in January of this year, when 30% of all LR surveys were conducted remotely. Saripaka says: "These more efficient surveys are not just cost effective, but they prioritise safety and help to increase a vessel's operational efficiency, which can result in significant emissions reductions and compliance with increasingly stringent regulations. There are other factors also contributing to the rise in demand, including the availability of new technologies and live video streaming capabilities. But LR's dedicated global remote survey teams and the ease of doing business with our responsive and consistent approach, are also contributing positively to this upward trend."

Saripaka is enthusiastic about the future potential for remote surveys and he and the rest of his GDSC team are working to make the whole process, from booking a remote survey on LR's Class Direct online portal, to the point where the case is closed, more responsive, consistent, streamlined and efficient.

Moreover, the expectation is that as technology advances so will the scale and scope of LR's remote survey applications. "Increased connectivity between ship and shore is improving constantly and this opens up further opportunities to expand the remit of remote surveys," Saripaka says. "Advancement of vessel digitalisation, including more sensors, data transmission, and other digital systems, will further enable our digital class offers." ■

FERRIES & RO-RO SHIPS

REPEAT FERRY CUSTOMERS SUPPORT REMONTOWA WITH MULTIPLE PROJECTS

The first quarter of 2024 has seen a number of leading North Sea and Baltic operators return for a wide range of project types

BRITTANY FERRIES' *NORMANDIE* IN DOCK AT REMONTOWA

The Polish yard Remontowa has a long track record of carrying out repairs and upgrades to ferries and ro-ro ships, and the past few months have seen a number of notable projects undertaken for leading operators, including Finnlines, Stena Line, TT-Line, Brittany Ferries and DFDS, among others.

Finland's Finnlines has been a long-standing customer and towards the end of 2023, *Finnstar* entered Remontowa for the replacement of its four existing scrubbers with new ones. The shipyard additionally installed a new bow thruster, carried out steelwork in the tanks and undertook general hull maintenance.

FINNLINES *FINNSTAR* ALONGSIDE FOR REPAIRS

Two more Finnlines' vessels, *Finnmaid* and *Finnmill*, also visited the yard for general repairs in April this year.

For another leading regional operator, DFDS, last year Remontowa retrofitted *Tulipa Seaways* and *Acacia Seaways* with scrubbers by mounting two fully equipped scrubbing towers in each vessel's funnel. The installation was preceded by several weeks of prefabrication work, covering the funnel section, the reinforced caustic soda tank and the room housing all the equipment. Creating the foundations and platforms for the scrubber installation was also required.

More recently DFDS' *King Seaways* and *Victoria Seaways*, which were both refurbished at the yard in 2022, returned to Remontowa in early 2024. The main scope of work on *King Seaways* included maintenance of the underwater part of the hull; the repair of four propeller blades including seal replacement; the overhaul of the thruster; and the installation of a fire and bilge pump in the engine room. On the *Victoria Seaways*, Remontowa installed a ballast water treatment system and overhauled the propeller hub and blades, the bow thruster, and two of the vessel's stabilisers, while maintenance and repairs to the stern ramp also generated a significant amount of work for the yard.

For Brittany Ferries, the ro-pax vessel *Normandie* recently underwent an extensive overhaul at Remontowa, covering four main and two auxiliary engines and over 30 different types of pumps. The ferry's stabilisers were also reconditioned during the stay at the yard, and hull maintenance was undertaken. Brittany Ferries' *Pont Aven* was another early 2024 visitor for general repairs.

Also in the first quarter of this year, the TT-Line operated ferry *Tom Sawyer* visited Remontowa for a lengthy stay, during which time around 100tonnes of steel was renewed, while the stern and bow ramps underwent maintenance and actuator overhauls. Lashings for large road transport vehicles were replaced on the car decks and inspections were carried out on the ferry's coolers, heat exchangers, fans and electric motors. Furthermore, an extensive amount of piping was replaced in the engine room and superstructure.

TT-LINES' *TOM SAWYER* UNDERWENT AN EXTENSIVE SCOPE OF WORK EARLIER THIS YEAR

In a major 2023 project, Remontowa converted the ferry *Stena Nordica*, fitting an additional superstructure above Deck 5 to create more passenger space. To ensure safe navigation once the additional superstructure had been installed, Remontowa stabilised the ferry by fitting it with a special steel structure mounted to the hull. As part of the conversion, the passenger lifts at the bow and stern were replaced, and the public spaces were refreshed.

Also in the passenger shipping sector, in early 2024 Remontowa completed a project to upgrade the cruise vessel *Amera*, owned by Phoenix Reisen, including modifications to the power and propulsion system to meet new energy efficiency and carbon footprint requirements. The yard replaced four main engines, weighing 400tonnes, with new, more economical ones; installed two new main gearboxes weighing 76tonnes; and fitted four shaft generators to replace the two previously on board. The upgraded engine room was equipped with new heat exchangers, pumps and fuel and oil separators and filters. Furthermore, a total of around 100tonnes of piping were dismantled, and over 1,000 new pipe sections were installed.

After replacing the main engines and gearboxes, Remontowa tuned the new power system by setting the relevant parameters of the individual components. This was complemented by installing new propellers in the bow thrusters and replacing the controllable pitch propeller hubs.

The azimuth thruster at the stern was removed, resulting in *Amera* gaining additional space in this area while Remontowa also repaired the underwater section along the entire length of the ship. Additionally the saltwater ballast tanks were converted to permanent ballast ones. ■

BLRT GRUPP AIMS TO EXCEED FERRY OWNERS EXPECTATIONS

By adopting a comprehensive approach to ferry maintenance, repairs and environmental upgrades, the yard operating group is aiming to build further on its fast-growing business in this sector

After the commissioning of the largest floating dock in the Baltics, measuring 235m by 45m in 2020, BLRT Repair Yards (BRY) effectively opened up a new chapter in its long history by enabling the repair and maintenance of larger vessel types. This strategic expansion has helped to significantly increase the proportion of ferries, including ro-ro and ro-pax vessels, docking at the group's yards in Estonia, Lithuania and Finland. Indeed, the ferry sector now accounts for around 22% of the vessels serviced by the company.

"This increase in the relative importance of ro-ro ships and ferries to BRY demonstrates our ability not only to undertake complex projects, but also highlights our increasing expertise and flexibility in terms of meeting the market's requirement for timely ferry maintenance," says Andrejus Babachinas, CEO of BRY.

Over the past year BRY has continued to collaborate closely with some long-standing partners, such as Stena Line, DFDS, TT-Line, Finnlines, Tallink and Viking Line, while also extending the customer base to include some high profile owners and managers, with P&O Ferries, ARC, CLdN and Scandlines amongst them.

"We look forward to undertaking many complex projects in the months ahead, further strengthening these partnerships," says Babachinas. "As maritime professionals well understand, the planning of ferry maintenance is an art of precision, governed by the tight deadline of the ferry's scheduled return to service. We have built our operations around this precision, especially during the winter months, which is the low season for ferries, ensuring minimal disruption to regular services while preparing vessels for peak demand in the spring and summer."

A notable project handled in recent months involved the maintenance and environmental upgrade of DFDS' *Petunia Seaways*. Despite the festive holiday season, adverse weather conditions and a tight schedule, BRY worked closely with the customer's representatives and vessel crew yard team to handle an extensive package of works to ensure a timely redelivery. This project included class renewal jobs, the installation of a ballast water treatment system and the application of silicone paint on the underwater hull to enhance efficiency and environmental friendliness.

VIKING CINDERELLA WAS AN EARLY 2024 VISITOR TO THE GROUP'S NAANTALI YARD IN FINLAND

The first quarter of 2024 has been bustling with activity at BRY's Klaipeda yard, setting an optimistic tone for the rest of the year. In January alone the yard welcomed nine ships, including three ferries for significant repair projects. One of the early visitors was the *Pride of Rotterdam* for P&O Ferries, which required class renewal works, followed by *Aurora Botnia*, a relatively new ferry built in 2020, for long-term partner Wasaline. The BRY team in Klaipeda also serviced the Scandlines ferry *Berlin*, a vessel of almost 170m in length, that underwent a comprehensive range of maintenance tasks, including work to steel structures and various pipeline systems, as well as some extensive painting jobs.

After completing work to *Berlin*, the BRY team smoothly transitioned to their next maintenance project, *Prins Richard*, also operated by Scandlines. The scope of work on this occasion included repairs to its four azimuth thrusters, as well as extensive blasting and painting of both the hull and deck areas. Special attention was paid to the silicone-coated underwater hull.

In late March this year, BRY started scheduled maintenance works to *Akka*, a ro-pax operated by TT-Line. The 191m-long ferry is a familiar vessel at the Klaipeda shipyard, having previously been serviced under its former name, *Nils Holgersson*. A month prior, in February, the yard serviced another TT-Line vessel, *Huckleberry Finn*, which was handled in its large floating dock No. 12.

The BRY yard in Naantali, Finland, has also been busy with ferry work over the winter season. One of the biggest projects was the transformation of Viking Line's *Viking Cinderella*, in preparation for its return to service between Helsinki and Stockholm. As well as a regular drydocking, the ferry underwent extensive interior refurbishment. The project scope further included tasks aimed at ensuring the vessel's operational safety and efficiency.

BRY says it is excited about the prospects that will be opened up by a new 180m floating dock currently under construction in Turkey and due for delivery to its Tallinn shipyard by summer 2024. "This addition to our six existing docks means we can do even more when it comes to servicing vessels, including ferries," states Babachinas. "It is a big step up for us and will open more doors to handling larger projects," he concludes. ■

LOCAL FERRY WORK HELPS UK YARDS TO RECORD-BREAKING START TO 2024

For the UK-based APCL Group the first few months of the year have been the best to date, with ferry and ro-ro work featuring heavily

The APCL Group of companies has experienced a significant period of growth over the first few months of 2024, with ferries and ro-ro ships accounting for an important element of the workload, as is the normal pattern for the time of year.

In the South West, A&P Falmouth completed four dockings of Red Funnel passenger ferries for their annual repair periods. The yard used its No. 3 Dock to accommodate the simultaneous docking of *Red Eagle* and *Red Kestrel*. The scope of works for both ships included hull cleaning and blasting, painting, the replacement of steel in the hulls, tank cleaning, various inspections and other survey associated work.

A&P Falmouth has also undertaken several projects for P&O Ferries, Wightlink and Stena Line to date this year, underlining its important contribution to maintaining the UK cross channel fleet in particular.

In the North West, APCL Group company Cammell Laird has experienced its busiest commercial period to date, with its four drydocks accommodating a variety of customers. Since the start of 2024, Cammell Laird has welcomed three Stena Line vessels to its facility, *Stena Edda, Stena Embla* and *Stena Adventurer*. *Stena Adventurer* underwent a particularly large programme of works that included extensive steel deck repairs, an overhaul, of the main propulsion system and other auxiliary works such as roller fairlead overhauls.

In February Cammell Laird's double-docked CalMac Ferries' *Hebrides* and Mersey Ferries' *Royal Iris of the Mersey* which simultaneously underwent ship repair works in the yard's No. 6 dock. Additionally, Calmac's *Caledonian Isles* entered drydock at Cammell Laird for extensive steelwork repairs, after having equipment overhaul work carried out alongside.

All vessels visiting Cammell Laird over the first quarter of 2024 had their blasting and painting scope completed by another APCL Group company, Neway Industrial Services. This included a re-paint and livery change for A&P Falmouth's new tug, *Morva*, previously *Svitzer Surrey*, which visited Cammell Laird's facility for conversion work, allowing it to be powered by hydrogenated vegetable oil (HVO) as part of a continuing initiative by APCL to reduce emissions in port.

In the North East, A&P Tyne yard has to date in 2024 focused more on offshore vessels, although several passenger vessels have visited the facility. One notable project involved the hybrid-powered diving support vessel *Boka Atlantis*. In this case the scope of works included painting the vessel's hull and topsides, polishing the thruster blades and high pressure washing of its cooler

TWO RED FUNNEL FERRIES DOCKED SIMULTANEOUSLY AT A&P FALMOUTH EARLIER THIS YEAR

STENA EDDA WAS ONE OF A NUMBER OF STENA LINE VESSELS TO VISIT CAMMELL LAIRD IN BIRKENHEAD OVER THE FIRST QUARTER FOG 2024 FOR REGULAR OVERHAULS AND MAINTENANCE WORK

boxes, as well as the overhaul of 30 fairlead rollers. The yard also supported the OEM with work to the vessel's 140tonne crane.

Boka Atlantis was followed into the Tyne yard by the arrival of multi-role survey vessel, *Ocean Resolution*, returning dredger *Arco Avon* and oil tanker *Solway Fisher*.

"We have experienced our busiest period to date with dockings from new and returning commercial customers alike. This firmly cements our position as the country's leading ship repair and conversion specialist, and it is fantastic to see our facilities across the Group working together to accommodate our clients, including those from the ro-ro and ferry sectors," says David McGinley, chief executive of APCL. ■

WÄRTSILÄ PARTNERS WITH P&O FERRIES

A long-term maintenance deal for two new ferries is expected to reduce operating costs carbon emissions

Technology group Wärtsilä has signed a Lifecycle Agreement with UK-based P&O Ferries. The five-year agreement covers two vessels, *Pioneer* and *Liberté*, and is designed to ensure minimal impact on their regular cross-Channel operations, while providing a high degree of predictability in terms of maintenance costs.

According to Wärtsilä: "Ferries have a huge role to play in meeting the growing demand for environmentally sustainable transport options. That's why it is especially crucial for ferry operations to run smoothly and efficiently, in order to avoid unnecessary costs, fuel consumption and emissions."

The scope of the Lifecycle Agreement with P&O Ferries includes parts and maintenance services, as well as maintenance planning, operational support and Wärtsilä's Expert Insight predictive maintenance service. This is designed to ensure that any issues can be identified before they cause a delay in the ferries' operational schedule.

"We are focused on doing everything possible to reduce our carbon footprint and protect the environment," says Stephen Pitt, senior procurement manager, P&O Ferries. "The ability to leverage Wärtsilä's advanced digital solutions is central to this, helping us to improve vessel uptime, save fuel and decrease emissions."

Both vessels feature hybrid propulsion with battery power and four high-efficiency Wärtsilä 31 main engines, which are expected to produce 40% fewer emissions than the ships they replace. By optimising performance, it is expected that the agreement will further enhance the ships' environmental sustainability.

Pioneer commenced commercial operations in June 2023, while *Liberté* entered service in March 2024. The 230m-long ships are the world's largest double-ended ferries, and sail between Dover and Calais. ■

P&O PIONEER, ONE OF TWO FERRIES COVERED BY A NEW LONG-TERM MAINTENANCE AGREEMENT

TURBINE REPAIRS

SULZER RESTORES CONTAINER SHIP STEAM TURBINE

A badly damaged turbine has been successfully made operational again

When a container ship owned by a leading container shipping company required a steam turbine overhaul, a regional team from Sulzer delivered a comprehensive repair and upgrade. Using reverse engineering techniques, Sulzer technicians were able to restore the operational readiness of the legacy steam turbine in a timely manner, limiting costly downtime.

While most modern container ships use diesel engines, some older vessels still rely on steam turbines for propulsion, and these require specialist servicing. In this particular case an 18-year old steam turbine installed on the containership had suffered damage due to operational wear and tear and there was a window of opportunity to conduct repairs in Shanghai as part of a scheduled maintenance drydocking.

However the original equipment manufacturer in the UK could not provide support in China due to the absence of local manpower, and the cost of flying in experts was a cost the owner was in any case reluctant to carry. As a result the vessel operator's central procurement team based in Singapore contacted Sulzer, which dispatched a team to China to inspect the unit.

FOLLOWING REVERSE ENGINEERING, SULZER MANUFACTURED NEW BLADES AND REPLACED THE TURBINE, EXTENDING SERVICE LIFE BY UP TO 15 YEARS

Having assessed the turbine, Sulzer discovered the damage extended beyond what was originally identified. A combination of visual inspections, non-destructive testing and root cause analysis revealed damage to the third, eighth and ninth stages of the turbine. Then trailing edges of the third stage had suffered impact damage, while the eighth stage had blades that were bent and cracked. In addition the ninth stage had visible cracks and a completely broken blade. On top of this, bolts on the upper cover diaphragm were damaged and the retaining rings could not be removed. In addition, the rotor journals had some scoring and it was determined that some of the labyrinth seals would need replacing, and others refurbished, to ensure operational reliability on a long-term basis.

The damaged elements of the turbine were all re-bladed, with erosion shields added to improve service life. The new blades were all manufactured by Sulzer's Puerwakarta Service Centre in Indonesia.

To ensure the new blades were a perfect fit, the original components were reverse engineered. In total 125 blades were produced for stage three; 97 for stage eight; and 96 for stage nine.

Meanwhile Sulzer's Suzhou Service Centre completed the refurbishment of some of the labyrinth seals, as well as the reverse engineering and replacement of more than 50 parts and components, including studs, bearings, couplings, labyrinth seals and other items. Additional engineering support for this process was provided by Sulzer's Singapore Service Centre.

Further work included the complete replacement of the turbine journal and thrust bearing, as well as polishing the rotor journals to remove any scoring.

The programme of work was complicated by the constricted space onboard the ship. This made removing the turbine casing cover and rotor more challenging, Sulzer says. Nonetheless the repair work was completed, and the turbine reinstalled on the ship, within the anticipated time frame, allowing the vessel to re-enter service on schedule.

According to Sulzer the repaired turbine is expected to have an extended service life of around 15 years. The positive results are reported to have instilled confidence in the owner, which is now organising further turbine and generator maintenance jobs with Sulzer for container ships docking in Asia over the coming months. ■

ALTERNATIVE FUEL RETROFITS

ENERGISING CRUISE SHIP METHANOL RETROFIT PLANS

SRC's well-known Sandwich Plate System is behind an innovative approach to onboard methanol storage

SRC'S CONCEPT HAS SPARKED INTEREST FROM A NUMBER OF CRUISE LINES. SOURCE: PETER HANSEN/UNSPLASH

Methanol-capable engines have been specified for a number of vessels, both newbuilds and as retrofits, over the past year or so. But most have been container ships, and the cruise ship sector has been reluctant to commit due to some significant constraints.

Stakeholders in the cruise industry have long been open to the attractions of the methanol alternative. But, along with the lack of bunkering infrastructure, the methanol road map features a shipboard storage challenge which undermines ship operating cost models. Tonne for tonne, methanol is almost two and a half times more space hungry than HFO in terms of energy efficiency.

Enthused by what appears to offer a solution, cruise shipping players have consequently been amongst those to respond positively to Lloyd's Register approval in principle (AiP) for 'Methanol Superstorage', a new approach to storage tank construction which its developer, the SRC Group, says increases volume by 85% compared with conventional solutions.

Conventionally, tanks storing low flashpoint fuels on board ship require cofferdams of at least 600mm across to separate internal and external walls as a safety precaution. Methanol superstorage by comparison features 25mm thick tank walls which are formed by Sandwich Plate System (SPS) technology. Applicable to newbuilds and retrofits, the Methanol Superstorage solution can be installed with only a minimal impact on the general arrangement, SRC claims.

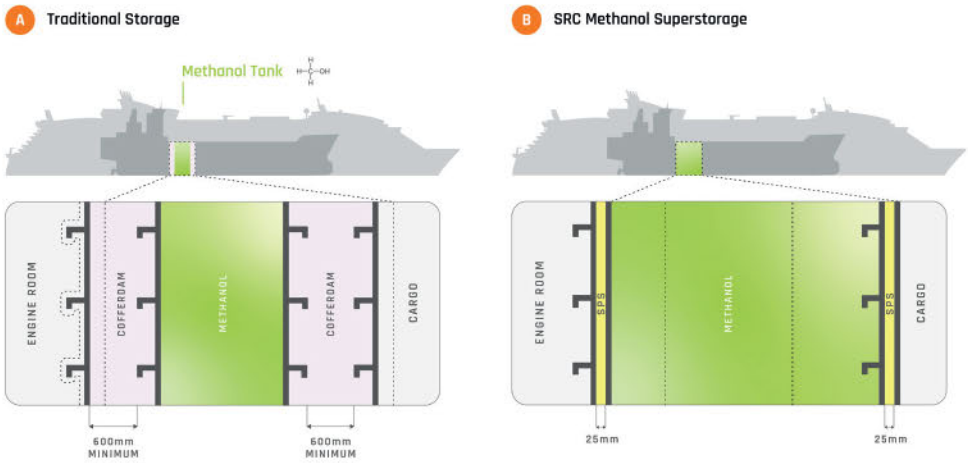
SPS technology consists of a patent-protected continuous polymer core that has been injected between two steel surfaces. The steel-polymer-steel barrier has been used in maritime and offshore applications for over two decades, and has been approved for permanent repairs by all major IACS class societies, including for corrosion in ship structures. Class approvals have also involved laboratory testing of the polymer core material for chemical resistance, including for methanol.

With many leading cruise lines now considering retrofitting ships for methanol as a marine fuel, the concept has sparked interest, and SRC is in discussions with several top players. "These are confidential discussions, but the projects that have been progressing are now under review to accommodate consideration of Methanol Superstorage, while one project that looked totally dead is being revived," says Hannes Lilp, CEO, SRC Group.

Securing the LR AiP last year was an important step forward as it provides assurances that there are no major obstacles to future certification or classification. This means stakeholders are likely to have more confidence in their investment.

Alex Vainokivi, innovation manager, SRC Group, acknowledges that the regulations underlying fuel storage are still evolving. "The journey from AiP to full class approval is also substantive," he observes. "Due to the regulatory status of low flash point fuels, methanol-fuelled ships need to go through a Risk Based

METHANOL SUPERSTORAGE OFFERS UP TO 85% LARGER METHANOL FUEL TANK CAPACITY FOR STORING METHANOL COMPARED TO THE TRADITIONAL COFFERDAM SOLUTION



Certification process that includes the whole fuel system, from bunkering station to the engines," adds Vainokivi.

One strength of the Methanol Superstorage case rests on its equivalent protection against fire or leakage to a conventional tank, he adds. The injected polymer also creates oxygen-free conditions behind the steel plates to prevent corrosion.

"Under fire testing, SPS technology satisfies the fire safety objectives and the functional requirements of SOLAS A-60 regulations without the need to install thermal insulation," claims Vainokivi.

Methanol has considerable potential as a future fuel in shipping's energy transition. By limiting the space needed for retrofits, the SRC solution is sure to garner a lot of attention and the company is certainly confident of securing breakthrough contracts in the near future. ■

TURBOCHARGERS

GTS SIGNS STRATEGIC AGREEMENT

New deal extends reach into the important Greek market

UAE-based Gulf Turbo Solutions (GTS) – an affiliate of MAN Energy Solutions – has taken an important step towards broadening its geographic coverage by signing an agreement with Euploia Drydocks & Services of Greece.

GTS has its own facilities in Dubai, Sharjah, Singapore and Bahrain, and is shortly also to open up service centres in Rotterdam and Dammam. Euploia says that by entering into this partnership the two companies hope to offer a wide range of turbocharger repair and maintenance and other services to clients in Greece.

Charis Valentakis, managing director of Euploia, says: "This partnership aligns with our vision of offering high quality turbocharging solutions and supplying components and services of reliable quality to our clients. We look forward to reshaping the landscape of turbocharger services in Greece alongside GTS."

From its base in the UAE, GTS offers a wide range of services, including all types of balancing, rotor shaft reblading, spare parts and field servicing. The company holds manufacturer approvals from various brands, including Mitsubishi Heavy Industries, Mitsui E&S, KBB and Napier, and its field service personnel are trained by MAN PrimeServ. GTS also maintains an extensive stock of new and reconditioned turbocharger parts to facilitate speedy distribution worldwide.

GTS has recently added to its range with the addition of portable 3D scanning technology, designed to acquire accurate measurements anywhere as required. This, the company says, improves its ability to develop drawings

GTS AND EUPLOIA ARE TO COLLABORATE IN DELIVERING TURBOCHARGER SERVICES TO THE GREEK MARKET

of critical turbocharger parts, and can be transported anywhere. The scanner used by GTS features multiple laser crosses and an automatic mesh generator, enabling faster workflow from initial setup, to scan and then to file.

According to GTS, the new technology allows even complex parts to be drawn quickly and with a high degree of accuracy, thereby improving its reverse engineering capabilities.

Euploia specialises in the ship repair and conversion sector within the Greek market. Core services include shiprepair in conjunction with partners, marine equipment supply, ballast water treatment systems, scrubbers and safety products. ■

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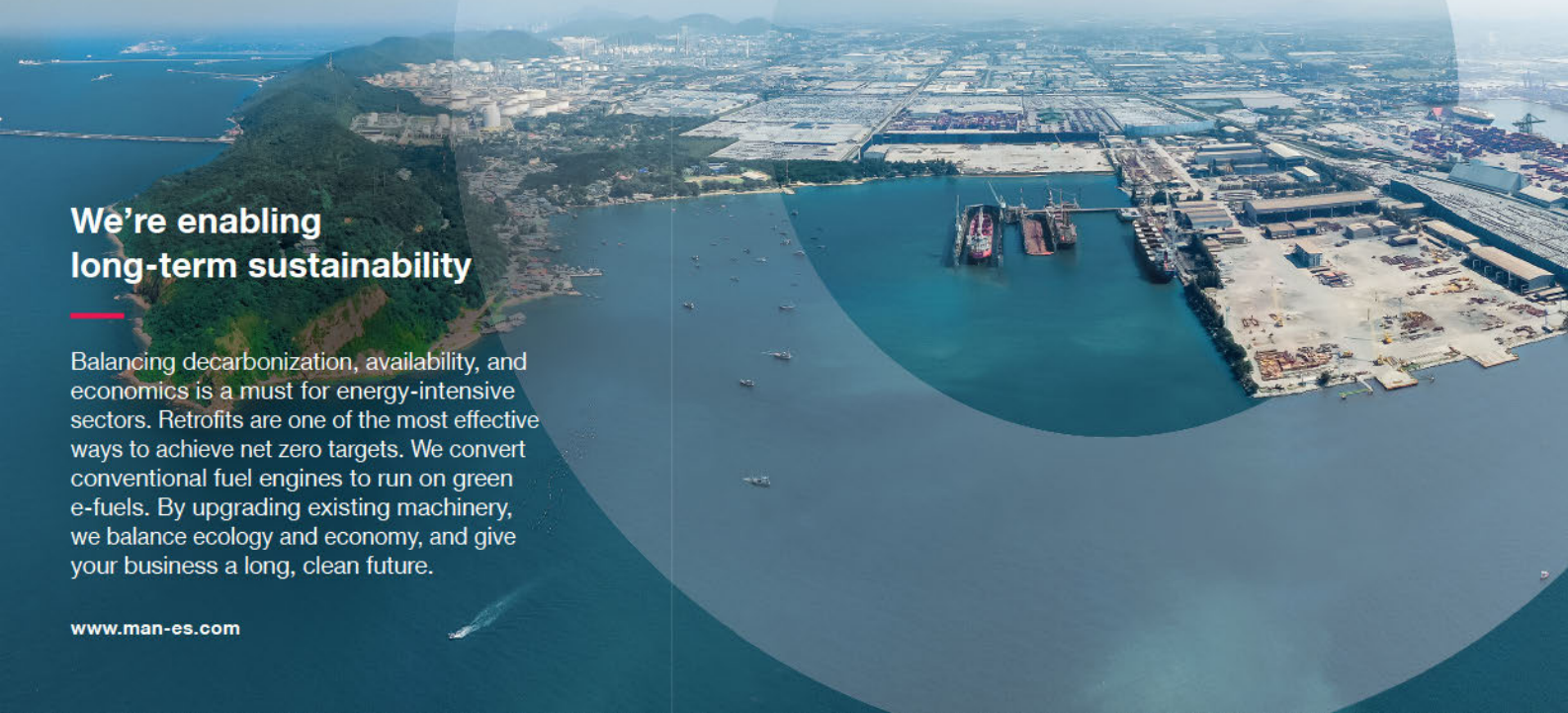

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