



APR 2024

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Published in March 2024, Significant Ships of 2023 brings together around 45 notable newbuildings delivered during the previous year. As ever, the publication will feature general arrangements, concise descriptions, in-depth particular details and photographs of each vessel. Vessel types will include:

- Cruise ships
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Comprising around 25-30 first-in-class vessels under 100m in length delivered during the year, the 2023 edition of Significant Small Ships features general arrangements, ship descriptions, technical particulars and photographs, the publication covers a wide range of ship types, including:

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- Fishing vessels
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- Superyachts and tenders



# CONTENTS

April 2024

EDITORIAL COMMENT  
MEPC 81: momentum builds for revised GHG strategy 5

NEWS  
NEWS 6-7  
ANALYSIS 8  
EQUIPMENT 10-11  
OPINION 12

FEATURES  
CAD/CAM/CAE  
How to model your alternative fuels 14-15  
future  
Shipbuilding 5.0 – an evolution of the CAD/CAM technology 16-17

JAPAN  
Navigating turbulent waters: Japan's maritime industry at a crossroads 18-19

CAREERS & EDUCATION  
Employers prioritise talent retention in naval architecture amidst competitive market 20-21  
Key UK companies harness the power of young naval architects with apprenticeship programmes 22-24  
Upskilling seafarers for the energy transition 24-25  
Strathclyde students share their naval architecture journey 26

OFFSHORE & SUBSEA  
Orange's green ship tasked with fixing broken subsea cables offshore Africa 28-30  
Ulstein bolsters subsea vessel portfolio with ship for all markets 30

NOISE & VIBRATION  
Propeller blade renewal intended to cut fuel consumption may reduce noise as well 32-33

TANK GAUGING  
In control: the technology behind the latest tank gauging systems offers multiple benefits for shippers 34-35

DECARBONISATION  
Breaking the barriers to shipping's alternative fuel future 36-37  
Retrofit solutions to achieve 55% GHG reduction by 2030 38-39

FOCUS 40-41

CALENDAR 42

# FEATURES



CAD/CAM/CAE

14



JAPAN

18



CAREERS & EDUCATION

20



OFFSHORE & SUBSEA

28



NOISE & VIBRATION

32



TANK GAUGING

34





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# MEPC 81: MOMENTUM BUILDS FOR REVISED GHG STRATEGY

By **Daniel Johnson**



MEPC 81 MET IN LONDON FROM 18 TO 22 MARCH 2024. SOURCE: IMO

Last month's 81st session of the International Maritime Organization's Marine Environment Protection Committee (MEPC 81), held at the maritime body's London headquarters from 18-22 March against an increasingly volatile geopolitical backdrop, provided an important opportunity for member states of the IMO to show their commitment to the advancement and implementation of policy measures capable of delivering the revised strategy for reduction on greenhouse gas (GHG) emissions from ships agreed at MEPC 80 in July 2023. While there is a consensus amongst observers that significant progress was made during the latest round of negotiations, it is also clear that there is still much work to be done ahead of the pivotal MEPC 83 meeting in April 2025.

Arguably one of the key outcomes of MEPC 81 was member states reaching an agreement on a possible draft outline of an "IMO net-zero framework" for cutting GHG emissions from international shipping. This marks a step forward in the legal process towards adopting global regulations, referred to as "mid-term GHG reduction measures", that will help achieve the targets contained in the 2023 revised strategy.

The draft outline proposes to create a new Chapter 5 of MARPOL Annex VI containing regulations on the IMO net-zero framework. According to maritime consultancy UMAS, although this new chapter is just a framework of subheadings for now, it does contain all the structure needed to adopt any of the GHG policy options currently under consideration, including a goal-based fuel standard, flexibility mechanisms (a type of economic measure that involves credit-trading like an ETS), GHG levy, fund management and revenue disbursement.

The consultancy also noted the new MARPOL chapter was well received by all countries – a positive signal for further cooperation. Additionally, there was an increased number and range of countries supporting a GHG levy (referred to as universal GHG price), which is encouraging for both the energy and equitable transition agendas.

Annika Frosch, researcher at the UCL Energy Institute and consultant at UMAS observed: "Though unanimous in agreeing to a common framework for the amendment of MARPOL Annex VI Chapter 5 amendment, the diversity of member states' preferences on key measures signals a complex journey ahead. Yet, this shared commitment lays a hopeful foundation for the negotiations required to achieve agreement on the measures as outlined in the revised GHG strategy."

In addition to progress on the legal framework, MEPC 81 clarified both an expert workshop on the modelling and analysis base of the measures and the agenda for the next IMO Working Group (ISWG-GHG 17) meeting in late September, which has been set up to advance the substance and detail in the new MARPOL Chapter 5 drafting.

UMAS concluded that the meeting's "generally progressive outcome and politically collaborative spirit" has increased the commercial risk for those who adopt a 'wait and see' approach to zero emission technology, or one that is dependent on the IMO not delivering what it committed to in 2023. In other words, the direction of travel is clear and shipowners failing to embrace decarbonisation may want to think again.

However, there is still much to be discussed ahead of MEPC 83 where the IMO is scheduled to approve the amendments to MARPOL Annex VI that will operationalise the global fuel standard and GHG pricing policies. Negotiations at the IMO are a delicate and complicated business, and the multi-lateral politics between nation states, where countries have vastly different starting points and interests, mean the potential of failing to meet the timeline and robustness set out in the revised GHG strategy does remain high. The year ahead will be intriguing, especially in light of current world events. That said, MEPC 81 should be seen as a step in the right direction. ■





# NEWS

## FERRIES

### P&O'S SECOND DOUBLE-ENDED HYBRID FERRY STARTS CHANNEL CROSSINGS



P&O LIBERTÉ HAS BEGUN CROSSINGS IN THE ENGLISH CHANNEL. SOURCE: P&O FERRIES

P&O Ferries has launched the second of its new class of hybrid vessels, *P&O Liberté*, on the key Dover-Calais route between the UK and France.

The 47,653gt ro-pax ferry and its sister ship *P&O Pioneer* represent a £250 million investment by P&O Ferries in UK trade and travel and mean the shipping company now boasts the newest and most technologically advanced ferry fleet on the English Channel.

Built by China's Guangzhou International Shipyard, the two 230m-long Fusion class vessels are the world's largest and fastest double-ender ferries, with a service speed of 20.8knots. They are powered by a battery-hybrid system that reduces carbon emissions by up to 40% compared with older vessels.

P&O Ferries chief executive Peter Hebblethwaite says: "The arrival of our second revolutionary hybrid vessel means we can offer even more of our customers the best travel experience and facilities available on the Channel."

He adds: "In the nine months since the first of our new vessels entered service, *P&O Pioneer* has become a transport icon, contributing to the 135,000tons of carbon emissions reduced from our operations in the last two years."

Each of the vessels is expected to carry out more than 100,000 crossings of the Channel in their lifetime. Last year more than 3.5 million passengers and nearly 800,000 freight units travelled with P&O Ferries on the Dover-Calais route.

## OFFSHORE AQUACULTURE

### FRENCH REGISTRY SOUGHT FOR FISH FARMING 'SUPERYACHT'

DNV has teamed up with UK-headquartered Ocean Sovereign to obtain French registration for the deployment of an offshore aquaculture "superyacht".

The Ocean Ark is a self-cleaning trimaran superstructure developed by Ocean Sovereign according to MARPOL, SOLAS and IMO regulations. The vessel – measuring 170m by 60m – is designed with low density to operate in high offshore waters, drifting with the natural current or powered by diesel-electric propulsion. It can also be towed by a tugboat if necessary.

The mobile nature of Ocean Ark will help to ensure the health and welfare of the fish and ensure that the fish are kept in their natural habitat, according to Ocean Sovereign.

The vessel is capable of being equipped with eight cages of 35m width or four cages of 64m width, with each cage 35m long and 20m deep. Its anti-fouling copper-zinc alloy mesh cages allow for better structural resistance and predator protection, the firm says.

DNV is supporting Ocean Sovereign with business-critical challenges and innovations, designed to prevent fish escape and reduce risk of technical failure in operation



OCEAN ARK. SOURCE: OCEAN SOVEREIGN

by delivering classification of the floating structure/vessel and marine systems; certification of mooring/dynamic positioning system; certification of aquaculture nets and systems; and assessing operation and integrity controls during the design's lifetime.

France was chosen for Ocean Ark's marine registration because of its large maritime exclusive economic zone, allowing for wide deployment, as well as its status as Europe's largest market for salmon, according to a spokesperson.



## CRUISE SHIPS

## STUDY COMMISSIONED TO CHART THE FUTURE OF CRUISE SHIP DECARBONISATION

Italian class society RINA has secured a contract from the Cruise Lines International Association (CLIA) to carry out a comprehensive Global Investment Plan Study aimed at steering the cruise sector towards a sustainable future.

The research will provide CLIA, which represents 95% of the global cruise ship fleet, a worldwide scenario focused on the cruise sector, mapping real-time energy needs, infrastructure and regulations with foresight scenarios extending to 2050.

According to RINA, the study represents a major step in the cruise industry's commitment to align with the IMO 2030 and 2050 environmental goals. It will cover all areas of the world outside Europe and will focus on a holistic view of the cruise industry's infrastructure and regulatory needs worldwide.

"It aims to provide clarity on the current status and future developments in fuel infrastructure and deployment over the next five to 10 years," says RINA. "A significant emphasis will be placed on the impact of itineraries and operations of cruise ships, considering various energy carriers both in navigation and at port."

The class society will analyse global cruise market itineraries, fuel choices and propulsion options;



SOURCE: SHUTTERSTOCK

evaluate worldwide fuel, bunkering and onshore power infrastructure; study international and local GHG regulatory frameworks and their impact on ship design and operations; and estimate the volume of energy carriers required to meet decarbonisation targets, as well as locations and sizes of infrastructure to support cruise itineraries and technologies, taking global funding and investment opportunities into consideration.

The outcomes of the study are expected to shape the cruise industry's approach to sustainability for decades to come, says RINA.

## LNG

## BUREAU VERITAS AND HANWHA OCEAN PARTNER ON NEW LNG CARRIER DESIGN

Bureau Veritas (BV) and South Korean shipbuilder Hanwha Ocean have announced the successful conclusion of a joint development project (JDP) for the development of a 270,000m<sup>3</sup> LNG carrier.

According to the organisations, Hanwha Ocean's proprietary hull design for a 270,000m<sup>3</sup> LNG carrier was developed to anticipate and fulfil the future demands of

the LNG market. By optimising the hull's performance and maximising cargo capacity, it exceeds the capabilities of the existing 263,000m<sup>3</sup> and FSRU design, they say.

Throughout the project Hanwha Ocean prepared the development of hull key drawings for the 270,000m<sup>3</sup> LNG carrier design in compliance with BV's requirements and relevant regulations. Subsequently, Hanwha Ocean and BV agreed to jointly develop this new size vessel to secure structural reliability and obtain approval in principle.

To verify the hull key drawings provided by Hanwha Ocean, BV performed 2D local scantling and 3D cargo hold finite element analysis, assessing the longitudinal strength of the hull, as well as the yielding and buckling of longitudinal and transverse members. Fatigue analysis was also conducted using a local fine mesh to evaluate the details of hull structures sensitive to fatigue.



THE JDP AGREEMENT WAS SIGNED BY SANG-DON KANG, VICE PRESIDENT OF THE BASIC DESIGN DEPARTMENT AT HANWHA OCEAN, AND DRAGO PINTERIC, COUNTRY CHIEF EXECUTIVE OF BV KOREA. SOURCE: BV





# NEWS ANALYSIS

## FIRST RED SEA FATALITIES, CONFLICTING VIEWS ON FUTURE FUEL COSTS AND AN OCCS FIRST

By **Malcolm Lataarche**, Correspondent

Sadly, this column was a little premature last month as after it was written the *Rubymar* sank on 2 March becoming the first vessel to be lost due to a Houthi attack. Even more tragic was that on 6 March the first fatalities would occur when three crew members were killed and four others injured in an attack on the bulk carrier *True Confidence*.

The various military forces in the Red Sea are doing what they can to lessen the threat, but it is clearly impossible for them to foil every attack. Hopefully no more innocent seafarers will perish or be injured especially as they have no link with the conflict taking place in Gaza and might actually sympathise with the suffering people there. It is right that there are voices condemning the attacks although highly doubtful that those firing the missiles will heed them, we can only hope that sense will return soon.

Moving to other topics, two reports on the subject of new fuels were published in March, one by Wärtsilä and the other by LR. Interestingly the reports do seem to contradict each other a little although one looked at fuel costs in general and the other at passenger vessels alone and making use of onboard carbon capture and storage.

Wärtsilä has concluded that new fuel regulations in Europe such as the EU ETS could see fossil fuels and sustainable alternative fuels reach price parity by 2035 with the cost of using fossil fuels doubling by 2030. Without such interventions sustainable fuels will be three to five times more expensive than today's fossil fuels in 2030. Strategies like ETS and FEUM will close the gap.

LR's report looked at the total cost of ownership (TCO) comparisons between passenger ships retrofitted with methanol dual-fuel engines and operating vessels on blended fuel (Blend B30), heavy fuel oil (HFO) and HFO with onboard carbon capture and storage (OCCS).

Based on a 15-year comparison period, and assumptions that the modelled vessel would spend 65% of voyage time in EU waters and subject to emission levies, the report indicates that passenger ships retrofitted with methanol dual-fuel engines would have TCO costs twice those supported by Blend B30, HFO and HFO with OCCS.

Natasha Pritchard, VP Strategic Accounts (Cruise) Lloyd's Register, said: "Our latest Fuel for Thought report brings some much-needed insights for passenger ship owners evaluating methanol as part of their energy transition



EVERGREEN'S *EVER TOP* IS THE FIRST NEO-PANAMAX TO GET AN OCCS RETROFIT. SOURCE: PORT OF HAMBURG

pathway. Whilst methanol holds considerable promise as a low carbon solution for passenger ship propulsion, the total cost of ownership compared to other fuels may represent an obstacle to its widespread take-up in the segment."

Regardless of the fuel type and future cost the clear winner is the ubiquitous marine diesel engine. Leading manufacturer MAN Energy Solutions expects the order book for dual-fuel engines to grow with around 85% of all ship engines ordered in 2030 to be dual-powered. The 2030 estimates compare to just around 35% dual-fuel engines ordered in 2021 and 56% in 2022 MAN's Singapore managing director, Nicolas Brabeck, told S&P Global Commodity Insights in an interview.

Onboard carbon capture is beginning to make inroads into shipping and could prove a useful tool for shipowners preferring to stick with fossil fuels. Three years after Value Maritime completed the first successful installation of an OCCS system on board a Netherlands-based ship, Japan's ClassNK has approved the first installation of OCCS on a Neo-Panamax container vessel. In this case the system was designed and developed by Shanghai Marine Diesel Engine Research Institute and installed on Evergreen's 13,806TEU vessel *Ever Top*. Last year, ClassNK issued an approval in principle for an OCCS system developed by China Shipbuilding Power Engineering Institute.

The subject was also on the agenda at MEPC 81 where support for OCCS was reported as growing. Consequently, the meeting agreed to instruct the Working Group of Air Pollution and Energy Efficiency to develop a work plan for the development of a regulatory framework for the use of onboard CO<sub>2</sub> capture. ■

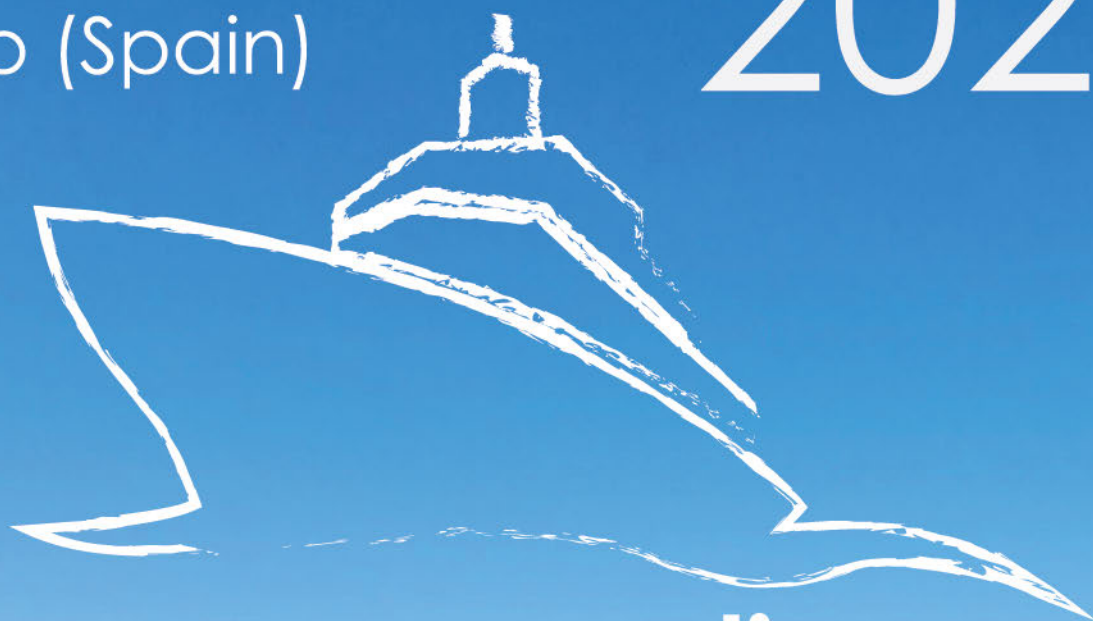


# NAVALIA

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# NEWS EQUIPMENT

## SHORE POWER

### ABB TO INSTALL SHORE CONNECTION FOR DEME'S FLEET IN VLISSINGEN PORT



DEME'S OFFSHORE BASE IN VLISSINGEN. SOURCE: DEME GROUP

ABB has secured a contract to provide shore connection installations for DEME's diverse fleet at the Port of Vlissingen, the Netherlands.

Shore connection technology enables vessels to eliminate carbon emissions by powering down their engines and accessing electricity from the shore while docked. DEME, a prominent player in offshore energy, environmental remediation, dredging and marine infrastructure, has set ambitious targets to reduce

greenhouse gas emissions by 40% from its fleet by 2030 compared to 2008, surpassing international maritime standards.

ABB will install shore power to connect to suitably equipped vessels calling at Vlissingen's DEME base by the end of 2024, as part of the 'Temporary Shore Power Grant Scheme for Marine Vessels 2022 – 2023', a government-supported initiative that stimulates the construction and use of shore power facilities in Dutch seaports.

Ultimately planned as a 2MVA converter, ABB's shoreside shore connection will run at a lower 1.75MVA until the local grid can deliver sufficient capacity between the substation and the power outlet at the dock. In a straightforward installation, the entire solution will be housed in two ISO containers – one 40ft unit and one 20ft unit.

Marc De Boom, department manager at DEME Base Vlissingen, says: "We are proud to partner with ABB, a trusted technology leader, as we advance our sustainability objectives. This project reflects DEME's commitment to integrating sustainable practices into our daily operations."

## WIND PROPULSION

### BAR AND GROKE PARTNER TO ENHANCE SITUATIONAL AWARENESS ABOARD WIND-ASSISTED SHIPS

BAR Technologies and Groke Technologies have signed a partnership agreement on the design and development of situational awareness systems for BAR Tech's WindWings wind propulsion technology.

The collaboration follows the success of both BAR Tech and Groke's involvement with the MC Shipping-owned and Cargill-operated Kamsarmax bulker *Pyxis Ocean*, which was retrofitted last year with two 37.5m tall WindWings sails and Groke's camera and imaging solutions.

Groke's CEO, Juha Rokka, says: "As shipping continues to evolve, Groke is committed to being among the front-runners of the maritime future. With our technology and know-how, we are confident that we can support the shipping industry in embodying higher standards in safety and materialising a cleaner future."

The company's Groke Pro system provides images to

bridge personnel from a range of locations around the vessel. Using sensor fusion technology, the ship's surroundings are continuously tracked and this data is combined with input from sensors as well as radar, automatic identification system (AIS) information, and Groke's day and night cameras.

Powered by machine vision and machine learning, tools such as blending and real-time risk analysis support the crew with accurate information to support their decisions.

John Cooper, CEO at BAR Technologies, says: "As we chart the future of the maritime industry, our partnership with Groke marks a pivotal stride toward the confluence of low-carbon propulsion and the latest automation technologies – both of which put global shipping on the path towards a cleaner, more efficient future."



## ENGINES

## NEPTUNE OPTIMISES CAR CARRIERS FOR SLOW STEAMING



HD HYUNDAI MARINE SOLUTION AND NEPTUNE HAVE SIGNED A CONTRACT FOR ENGINE OPTIMISATION. SOURCE: ACCELLERON

Total solution service provider HD Hyundai Marine Solution has signed an agreement with Greek operator Neptune Lines to provide engine part-load optimisation (EPLO) services for four car carriers.

HD Hyundai Marine Solution partnered with Accelleron to launch the EPLO service last year, receiving the first order for one ship in October.

Most marine engines are built to provide optimal fuel efficiency and performance for the speed and environment for which the ship is designed. However, more than 60% of the world's ships of 400gt and above

are required by the International Maritime Organization (IMO) to comply with the IMO's Energy Efficiency Existing Ship Index (EEXI) and Carbon Intensity Indicator (CII) regulations to reduce greenhouse gas emissions.

As a result, many shipping companies are considering engine power limitation, operating at reduced speeds with engine output reduced by up to 70%. According to Accelleron, EPLO is an eco-friendly solution that increases combustion efficiency by matching the turbocharger to the new load requirements, as well as adjusting factors including the amount and timing of fuel injection and fuel-air mixture ratio.

These adaptations can improve fuel efficiency by as much as 6g/kWh, with an equivalent reduction in carbon emissions, the firm says.

"With EPLO, Accelleron is assisting the maritime industry to not only boost the competitiveness of their vessels but also to achieve profitable navigation towards their mid-term decarbonisation goals," adds Matthias Reichmann, global product manager for upgrades at Accelleron.

## CONNECTIVITY

## DFDS DEEPENS COLLABORATION WITH NOWHERE NETWORKS TO ENHANCE CONNECTIVITY

DFDS has announced an expansion of its collaboration with Nowhere Networks, a high-tech company specialising in maritime internet broadband solutions.

The new agreement includes the addition of the Dieppe-Newhaven route with two ships and an arrangement for port connectivity solutions for seven of DFDS's approximately 40 freight ships initially.

"We are very pleased with the service Nowhere Networks has provided for six of our ships operating on our Dover-Calais-Dunkerque route. Therefore, we are happy to announce the expansion of our collaboration with the addition of another route and two more ships," says Jan Svane, IT communication manager, DFDS. "We have also added seven freight ships to the agreement, ensuring that these ships will have fast and stable internet connection in several ports."

The shipping and logistics company has been a Nowhere Networks customer since 2019.

Asbjörn Frydenlund, CEO of Nowhere Networks, says: "DFDS is one of our first customers and we find it

enormously gratifying that they have chosen to expand our good cooperation with more ships, more routes and more ports.

"We are particularly excited for the opportunity to deliver internet to DFDS's freight ships. It is a new line of business for us, and one with plenty of potential. The market counts tens of thousands of ships which could benefit from improved internet connectivity, and we are investing heavily to be able to provide them with it."



THE NEW AGREEMENT INCLUDES THE ADDITION OF THE DIEPPE-NEWHAVEN ROUTE WITH TWO SHIPS. SOURCE: NOWHERE NETWORKS





# OPINION

## RED SEA CRISIS UNDERLINES THE NEED FOR GREATER DATA TRANSPARENCY

By **Captain Steve Bomgardner**, vice president, Shipping & Offshore, Pole Star Global



CAPTAIN STEVE BOMGARDNER. SOURCE: POLE STAR GLOBAL

is different this time around is the risk assessment and insurance premium. To the existing baseline calculations, companies are quickly adding the cost of war insurance as well as a vessel-by-vessel perception of risk associated with the targeted nature of attacks.

This current disruption to global shipping is just one more example of a global supply chain facing constant and ever evolving challenges. The maritime industry increasingly recognises the vital importance of fast access to an array of data sources to support complex risk assessment and rerouting decisions. The rapid digitisation occurring throughout the industry is supporting fast decision making, however emergency response, as well as day to day activity, remains challenged by the lack of open data.

It is fast becoming clear that shipping companies have evolved beyond their immediate, journey specific response to the escalation of hostilities in the Red Sea to a strategic approach that has been embedded in 2024 plans. Data from Pole Star confirms a significant reduction in the number of vessels using the Red Sea. Despite the additional cost and delay associated with rerouting via the Cape of Good Hope, the number of cargo ships and tankers travelling through the Red Sea dropped almost a quarter in the last few months, from 830 in October 2023 to 626 in February 2024.

Rerouting decisions are, of course, influenced by a number of factors, including cargo, cost and risk perception; but with the cost of war insurance rising, especially for US, UK and Israeli shipping firms, the shift towards the Cape of Good Hope is increasing. For many firms, the experience in March 2021 when the *Ever Given* container ship blocked the Suez Canal, causing an unprecedented shipping backlog, has provided vital insight to support these rerouting decisions. The additional time required for the Cape of Good Hope route, as well as issues of fuel consumption and emissions, were already understood. Firms have been able to quickly calculate the implications for crew, including the potential need to extend contracts by several weeks and delay the onboarding of new crew members.

This information is now firmly embedded in shipping companies' emergency response plans, enabling rapid, vessel-by-vessel decision making based on crew costs, fuel and state of repair, balanced against the potential time sensitive nature of the cargo commodity and possible penalties for missed delivery deadlines. What

Shipping companies need instant visibility of an array of data from multiple sources, and without open Application Programming Interfaces (API), integrating these diverse data resources is incredibly challenging. The slow, painstaking integration process is adding significant time and cost to digitisation projects, and delaying access to the consolidated information resources and analytics that have the power to transform the speed and power of decision making.

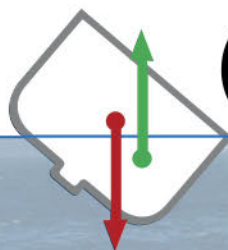
### Who owns the data?

Furthermore, as companies increasingly look to add sensors across their vessels to provide vital information to improve efficiency and safety and support preventative maintenance, uncertainties over data ownership are arising. The shipping company may own the sensor but the ownership of the valuable data recorded by that sensor, the temperature, fuel consumption or engine emission reading, often turns out to have been retained by the OEM.

Fast access to high quality data is transforming the maritime industry both day to day activity and emergency response. Solutions such as hardware free voyage optimisation systems that deliver fleet monitoring, regulatory compliance, performance analytics and voyage optimisation in a single view are providing a seamless access to vital information both on board and on shore.

However, these data issues clearly need to be urgently addressed if the maritime industry's adoption of digitisation is to continue at pace to provide shipping owners with the trusted, real-time insight required to respond to the next emerging crisis. ■





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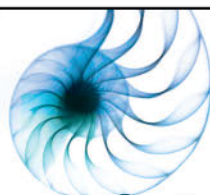


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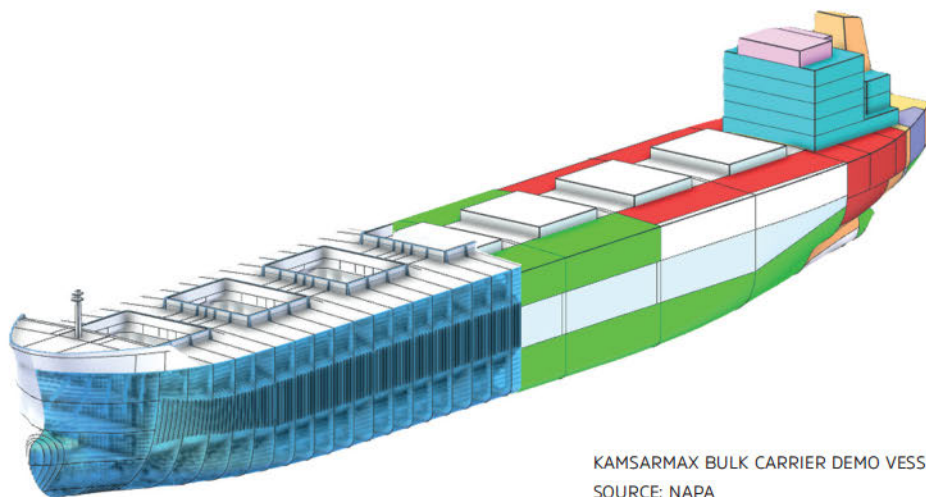
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# CAD/CAM/CAE

## HOW TO MODEL YOUR ALTERNATIVE FUELS FUTURE

By **Joakim Heinolainen**, technical consultant, Design Solutions, NAPA



KAMSARMAX BULK CARRIER DEMO VESSEL MODELLED IN NAPA SOFTWARE.  
SOURCE: NAPA

Want to know what your fleet's alternative fuels future will look like? You're not alone. As new energy sources make their entry on global fleets shipping is craving certainty. But there is no need for fortune-telling – instead, simulation tools can reveal what to expect in terms of new ship designs, operations and costs for every fleet. Here's how it works.

Shipping's appetite for alternative fuels and innovative ship designs is undeniable. While vessels that can operate on alternative fuels today still represent a tiny proportion of the world's fleet – around 6.52% in gross tonnage – their number is set to rise sharply. Around half of the global orderbook in 2023 was for vessels that are set to run on alternative fuels or power systems, including methanol, LPG, LNG or batteries, compared to a third the previous year, according to analysis by DNV.

This increased demand for alternative fuels is in large part driven by a simple calculation: having an energy efficient fleet pays off commercially. We already see that modern energy-efficient vessels tend to achieve better chartering rates than their older counterparts, with premiums reaching several thousands of dollars per day, and even more for certain vessel types.

The business case will continue to grow not only for fuel efficiency, but also for substantial greenhouse gas (GHG) emissions reductions as an aim in itself. The recent expansion of the European Union Emissions Trading System (EU ETS) to shipping means that ships are now required to pay for their CO<sub>2</sub> emissions, putting a direct price on carbon. This adds to the IMO's Carbon Intensity Indicator (CII) regulation, which aims to tie a ship's

competitiveness and business prospects to its operational efficiency. Going forward, poorly rated ships may struggle to secure business and financing, while top-rated vessels are likely to have a competitive advantage.

### Balancing risk and opportunity

As a result, there are huge potential gains for shipowners who pioneer the use of alternative fuels. But this strategy isn't without risk. Transitioning to new fuels has massive implications for a ship's safety, stability and configuration, while requiring the integration of new storage tanks which can reduce cargo capacity and therefore impact commercial profitability. Getting it right is vital, but how?

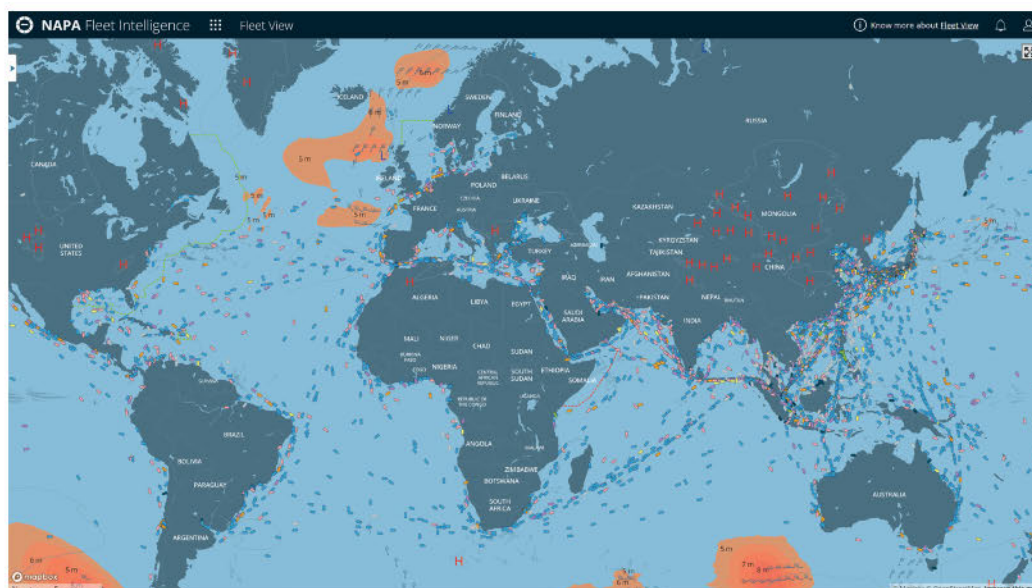
Part of the answer lies in thinking creatively about how we use and combine tools that are already at our disposal. Here, much insight can be gained by using operational simulation capabilities together with 3D tools in ship design.

### How operational data brings new insights for ship design

This is already a reality today – naval architects and engineers can use operational simulation models to get a detailed picture of the range of weather and sea conditions on the routes where the future ship will be operated.

This analysis is powered by historical data on wind speed and direction, wave height and swell, and current speeds and directions. From there, direct strength analysis and load assessment can be conducted using 3D models created in NAPA Designer, helping simulate the future stresses on the hull in a realistic manner and adjust designs accordingly.





NAPA FLEET INTELLIGENCE IS A CLOUD-BASED SOLUTION FOR IMPROVING SHIP EFFICIENCY AND SAFETY. SOURCE: NAPA

This data-driven picture of weather and sea conditions data can also be used to simulate the real-life emissions reductions that wind propulsion systems are likely to achieve for the specific ship, giving shipowners more certainty before investing in those systems.

As we enter a multi-fuel era, operational simulation can also deliver precious insights into the range of speeds at which the future ship will be operated as well as its future fuel consumption. This helps determine the optimal engine power required, but also the size of the fuel tanks that will be needed for the vessel. Given that future fuels such as ammonia, hydrogen and methanol are less energy-dense than their fossil fuel equivalent, getting this assessment right is critical as it can minimise the loss of cargo space.

### Comparing options to make the best decisions

The magic is fully unlocked when we combine insights from operational simulations with digital twins to test different design variations and model how they would behave in real life. For example, 3D models can be used to compare different configurations for alternative-fuelled vessels and calculate the impact on the vessel's future

performance, fuel consumption, GHG emissions, stability parameters and hydrodynamic profile.

This capacity to test different shapes and profiles easily helps naval architects and engineers evaluate where exactly new systems such as batteries or additional tanks should be installed on a ship, accounting not only for the total volumes needed but also for where they need to be installed to ensure safety.

These simulations can be done from the early concept design stages, and the results increase in accuracy as the design progresses and more details are confirmed. In tangible terms, teams will be able to trial different options throughout the process to support the multiple decisions that have to be made as the design progresses from the initial phases through to structural and more detailed phases. In other words, simulation tools help remove the 'guess work' and back decisions with data and evidence.

### Estimating emissions and costs – the multi-million-dollar question

For shipowners, this matters because they gain a better understanding, from the early design stages, of what different fuel options, such as LNG or methanol, would look like in real life, as well as their implications for cargo capacity and predicted fuel consumption. As the ship design takes shape, simulation tools can model its future levels of GHG emissions, and how this will impact compliance with environmental regulations.

Ultimately, the aim would be to use those estimated emissions levels to predict the combined costs related to buying the fuel itself and emissions allowances for different fuel options. Simulations could show when a design would become cost-competitive under EU ETS, for example, which would bring tremendous commercial value and help inform new fuel and ship design choices from the outset.

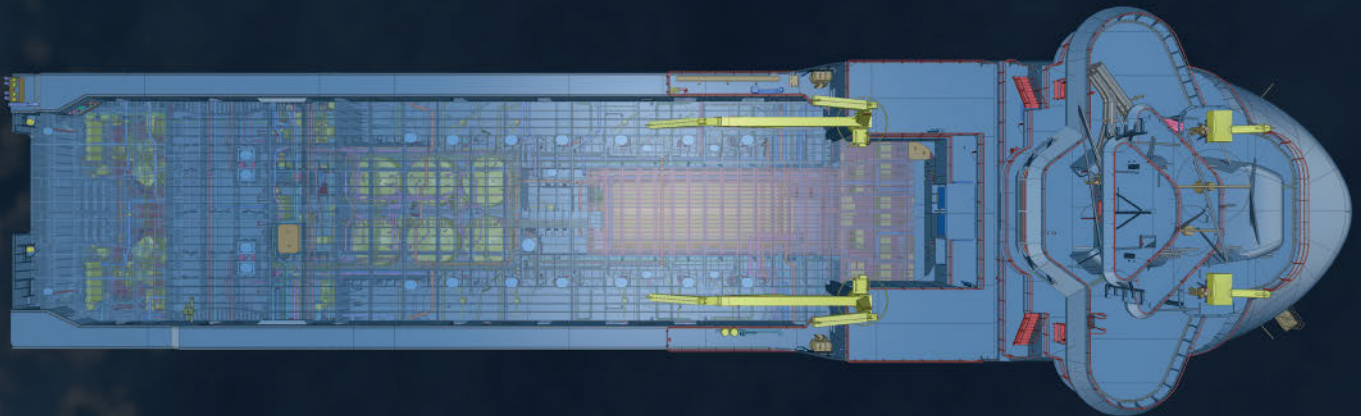
We can't predict the future, but we can model it in a way that is grounded in data – and for the purpose of designing innovative ships, that's already a sea of change. ■



JOAKIM HEINOLAINEN. SOURCE: NAPA







# SHIPBUILDING 5.0 – AN EVOLUTION OF THE CAD/CAM TECHNOLOGY

By **Ludmila Seppälä**, commercial offering director, CADMATIC

The levels of the Industrial Revolution are conceptual simplifications capturing the core changes in the social-technology landscapes and related processes understanding. To illustrate this, we can think about society's transitions from hunter-gatherers to agriculture, industry, and information society. The changes in the industry are typically separated by their timescale, with the main stages of mechanisation, mass production, automation, computers, and cyber-physical systems. The last one constitutes the core of Industry 4.0, a used term for shipbuilding. A recently introduced concept to the shipbuilding world is Industry 5.0. Initially developed by the EU, it takes the previous idea of Industry 4.0 to the next level. The main difference is

the introduction of human-centricity into the discussion. This brings perspectives of sustainability, resilience, and human skills to the centre of the design of future complex industrial systems.

These levels should not be interpreted as an assessment of the technology use or advancement in digitalisation, as these only indicate the stage of transformation in the industry and a conceptual framework in a simplified way.

## Shipbuilding 5.0 and CAD/CAM in shipbuilding

Applying the same concept of steps in evolution to shipbuilding, one can present it as a synergy of changes in how and what type of vessels are built. These steps

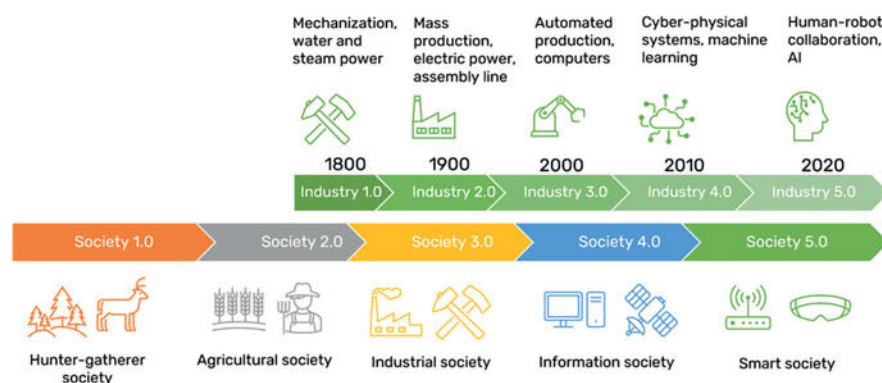
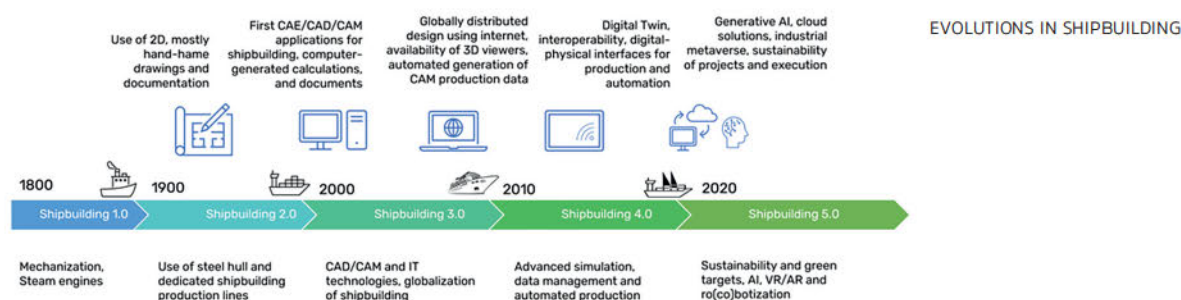


ILLUSTRATION OF THE CHANGES IN THE SOCIETY AND INDUSTRY, CONCEPTUALLY SHOWING LEAPS IN THE USE OF TECHNOLOGY





would be the introduction of steam engines and mechanisation around 1800, the use of steel hulls in 1900, the first applications of CAE/CAD/CAM in early 2000, the last few decades have seen a rapid development of shipbuilding technology, especially in the CAD/CAM area. Technology has enabled complex 3D models and data availability on demand. It is possible to have the same 3D model with applied layers of information serving different purposes in planning, production, construction, and after-delivery purposes later. Providing production status to design teams, and getting planning data based on available resources and machinery using AI and accurate time control is now possible. Welding automation and the use of robots for assembly lines have become the mainstream of production at shipyards. These and many other advancements focus on blurring the borders between the digital and physical world. For shipbuilding, it means using digital twins for the design, production, and enabling the use of design data after delivery.

It is impossible to say that the industry has achieved the highs of Industry 4.0 overall, as adaptation of the technology varies, and the shipyard's processes might work differently. However, one can say that technology enabling Shipbuilding 4.0 exists and is in practical use.

### What changes shipbuilding 5.0 will bring?

As technology develops in giant leaps, the next generation of technological advancements is already emerging and finding its way into shipbuilding. These are found in the metaverse, the use of various AR/VR/MR, applications of generative AI, and robotics developments. At the same time, the focus on shipbuilders shifts towards sustainability and green targets. The change is happening in society, where a shared understanding of the importance of sustainability accelerates this shift in the form of IMO targets, green initiatives, investments in R&D projects, and overall societal expectations.

Industry 5.0 heralds a paradigm shift by reinstating the significance of human collaboration alongside technology. Incorporating human centricity into shipbuilding aligns with the imperative of facilitating sustainable goals in the industry. Focusing on human skills and aspirations alongside technology offers a viable path to expedite the adoption of new technology into the mainstream, aligning with the evolving needs of the shipbuilding industry.

### What can be expected ahead in the future?

Shipbuilding 5.0 as an enabler can be interpreted in many ways. Three main trend categories can be

identified: technology, digital tools, and sustainability. Many technological advancements are used in shipbuilding, significantly impacting how ships are designed and built, and even more influence can be expected. The main trends are automation, the use of new materials, and new shop floor systems. New digital technologies are digital models, twins, threads, generative AI, and an overall increase of computational power, enabling management of information of various types. Sustainability is the most visibly impacting trend in the industry now. According to data from DNV, over 25% of orders for new ships in 2024 will be using non-fossil fuels, such as hydrogen, LNG/PLG, hybrid, or more. More must be done to meet IMO sustainability targets, so the pressure will only intensify in the coming years.

Shipbuilders face the need to address three areas:

- Complexity of the projects to meet electrification needs and incorporate new technologies for energy generation and use;
- Evolution of the project execution process with new technology and tools, including those powered by AI;
- The extended use of digital models through the life cycle of the vessels and the possibilities for lifecycle services, predictive maintenance and refit.

Connecting the dots and looking into the future, we can see accelerating innovation. Conceptually, we are entering an era where the main focus lies on human-cyber-physical interactions. It is a welcome step forward from a limited Industry 4.0 framework, as it places the people in the centre of technology use. We can expect even more co-bot applications from generative AI, and digital technology, as well as in construction processes, with a focus on incorporating sustainability goals instead of a limited focus on efficiency and profitability. ■



LUDMILA SEPPÄLÄ





## JAPAN

## NAVIGATING TURBULENT WATERS: JAPAN'S MARITIME INDUSTRY AT A CROSSROADS

By Tom Barlow-Brown



SHIME'S MAIN SHIPYARD IN YOKOSUKA. SOURCE: SHIME

Japan's maritime sector stands as a testament to the nation's ingenuity, resilience, and global competitiveness. For over a century, Japanese shipbuilders have been at the forefront of the market, constructing vessels that have sailed the world's waters with precision and reliability. Yet, beneath this veneer of success lies a landscape fraught with challenges, where economic uncertainties, demographic shifts, and technological disruptions converge to reshape the industry's trajectory.

At the epicentre of this seismic transformation stands Sumitomo Heavy Industries Marine and Engineering (SHIME), a titan in Japan's shipbuilding realm for over 125 years. However, in a stunning announcement reverberating across maritime circles, SHIME has recently declared its intent to exit the shipbuilding business – a decision emblematic of Japan's maritime industry's struggle to navigate treacherous waters.

The catalysts behind SHIME's departure are manifold, rooted in a confluence of economic headwinds and demographic realities. The company cites a "deteriorating environment", marked by soaring material costs and erratic ship prices, as primary drivers behind its exit strategy. This acknowledgment underscores the profound impact of global economic fluctuations on Japan's industrial landscape, illustrating the fragile interplay between market forces and industrial sustainability.

Compounding these challenges is Japan's demographic dilemma – a rapidly aging population that threatens to unravel the fabric of the nation's labour market. According to Statista, a dearth of regular full-time employees plagues major industries, with transportation, construction, and technical research bearing the brunt of the crisis. This

demographic imbalance not only strains existing resources but also portends long-term implications for economic growth and sustainability.

In response to these existential threats, SHIME has opted to cease new vessel orders, signalling a strategic pivot away from shipbuilding. Once renowned for producing mid-size Aframax tankers, the company's decision reflects a sober reckoning with economic realities, tempered by decades of industry expertise and tradition. Despite concerted efforts to weather previous storms, including the fallout from the 2008 financial crash and subsequent global downturns, SHIME finds itself at a crossroads, compelled to chart a new course away from large-scale shipbuilding.

The company can trace its origins back to the establishment of Uruga Senkyo Corporation in 1897 and has a storied history in the shipbuilding sector, with successes like the building of the *Seawise Giant* in 1979, the longest self-propelled ship ever built.

### Rays of light

Amidst these challenges, glimmers of hope emerge as Japan's maritime industry seeks to reinvent itself for the digital age. Heavy investments in automation and unmanned vessels signal a paradigm shift towards efficiency and sustainability. Yet, while these technological advancements promise to alleviate market gaps and enhance operational efficiency, they also underscore the pressing need to address underlying structural issues, including labour shortages in shipyards.

In tandem with technological innovation, strategic partnerships offer a lifeline for Japan's maritime sector, particularly in the realm of defence. Increased spending on naval revitalisation, particularly in the Asia-Pacific region, presents opportunities for Japanese shipyards to thrive.

Defence spending amongst ASEAN countries has lately been at an all-time high, largely because of Chinese security threats. However, according to analysis from defence intelligence company Janes, while spending is calculated to be US\$12.1 billion higher than in 2023 this still represents a significant slowdown in the rate of spending growth, which spiked to 7.5% year on year in 2023, when Asia-Pacific countries added more than US\$41.5 billion to their total defence spend; the most in dollar terms than in any year on Janes' record.



Collaborative efforts with the United States to repair US Navy vessels in the country, as well as invest in mothballed yards stateside do also present a ray of hope and highlight the potential for cross-border cooperation in bolstering maritime infrastructure and capabilities.

Speaking to financial newspaper *Nikkei Asia* on a recent visit to Mitsubishi Heavy Industries' shipyard in Yokohama, accompanied by US Secretary of the Navy Carlos Del Toro, US Ambassador to Japan Rahm Emanuel stated that part of the reason for the visit was to gauge the interest of the Japanese company in investing in opportunities in the US.

Nevertheless, regulatory obstacles, such as the Jones Act, and other US laws prohibiting full-scale overhaul, repair, or maintenance of US-based ships outside the country or Guam, pose significant barriers to collaboration and market access for Japanese shipbuilders.

Despite the slowdown on defence spending, continued investments, and cooperation among regional players signal resilience within the maritime landscape. A recently announced partnership between Japan and Australia to focus on enhancing underwater communication technologies and co-develop robotics and autonomous systems (RAS) for undersea warfare, is one such example. The results of the project will be used for the development



US SECRETARY OF THE NAVY CARLOS DEL TORO AND US AMBASSADOR TO JAPAN RAHM EMANUEL MEET WITH EXECUTIVES FROM MITSUBISHI HEAVY INDUSTRIES. SOURCE: US EMBASSY TOKYO

of unmanned underwater vehicles (UUVs) between Japan and Australia in the future.

As Japan's maritime industry looks ahead to the future, it confronts a dual imperative: to navigate immediate challenges while laying the groundwork for sustainable growth and resilience. The industry's ability to adapt, innovate, and forge strategic alliances will determine its trajectory in the years to come. ■



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# CAREERS & EDUCATION

## EMPLOYERS PRIORITISE TALENT RETENTION IN NAVAL ARCHITECTURE AMIDST COMPETITIVE MARKET

By Tom Barlow-Brown

The latest Naval Architecture Employment Report published by Faststream Recruitment offers a comprehensive analysis of the prevailing trends, challenges and opportunities within the naval architecture sector. Drawing insights from surveys conducted between 2019 and 2023, the report reveals a nuanced understanding of the evolving employment landscape in this specialised field.

As befits such a specialised profession as naval architecture, the job market remains fiercely competitive. The findings from Faststream's report provides valuable insights into the current state of the industry, highlighting key trends and areas for improvement in talent management. Dominant amongst these are statistics that show an industry characterised by a candidate-led job environment, with employers recalibrating their strategies to focus on talent retention rather than merely hiring new staff.

This shift is underscored by the notable increase in the time to hire, indicative of the challenges faced by employers in securing skilled naval architects. Despite these hurdles, retention rates among naval architects have shown promising signs, with job-seeking sentiments declining from 71% to 60% year-on-year. However, this may also indicate a lack of available jobs across the sector as well.

While salary and benefits remain primary motivators for job-seeking naval architects, the report highlights a growing emphasis on career development. Naval architects aspire for continuous growth and progression in their roles, seeking opportunities for learning, mentoring, and increased responsibility.

"People want to see their careers grow and feel more successful by making progressive steps," notes Adam Graves, Faststream's director of Marine and Energy, Europe, Middle East, Africa and the Americas.

"This can be from learning opportunities, mentoring, training, new challenges, attending events, gaining more responsibility, and managing projects. Small steps can go a long way in making people feel challenged and stimulated in their role, often a helping hand in retention," he adds.

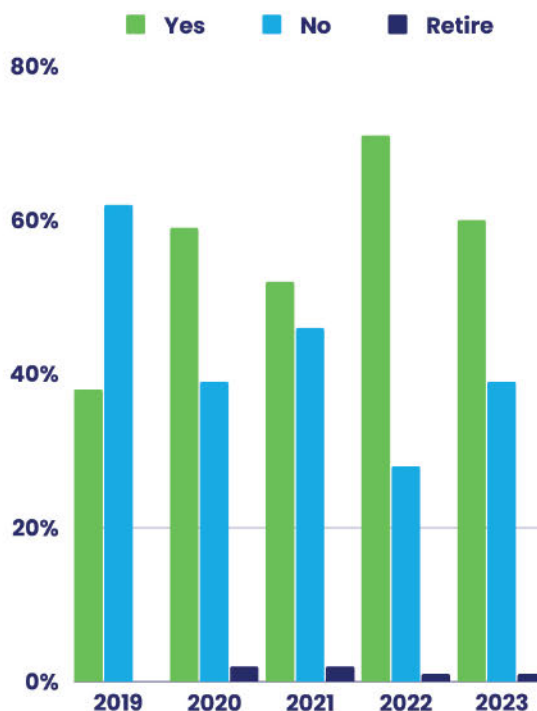
The report also reveals a positive upward trend in salary increases, with 80% of naval architects reporting a pay rise in 2023 – an increase from the previous year. Notably, 55% of respondents received a pay rise in the last six months, indicating a willingness from employers to adapt compensation to retain talent.

### Work-life balance as a loyalty factor

Employee benefits, particularly those fostering work-life balance, play a pivotal role in talent retention. The report identifies flexible working arrangements, bonuses, and private medical coverage as top benefits sought by naval architects. Moreover, work-life balance emerges as a primary factor influencing job satisfaction, with nearly half of respondents citing it as their primary reason for remaining with their current employer. This preference is underscored by the finding that 74% of surveyed professionals prioritise work-life balance over salary.

Naval architects' desired benefits closely align with those currently received, indicating that employers are effectively meeting the needs of their workforce. However, there remains room for improvement in communication about benefits, with a substantial percentage of naval architects reporting inadequate communication from their employers. Furthermore, while 57% of naval architects report receiving regular reviews – a slight increase from

### Are you planning to change jobs in the next 12 months? 2019 to 2023



60% OF NAVAL ARCHITECTS ARE PLANNING TO CHANGE JOBS. SOURCE: FASTSTREAM RECRUITMENT





FASTSTREAM RECRUITMENT  
CEO MARK CHARMAN. SOURCE:  
FASTSTREAM RECRUITMENT

the previous year – 88% consider these reviews important or very important to their jobs, suggesting a disconnect between perception and implementation.

Despite the importance placed on these two factors, it should be noted that salary and benefits, while crucial, are not the sole determinants of job satisfaction for naval architects. According to data from those surveyed in the course of the report compensation and career development are also key factors. Naval architects will often move on to a new role if they see that a new

opportunity is the best way to secure more pay. This naturally avoids awkward discussions with employers regarding pay rises. According to Faststream's research, career development was chosen for the third year as the second most popular motivator for job seeking.

"The great resignation that we saw after the storm of the pandemic appears to be diminishing, with more naval architects feeling settled with their current employer," states Mark Charman, CEO and founder of Faststream Recruitment. "However, it is the most experienced candidates [over 15 years postgraduate experience] who are now more active in search of a new opportunity, and this is going to be concerning for employers. Increased 'bear hugging' tactics will need to be deployed."

As the naval architecture sector continues to evolve, the research shows that employers will need to adopt agile strategies to attract and retain top talent – prioritising competitive compensation and robust career development programmes, along with tailored benefits packages. Furthermore, enhancing communication about benefits and ensuring regular performance reviews can contribute to a more engaged and loyal workforce.

The insights provided by report show that companies in the sector will need to develop strategic investments in talent retention to increase employee satisfaction lest they lose experienced staff to more attractive roles. ■



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The rapid technological development in the field of Maritime Autonomy is creating an opportunity for the marine industry as well as a challenge for the regulatory framework. In recent years, various ships projects involving coastal and ocean-going routes with different degrees of autonomy are being tested. Those will have great implications for naval architects, shipbuilders, shipping companies, and maritime systems providers.

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

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# KEY UK COMPANIES HARNESS THE POWER OF YOUNG NAVAL ARCHITECTS WITH APPRENTICESHIP PROGRAMMES

By Tom Barlow-Brown



BABCOCK IS TO CREATE 1,000 NEW JOBS AT ROSYTH OVER FOUR YEARS. SOURCE: BABCOCK

"You're coming straight into a job where that is well paid, and well supported," says Charlie, an engineering technician at BAE. "You're supported going through professional registration, your degree, you've got a career path to follow, and you're guaranteed a full-time job at the end of it if you be yourself kind of thing. So I think it's brilliant," the 24-year-old who recently completed her apprenticeship with the company tells *The Naval Architect*.

In the ever-evolving landscape of naval architecture and engineering, innovation and investment in new talent is a key driver of progress. Most companies recognise that fostering expertise helps to shape the future. Nurturing young talent should therefore be paramount. Recognising this need, companies across the UK have established schemes to develop and support early career naval architects.

Two of the UK's major players in defence, Babcock, and BAE Systems, have both established robust apprenticeship programmes to support the development of aspiring professionals. Both companies are key players in the UK's defence industry and have key contracts to support the Royal Navy. It was announced recently that Babcock will be refitting the Royal Navy submarine HMS *Victorious* in a contract that was agreed with the UK's Submarine Delivery Agency worth an estimated £560 million.

Elsewhere, the company also aims to create over 1,000 extra jobs at its Rosyth facility in Scotland, including an extra 400 apprenticeships, to be recruited over a 4-year period. The roles will support key programmes like the Type 31 frigate build programme.

Meanwhile BAE has also begun a significant expansion of its shipyards in, including a state-of-the-art facility to support the construction of Type 26 Frigates which will support 100s of new jobs.

Alongside this the company plans to expand its training facilities with a new applied shipbuilding academy at BAE Systems' Scotstoun shipyard on the banks of the River Clyde in Glasgow. The academy will comprise of a new trade hall and learning hub with more than 30 classrooms and a STEM innovation lab. Through it BAE aims to provide training for almost 4,500 employees, including 700 apprentices.

The company plans to double its intake of apprentices to more than 200 each year at its Glasgow site alone. There are currently 201 apprentices at BAE Systems in Scotland, spread across the company's Maritime Services division in Hillend and working with the Naval Ships division in Glasgow.

"The Engineering Technical Apprentice (ETA) scheme is a great introduction to the business and the industry, allowing us to now take ETAs into the Naval Architecture discipline and develop their careers in various areas of the discipline," says Stuart Hunt, who is BAE Systems Head of Discipline Naval Architecture at the company's Naval Ships division and is based in Glasgow. "A new career pathway has been developed to facilitate this and support part time studying to gain academic qualifications. We also support development through the different levels of professional registration as careers progress," Hunt adds.

Babcock also continues to invest in education and



training. The company is building its workforce through its Plymouth-based Babcock Skills Academy. In tandem, it is estimated the contract for HMS *Victorious* will sustain a further 1,000 jobs in Southwest England. The Academy will allow individuals the opportunity to focus on submarine support and develop expertise required to perform deep submarine maintenance.

Early career naval architects Sebastian and Benjamin both have benefitted from Babcock's apprenticeship scheme. Benjamin completed a higher-level naval architect apprenticeship from September 2017 to October 2021. "I was lucky enough to get an assistant engineer role and funding to top up my foundation degree to a full degree, alongside my work," says Benjamin, describing his career progression. He has worked in a development role in the Naval Architect Design Group (NADG) since completing the apprenticeship.

Sebastian is currently a higher-level naval architect apprentice with Babcock. "I'm 21 and I wasn't sure too sure what I really wanted to do when I started," he says. "With this programme you get to experience various placements and try different things to see what you enjoy the most. Everything sounds good from looking at it, but you never know until you try it. So, it was a good opportunity to find what works best," he adds.

"In your first year you start right from the fundamentals," says Sebastian. "You're hands on using tools in the dockyard. Then you gradually branch out and develop so you can get a bit of experience everywhere, so you know what kind of area you want to go into. I found that useful to be able to get a bit of experience everywhere to help guide my career," Sebastian adds.

Gareth, the Early Careers Manager for Babcock's Devonport facility provides insights into the broader context of apprenticeships within Babcock and the maritime industry. "It's great that we've got such an extensive early careers programme where we can bring people into the organisation, to teach them what we need them to do to best support our customer," he says.

He emphasises the importance of apprenticeships in addressing the growing demand for skilled workforce while also addressing the aging workforce within the industry. Highlighting the value of apprenticeships in providing a pathway for individuals to gain qualifications and skills without accruing substantial student debt.

Gareth states that having a workforce that's trained to the level an expert professional is of utmost importance. "Apprenticeships allow us to bring in a workforce and train them with up-to-date current skills, but then keep them trained with new skills that come along. That's what allows us to meet the needs of our customers," adds Gareth.

The programme allows Sebastian and Benjamin to gradually develop their expertise through practical experiences and exposure to various departments within Babcock. Additionally, they highlight the importance of

communication, teamwork, resilience, and curiosity as essential traits for success in their roles.

Working and studying with Babcock made sense for Sebastian as he is local to the company's Devonport site. "I'm just across the river into Cornwall. So not too far and I also know people within Babcock already, so I was hearing good things about it. It's also an international company that's well recognised. I saw that I could get a good qualification through there which everyone recognises," he says.

After school both Sebastian and Benjamin realised that university wasn't the right path for them. Their interest in practical learning and hands-on experiences, particularly sailing and marine engineering, was key to this decision.

For Benjamin, the hands-on aspect of the programme was a key motivator as he wasn't interested in an academic qualification at university following his studies at school. "I wanted to do an apprenticeship rather than university because I really like the idea of the practical side of things. I find that helps really embed the knowledge you're taking in while studying," he says. "Of course, it works vice versa as well. You can apply a study to your work, so I thought it was good to do an apprenticeship," he adds.

The experiences of both Sebastian and Benjamin underscore the importance of apprenticeships in providing opportunities for individuals to enter and excel in the field of naval architecture and engineering, regardless of their background or prior experience.

BAE Systems are already well-established education and training providers. For Charlie, it was her interest in shipbuilding led her to choose the apprenticeship route for the hands-on experience in the industry. Her apprenticeship included a year in college and three years of part-time work in the office with placements in various sections of the company.

"I think for me in school it very much felt that you've got to be intelligent go to university, but that's just not the be all and end all. Now I think apprenticeships are



MARTIN, ENGINEERING TECHNICIAN APPRENTICE, AT BAE SYSTEMS NAVAL SHIPS. SOURCE: BAE SYSTEMS





amazing for getting your foot in the door, getting you that industry experience straight up. It kind of gives you an edge that people straight out of school you don't have. Obviously, degrees are brilliant, but it is not the be all and end all and don't let it put you off that you're not getting a degree straight off the bat," she says.

Martin, an engineering technician apprentice, is in his fourth year and currently involved in the Hunter class frigate programme. He initially planned to pursue higher education but was drawn to the apprenticeship scheme after a presentation at his school. He highlights the support provided by BAE during the onboarding process, despite challenges posed by the COVID-19 pandemic. "I worked through my classes using remote learning, but still managed to keep on top of the workshops that we had to do in person and that was good as well. From then on, I did rotational placements around different teams in the business," says Martin.

Charlie has recently completed her apprenticeship and is now studying Engineering; Design and Manufacture at the University of Strathclyde as part of the Graduate Apprenticeship while also working in the Weights team on the CSC (Canadian Surface Combatant) Project as an engineering technician. Both she and Martin highlight the diverse learning opportunities and rotations across different teams within the company, as well as the close links to the industry provided by BAE.

"On an apprenticeship you're getting paid and you're in the exact same industry you'll end up applying for. To me it seemed like a win-win. It's a good to get a foot in the door quicker than everyone else," says Martin who chose BAE because of what it has to offer in terms of progression. "Even after the apprenticeship there's multiple pathways from further education or even a management role. I feel my peers are bound to one specific branch of work whereas mine are so diverse you could be working on multiple things at once," he adds.

Looking ahead, Charlie aims to gain further experience in naval architecture, while Martin aims to complete his apprenticeship and potentially join the graduate programme. Like Sebastian and Benjamin at Babcock

both stress the importance of hands-on experience and practical learning gained through the apprenticeship, compared to traditional academic routes.

The culture of open learning at both companies means that for all the apprentices no question is considered too trivial allowing apprentices to gain insights from peers and individuals with a broad range of experiences during their rotational placements. Work-based learning also allows apprentices to bridge theoretical concepts with practical applications, complement academic pursuits.

"You find things that you're doing in university and think, 'when am I ever going to use that?' But you are using a lot of it in the workplace and it's essential to have. I think it's good to have that to cross over. The way we've done it is you've got them both at the same time and I think that's good to be able to see the importance of things as you're doing it," says Charlie.

Through the initiatives from BAE Systems and Babcock individuals like Sebastian, Benjamin, Charlie, and Martin have. Their testimonials all echo a common theme: apprenticeships offer a viable alternative to traditional education pathways, equipping individuals with the skills and confidence to succeed, and providing pathways to fulfilling careers.

The demand for skilled professionals remains constant. Babcock and BAE Systems' apprenticeship schemes provide young naval architects with opportunity, equipping them with the tools and experiences needed to thrive in this dynamic landscape. The success stories emerging from Babcock and BAE apprenticeship programs highlight the transformative impact of structured vocational training in the maritime sector.

By nurturing talent and fostering a culture of continuous learning, these initiatives not only support individual career aspirations but also contribute to the long-term sustainability and innovation of the industry. Investing in apprenticeships remains crucial in empowering the next generation of naval architects and engineers, ensuring a prosperous and resilient maritime sector for years to come. ■

## UPSKILLING SEAFARERS FOR THE ENERGY TRANSITION

By **David Tinsley**, Correspondent

Over the decades, sea-going personnel have consistently demonstrated a readiness, ability and constancy in adapting to technological advance and related changes in navigation, engineering, operating methods and industry practices.

The unfolding era of the energy transition continues to engender manifold technical solutions and proposals

addressing ships' powering arrangements and fuel usage, shaping fleet newbuild design and investment. Whether or not there has been proportionate consideration of the new challenges presented to seafarers and training procedures is open to question. Clearly, though, crew upskilling is fundamentally important to the ultimate working effectiveness, efficiency and safety of shipboard technical developments.







SEAFARERS ARE CENTRAL TO THE GOAL OF DECARBONISATION.  
SOURCE: IMO

With the pursuit of 'green' shipping through decarbonisation and the consequent search for cleaner fuels and alternate propulsion systems and ship design arrangements, the attentions of IMO and other international organisations as concerns the ramifications for seafarers must surely come into sharper focus.

### Putting seafarers at the heart of the climate emergency

Significantly in this context, the Maritime Just Transition Task Force recently announced a move to establish a new training framework to equip seafarers with the necessary skills in decarbonisation as the maritime industry progresses on the path towards the ultimate goal of zero emissions. The project, implemented with funding from IMO and Lloyd's Register Foundation, puts seafarers at the heart of shipping's response to what is acknowledged as the climate emergency.

IMO's standpoint on decarbonisation is expressed in its ambition for international shipping to achieve net-zero greenhouse gas (GHG) emissions by or around 2050. As a first-stage objective which should concentrate minds, it is looking to ensure an uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources to an extent that will represent at least 5%, while striving for up to 10%, of the energy used by the industry come 2030.

The new Maritime Just Transition Task Force endeavour, entitled 'Training Seafarers for a Decarbonised Future', was announced at December's UN Climate Change Conference (COP 28) meeting in Dubai. The project is being run by IMO and the secretariat of the Task Force, which is a joint undertaking of London-headquartered IMO and the United Nations Global Compact, the International Chamber of Shipping (ICS), International Labour Organization (ILO), and International Transport Workers Federation (ITF).

Lloyd's Register will develop the training framework for seafarers and officers, as well as an instructor handbook for maritime training institutions, and IMO's World Maritime University in Malmo, Sweden, will lend its academic expertise to the project. Other organisations are also involved through a global industry peer group, to achieve wider knowledge sharing.

The envisaged baseline training framework and associated material plus a train-the-trainer programme is scheduled to be ready by mid-2025, making for an 18-month work timeline. Upon completion, the package will first be tested in Asia through a WMU-led campaign, with support from the regional IMO Maritime Technology Cooperation Centre (MTCC) and other partners. The intention is to subsequently expand testing globally, through the various MTCCs and other establishments.

Once its efficacy has been assured, the package will become available to all IMO member states, for use by maritime education and training institutions.

The Maritime Just Transition Task Force was set up in 2021 during the COP26 event in Glasgow, with the aim of strengthening and coordinating collaboration between governments, industry, academia and seafarers' representatives to ensure that shipboard personnel are central to decarbonisation strategies.

The founders' rationale is that seafarers will need adequate skills, education and training to operate new technological systems onboard and to manage fuels new to the marine sector, such as methanol, ammonia and hydrogen, which could represent significant health and safety risks for crew, ships, the environment and communities if not properly handled.

The initial action by the Task Force was to commission a study from DNV to explore how best to support seafarers during the energy transition and to provide an overview of training challenges. The ensuing report modelled three decarbonisation scenarios (based on individual IMO, DNV and LR/UMAS investigations), including dual-fuel internal combustion engines running on methanol, ammonia or liquefied hydrogen, as well as hydrogen fuel cells, ammonia fuel cells and battery systems.

It was determined from all three scenarios that the need for training was immediate. The scale of the challenge as regards number of seagoing personnel differed according to the various models and uptake trajectories for decarbonisation technologies and alternative fuels. DNV put a figure of 750,000 seafarers requiring additional training by 2050, while assessments for the scenario based on LR/UMAS modelling indicated that as many as 800,000 crew would need the requisite upskilling by the mid-2030s.

The findings and recommendations from this first-phase initiative of the Maritime Just Transition Task Force will feed into the current collaborative project. ■

*More information on the Maritime Just Transition Task Force can be found at: <https://unglobalcompact.org/take-action/think-labs/just-transition/about>*





# STRATHCLYDE STUDENTS SHARE THEIR NAVAL ARCHITECTURE JOURNEY

By Tom Barlow-Brown

Naval architecture is a cornerstone of the UK's maritime sector, vital for designing and maintaining marine vessels and structures. The need for skilled naval architects is increasingly pressing and there's a growing demand for more students to pursue studies in this field.

Speaking to *The Naval Architect*, three students at the University of Strathclyde share their paths into the field shedding light on their motivations and the highlights of their academic journey thus far.

Liam Nugent, currently in his fourth year, says his career began in the Merchant Navy. "I developed a real interest and passion for the design and engineering behind the construction of ships," he recalls. Nugent's ties to shipbuilding on the Clyde further fuelled his ambitions. "Generations of my family have worked in shipbuilding," he says. "Watching my first ship launch at eight years old stuck with me."

Reflecting on their choices of university over apprenticeships, each student has a wide range of reasons why they chose the course. Nugent emphasises the importance of bridging the gap between practical experience and academic knowledge. "The only way to really do that without staying at sea for at least another 15 years was to go to university," he explains.

Magnus McIntosh, who is currently pursuing his master's degree, also explains his route into studying the profession. "Naval architecture is something I've always wanted to do since primary school," he states. "It was a very natural progression for me." McIntosh chose Strathclyde due to Scottish government funding and his passion for ships, inherited from a family history in shipbuilding, as well as an interest in naval history.

Sophie Inglis, now in her third year of study, recounts her discovery of naval architecture. "I'd never heard of it, it was a new one for me," she admits. But an interest in a course with more practical application led her to Strathclyde's doorstep. "I loved maths and sciences in school. I wanted something more applied than a straight degree in maths. I didn't know I would enjoy naval architecture until I started it. It's been the right path for me, but I wasn't sure why it would appeal to me at first."

When asked whether it would have been better to apply for an apprenticeship Magnus says he sees university as a gateway to a higher level of understanding. "University gives you the highest level of understanding in a subject," he notes.

The students are increasingly involved in hands-on projects that help to bridge the gap between theory and practise. As part of each student's coursework, they must design a vessel from the ground up. "We designed



MAKING WAVES: THE UNIVERSITY OF STRATHCLYDE'S TOWING TANK.  
SOURCE: UNIVERSITY OF STRATHCLYDE

a frigate. It was an enjoyable project and felt worthwhile having an overarching design process where we could see the knock-on effects that design has," says Nugent, who is now using the findings for his dissertation focusing on optimising naval vessels.

Inglis expresses her pride in tackling challenging coursework, noting that third year has been the most practical and rewarding so far. "Second year was very concept based and more theoretical," she says. "This year's been a lot more practical going from start to finish on a project, so you can really see how it's going to help you in future and how that's going to kind of develop into a job."

"It's all taken back to a practical application with ships," emphasises McIntosh, highlighting the department's unique focus and commitment as well as its dedication to naval architecture, with courses tailored specifically to the field.

The experience of the students illustrates that those choosing naval architecture as a discipline come from a diverse set of backgrounds. However, Dr Sefer Anil Gunbeyaz, lecturer at Strathclyde's Maritime Human Factors Centre acknowledges that there has been a recent decline in student numbers, attributed to the impact of Covid-19 and Brexit. Despite this, he notes an upward trend in student interest.

"We are working to raise awareness in collaboration with RINA, other organisations and companies who take an interest in naval architecture, because in the coming years there will be a skills shortage," says Gunbeyaz.

As these students continue their academic voyage, they remain anchored in their passion for naval architecture, guided by the waves of curiosity and the winds of ambition. With each project, lecture, and discovery, they inch closer to mastering the craft of ship design, leaving a lasting imprint on Scotland's maritime legacy. ■





The Royal Institution of Naval Architects Presents:

# Warship 2024: Future Surface Combatants

18-19 June 2024, Adelaide, Australia

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Sponsored by BMT, Babcock, Defence SA, ANSYS, and SH Defence, and Supported by the RINA Australian Division, the Royal Institution of Naval Architects is once again hosting the highly popular Warship International Conference in June 2024.

The increasing complex warship design requires an effective engineering assistance, design configuration control, supply chain and inventory management to meet operational requirements. With the introduction of autonomy and disruptive developments such as quantum technologies, could future operating concepts evolve leading to a step change in design requirements. With vessel design lives between 25 and 50 years naval architects need to consider the effects of current and future technological and operational developments now.

For the first time, RINA Warship Conference will be a 2-stream event with more talks available to hear from than ever before! The event will be a fantastic learning and networking opportunity, filled with many presentations, interactive Q&A panel discussions, and chances to catch up with old friends as well as make new connections from the Warship industry.

## Keynote Speakers



**Rear Admiral Rachel Durbin CSC, RAN**

A distinguished leader in the Royal Australian Navy, RADM Durbin's career encompasses pivotal roles in marine engineering and strategic naval operations. With her extensive experience in naval capability development and engineering workforce management, her insights will be a cornerstone of the conference.



**Glenn Callow, Chief Technology Officer, Austal Limited**

An expert in autonomous systems and naval technology, Glenn brings a unique perspective from his time at BAE Systems and Rio Tinto, where he led innovative projects in autonomous and digital technologies. His expertise is vital in understanding the future of warship design and construction.

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<https://rina.org.uk/events/events-programme/warship-2024-future-surface-combatants/>





CABLE SHIP SOPHIE GERMAIN. SOURCE: ORANGE MARINE

## OFFSHORE & SUBSEA

# ORANGE'S GREEN SHIP TASKED WITH FIXING BROKEN SUBSEA CABLES OFFSHORE AFRICA

By **Daniel Johnson**

As the world grows ever more connected, the laying and maintenance of subsea cable systems plays a vital yet often overlooked role in meeting evolving global connectivity needs. Around 500 submarine cables – measuring a total length of 1.3 million kilometres (or 33 times around the Earth) – currently traverse the oceans and account for roughly 99% of all intercontinental telephone communications and data traffic.

Damage to these unsung underwater heroes can have major impacts on international connectivity, as was witnessed in two such incidents last month. In early March three subsea fiber optic cables in the Red Sea were cut disrupting an estimated 25% of internet traffic in the Middle East, Asia and Europe, while more recently breaks

to cables offshore Côte d'Ivoire caused web outages across Africa.

Efforts to fix the undersea cables off the West African coast are expected to last at least until the end of April with Orange Marine, a subsidiary of French telephone carrier Orange SA, and its recently acquired newbuild cable laying and repair ship *Sophie Germain* playing a lead role in the repair operations. Designed by Vard Design in Norway and built by Colombo Dockyard in Sri Lanka, the €50 million vessel signifies a strengthening of Orange Marine's position as a major player when it comes to laying and repairing submarine cables worldwide – reports suggest that of the 60 or so cable ships currently operating in the sector, the company owns 15% of the global fleet.

It is also something of a novelty in the niche market of cable ships where vessels tend to be converted from another type. Building a new cable ship represents a larger investment than the conversion of an existing vessel but does mean Orange Marine benefits from a ship with minimal environmental footprint that is fully equipped to meet the growing needs of a connectivity-hungry world.

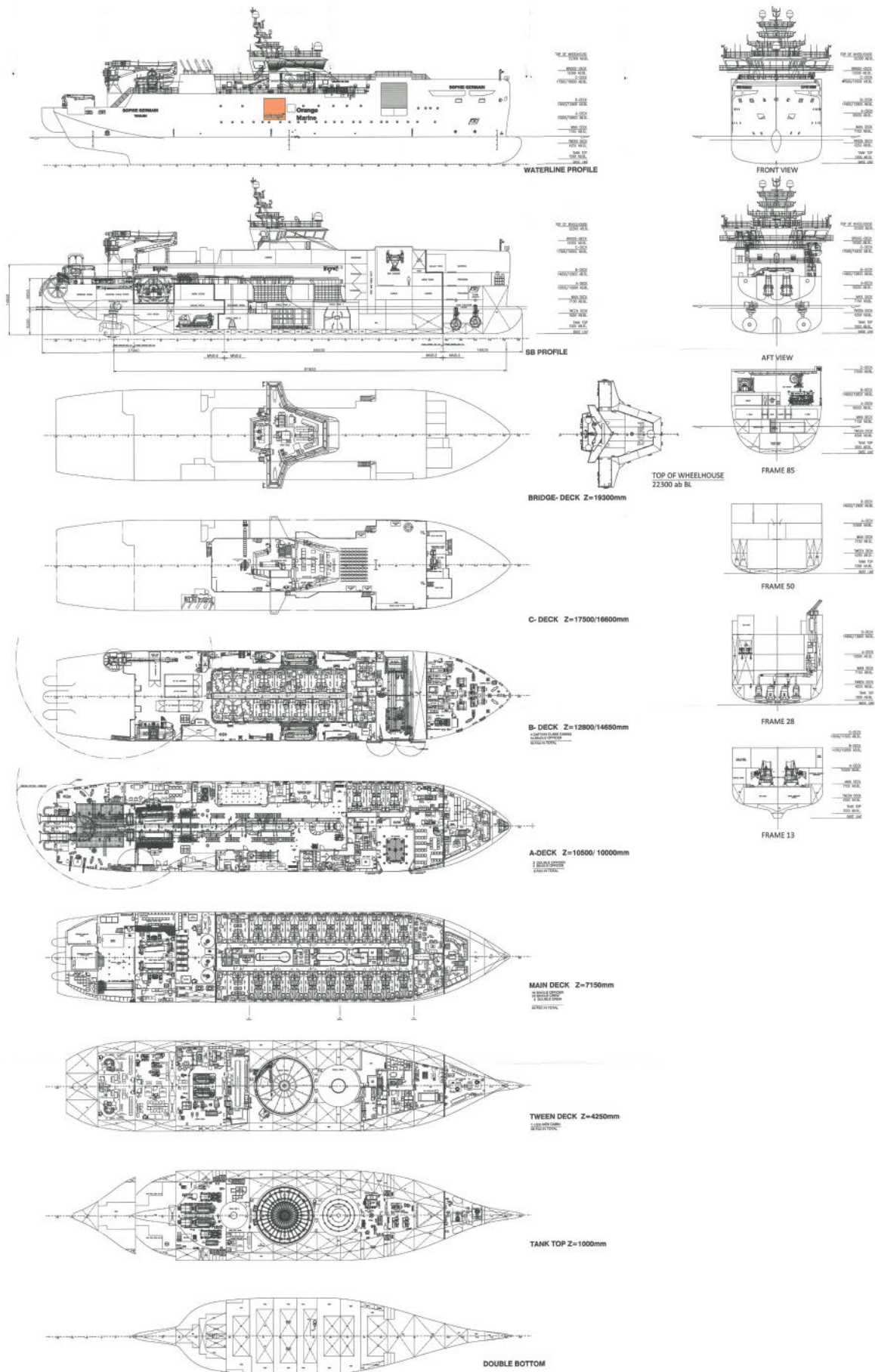
Named after one of France's most outstanding mathematicians and physicists, the 100m-long *Sophie Germain* has been specifically designed according to characteristics defined by Orange Marine based on the company's experience in subsea cable operations, with close attention paid to the hull form to ensure low fuel consumption and enhanced seakeeping capabilities.

### TECHNICAL PARTICULARS SOPHIE GERMAIN

Length oa	100.00m
Breadth, moulded	18.80m
Depth, moulded	7.15m
Draught, design	5.70m
Deadweight tonnage	1,800t
Main engines	Bergen C25:33L6A / CAT C32
Speed, maximum	14.64knots
Classification society	Bureau Veritas
Flag registry	France



SOPHIE GERMAIN GENERAL ARRANGEMENT.  
SOURCE: COLOMBO DOCKYARD





The DP2 vessel is outfitted with hybrid diesel-electric propulsion and Azipod propellers. A pair of tunnel thrusters forward combine with the Azipods to provide exceptional manoeuvrability.

The ship's twin engine rooms are each equipped with a Bergen C25:33L6A engine producing 1,920kW and a Caterpillar C32 engine producing 994kW. To meet NOx Tier III requirements, SCR is used on all engines. The ship is also equipped with a Corvus Energy 500kWh battery and when a berth the vessel can be connected to an onshore power supply.

The ship boasts three cable tanks, including one fitted

with a carousel system, and a 3,000m depth rated ROV – designed and built in-house by Orange Marine for cutting, inspecting and burying cables – is stored on board in a dedicated hanger. A Melcal heavy duty 10t/20m crane is fitted on the aft deck.

Registered in France and classed by BV, *Sophie Germain* was built to replace Orange Marine's 40-year-old vessel *Raymond Croze* and will cut CO<sub>2</sub> emissions by 20% and NOx by 80% compared to the previous generation cable layer, according to the company.

*Sophie Germain* is further profiled in RINA's *Significant Ships of 2023*, available to order now. ■

## ULSTEIN BOLSTERS SUBSEA VESSEL PORTFOLIO WITH SHIP FOR ALL MARKETS

A "booming" offshore energy market has led Norwegian shipbuilder and ship designer Ulstein to develop a new subsea vessel to serve both the fixed and floating offshore wind markets as well as offshore oil and gas.

"The offshore vessel market is experiencing a surge of optimism thanks to high growth rates in offshore energy investment, large order backlogs, and strengthening day rates," says the company.

It adds that the new SX232 design is based on three core principles that make it stand out from the crowd: an optimised hull design based on the Ulstein TWIN X-STERN; a smart power and propulsion system developed to minimise energy consumption during DP operations; and an integrated energy recovery system utilising all the waste heat in the machinery systems (cooling water and exhaust).

### Enhanced efficiency and operability

According to Ulstein, the TWIN X-STERN solution, with main propellers fore and aft, is ideal for DP operations and offers considerable efficiency potential.

"A ship has to follow the weather when in operation, and turning the ship is traditionally required up to 50% of the time. And this is where the TWIN X-STERN excels.

By having excellent performance in either direction, you avoid having to turn the ship to follow weather changes," explains Lars Ståle Skoge, commercial director at Ulstein Design & Solutions.

With a length of 139.8m, beam of 28m and deadweight of 17,500tonnes, the design has also been developed to include versatile fuel options and a battery energy storage system for peak shaving and spinning reserve purposes has been implemented.

The vessel's forward section accommodates 130 people and includes two remotely operated vehicle hangars. A moonpool is positioned at the rear of the accommodation block, complemented by a flat deck spanning over 2,000m<sup>2</sup>. This flat deck design enhances the vessel's adaptability, allowing multiple operational setups to suit diverse maritime tasks.

The basic platform has been configured with a 250tonne offshore crane; however, the platform can also support a larger crane of 400tonnes. With the upgraded crane capacity, the vessel can support the installation of suction anchors, which are common for floating offshore energy.

An alternative use of the SX232 platform is for inter-array cable laying operations. ■



THE ULSTEIN SX232. DESIGNER'S ILLUSTRATION OF 6 X 20M SUCTION ANCHORS ON DECK. SOURCE: ULSTEIN





The Royal Institution of Naval Architects Presents:

# Human Factors 2024 Conference

8-9 October 2024, Wageningen, The Netherlands

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The conference will provide an opportunity for human factors experts, naval architects, bridge officers and others to get together and discuss the recent developments. It will focus on lessons learned from interventions and applied research that were successful, or even more interesting, unexpected or bad results. For example, implementation of new automation on board that worked out differently or behavioral interventions that had unexpected effects. It is all about applied research that provides learned lessons for future Human Factor research, specifically for the Maritime domain.

As part of the conference, the delegates will have a unique opportunity to visit the new Seven Oceans Simulator centre of MARIN on 10th October 2024, where the attendees will have a chance to:

- Tour in the brand new Seven Oceans Simulator centre
- A workshop on how to design a bridge layout for special purpose vessels with physical mock-ups.
- A workshop measuring human performance covering eye-tracking, emotion recognition, heart rate variability and galvanic skin response.
- ..... and more!

## Keynote Speakers



**Job Brügggen, LVNL**

Job Brügggen holds a masters degree from Delft University of Technology in Aerospace Engineering. In 1986 he started working for the National Aerospace Laboratory where he later became the head of the Air Transport Division. His particular interest in safety led him to Air Traffic Control the Netherlands, to become their first safety manager in 2002. He is particularly known for his activities in Just Culture developments and was one of the first to demonstrate the detrimental effect of prosecution of air traffic controllers on incident reporting. In 2003 he re-created the CANSO Safety Standing Committee and chaired it for six years. He also advises in the health care industry on safety matters with a particular focus on safety leadership. From November 2014 he was co-chairman of the Eurocontrol Safety Team, until 2019. For the Air Traffic Controllers academy of LVNL, he is the chairman of the examinations committee.



**Dr Rafet Emek Kurt, Reader, in Maritime Safety and Human Factors, Department of Naval Architecture Ocean and Marine Engineering, University of Strathclyde**

Dr. Kurt also serves as the Director of the Maritime Human Factors Centre, further demonstrating his commitment to advancing research in this field. Additionally, he holds the position of Associate Editor in Ships and Offshore Structures, showcasing his dedication to the dissemination of knowledge within the maritime community. Dr. Kurt is also a member of the International Ship and Offshore Structures Congress (ISSC), where he collaborates with peers to develop ship design criteria informed by human factors, further highlighting his commitment to the advancement of maritime safety practices.

Over the years, Dr. Kurt has worked on many research projects aimed at integrating human factors, safety, and risk into maritime practices. His work has been published in respected journals and conferences, igniting essential discussions in the maritime community.

<https://rina.org.uk/events/events-programme/human-factors-2024/>



# NOISE & VIBRATION

## PROPELLER BLADE RENEWAL INTENDED TO CUT FUEL CONSUMPTION MAY REDUCE NOISE AS WELL

By **Kari Reinikainen**, Correspondent

Efforts of the shipping industry to reduce fuel consumption and thereby pollution to the air may contribute to reduction of noise and vibration as well through the replacement of propeller blades.

Rasmus Lyngdal-Christensen, senior specialist in Acoustics, Noise & Vibrations at FORCETechnology in Denmark says that the main contribution to underwater noise from propellers is cavitation. "Cavitation occurs when the pressure in the water around the propeller drops below the vapour pressure, leading to the formation of bubbles that collapse and generate noise," he explains.

Designing propellers to minimise cavitation is crucial for reducing underwater noise. This again involves optimising the blade shape and the propeller's operating conditions to prevent large pressure drops. Propeller blades designed to reduce fuel consumption do not automatically lead to a reduction in underwater noise, as there is an efficiency-noise trade-off.

As an example, blades designed for fuel efficiency may inadvertently increase noise and propeller designers must strike a balance between achieving fuel savings and minimising noise. "However, there may be a correlation because designs that enhance efficiency often do so by improving hydrodynamic performance and reducing cavitation," Lyngdal-Christensen points out.

Luis Felipe Sánchez Castro, senior naval architect and CFD engineer at Knud E Hansen in Denmark, says that when a ship is designed, considerable effort goes in to ensuring that the entire ship system is optimised for the most common operating conditions, such as speed etc.

"Often it is the case through the life of the vessel that the operating speeds change due to the vessel changing routes, high fuel prices, or regulatory pressures requiring a lower fuel consumption. In these situations, it is common for the design speed to drop from 24knots to 16 for example," he states.

"This is a large deviation from what the propeller was designed for, and therefore it is often a good idea to revisit or retrofit the design of the propeller to suit the slower speed and often resulting in significant fuel savings.

"In parallel with this process, it is often a good idea to examine the bulbous bow of the vessel. It can be a relatively straight forward process to retrofit a new bulb



RASMUS LYNGDAL-CHRISTENSEN. SOURCE: FORCETECHNOLOGY

which is optimised for the new slower speed and reduce the resistance in the order of 7% to 10%."

### Several parameter changes in propeller design can reduce noise

There are several changes that are made during a propeller design that can also have a positive impact on the noise. If the new propeller is designed for the same speed as the original design and the efficiency has improved most likely a number of design parameters will have changed. Firstly, it is very likely that the weight of the propeller has been reduced and its efficiency has been increased. Pressure pulses, which impact underwater radiated noise (URN), are likely to have been reduced.

The shape and airfoil sections of the blade impact the URN i.e. chord distribution, skew angle, thickness. "But let's suppose that the chord distribution is increased towards the tip, that can help to reduce pressure pulses, depending on the design that can also reduce cavitation and if the propeller is well balanced that can also reduce the weight and therefore have a better efficiency. As cavitation is one of the largest sources of URN, any reduction in cavitation will most likely also result in reduced URN," Sánchez Castro notes.

Tallink Grupp, the Estonian cruise ferry company, recently replaced the original propeller blades on its 2008-built *Baltic Queen* with ones optimised for a slower speed and obtained significant reductions in noise levels. To measure these, the company partnered with Tallinn University of Technology (TalTech).

As the 48,000gt ship is the second unit of the class, its original propellers and their blades had been designed



four years earlier for *Galaxy*, the first unit in the class of three sister ships that were built at what is now Rauma Marine Constructions in Finland.

This was done in two stages. First, the underwater noise level produced by the original propeller blades was measured prior to the vessel's drydocking from 30 August to 4 September 2023. The second set of reading was obtained after the installation of the new propeller blades, from 15 to 25 September 2023.

The measuring results showed that 40Hz decade source level with the new propeller blades, moving at the speed of 17.6knots, is by  $16 \pm 5$ dB lower and that broadband source level in decade from 20Hz to 20,000Hz with the new propeller blades, moving at the speed of 17.6knots, is lower by  $8 \pm 5$ dB.

Commenting on the results, Aleksander Klauson, Professor of Structural and Fluid Mechanics at the Institute of Civil Engineering and Architecture at TalTech, states: "The measurements demonstrated that by optimising the ship's propeller, it is possible to mitigate cavitation and significantly reduce the underwater noise caused by the passenger ship."

#### **Cavitation noise can travel 100 miles under water**

International Institute of Marine Surveying says that propeller cavitation can generate as much as 180dB of underwater radiated noise and this can be heard by marine life 100 miles away. Dr Stephen Simpson, Associate Professor in Marine Biology & Global Climate Change, University of Exeter, a leader in marine noise pollution research, says: "Noise levels in the ocean due to maritime activity has been rising for decades, from a growing number of sources, including shipping,

motorboats, oil prospecting, offshore energy installations and military activity."

In October of last year, the IMO's revised guidelines for the reduction of underwater radiated noise from ships took effect. About propellers, these note that propellers should be designed and selected to minimise cavitation while considering and optimising effects on energy efficiency.

"Cavitation can be the dominant URN source and may increase underwater radiated noise significantly. At typical operating speeds, cavitation can be reduced under normal operating conditions through good design, such as optimising propeller load, ensuring uniform water flow through propellers (influenced by hull design), and careful selection of the propeller characteristics such as diameter, blade number, blade area, pitch, skew, rake and sections," according to IMO.

Interaction between the hull and propeller can be analysed to optimise the design of the propeller, hull, rudder and ship performance concurrently. While noise-reducing propeller design options are available for many applications and while these should be considered, IMO states it is also acknowledged that the optimal propeller with regard to URN reduction cannot always be employed due to technical or geometrical constraints.

Ice-strengthening of the propeller and mass pose such constraints, and it is also acknowledged that some design principles for cavitation reduction can cause a decrease in efficiency. "Some new state-of-the-art propeller design and concepts have been developed, including high-skewed propellers, forward-skew propellers and contra-rotating propellers," IMO notes. ■



BALTIC QUEEN. SOURCE: TALLINK SILJA





# TANK GAUGING

## IN CONTROL: THE TECHNOLOGY BEHIND THE LATEST TANK GAUGING SYSTEMS OFFERS MULTIPLE BENEFITS FOR SHIPPERS

By **Mark Jones**, sales director, Scanjet PSM

Tank gauging systems provide a vital function aboard ship, monitoring the level, temperature and pressure throughout vessels, covering the full range of shipboard fluid types from fuel oil and lubricants to ballast water, and in the case of tankers, the cargo itself.

Alongside the 24/7 provision of accurate data, key drivers in product design for Scanjet PSM have been simplicity, flexibility, visibility and access. The evolution of tank gauging systems design during this time has seen a fundamental redevelopment of central elements including sensors, processing technology and display systems.

### Smart data capture

The latest generation intelligent sensors like Scanjet PSM's APT1000 have extended the configuration flexibility and functionality of previous ship sensors, providing highly accurate data to deliver improved control and enable proactive action should a problem occur.

Capable of withstanding harsh environments, the new generation sensors are fully encapsulated with no reliance on sealing rings. This leakproof construction combined with a smaller footprint permits a range of mounting options including full immersion in tanks or side mounting to the tank exterior. Electronics are integrated within the body which allow micro-controlled monitoring.

The new type of sensor generates data in real time and in digital format from onboard tanks and relays it directly to other shipboard systems such as ship management or loading systems, via integral serial communication, to achieve improved shipboard integration.

By connecting all sensors on a single cable multi-drop network, the need for a separate cable to each transmitter is eliminated, with potential savings of up to 50% in installation time, costs and weight. This offers opportunities for shipyards and fleet operators to fast track newbuilds and to minimise downtime for repair and retrofits. Compatibility with other products and designed-in connectivity also facilitates conversion and updating for safety compliance and to accommodate changes in vessel use.

Sensors can be delivered pre-calibrated, or have their settings fine-tuned on the spot, by connecting to a laptop. The in-built programmability of the new breed of transmitters also allows for simple and rapid in-service replacement by ship's crew in transit, avoiding lengthy repairs involving downtime in shipyards. This was one of a

number of issues flagged in the Allianz Global Corporate & Specialty Safety and Shipping Review 2023 that has seen expenses soaring, with owners and managers facing an increase of 18% or over in ship repair costs.

### Integrated processing

Bringing the development of sensors and partner systems up to date, the networking hardware and software available to link sensors to provide shipboard integration has undergone a step-change in recent years. Partnering with modern systems such as Scanjet PSM's VPMS Connect system which offers a centralised touch screen display and serial links to other onboard systems, allows users to further customise their preferences and link with alarm monitoring systems and loading computers for complete ship-wide visibility and management of tank status and vessel loading.

### Expanded connectivity and reach

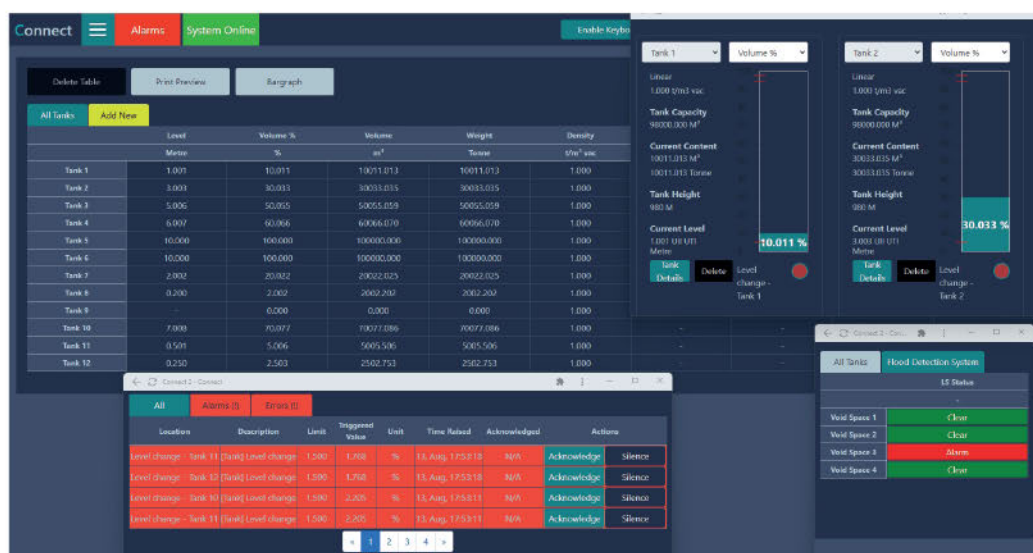
More recent developments include Scanjet PSM's Connect Tank Monitoring System, which features a new processing unit capable of receiving input from multiple sources. These can be connected directly via RS485 communication to the new generation of intelligent level and pressure transmitters or accept signals from all other sensor types via intelligent interface cards.

With the contemporary system, all signal processing and data calculations are undertaken within the central processing unit which is linked in a server/client relationship with the local displays. A key differentiator, this latest iteration in central processor design avoids the need for multiple computer hubs, saving money on equipment purchase and cabling.

Key to the new processor design is that it opens up ship networks for remote shore-based access, both for configuration purposes and for further analysis of the data provided by the sensors for remote ship management. Previously a closed network limiting integration within individual ships, the new open network can provide desk to vessel connectivity through the shipping company's own hardware and software.

The ability to connect out promises huge operational and maintenance benefits going forward. Shipping owners and managers will be able to deal more proactively with maintenance, pinpointing potential faults through sensor monitoring while eliminating the need for expensive engineer location visits or diminishing fleet capacities due to downtime. Taking





MULTI SCREEN VIEW  
USING POP OUT  
WINDOWS - DARK  
MODE. SOURCE:  
SCANJET PSM

it to the next level, remote connection facilitates the introduction of predictive maintenance regimes, to include condition monitoring and reporting, with the potential to extend the operating life of vessels and the lifecycle reduction in capital expenditure.

Remote access to real-time data has the potential to further improve the efficiency and safety of ships by providing a powerful tool to assist strategic management with regular remote reporting.

### Flexibility and scalability

The modular nature of these next generation solutions provides built-in flexibility, which enables customer-specific customisation, multiple display locations, and upscaling within the standard design for maximum cost-effectiveness.

Supplied pre-configured, the tank management package can be fitted by local engineers without the need for specialist support, whilst still allowing further customisation and simple updates as required. This offers further time and cost benefits to both ship owners and ship builders.

### Infinite adaptability

Scanjet PSM was the first manufacturer to offer a 'one size fits all' solution to the marketplace. This development offered particular advantages for workboats and fishing boats providing an affordable yet fully featured system for monitoring tank levels previously only available for larger vessel use. Built in adaptability is especially important for smaller coastal and supply vessels, whose role continues to change and expand, typically monitoring between 10 and 20 points.

At the other end of the scale, tankers may have a requirement to monitor anywhere upwards of 40 points for small tankers and more for VLCCs and ULVCCs, covering cargo tanks, manifold and pump pressure discharge. Naval vessels too have more complex monitoring requirements to be met which may include 80-plus points covering tank and temperature monitoring, with a need for integration.

The larger bridge areas in these vessels typically allows for more extensive displays. Screens of typically 24inches offer further display options including graphical and tabular presentation of tabbed pages, providing the opportunity for customisable sections specific to the vessel application and key functions. In addition, the capability to install additional displays on deck is vital in enabling time-pressured crews with specific responsibilities to access function-critical information directly and swiftly. Inbuilt diagnostics and the ability to interrogate all modules from any point on the network, without the need to enter tanks, means routine checks and tests can be conducted easily and quickly.

Europe's river going barges are also essentially like large floating tankers, with less tanks but also a need for safety monitoring to avoid landform features which could increase the risk of capsizing.

Passenger vessels and ferries have specific requirements pertaining to safety, which includes monitoring of draught, service and ballast tanks, void and bilge spaces and flood detection, all of which can be monitored continuously in the latest systems, with appropriate alarms to enable prompt reaction should a problem occur at sea.

Scanjet PSM's Connect system is also increasingly being installed in superyachts, covering up to 30 points potentially and providing a sophisticated yet easy to use solution for expeditions and cruising.

For shipping applications with very specific, reduced monitoring requirements, Scanjet PSM has recently introduced a dedicated draught monitoring system which provides monitoring and indication of vessel draught over two to four points plus measurement in real time of vessel trim and heel. This system provides improved safety and stability where accurate draught, trim and heel information is key to safe operation and enhanced operational efficiency. Recent installations include the supply of two systems to Shannon Ferries for its ro-ro vessels, where all existing cabling was re-used. ■





# DECARBONISATION

## BREAKING THE BARRIERS TO SHIPPING'S ALTERNATIVE FUEL FUTURE

By **Mikael Wideskog**, director, Sustainable Fuels & Decarbonisation, Wärtsilä

Planning for a future where adopting new fuels is a given requires an iron-clad commitment to invest in new technologies. The shift towards alternative energy sources can be daunting given the sheer number of pathways being presented towards lower greenhouse gas (GHG) emissions. While a focus on improving the energy efficiency and fuel flexibility of vessels will help individual ship operators to make ready for a decarbonised future, for the industry at large other, far wider challenges demand attention.

An understandable focus is on improving efficiency, both for meeting short-term emissions requirements such as IMO's Energy Efficiency Index for Existing Ships (EEXI) and Carbon Intensity Indicator (CII) as well as for reducing the later cost of applying alternative fuels. But this is just one step as shipping strives to meet its long-term climate targets. To be fully futureproof, investing in fuel flexibility will ensure operators can meet tightening climate demands while safeguarding their fuel choices against energy market disruptions.

Combining both energy efficiency and fuel flexibility will be the key to a cost-efficient energy transition. Early investment in establishing onboard technology for sustainable fuels will be important in managing costs. As an example, the EU Emissions Trading System is already rewarding operators using zero or near-zero carbon fuels with lower payments, and the FuelEU Maritime regime entering effect next year will add to that by requiring stepped reductions in the greenhouse gas intensity of fuels used on board. The longer the delay in implementing alternative fuels, the more costly the transition will be.

### New tools for a new age

The technologies to enable alternative fuel use are already entering the market. In 2022, Wärtsilä launched the Wärtsilä 32 Methanol, its first newbuild methanol engine and the MethanolPac fuel supply system. This was followed by the recent announcement that it will introduce four methanol engines to its portfolio, marking a significant milestone in the marine industry's pathway to sustainability. It also announced in 2023 that its Wärtsilä 25 dual-fuel LNG engine family could be adapted for ammonia capability, whilst, at the same time, securing a letter of intent for the new Wärtsilä 25 Ammonia solution with Virdis Bulk Carriers.

In February this year, an ammonia fuel supply system (AFSS) was introduced and will be deployed on some of the first ammonia-fuelled vessels, for Belgian company Exmar. Extending alternative fuel capability

across Wärtsilä's engine portfolio and developing the required fuel supply and storage solutions exemplify the technological flexibility needed to successfully implement alternative fuels across the maritime industry.

Basing new fuel capabilities on existing engine platforms streamlines the development process and simplifies conversion between fuels. The fuel gas system on the 25DF engine, for example, shares common components with the Wärtsilä 31DF, which facilitates both system validation and the availability of spare parts. Commonality also allows for continuous efficiency advances to be transferred across engines of all fuel types. As an example of these advances, Wärtsilä has accumulated more than 300 hours of testing on an enhanced combustion concept for its lean-burn LNG engines, achieving significant reductions in both NOx and methane emissions.

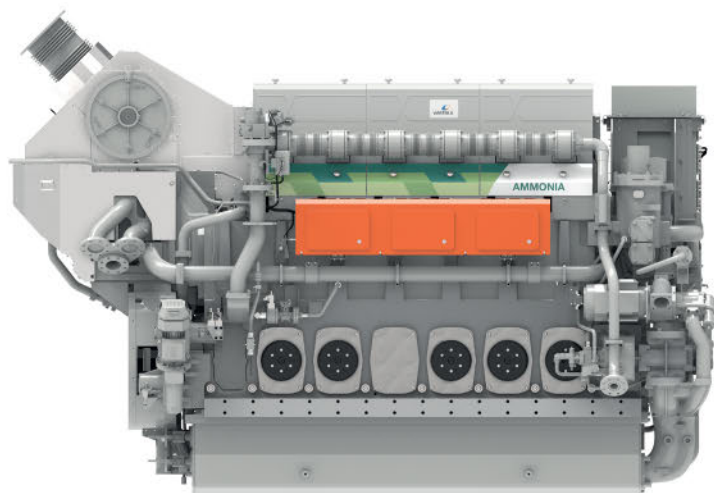
With these new capabilities, new solutions are emerging to reduce emissions not just on vessels but also in ports. Wärtsilä is working with Seattle-based naval architecture and marine engineering firm Elliott Bay Design Group on the Clean Harbor Alternative Mobile Power (CHAMP) project, developing a cold-ironing barge powered by Wärtsilä 32 Methanol engines. The collaboration to deliver at-berth electricity from carbon-neutral methanol will provide a cost-effective solution to reduce emissions from large vessels in areas where shore power – increasingly required by regulations in the US as well as China and the EU – is limited or not available.

Decarbonising the maritime ecosystem depends on such alternative fuel technologies and innovative solutions. However, the industry is still eagerly awaiting the availability of the zero and near-zero carbon fuels that will account for the biggest portion of future emissions



MIKAEL WIDESKOG, WÄRTSILÄ





WÄRTSILÄ 25 IS NOW AVAILABLE IN A DUAL FUEL AMMONIA VERSION

reductions. LNG is well-placed to act as a transition fuel given its already wide uptake, followed by biofuels in the 2030s. Blue fuels, with carbon captured during production from fossil energy sources, will then act as bridging fuel before green, synthetic fuels become widely available at scale in the late 2030s and early 2040s.

The transition represents a significant investment challenge. According to the 2023 UN Review of Maritime Transport, to fully decarbonise by 2050, the industry will need to replace about 270 million tonnes of heavy fuel oil annually with alternative fuels. As those fuels are likely to be several times more expensive than conventional fuel, shipping will need to invest around US\$5 trillion in near-zero fuels and propulsion technologies by 2050 – alongside an annual liquidity injection of US\$8 billion to US\$28 billion needed to scale up production, fuel distribution and bunkering infrastructure to the necessary degree.

While acknowledging that there is no existing zero-carbon fuel globally in significant enough quantities or a single technological solution applicable to all vessel classes, the existing orderbook for vessels adopting new fuels is nonetheless increasing. Operators are already realising that preparing vessel infrastructure ahead of time, as cleaner fuels become more viable and as costs of traditional fuels rise, is the most cost-effective approach to adopting new fuels.

Ship operators will also need to 'think upstream' to deliver a cost-effective transition. This means greater efforts in securing alternative fuel supply while availability matures, supporting clean fuel production projects with long-term supply contracts or even direct investments – the kind of actions that large ship operators are already taking. However, to truly accelerate the transition, the industry will need to look beyond individual actions and work together on a much wider scale.

Industry collaboration will be essential on several fronts. First, pooling purchasing power will drive clean fuel investment far quicker than any individual ship operator could, sending clear demand signals that enable investment and improve shipping's opportunity to gain access to limited supplies. If pooling were possible, it

would also help to reduce fuel prices and minimise supply chain costs for individual companies. It would represent a significant departure from conventional bunker buying today, but wide group commitments to purchase could be one answer to delivering cheaper clean fuels for shipping.

### Looking beyond shipping

Collaboration to spur clean fuel availability should not be confined to talking amongst ourselves. Shipping will also need to work closely with other industries. Taking blue or green ammonia as an example, there will be considerable demand from agriculture as a fertiliser ingredient, and an emerging seaborne trade for ammonia as a hydrogen carrier capable of decarbonising heavy industry. Showing fuel producers a clearer picture of what a user ecosystem looks like will spur investment and highlight the role of shipping not only as a consumer but also as an enabler of clean fuels.

The industry also needs to work with regulators to develop the policy framework for alternative fuels. That means delivering the certainty and stability needed to incentivise clean fuel production, both directly or through measures such as carbon pricing, fuel standards and fossil phase-out timeframes. A level playing field will be crucial to ensure the opportunities and risks of the energy transition are spread fairly across stakeholders. Just as collaborative action between ship operators can be more impactful than individual efforts, so will cooperation between governments, regional authorities and industry regulators be crucial to ensure global consistency – in fuel availability, price and incentives to produce and use clean fuels.

For technology providers like Wärtsilä, industry collaboration also means sharing knowledge. The technologies to implement alternative fuels exist, but the number of options can be overwhelming. Supporting operators through feasibility studies and execution planning, along with new product implementation, will be vital. So too will early operational support such as training in new technologies. By dispelling uncertainty and sharing expertise, technology companies can help facilitate a fuel-flexible future.

Wärtsilä's continued cooperation with Carnival Corporation is a prime example of how that support can be delivered. The programme to optimise performance and efficiency on Carnival's cruise vessels is considered a key element of the company's strategy to reduce greenhouse gas emissions along its fleet operations. Using digital monitoring to identify the scope for optimisation using both existing and new technologies, takes the standard service relationship between technology provider and ship operator to a new level, sharing technical expertise to plot the best path to decarbonisation.

Shipping's decarbonised future depends on alternative fuels, and the best way to apply those is with efficient and fuel-flexible technology, much of which already exists today. But it also depends on active engagement in developing the availability of the fuels that these technologies will harness. Timely, collaborative action will be key to minimising both shipping's climate impact and the disruption that the transition will bring. ■





# RETROFIT SOLUTIONS TO ACHIEVE 55% GHG REDUCTION BY 2030

By **EU Horizon RETROFIT55** project team

The RETROFIT55 project aims to address the urgent need for decarbonisation in the maritime industry by developing innovative retrofitting solutions and green technologies to reduce fuel consumption and greenhouse gas (GHG) emissions. Focusing on ship efficiency improvements and the utilisation of zero- and low-emission energy sources, the project seeks to achieve the targets set by the ZEWT partnership, which aims to reduce fuel consumption in waterborne transport by at least 55% before 2030 compared to 2008 levels.

To achieve these objectives, the project consortium explores various retrofitting solutions, including air lubrication systems (ALS), smart energy management, holistic hydrodynamic and operational optimisation, wind-assisted propulsion, fuel cells, and hybridisation of propulsion systems. Recognising that no single retrofitting solution can achieve the necessary emissions reductions, the project emphasises the intelligent combination of existing high Technology Readiness Level (TRL) systems and the development of additional solutions that may reach TRL 7 to 8. The project also acknowledges the interdependence of retrofitting systems, requiring a balanced approach to maximise overall improvement while considering the impact on individual system gains.

The RETROFIT55 project aligns with the Design and Retrofit section of the Waterborne Strategic Research and Innovation Agenda (SRIA) and intersects with other areas such as the use of sustainable alternative fuels, energy efficiency, electrification, and digital green initiatives. By integrating these advancements into existing ships, the project seeks to ensure compliance with regulatory frameworks, cost-effectiveness, and sustainability throughout the life cycle of the vessel. The project will develop an advanced web-based Decision Support System (DSS) that features an up-to-date catalogue of retrofitting solutions, ready for deployment at the project's end and easily expandable thereafter. The DSS will facilitate the combination of retrofitting solutions to achieve a targeted 35% reduction in GHG emissions compared to the original ship design.

The WASP aspect of the project focuses on the development of two wind-assisted solutions: one based on rigid sails, and another based on flexible sails.

The rigid-sails solution is already installed on a ship and will provide relevant data for the development and validation of digital twin models. The flexible-sails solution is currently installed on boats and catamarans but not on large ships. Both solutions aim to fold or collapse when there is no wind or during port approaches to prevent interference with manoeuvring. The project also involves the development of digital twins for sail management, enabling performance predictions by combining thrust and lateral force computations with the ship model. The project emphasises the importance of stowing the systems to a small size and modularizing them for simple retrofitting. The goal is to reach TRL8 by the project's end, supporting widespread industry adoption through performance predictions and capital investment decisions.

The ALS aspect of the project aims to reduce the frictional resistance of ships by injecting compressed air bubbles into the seawater, which dilutes the local viscosity and significantly reduces water friction. This reduction in friction can lead to a substantial decrease in fuel consumption and associated greenhouse gas emissions.

The ALS developed in the project utilises a largely passive air lubrication system (PALS) that minimises the power required for bubble production by employing a Venturi mechanism. Compared to existing solutions, the PALS system offers improved bubble generation, inboard injection of bubbles, and enhanced control over the lubrication speeds. The system is designed to optimise the effect of lubrication and provide potential net performance improvements twice that of currently available systems. The project involves further development through laboratory experiments, computational fluid dynamics (CFD) simulations, and optimisation of the system's installation, configuration, and management.

In one of the work packages (which is dedicated to the Hydrodynamic Design Optimisation) emphasis will

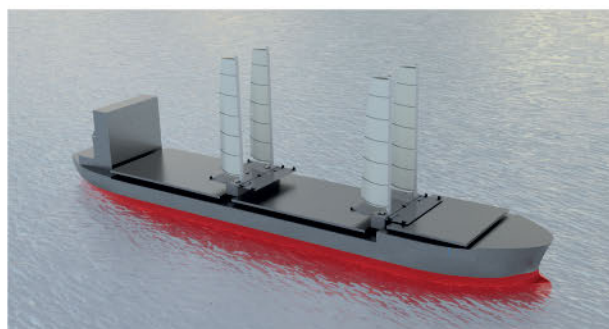


FIG 1. APPLICATIONS FOR RIGID SAIL (LEFT) AND FLEXIBLE SAILS (RIGHT)



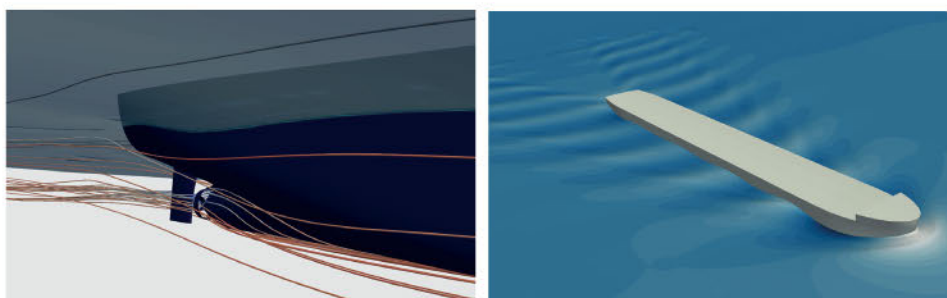


FIG 2. RESULTS FROM CFD COMPUTATIONS – VELOCITY STREAMLINES (LEFT) AND WAVE ELEVATION (RIGHT)



FIG 3: CASE STUDY VESSELS – BULK CARRIER (LEFT) & RO-RO VESSEL (RIGHT)

be placed on the interaction between hydrodynamic design and other energy saving measures adopted, in order to realistically assess the cumulative effect and optimise the ship's design in a holistic way.

Attention will also be given to optimising for realistic operational profile (speed, displacement, wind and sea conditions), based on available operational data.

Another work package will focus on analysing the energy systems on board existing ships and proposing new solutions that can improve the ship efficiency and reduce the GHG emissions. The implemented solution will enable a significant reduction of ship-related pollution in port area, which is particularly important especially in Emission Control Areas (ECA).

Developed solutions will be based on a combination of retrofit solutions like shaft generators, battery banks, fuels cells and, wherever compatible with the ship use, photovoltaic plants. The different solutions will be integrated within an energy management system that will make the main power plant operating always at the optimum working point when in navigation, storing the excess of energy which can be used in combination with fuel cells or photovoltaic plants during the manoeuvre and stay of the ship in port.

Regulatory aspects are also considered during development. The objectives include determining the full system design, optimising fuel savings, evaluating risks, obtaining classification approval in principle (AiP), and meeting installation and operation requirements.

The project includes a task focused on hydrodynamic optimisation at realistic operational conditions for two case study ships: a bulk carrier and a ro-ro vessel.

The aim is to explore retrofitting solutions that improve the hydrodynamic design of these ships based on data provided by operators, with a specific focus on the ships'

actual operating speed range and encountered sea states, rather than assuming ideal weather conditions. Various tools, including higher fidelity computational fluid dynamics (CFD) and potential flow solvers, as well as reduced-order engineering models, are utilised to calculate the effects of ship motions on propeller performance and assess the propulsion efficiency of the vessels in wind and wave conditions. The solutions considered include bow retrofitting to better align with actual or modified speed and displacement profiles in realistic sea states, as well as propeller retrofitting to optimise the propulsion system for lower operating speeds and reduced thrust requirements. This can be achieved through the installation of other energy-saving technologies and the modification of propeller design, such as incorporating winglets at blade tips, optimising tip rake distributions, and adjusting blade roughness to control blade tip cavitation. The outcomes of this task are expected to have broad applicability to a wide range of ship types, as the selected bulk carrier and ro-ro vessels represent two major categories with distinct design characteristics.

Exploitation, dissemination, and marketing activities shall be organised during the course of this project, in order to ensure and maximise the visibility and sustainability of the project outcomes and its commercial continuation after project closure. Planned activities aim to attract the interest of all types of relevant stakeholders, such as ship operators/managers, large shipping lines, and players in commodities markets as well as shipbuilders and ship design consultancy companies. Work groups to be reached include relevant industry and research communities, consortia from relevant EU and/or national/international projects and initiatives, users/commercial communities relevant to project's use cases, like shipping, shipbuilding, and service providers, including pertinent professional bodies.

Regular updates on the project's progress will be posted on our dedicated website: [www.retrofit55.eu](http://www.retrofit55.eu). ■





# CONFERENCES & EXHIBITIONS

## METSTRADE GETS READY FOR CONTINUED GROWTH WITH FOCUS ON SUSTAINABILITY, INNOVATION AND PEOPLE

By **Daniel Johnson**



METSTRADE SUPERYACHT PAVILION

METSTRADE, the world's largest trade exhibition for equipment, materials and systems for the international leisure marine industry, returns to the RAI Amsterdam from 19-21 November 2024 looking to build on the success of last year's record-breaking event. Now on its 36th edition, the annual show has an impressive track record serving as an essential anchor point and meeting place for marine companies and professionals, with a target audience that includes yacht builders, refit yards, equipment manufacturers, distributors and, of course, naval architects.

"Our 35th edition hit an all-time high in attendance and we expect METSTRADE 2024 will again be a full house," Niels Klarenbeek, METSTRADE's director, tells *TNA*.

The marine industry, he adds, is moving at incredible pace to address the many opportunities and challenges set before it and METSTRADE's team are happy to play their part by offering a number of features targeted at sustainability, innovation, accessibility and inclusivity.

### A sustainable future

The show's strong emphasis on sustainability includes a Next Generation Propulsion Zone that brings together the latest electric and hybrid engines, alternative fuels and zero-emission products in one easily accessed display. Visitors can also walk the Superyacht Sustainability Route and explore products from marine businesses that have had their environmental claims verified through rigorous third-party Life Cycle Assessments (LCAs) overseen by the Water Revolution Foundation, a non-profit organisation that aims to neutralise the superyacht industry's ecological footprint.

Klarenbeek notes: "When we first initiated the route back in 2022 we only had two participating companies. For the upcoming show we expect somewhere between 15 and 20 companies.

"You could argue that's not an awful lot compared to the 350 exhibitors within the Superyacht Pavilion, but those companies stand out and have the ability to be very open and transparent about the sustainability of their products. We feel it's going to be a trend and the route should inspire other companies to also take on that challenge."

According to Klarenbeek, the Superyacht Pavilion is now one of the fastest growing areas within the METSTRADE show and will be of particular interest to *TNA* readers. "We see that the superyacht market is doing very well and currently the team are preparing a significant extension of the Superyacht Pavilion from 2025 onwards. We will be adding another hall fully dedicated to superyacht technology," he says.

### Inspiring technological innovation

Well-established sector specific pavilions such as the Superyacht Pavilion, Construction Materials Pavilion and Marina & Yard Pavilion were joined by a Foiling Technology Pavilion and Start-Up Pavilion at last year's event. Klarenbeek says both newcomers proved instant hits and will return in 2024.

"The Foiling Technology Pavilion has been developed in partnership with the Foiling Organisation and brings many key players involved in this technology to the show as exhibitors," he explains. "Visitors can see what is currently being developed in the racing scene, especially in regard to the America's Cup, and learn how to implement the technology into mainstream yacht design and construction."

Launched in collaboration with global marine start-up hub Yachting Ventures, the Start-Up Pavilion features carefully curated new businesses and their market disruptive products. The exhibitors in this pavilion at METSTRADE 2023 focused on two key areas – digitisation and sustainability. Within those categories there was a wide range of activity, from underwater robotics, 3D printed inflatable complex structures and electrification enablers, to management systems and battery health prediction software. Out of the 15 fledgling companies exhibiting in the pavilion last year, four have already shown interest in becoming a regular exhibitor in the METSTRADE main arena in 2024, Klarenbeek says.



### Encouraging accessibility and diversity

METSTRADE's Young Professionals Club (YPC) has been nurturing marine professionals under the age of 35 for many years with its free to access lounge providing networking opportunities and tours. Within the YPC is the recently added METSTRADE Career Zone run in partnership with international recruitment specialist Marine Resources. It offers students and up-and-coming professionals complimentary access to career coaching sessions with the Marine Resources team, plenty of informal advice, and opportunities to meet industry leaders and hear about the latest job vacancies.

"We have a vibrant community of young professionals at METSTRADE and aspiring naval architects interested in being part of the leisure marine industry should definitely get along to the Young Professionals Club and Career Zone," observes Klarenbeek.

Returning to METSTRADE 2024 for the third year in a row will be a breakfast time Women in the Marine Industry International meeting at which female leaders will discuss how to take advantage of the opportunities open to women in the marine industry and answer audience questions. "We look forward to building on the success of the 2022 and 2023 events and on this year's panel will have an exceptional group of female leaders from across the globe," Klarenbeek notes.

### And there's more

He adds that METSTRADE is also looking forward to welcoming the Yacht Racing Forum – the principal annual conference for the business of sailing and yacht racing – to Amsterdam this year. From 2024 onwards the event will be held in parallel with METSTRADE.

"The Forum's arrival is expected to bolster METSTRADE's status as a versatile platform that caters to a diverse audience and offers various opportunities for different interests or industries related to yacht racing or the marine sector," says Klarenbeek. "We can't wait to join forces and bring together the world of yacht racing and leisure marine equipment."

METSTRADE not only provides unrivalled access to today's transformational leisure marine technology, but



METSTRADE DIRECTOR NIELS  
KLARENBEK

also facilitates business to business get-togethers. Both inside and outside the exhibition halls, a variety of social events will ensure exhibitors and visitors can network around the clock. Klarenbeek highlights one such event, the Boat Builder Awards for Business Achievement. To be held under the star-studded glass canopy of the historic National Maritime Museum, the awards' 10th anniversary edition, with celebratory awards dinner, will be the hottest and most exclusive evening date in Amsterdam, he suggests.

The Boat Builder Awards for Business Achievement, run in association with Raymarine, recognise the significant contributions of individuals, teams and supply chain partners within boat building companies globally. Klarenbeek says the significant influence of boat and superyacht production and refit activity across the whole industry cannot be under-estimated and that 2024's awards will not only cast a spotlight on another year of remarkable industry advances, but also look back at the innovations presented over the last decade and the impact that they have had on the industry.

"We see the leisure marine market doing well and the luxury yacht market doing even better and very much look forward to welcoming visitors to the RAI Amsterdam for three days of vital networking, research, education and fun," he concludes. ■

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METSTRADE	OFC
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MAY 16, 2024  
**RINA ANNUAL DINNER 2024**  
RINA event  
London, UK

JUNE 18-19, 2024  
**WARSHIP 2024: FUTURE SURFACE COMBATANTS**  
RINA conference  
Adelaide, Australia

SEPTEMBER 10-12, 2024  
**ICCAS 2024: INTERNATIONAL CONFERENCE ON COMPUTER APPLICATIONS IN SHIPBUILDING**  
RINA conference  
Genoa, Italy

OCTOBER 8-9, 2024  
**HUMAN FACTORS 2024**  
RINA conference  
Wageningen, the Netherlands

OCTOBER 22-23, 2024  
**WIND PROPULSION 2024**  
RINA conference  
London, UK

NOVEMBER 20-21, 2024  
**AUTONOMOUS SHIPS 2024**  
RINA conference  
Copenhagen, Denmark

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APRIL 24-26, 2024  
**63RD INTERNATIONAL CONGRESS OF NAVAL ARCHITECTURE, MARINE ENGINEERING AND MARITIME INDUSTRY**  
International congress  
Madrid, Spain  
<https://63congreso.ingenierosnavales.com/en>

MAY 14-15, 2024  
**SCANDINAVIAN MARITIME FAIR 2024**  
Maritime fair  
Copenhagen, Denmark  
[www.scandinavianmaritimefair.com](http://www.scandinavianmaritimefair.com)

MAY 15-19, 2024  
**THE INTERNATIONAL WATERBIKE REGATTA 2024**  
International student event  
Flensburg, Germany  
<https://asta-fl.de/iwr-2024>

MAY 15-24, 2024  
**IMO MARITIME SAFETY COMMITTEE (MSC 108)**  
IMO meeting  
London, UK/Online  
[www.imo.org](http://www.imo.org)

MAY 29, 2024  
**FUTURE MARITIME FORUM 2024**  
International forum  
Buckingham, UK  
[www.futuremaritimeforum.com](http://www.futuremaritimeforum.com)

JUNE 2-6, 2024  
**INTERNATIONAL MARINE DESIGN CONFERENCE (IMDC) 2024**  
International conference  
Amsterdam, the Netherlands  
[www.imdc-info.com/141798](http://www.imdc-info.com/141798)

JUNE 3-7, 2024  
**POSIDONIA**  
International exhibition  
Athens, Greece  
<https://posidonia-events.com>

JUNE 6-7, 2024  
**CRUISE SHIP INTERIORS DESIGN EXPO AMERICAS**  
International exposition  
Miami, USA  
<https://cruiseshipinteriors-expo.com>

JUNE 11-13, 2024  
**SEAWORK 2024**  
International exhibition  
Southampton, UK  
<https://seawork.com>

JUNE 26-27, 2024  
**5TH DECARBONISING SHIPPING FORUM**  
International forum  
Rotterdam, the Netherlands  
<https://decarbonizingforum.com>

AUGUST 26-29, 2024  
**OFFSHORE NORTHERN SEAS (ONS) 2024**  
International exhibition  
Stavanger, Norway  
[www.ons.no](http://www.ons.no)

SEPTEMBER 3-6, 2024  
**SMM 2024**  
International exhibition  
Hamburg, Germany  
[www.smm-hamburg.com](http://www.smm-hamburg.com)

SEPTEMBER 30 – OCTOBER 4, 2024  
**IMO MARINE ENVIRONMENT PROTECTION COMMITTEE (MEPC 82)**  
IMO meeting  
London, UK/Online  
[www.imo.org](http://www.imo.org)

NOVEMBER 4-7, 2024  
**EURONAVAL 2024**  
International exhibition  
Paris-Nord Villepinte, France  
[www.euronaval.fr](http://www.euronaval.fr)

NOVEMBER 19-21, 2024  
**METSTRIDE 2024**  
International exhibition  
Amsterdam, the Netherlands  
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# ANNUAL REPORT & TRANSACTIONS OF THE ROYAL INSTITUTION OF NAVAL ARCHITECTS



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