



JAN 2023

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CONTENTS

January 2023

EDITORIAL COMMENT	
IMO progress on revised GHG strategy but more work needed	5
NEWS	
NEWS	6-8
ANALYSIS	10
EQUIPMENT	12-13
OPINION	14
FEATURES	
CAD/CAM	
German startup has disruptive ambitions for cloud-based 3D design platform	16-17
Boosting collaboration for greener designs	17-19
Efficient design-stage investigation of EEXI compliance	20-22
CONSULTANCY	
Larsens Marine celebrates 10 years in business	23
BALLAST WATER TREATMENT	
BWTS reliability, service and support give ships licence to trade	24-25
CRUISE SHIPS	
Expedition ships and cruise yachts face challenges going green	26-27
RO-ROS	
Future-proof solutions for LNG-fuelled PCTCs	28-29
Sustained demand for sustainable PCTC equipment	30-31
MARINE 4.0	
Seapeak LNG carrier secures cybersecurity first	32-33
AI: transforming the fleet of today and tomorrow	34-35
FOCUS	
Robin Burnett 1933-2022	36-37
CALENDAR	38

FEATURES

NEWS ANALYSIS

COP27
SHARM EL-SHEIKH
EGYPT 2022

10

CAD/CAM

16

BALLAST WATER TREATMENT

24

CRUISE SHIPS

26

RO-ROS

28

MARINE 4.0

32





THE NAVAL ARCHITECT

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The Royal Institution of Naval Architects

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Printed in Wales by Stephens & George Magazines.

The Institution is not, as a body, responsible for opinions expressed in The Naval Architect unless it is expressly stated that these are the Council's views.

Registered charity No. 211161

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A 2023 subscription to The Naval Architect costs:

THE NAVAL ARCHITECT SUBSCRIPTION (10 issues per year)			
LOCATION	PRINT ONLY	DIGITAL ONLY	PRINT + DIGITAL
UK	£232	£232	£296
Rest of Europe	£245	£232	£308
Rest of World	£261	£232	£325

Includes P+P

Inclusive of VAT



The Naval Architect Group (English Edition)

Average Net Circulation 9,104 (total)

1 January to 31 December 2021

ISSN 03060209

IMO PROGRESS ON REVISED GHG STRATEGY BUT MORE WORK NEEDED

By **Daniel Johnson**

There is something about the transition of one year into another that heightens one's concern for the future, ever more so with the looming threat of climate crisis. Weather, water and climate-related disasters including extreme flooding, heat and drought affected millions of people and cost billions of dollars in 2022, as the tell-tale signs and impacts of human-induced climate change intensified.

The environmental catastrophes of 2022 once again underlined the clear need to do much more and pressure is mounting on the shipping industry to speed up its climate mitigation efforts. It was with this backdrop that the 79th session of the IMO Marine Environment Protection Committee (MEPC) took place from 12-16 December. Several matters were on the agenda at MEPC 79, such as adopting mandatory MARPOL amendments concerning regional facilities in Arctic waters, changes to garbage record books and bunker delivery note regulations. But without doubt the big issue that dominated the meeting was the revision of IMO's strategy to reduce GHG emissions from ships.

Following hot on the heels of COP27, the meeting was the first time IMO had welcomed MEPC delegates through its doors since May 2019. It also saw the return of environmental group Ocean Rebellion, no stranger to elaborately staged demonstrations in front of the IMO headquarters. The high-octane protest that greeted delegates will have added fuel to the increasing pressure on maritime's rule makers for strengthened GHG ambitions.

IMO's initial strategy was adopted back in 2018 and targets a 40% reduction in CO₂ intensity by 2030, a 70% reduction by 2050, and a 50% reduction in all GHG by 2050, all with reference to 2008 levels. Since then, climate science has developed, as has the realised heating of the planet. At MEPC 78 in June 2022, the IMO showed it was working towards adopting a revised strategy by mid-2023 and many had hoped that MEPC 79 would help resolve outstanding issues and clear the way for the adoption of a much more ambitious revised GHG strategy at MEPC 80 this July.

Somewhat inevitably however, given the breadth of views across the shipping sector and the likely impact of the cost of decarbonisation at a time when the global economy is facing a period of recession, there was limited convergence between member states on the vision and levels of GHG reduction ambitions in the strategy.

According to Unni Einemo, director of the International Bunker Industry Association (IBIA) and IMO representative: "At present, a large share of IMO member states want GHG emissions from shipping to be phased out by 2050, but there is significant opposition from member states that are concerned this is not realistic and could have disproportionately negative impacts on developing



OCEAN REBELLION ACTIVISTS DEMONSTRATE OUTSIDE THE IMO. SOURCE: CRISPIN HUGHES/OCEAN REBELLION

countries. There are also diverging views on adopting interim GHG reduction targets in the period between 2030 and 2050."

Despite the lack of consensus on the final strategy, there was a convergence towards stronger ambitions and also new measures – combining technical elements as well as economic instruments. This would be some sort of Fuel GHG intensity standard combined with a levy which would take care of funding issues, such as necessary assistance to small island developing states and least developed countries. Details are still at the conceptual stage, but nonetheless this does appear the direction IMO is moving in.

One issue where real progress was made was the adoption of amendments to designate all of the Mediterranean Sea, as a whole, as an Emission Control Area (ECA) for sulphur oxides and particulate matter, under MARPOL Annex VI. This will be the fifth such ECA worldwide where the limit for sulphur in fuel oil used onboard ships is 0.10% mass by mass (m/m), while outside these areas the limit is 0.50% m/m. The amendment is expected to enter into force on 1 May 2024, with the new limit taking effect from 1 May 2025.

An unintended effect of the decision could be a spike in scrubber adoption, especially as the meeting also discussed their future use and possible ban. However, no decisions were taken at the meeting and it is thought unlikely that IMO would prevent ships from using scrubbers already installed in any future regulation.

Work on IMO's revised GHG strategy will continue at two intersessional working group sessions ahead of MEPC 80. Hopefully further progress will be made and I am sure the outcome of those meetings will be awaited with great interest. ■



NEWS

AUTONOMOUS SHIPS

MARITIME UK UPDATES MASS CODE OF PRACTICE

Maritime UK has introduced Version 6 of the Industry Code of Practice for Maritime Autonomous Ship Systems (MASS).

Whilst not a legal text, the code has been used by manufacturers, service providers, and others as part of their day-to-day work. A number of manufacturers have reported clients requiring compliance with the code as a basis for contractual negotiations.

Version 6 adds updated guidance on a variety of topics including MoD maritime levels of automation, MASS shoreside interface guidance and remote control centre manning and operation.

The Maritime UK Autonomous Systems Regulatory Working Group (MASRWG) published the first Code of Practice in November 2017 and has provided annual updates since then.

Lloyd's Register has supported the publication of this version of the code.



SARAH KENNY, CHAIR OF MARITIME UK. SOURCE: MARITIME UK

Sarah Kenny, chair of Maritime UK, says: "I am delighted that we continue to produce such well-regarded guidance in this most rapidly growing of domains. For the UK, autonomy is a key driver of future growth opportunities and fuses our expertise across the sector – professional services, cutting-edge innovation and high-quality manufacturing and design. Autonomy is at the heart of key national missions like decarbonisation and the National Shipbuilding Strategy."

AUTONOMOUS SHIPS

ZERO-EMISSION BOXSHIP DESIGN GETS LR APPROVAL

Classification society Lloyd's Register (LR) has granted approval in principle (AiP) to Belgium-based company Zulu Associates for a new zero-emission containership design.

According to LR, the AiP marks a significant landmark for the energy transition and maritime digitalisation. The 100m short-sea vessel is set to be one of the first of its kind to have the capability of operating autonomously as a zero-emissions cargo vessel in the English Channel and the North Sea.

The ship design, with a capacity of 200TEU, features a 650kW electrical propulsion motor which can be powered by either a hydrogen-, ammonia- or methanol-fuelled engine and generator, a hydrogen,

ammonia, methanol fuel cell or alternatively via a battery. Approval in principle was awarded by LR following a comprehensive and thorough analysis of the design undertaken against the requirements of the relevant industry codes and standards.

Mike Holliday, LR's UK & Ireland area manager, says: "The ZULU Mass design developed by ZULU Associates is a crucial milestone for autonomous shipping in both Europe and across the globe. LR is delighted to have granted approval in principle for this design, which has the potential to use a number of alternative propulsion technologies and helps to underline our credentials as an organisation dedicated to driving forward digitalisation and decarbonisation in the maritime industry."

ZULU Associates hopes to start construction on the vessel later this year. "Talks are already underway with interested customers for such a ship and we have also been in contact with shipyards," says Antoon van Coillie, the company's CEO.

ZULU MASS WILL HAVE THE CAPABILITY TO OPERATE AUTONOMOUSLY AS A ZERO-EMISSIONS CARGO VESSEL IN THE ENGLISH CHANNEL AND THE NORTH SEA. SOURCE: BMT



ALTERNATIVE FUELS

JERA TEAMS WITH NYK AND MOL ON AMMONIA TRANSPORTATION STUDY

Japanese energy company JERA has partnered with shipping firms Nippon Yusen Kabushiki Kaisha (NYK) and Mitsui O.S.K. Lines (MOL) on the transportation of fuel ammonia for the Hekinan thermal power plant, where JERA aims to begin using fuel ammonia in commercial operations later this decade.

The three companies have signed memorandums of understanding to examine ways of developing large-volume ammonia carriers and establishing safe transport systems.

Specifically, they will look into developing fuel-ammonia carriers suitable for domestic thermal power plants and receiving stations, building a fuel ammonia transportation and receiving system, as well as

installing and operating propulsion engines that use ammonia as ship fuel.

The partners say they will also be working with related parties to foster the formation of rules related to the reception of fuel ammonia.

"If the development of large-volume ammonia carriers and the construction of a fuel ammonia supply chain are achieved, both would be world firsts," according to JERA.

JERA has been working on the production and promotion of green fuels such as ammonia as part of its JERA Zero CO₂ Emissions 2050 objective as it looks at ways to cut its emissions in domestic and overseas businesses.

In 2021, NYK announced a long-term greenhouse gas (GHG) reduction target of net-zero emissions by 2050 for its oceangoing shipping business.

Previously, MOL has designed an ammonia bunkering vessel in co-operation with Itochu and Singapore's Sembcorp Marine. The vessel's design received an approval in principle (AIP) from ABS in 2022.



SOURCE: NYK

OFFSHORE

COSCO TO BUILD NEW F-CLASS VESSEL

Denmark-based Cadeler has placed an order with China's COSCO Heavy Industries for the construction of a new F-class jack-up vessel for deployment in the offshore wind industry.

It will be Cadeler's second F-class vessel and the sixth vessel in its jack-up fleet.

Featuring a hybrid design, the new vessel can be transformed from a foundation installation unit to a wind turbine generator installation vessel.

At present, COSCO is engaged in the construction of two X-class vessels as well as one F-class vessel, all of which are expected to be delivered in the second half of 2024.

The new F-class vessel is expected to be delivered in the second half of 2026.

The global demand for offshore wind capacity and technological developments resulting in increasingly larger wind turbines calls for ever-larger installation vessels. The F-class will cater for some of the largest dimensions in the offshore wind industry.

With an overall length (ex. crane) of 162m, the vessels offer a deck space of 5,600m² and a payload of more than 17,600tons. They will be able to transport and install seven complete 15MW turbine sets per load or six sets of 2XL monopile foundations, cutting down the number of transits needed for each project.

"We are honoured that Cadeler continues to see us as a strategic business partner that can deliver the state-of-the-art vessels that the market requires," says Yu Jian, commercial director at COSCO Shipping (Qidong) Offshore.

THE F-CLASS DESIGN CAN INSTALL BOTH FOUNDATIONS AND WIND TURBINES.
SOURCE: CADELER



SHIPBUILDING

HANWHA SIGNS AGREEMENT TO TAKE CONTROL OF DSME



Hanwha Group, the South Korea-based defence-to-energy conglomerate, has reached an agreement to acquire a controlling stake in compatriot shipbuilder Daewoo Shipbuilding & Marine Engineering (DSME).

The US\$1.5 billion-deal signals the end of two decades of control by the state-owned Korea Development Bank (KDB), during which time several attempts to privatise the shipbuilder have fallen through.

Under the terms of the agreement Hanwha will take a 49.3% stake in DSME, making it the largest shareholder. KDB will retain a 28.2% stake.

SEVERAL PREVIOUS ATTEMPTS TO PRIVATISE DSME HAVE ALL FALLEN THROUGH

Hanwha's agreement is conditional on the submission of resignations from all registered directors of DSME.

"With the signing of this contract, Daewoo Shipbuilding & Marine Engineering plans to promote early business normalisation by improving its financial structure and securing liquidity and will use this as a stepping-stone to strengthen and expand synergies with the Hanwha Group in the global defence industry, and the renewable energy sector," according to DSME.

The announcement comes almost a year after a bid to acquire DSME by rival South Korean shipbuilder Hyundai Heavy Industries (HHI) was vetoed by the European Union (EU) because of fears that the deal would create a monopoly in the LNG carrier market.

Hanwha's acquisition of DSME awaits clearance from South Korea's Fair Trade Commission and foreign competition regulators, including those in the EU, Japan, China, Singapore and the UK, a process which is expected to take at least three months.

CRUISE SHIPS

MOL PLANS TWO NEW LUXURY CRUISE SHIPS

Mitsui O.S.K Lines (MOL), best known for its commercial shipping operations, has announced it is to diversify into the cruising business with the construction of two new luxury cruise ships.

Construction is expected to cost at least US\$710 million and delivery of the first ship is anticipated for around 2027.

According to MOL president and CEO Takeshi Hashimoto, the decision is part of a strategy to strengthen the company's non-cargo business. The new cruise ships will be used to capture domestic and international cruise demand, which has less linkage to shipping market fluctuations and is expected to expand in the future, he says.

While many aspects regarding the vessels are undecided, they are expected to be 35,000gt and carry a Japanese flag. MOL is considering environmentally friendly fuels such as liquefied natural gas for the ships.

The company has plans to build an additional two vessels if the first two vessels are successful.

The announcement comes shortly after Japan said it was reopening for international tourism and would

permit international cruises again after a two-and-a-half-year pause due to Covid-19.

Although not well known for its cruises, MOL does have one cruise ship in its fleet. The 167m *Nippon Maru* was constructed by Mitsubishi Heavy Industries and delivered to MOL in September 1990.

In celebration of 30 years of service, the vessel underwent a renovation and retrofit in 2020.



THE 1990-BUILT *NIPPON MARU*. SOURCE: MOL



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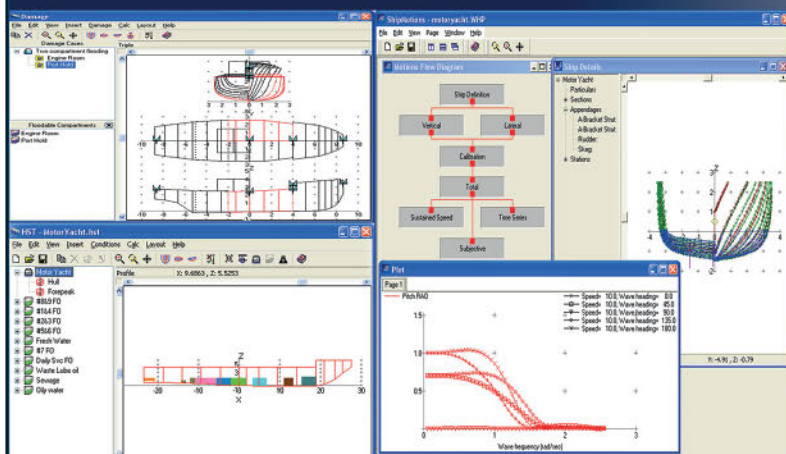


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NEWS ANALYSIS

COP27 GREEN SHIPPING PLEDGES SET AMBITIOUS TONE

By Malcolm Latache



Shipping normally comes off pretty badly at the IPCC's COP meetings with environmental lobby groups queueing up to criticise the industry for its supposed failings. At COP27 held in Egypt in November, this was not the case. Although the event was largely criticised for its failings aside from an agreement of sorts on the issues of loss and damage and carbon markets, it could be said that shipping improved its reputation somewhat.

This was mainly down to the efforts of the US and Norway organising the Green Shipping Challenge where governments, ports, and companies were encouraged to prepare commitments to spur the transition to green shipping. Around 40 announcements were made during the meeting all of which can be seen at the Green Shipping Challenge website.

Many of the announcements were by state players around the establishment of green shipping corridors but there were also technical commitments and announcements of collaborative projects by ports and shipping companies and bodies as well. How many of the projects come to fruition is yet to be seen but there is clear evidence that some sectors of the industry are keen to grasp the nettle.

Following on from COP27, a preliminary agreement was reached by the European Parliament and the European Commission to include shipping in the EU's emission trading system (ETS). Under the agreement all ships over 5,000gt will be included in the ETS covering 100% of emissions from intra EU voyages and 50% of emissions from voyages between EU ports and the rest of the world. The system will be phased in beginning in 2024 with 40% of the costs due and rising to 70% in 2025 and 100% from 2026 onwards.

This will impose a considerable cost on shipping and with the EU carbon price currently around US\$84 per tonne the system would add around US\$120 to the bunker price for intra EU voyages in 2024 rising to almost US\$300 from 2026.

The EU agreement was not with total support from the shipping industry. One of the first bodies to point out its short comings was Danish Shipping representing the interest of Danish shipowners. While Denmark has been a leading advocate of greening shipping, Danish Shipping's objections highlight that the move will put short-sea shipping in Europe at a competitive disadvantage with the road haulage sector which will only join the ETS at a much later date.

It looks too that the latest decarbonisation measure – the CII – which came into effect this month is to come in for some heavy criticism before it has even got properly off the ground. The IMO has already decided against enforcement action for ships that fail to meet the highest standards imposed, attracting the ire of lobby bodies but it is now the shipowners that are putting their point of view.

Several analysts have pointed out that the CII is flawed in its conception and will have the opposite effect of its intention for several reasons. Germany-based bulk carrier specialist Oldendorff has taken the unusual step of issuing a statement about the failings of the CII. Oldendorff said its argument is that, "the shipping industry should not rely solely on the formulas in the regulation but needs to take a holistic view and focus on reduction of absolute emissions. The CII formulas in the regulation are not holistic, can be gamed and there are many real-world instances where strict adherence and focus on the CII rating letter grades will do more damage than good".

On the operational front, it would appear that the liner sector is about to repeat its mistake of over-tonnaging. During the pandemic, container ship operators were able to increase rates to record levels after years in the doldrums. Encouraged by that success, many operators have ordered new vessels with the orderbook now standing at around 1,000 vessels. If new orders rumoured in early December materialise, the orderbook will swell to around 34% of the current fleet capacity.

However, with the world looking to enter a period of what may be prolonged recession, the wisdom of a new period of fleet expansion is questionable. Demand for goods is diminishing as world populations are lowering consumer spending in order to afford soaring energy and food bills. The first of the ships on the orderbook will therefore be delivered into a falling market for liner services exacerbating the falling freight rates achievable. ■



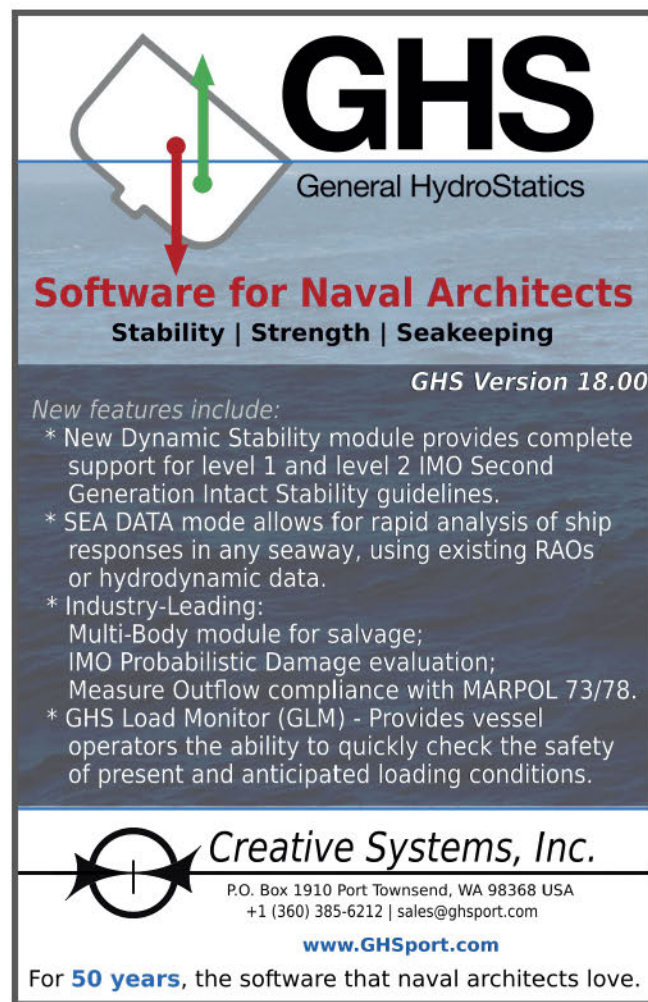
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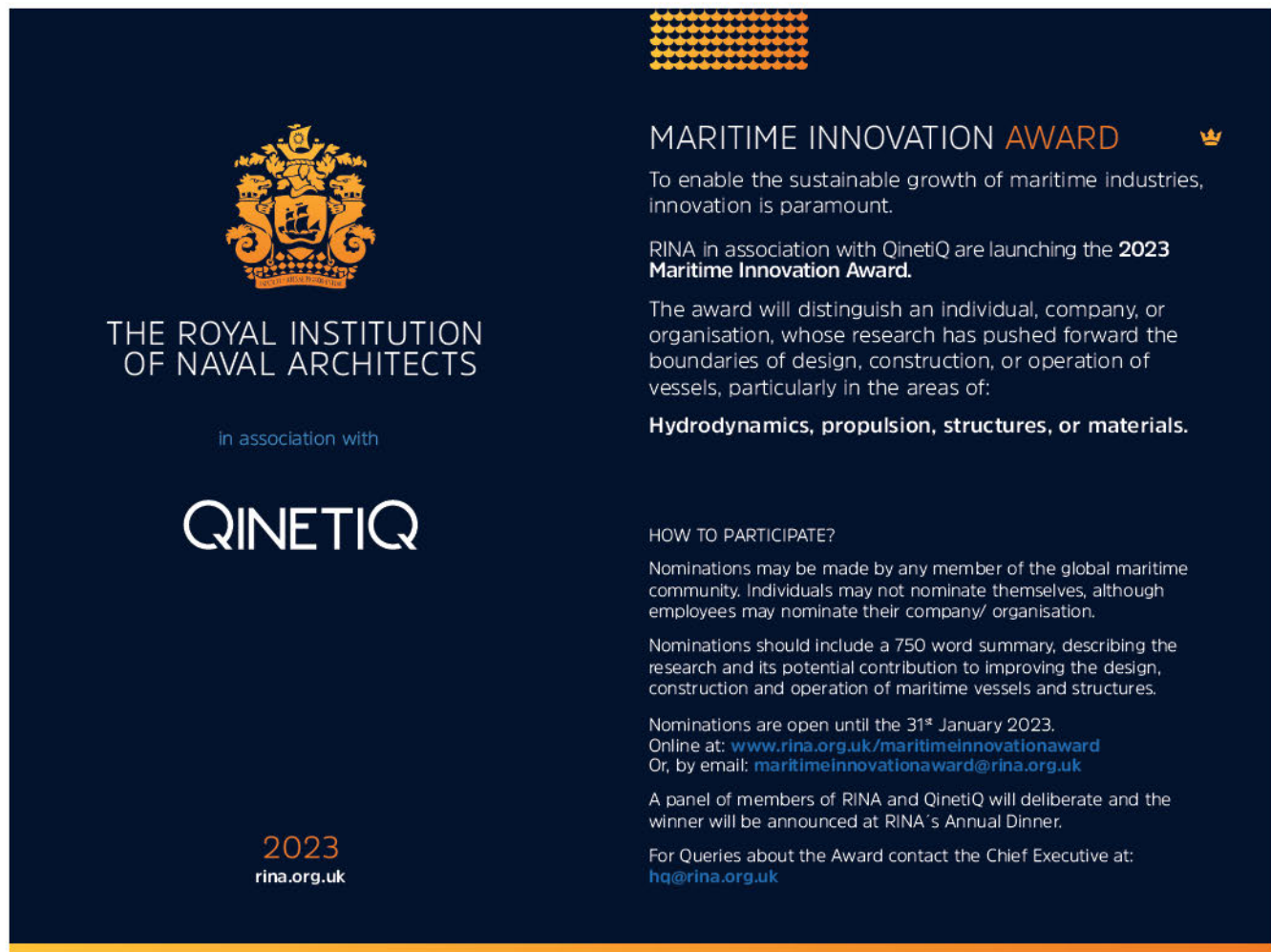
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NEWS EQUIPMENT

SMART SHIPS

DNV APPROVAL FOR WINGD CONTROL SYSTEM

Swiss marine power company WinGD has secured cybersecurity-type approval from classification society DNV for its engine control system.

The SP1 type approval has been granted for WinGD Control Electronics (WiCE), ahead of mandatory regulations due to enter force in 2024.

The approval is also said to be in line with the International Association of Classification Societies (IACS) Unified Requirement (UR) E27 technical system requirements – a cybersecurity standard that will apply to all newbuilds.

DNV's SP1 'Cyber Secure Essential' notation confirms that the vessels are constructed to meet cybersecurity standards equivalent to UR E26 and UR E27.

The approval also confirms that WiCE adheres to a list of requirements regarding cybersecurity according to the IEC62443 standard. These requirements include identification and authentication, software authenticity verification, backup and rollback functionality, and cybersecurity event logging.

The company says it will now focus on securing type approval for sub-control systems that govern auxiliary components.

PETER KRÄHENBÜHL, WINGD



WinGD launched WiCE in 2019 to provide better connectivity and security for WinGD engines. Designed to replace the Unic architecture, the system is deployed across most new WinGD engines.

"This approval places WinGD as a frontrunner in the cybersecurity of essential ship systems, offering peace of mind to yards and shipowners that vessels powered by a WinGD engine will be compliant with upcoming regulations," says WinGD digital transformation and technology head Peter Krähenbühl. "It is great to see our digital roadmap on track to deliver the confidence and security our customers rely on us for."

WIND PROPULSION

MARUBENI SIGNS UP FOR BOUND4BLUE SUCTION SAILS

Japanese shipping company Marubeni has signed an agreement to install a bound4blue suction sail system aboard the 2016-built Panamax bulk carrier *Crimson Kingdom*.

According to the preliminary studies, the 229m vessel will be retrofitted with four 26m-high eSAILs, expected to be the largest suction sails ever built and installed on a vessel.

The installation is scheduled to take place in 2023/24, making *Crimson Kingdom* the first wind-assisted vessel owned by Marubeni.

After the installation, the vessel will be operated by MaruKlav Management, a Panamax pool company jointly owned by Marubeni and Norway's Torvald Klaveness Group.

The suction sails should help to reduce the ship's fuel costs and annual CO₂ emissions by up to 20% in favourable trade routes, according to the technology's creator: Barcelona-based company bound4blue.



CRIMSON KINGDOM

José Miguel Bermúdez, CEO of bound4blue, says: "The installation on *Crimson Kingdom* will probe the potential of our suction sails on bulk carriers, a strategic segment for our company. This agreement with Marubeni will enable us to scale up our technology to the next level, installing our 26m units on a bulk carrier for the first time and giving us the opportunity to partner with one of the most important international shipowners."

BOIL-OFF GAS

SHELL AND ALFA LAVAL TO DEVELOP GCU FOR HYDROGEN BOIL-OFF GAS

Shell has signed a memorandum of understanding (MOU) with Alfa Laval regarding the development of a new gas combustion unit (GCU) for use on liquid hydrogen carriers.

Under the agreement, Alfa Laval will develop a system to safely combust hydrogen boil-off gas (BOG) from a vessel's storage tank, as part of a new liquid hydrogen carrier.

Because the venting of cargo is restricted, a GCU offers a means of controlling tank pressure/temperature when the BOG poses safety risks beyond the tank's design conditions.

"By enabling safe ocean transport of liquid hydrogen, we can help speed up the global transition to clean energy and Shell's target to become a net-zero emissions energy business by 2050," says Carl Henrikson, general manager of shipping technology, Shell.

The design of the new GCU system for hydrogen will be based on the existing Alfa Laval GCU for LNG. More than 200 of these units have been installed in just over a decade, and an additional 100 units have been ordered during 2022. The challenges in hydrogen combustion, however, are significantly greater than those involved with LNG.



SHELL'S CARL HENRICKSON AND ALFA LAVAL'S DAVID JUNG

"With its boiling point of -253°C , hydrogen is expected to have a higher boil-off rate than methane, which will make having a GCU or similar means of BOG handling crucial on hydrogen carriers," says David Jung, business development manager, Alfa Laval.

Alfa Laval will design and engineer the new GCU for hydrogen with the aim of receiving an approval in principle (AiP) from an IACS classification society. Once the AiP is achieved, a GCU prototype will be built for testing and type approval.

LPG

WÄRTSILÄ EQUIPMENT SELECTED FOR EXMAR GAS CARRIERS

Finnish technology group Wärtsilä is providing cargo handling and LPG fuel supply systems for two LPG/Midsize gas carrier vessels being built at Hyundai Mipo Dockyard in South Korea for EXMAR LPG.

EXMAR LPG is a joint venture between EXMAR, a maritime and offshore solutions provider, and Seapeak.

According to Wärtsilä, the $46,000\text{m}^3$ capacity vessels will be the largest of their kind in the world, and there is an option for two additional ships.



The company recently supplied a similar scope of solutions for a series of EXMAR vessels built at the Jiangnan shipyard in China.

"There is increasing demand for efficient and well-designed gas carriers and these two vessels are designed to the latest standards," says Jae Woon Kim, senior engineer, Project Planning Department, Hyundai Mipo. "The equipment selected has also to be the latest and most advanced technology, and we are pleased to have Wärtsilä as the supplier for the cargo handling and fuel supply systems."

"We are extremely proud to be chosen to supply these latest EXMAR vessels with our advanced systems. Wärtsilä is one of the market leaders in this field with an unmatched reference list of successful installations. We are happy to extend this list even further," says Hans Jakob Buvorp, Wärtsilä sales manager, marine, VOC and cargo handling systems.

The Wärtsilä equipment is scheduled to be delivered to the yard in the latter part of 2023.

KAPRIJKE, ONE OF EXMAR'S LPG/MIDSIZE GAS CARRIERS



OPINION

HOW TO GUARANTEE GOOD SHIP DESIGN AMID RACE TO REDUCE CARBON INTENSITY

By **Matias Niemeläinen**, head of hydrodynamics, and **Jyri-Pekka Arjava**, senior naval architect, Deltamarin

Today we can't expect pure hull form development to generate the same kind of huge ship-performance improvements at design conditions as we've seen in the past. However, we have been able to boost total efficiency over 10% due to better simulation tools and practices over the past 10 years. For example, highly developed computational fluid dynamics (CFD) allows you to model a host of other details than just hull resistance, in order to squeeze out as much performance enhancement as possible.

This continuous improvement characterises every ship type we design. However, ship projects normally have limitations regarding main dimensions or cargo demands etc., and as designers we rarely have a completely free hand to create the best design. But owners and designers have to challenge these limits especially now when the main objective is to attain the lowest possible carbon intensity.

Holistic modelling

For us it is crucial to understand how the ship will trade and how efficient our design is in real-world conditions. We are not a typical ship design company in that we often design the vessel from the conceptual design stage right the way through to basic or detailed design. This behoves us to take responsibility for the ships' performance first in sea trials, but very soon after that they will have to report on their carbon intensity. Conducting realistic simulation of the design is therefore vital.

The future of hydrodynamics development is all about focusing on the big picture using big data. It's where design and technology optimisation meet. Up until now, designers have had only minimal data from live ship operations to serve as a continuous feedback loop on designs. Data has been typically limited to sea trials. However, since starting to receive live data from customers' ships we can now connect newbuilding designs to actual loading conditions, operating speeds and wind and wave data, enabling us to identify exactly where the development focus should be.

Operational data shows that even today, design conditions defined at the conceptual stage do not necessarily match the actual operation of the vessel. Using holistic modelling makes it possible to still take big steps in optimising the powering performance and the entire ship concept, right from the design stage. We use our proprietary DeltaSeas method to evaluate ship performance in a large number of sea states.

References and 'cross-fertilisation'

Having plentiful references, such as model test and sea trial results, from all types of vessels, is very important and one of Deltamarin's key strengths. A comprehensive reference database enables you to give accurate predictions of propulsion power already at an early concept stage. Insight gained from working on a host of projects is also essential – you need to know all the fine detail to generate an accurate prediction.

Also invaluable is practical experience in designing all main types of ships. For example, the superior form of our bulk carriers' stern shape was inspired by passenger vessel designs, which at the time were very different from traditional bulker designs. In addition, we were the first to make the vertical bow work efficiently in our bulker designs, and they have since become more popular on almost all other ship types. In contrast, some shipyards typically design and build only a limited range of ships, which is not conducive to 'cross-fertilisation' of learning and innovations between ship types.

Meanwhile, we are working to further enhance our DeltaSeas tool by generating an even more accurate interaction model of the ship hull and propulsion-related systems, based on a realistic operational profile, to drive additional efficiency improvement. ■



MATIAS NIEMELÄINEN (TOP) AND
JYRI-PEKKA ARJAVA





THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

2023

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EILY KEARY AWARD



RINA is committed to ensuring that all individuals, regardless of gender, faith or ethnicity, have equal opportunity of being part of the global maritime community.

To raise awareness on this important topic RINA is launching the 2023 Eily Keary Award.

The award will distinguish an individual, company, or organization who has contributed to increasing **equality, diversity and inclusion** in the maritime industry.

HOW TO PARTICIPATE?

Nominations may be made by any member of the global maritime community. Individuals may not nominate themselves, although employees may nominate their company/ organisation.

Nominations should include a 750 word summary, describing the nominee's contribution towards the advancement of equality, diversity and inclusion in the maritime industry.

Nominations are open until the 31st January 2023.

Online at: www.rina.org.uk/EilyAward

Or, by email: EilyKearyAward@rina.org.uk

A panel of members of RINA will deliberate and the winner will be announced at RINA's Annual Dinner.

For queries about this Award please contact the Chief Executive at: hq@rina.org.uk



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2023

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MARITIME SAFETY AWARD



Safety at sea is a crucial collective responsibility of the maritime industry. Naval architects and other engineers involved in the design, construction, and operation of maritime vessels; have a significant role in maritime safety.

To raise awareness and promote further improvements in this important field, RINA in association with Lloyd's Register are launching the **2023 Maritime Safety Award**.

The award will distinguish an individual, company, or organisation, who has made a **significant technological contribution to improve maritime safety**.

HOW TO PARTICIPATE?

Nominations may be made by any member of the global maritime community. Individuals may not nominate themselves, although employees may nominate their company/ organisation.

Nominations should include a 750 word summary, describing the technological contribution made towards the advancement of maritime safety.

Nominations are open until the 31st January 2023.

Online at: www.rina.org.uk/maritivesafetyaward

Or, by email: maritivesafetyaward@rina.org.uk

A panel of members of RINA and Lloyd's Register will deliberate and the winner will be announced at RINA's Annual Dinner.

For Queries about the Award contact the Chief Executive at: hq@rina.org.uk

CAD/CAM

GERMAN STARTUP HAS DISRUPTIVE AMBITIONS FOR CLOUD-BASED 3D DESIGN PLATFORM

By Richard Halfhide

As a notoriously conservative industry it probably shouldn't come as much of a surprise that ship design and construction wasn't exactly among the pacesetters when it comes to cloud-based collaboration. However, a German startup company is hoping it can seize the advantage where other software platform providers have hitherto been less successful.

Officially founded in 2021, Naval Architect (no relation to RINA's publication) is a 3D design tool created with the vision of making collaboration accessible and easy. Originally formed as a spin-off project of the University of Rostock, the company has ambitions of digitalisation in a range of industries but has identified shipbuilding as a priority area. The company already boasts a range of clients ranging from yacht-specialist shipyards to international design offices.

Sebastian Greshake, Naval Architect's CEO and co-founder, stresses to *TNA* that his company is not simply offering another CAD tool. He explains: "In a sense, one can recognise 3D-CAD as another step in the evolution from manual drafting to computer-aided drafting to creating kinds of 3D drawings which carry more and better information than pure 2D drawings."

"Whether we talk about 2D or 3D, the way that people work together hasn't changed much in the last 100 years... We want to change the process: people should

collaborate on a common model instead of maintaining their own drawings. That's what is absolutely unique [about the company] and therefore we aren't even afraid of large competitors. They would need to start a completely new product to compete with us.

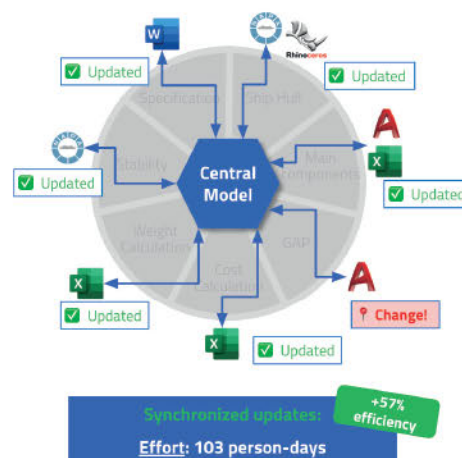
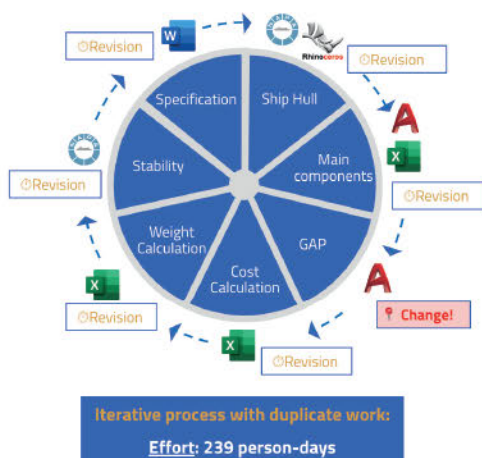
Rather, Naval Architect is intended as a holistic system for improving the traditional ship design process, utilising a cloud-native software platform that acts as the single source of truth for all project related information, ranging from geometric data, specification. Adopting an API-first [Application Programming Interface] approach, its technology can be easily integrated with other software tools.

"The increase and optimisation of efficiency, reliability and collaboration in the ship design process are our key goals," says Greshake, adding that today's processes are effectively burning money by iterating changes through design documents and models, rather than the engineering tasks that might actually add value to the project.

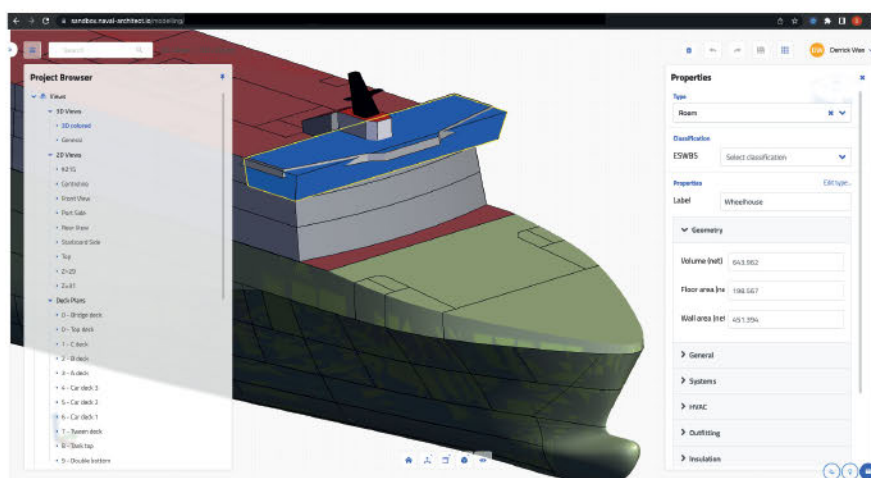
For example, a new project will typically begin with a first draft of the General Arrangement Plan (GAP) and a template or copy of a building specification of a similar vessel in the shipyard or designer's portfolio. The GAP will often be a simple AutoCAD drawing, meaning that heights, lengths and volumes will all need to be

Process Optimization

Reduce design hours and design errors



THE COMPANY BELIEVES SYNCHRONISED UPDATES CAN BRING ENORMOUS EFFICIENCY BENEFITS



NAVAL ARCHITECT ALLOWS USERS TO SPECIFY PROPERTIES WITHIN THE 3D MODEL

calculated manually. Because the documents will change significantly as the project evolves, the measurements will need to be taken repeatedly and certain details may even get overlooked, resulting in costly corrections later on. But if the GAP and building specification are combined from the outset, so that the design's geometric properties are directly aligned with the properties of components (density, thickness, etc.) the calculations would automatically update. Moreover, although the user creates a 3D model from the outset, this is largely a similarly automated process requiring minimal effort. Greshake says efficiency can be boosted by as much as 50% through eliminating manual double work.

Given the domination of legacy players, with little incentive to embrace the full possibilities of digitalisation, the much-promised 'disruption' of the industry is long overdue, but he believes the shift towards decarbonisation in particular is likely to create greater receptiveness towards new solutions.

He explains: "It will steadily increase the demand for newbuilds, retrofits and climate-friendly technologies

in the near future. The maritime industry needs to not only implement these technologies on a larger scale and faster, but also more cost-effectively. These challenges require a modern underlying tech-stack and this is where Naval Architect comes into play."

Like any startup, the company can't rule out being acquired by one of the bigger fish as it seeks to build its reputation, but for the present the emphasis is on adding further components to the platform. This includes introducing an increased level of detail for modelling as well as reports (e.g. weight and cost calculation), as well as advanced functionality for its version control system.

"We aspire to become the leading software platform made for shipbuilding. Besides that, we might leverage our technology for other industries, e.g. the construction industry or the process and plant engineering space," Greshake concludes. ■

For more information visit:
<https://naval-architect.io>

BOOSTING COLLABORATION FOR GREENER DESIGNS

By **Janne Huotari**, senior research and development engineer, NAPA

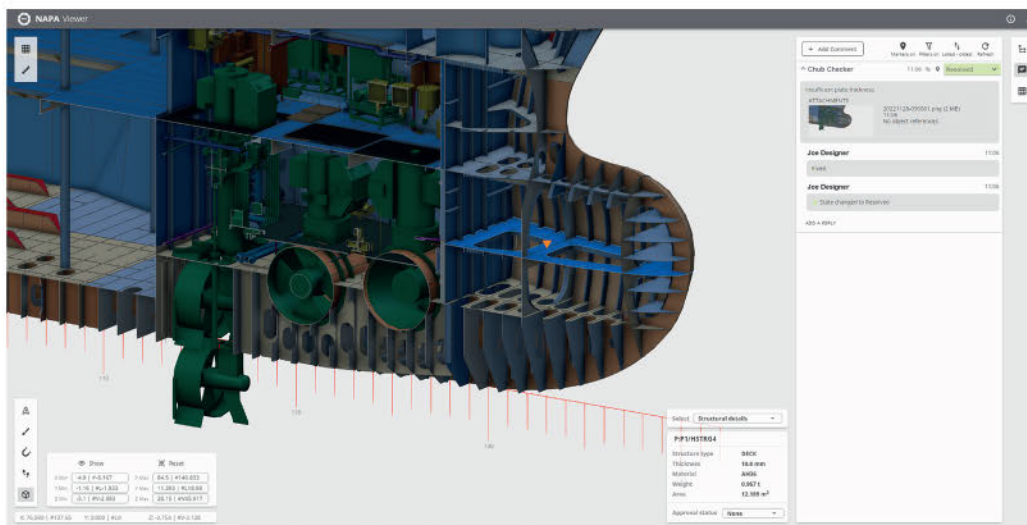
Shipping's decarbonisation transition is profoundly transforming the playbook for shipyards. While designing safe, cost-effective ships has always been a key objective for yards, the current focus on sustainability is unprecedented – and so is the pace of innovation demanded by their customers. To future-proof their fleets, a growing number of shipowners want to incorporate different fuel options and technologies in their vessels being built today; and for naval architects and engineers, this demand for innovative designs brings its share of technical challenges and new requirements.

For example, designers may need to include larger tanks to account for the lower energy density of alternative

fuels, or prepare the structure so it can support the strains of wind propulsion systems. And this trend will only intensify as shipowners face growing pressure from regulators, investors and their end customers to reduce their greenhouse gas emissions. While it has always been the case that no two vessels are exactly the same, the level of innovation and the number of different variables that must be considered today are unprecedented.

As a result, designing a ship is a much more complex process today than it was before – and managing this complexity is key to success in this new fast-paced environment. Engineers and designers have traditionally been able to rely on past experience and existing designs





NAPA VIEWER IS A REAL-TIME PLATFORM FOR DIFFERENT PROJECT STAKEHOLDERS TO ACCESS ALL THE INFORMATION THEY REQUIRE

to answer their customers' needs, iterating heavily on past designs to create new vessels. However, now that new technology and efficiency requirements are pushing into new territory, they need additional sources of knowledge and insights. They need the right tools to explore new technological territories.

Innovating on such a scale, and at such a pace, is something that can't be achieved without wide-ranging collaboration that must involve shipyards, technology providers, and classification societies, among others. At the same time, shipyards also need to be able to model and simulate new designs and their individual components, to gain clarity on the safety and performance of new concepts.

Streamlining feedback loops

The ship design process is inherently a collaborative one, involving multiple stakeholders, including naval engineers, sub-contractors, classification societies, and the owners themselves. There is a constant dialogue between these stakeholders to make the best possible decisions on the designs and technologies that will define each unique vessel.

In other words, any ship design is bound to evolve throughout the process, starting with a general outline that becomes clearer as details are added and confirmed, and feedback is actioned. Therefore, the capacity to communicate and implement changes seamlessly is critical, enabling shipyards to make the most of limited time and resources to deliver the best possible designs. This is particularly important for new vessel types or designs incorporating new technology, which require even more rigorous checks and closer collaboration throughout the process.

The foundation of this greater collaboration is made from intelligent 3D models, like NAPA, which provides a common software base where design, calculations, analyses, feedback and drawings all take place – and ensures that any changes are reflected in all outputs. These are complemented by web-based information-sharing platforms that help streamline reviews and approvals. NAPA Viewer, for instance, gives owners,

sub-contractors and class societies access to all the information they need in real time, whilst also ensuring that the intellectual property rights of each party are protected.

Moving forward, a key practical application of the digital era will be 3D model-based approvals (3D MBA), where class societies can review and approve designs using the 3D model created to design the ship, rather than 2D drawings, the current norm. This eliminates the need for designers to translate the 3D models that they use to design vessels into 2D drawing for classification approvals, and then back into 3D – getting rid of a time-consuming process which all too often slows down communication between class societies and designers and can lead to errors. Instead, using 3D models enable all partners to work collaboratively on a “single source of truth”, which helps them communicate more efficiently – and ultimately innovate faster.

For shipyards, time is of the essence, and one of the main constraints. Measures that can make the design process more efficient are therefore critical to ensure that they can make the most of the allocated time, freeing up space to test new approaches more easily and create more efficient and innovative vessels. In a nutshell, boosting efficiency in the design process leads to better designs.

Making the right choices early

Another factor that is critical for any design, but particularly important for innovative ones, is the capacity to manage and implement changes in a timely manner. The more a design progresses, the more costly and difficult it is to make changes, especially major ones, because each change requires new checks to ensure the structural integrity of the ship and that all rules are met. It is thus important to make the right decisions already in the early stages.

This goes hand in hand with one of the key considerations in maximise a design's efficiency and sustainability: using as little steel as possible. Self-evidently, the more steel is used, the heavier the vessel, meaning that more fuel will be needed to propel it. Having to use more steel often occurs when designers determine relatively late in the

process that additional steel elements are needed to stabilise the structure.

Digital tools like NAPA Steel for 3D structural design can help solve this. For example, we have developed tools streamlining the process of Finite Element Method (FEM) analysis, a methodology that used to simulate physical phenomena of a structure, to assess whether these structures can handle the stresses they will face. Using FEM at the earliest stages of the structural design enables engineers to understand how new features will work together and impact the integrity of the overall structure. This helps them make optimal choices from the onset to reduce the weight of the hull and ensure that they won't have to add additional steel later on. Here, the technology to create structural models and quality FEM mesh quickly, like NAPA Steel, is essential.

A lighter hull also contributes to the economics of operation and environmental performance. Transportation and fuel efficiency can be improved if the hull structure can be made lighter, as a ship with a lighter hull weight can carry more cargo, or have better propulsive performance for the same deadweight. Furthermore, reducing the amount of steel used is a critical business issue: Since steel costs account for a large proportion of the cost of building a cargo ship, the shipyard's competitiveness is directly connected to its ability to lighten the hull weight.

Predicting performance

Finally, simulation capabilities help shipyards create more efficient and greener vessels, giving them clarity on the future performance of their new designs. The 3D model developed during the design stage can be a basis for a ship's digital twin, which can be used to simulate and predict the vessel's operational efficiency and emissions on different routes, before its steel structure is even welded together. Digital twins and models enable the partners involved in a design to easily simulate design variations in different operational profiles – pushing the limits of their creativity and enabling them to test ideas virtually, with results that they can trust.

Being able to predict performance from the design stages is critical, especially as the entry into force of

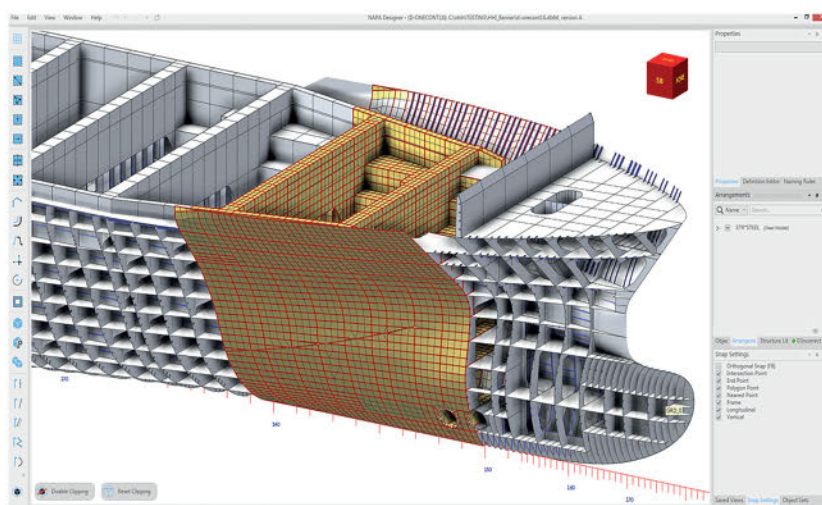


JANNE HUOTARI

the IMO's Carbon Intensity Indicator (CII) increases the need to optimise designs to the conditions and routes where the ship will be operated. Such prediction and analysis should happen in the early design stage, since solutions for decreasing the ship's emissions may trigger a cascade of design alterations.

A key step towards this aim will be to enable more operational data to be fed back to shipyards, where it can provide formidable insights to help optimise the future fleet. For example, by gathering historical data from thousands of voyages, we can draw a statistical picture of the weather conditions that a ship is likely to encounter on a given route. Naval architects and engineers can use these insights to determine the level of engine power that will be needed on the routes where the vessels will be deployed – rather than simply installing a more powerful engine that would increase emissions unnecessarily.

Data-driven insights are an antidote to the uncertainty felt by many in this period of fast-paced innovation, giving owners and shipyards the confidence that they are creating the right designs to carry out the work efficiently, while minimising greenhouse gas emissions. Designing the greener fleets of the future begins today, and the industry is up for the challenge. Crucially, we have the right tools to enable naval engineers and architects to do what they do best: make the most of their knowledge and expertise to develop the best possible vessels for the industry, and for the planet. ■



NAPA STEEL USES TECHNIQUES SUCH AS FINITE ELEMENT ANALYSIS TO ENSURE SURE DESIGNERS MAKE OPTIMAL USE OF MATERIALS



EFFICIENT DESIGN-STAGE INVESTIGATION OF EEXI COMPLIANCE

By **Donald MacPherson**, technical director, HydroComp, Inc.

Little needs to be said regarding the impact that EEXI (the Energy Efficiency Existing Ship Index) will have on industry. While it is somewhat controversial in many circles, the regulations are in force. The immediate challenge is how you comply.

Most discussion about EEXI relates to large ocean-going ships, run by large companies with substantial resources. However, the EEXI requirements affect ships as small as 400 gross tons, and the process to obtain compliance certification can be intimidating and costly for companies running these vessels. This is particularly true during design-stage assessment of EEXI compliance, where the objective is not to prepare the 'Technical File' for submittal but to investigate the current EEXI compliance status of a ship. This business planning stage can require multiple computations to evaluate the various options necessary to achieve compliance.

Compliance simply compares an EEXI 'score' to a ship-type criteria, so why are EEXI compliance calculations so difficult and costly? The reason is principally to ensure appropriate commonality for each submittal, so that no one can 'game' the calculation of the score. This requires the prediction of an approved speed-power curve from which is extracted a reference speed, power, and fuel rate. This has led to a set of requirements that are intricate, require a narrow definition of acceptable methodology, and can only be accepted from approved and verified providers (the class societies themselves being among them).

For example, computations using the defined methodologies would require:

- Numerical computations. These are narrowly prescribed as CFD calculations that implement "Reynolds-Averaged Navier-Stokes equations as governing equations with the consideration of viscosity and in presence of free-surface" [IACS Recommendations 2022, No. 173]. To utilise CFD, however, practitioners are required to demonstrate qualification in CFD computations and to conduct calibration/validation studies as part of the calculation of the reference speed-power curve.
- Model tests. Tank tests of resistance, self-propulsion, and/or propeller open-water performance following ITTC-1978 guidelines can be utilised in the calculations. This includes tests for ship load conditions that are different from the prescribed EEXI draft condition (typically the summer load line).
- Sea trials. Trials conducted for normal business and operational planning are typically insufficient for use in the prescribed EEXI methodology. Approved trials must be conducted according to ISO or ITTC recommendations, which include the use of specified and accepted shaft torque measurement equipment and with an independent 'verifier' present during testing.

Calibration of CFD computations would use the above-described model tests or sea trials of the subject vessel. The guidelines do allow for calibration using model tests of an appropriate similar ship, such as with a known benchmark hull or an in-house test of another vessel design. However, approval for the use of a different ship requires documentation of the technical methods employed for calibration and is subject to the discretion of the regulatory 'verifier'.

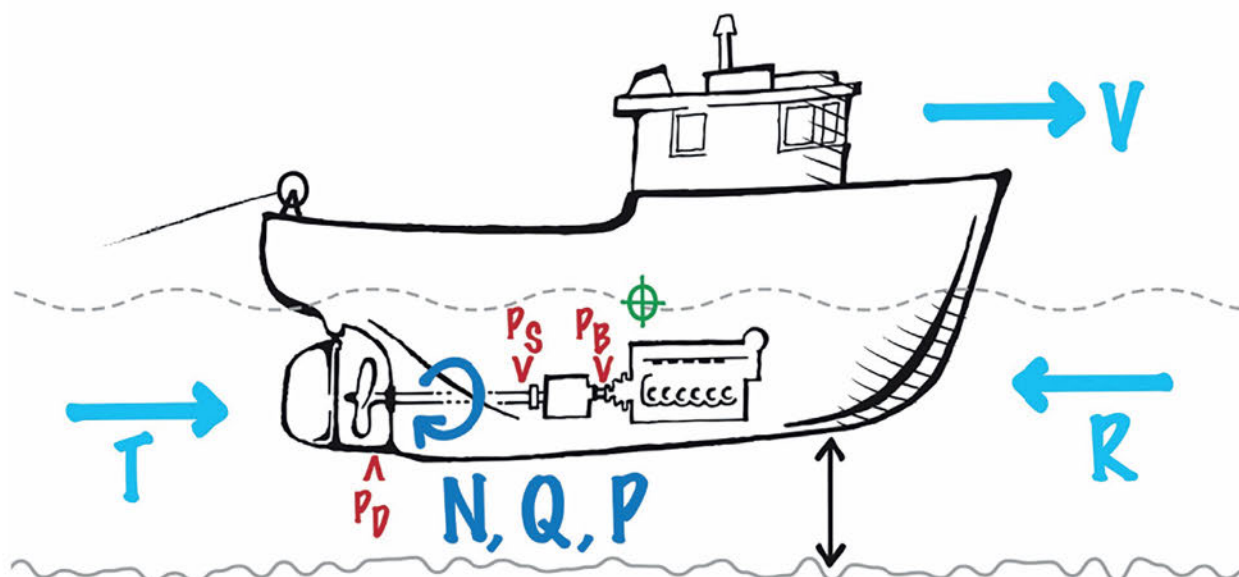


FIGURE 1. ILLUSTRATION OF NAVCAD'S VESSEL-PROPULSOR-DRIVE SYSTEM SIMULATION MODEL

While the intent of these prescribed computational methods is laudable from the regulatory perspective, there needs to be a distinction made between what is needed for the strict requirements of compliance and what is useful and appropriate for design investigations. In fact, reliable – and technically valid – alternative methodologies are available. Effective resource-friendly evaluation of the EEXI score for design investigation has led HydroComp to develop its new EEXI Assessment utility for the upcoming NavCad 2023 Premium Edition.

Let us share an example of a small 70m ro-pax vessel wanting to investigate its current state of EEXI compliance, and to evaluate measures that might be taken if found to be non-compliant. General specifications of the ship are:

- Length overall: 70m
- Displacement: 2480t
- Deadweight: 985t
- Propulsion power: 2 x 900kW medium-speed diesels
- Auxiliary power: 1 x 250kW diesel-generator

This is a pre-EEDI ship, so there are no prior computations to build upon. Conducting a design investigation according to the prescribed methodologies could mean multiple iterations of

the detailed compliance calculations, including CFD verification and calibration to approved model tests or validated sea trials. For this example, sufficient CAD models and existing ship performance data were available to prepare a NavCad project that follows the same objective approach of calibrated models with technically appropriate methodologies, but without the overhead and resource costs of the compliance restrictions.

Built upon an equilibrium Vessel-Propulsor-Drive system simulation model, NavCad can predict the various components of the system, including bare-hull and appendage resistance, drag due to the ship's windage area and speed, hull-propulsor interaction factors, propeller performance, and engine demand (including fuel consumption). NavCad can also utilise resistance and self-propulsion model tests directly or for correlation as a 'reference ship' with its 'Aligned Prediction' feature. Propeller open-water tests can also be used for propeller performance, or as a 'reference propeller' of an 'Aligned Series'. In both cases, alignment can be with tests specific to the ship being investigated, or alternatively aligned with easily obtained tests from published benchmark studies.

Data for alignment can also be developed in NavCad from sea trials that includes some measure of engine



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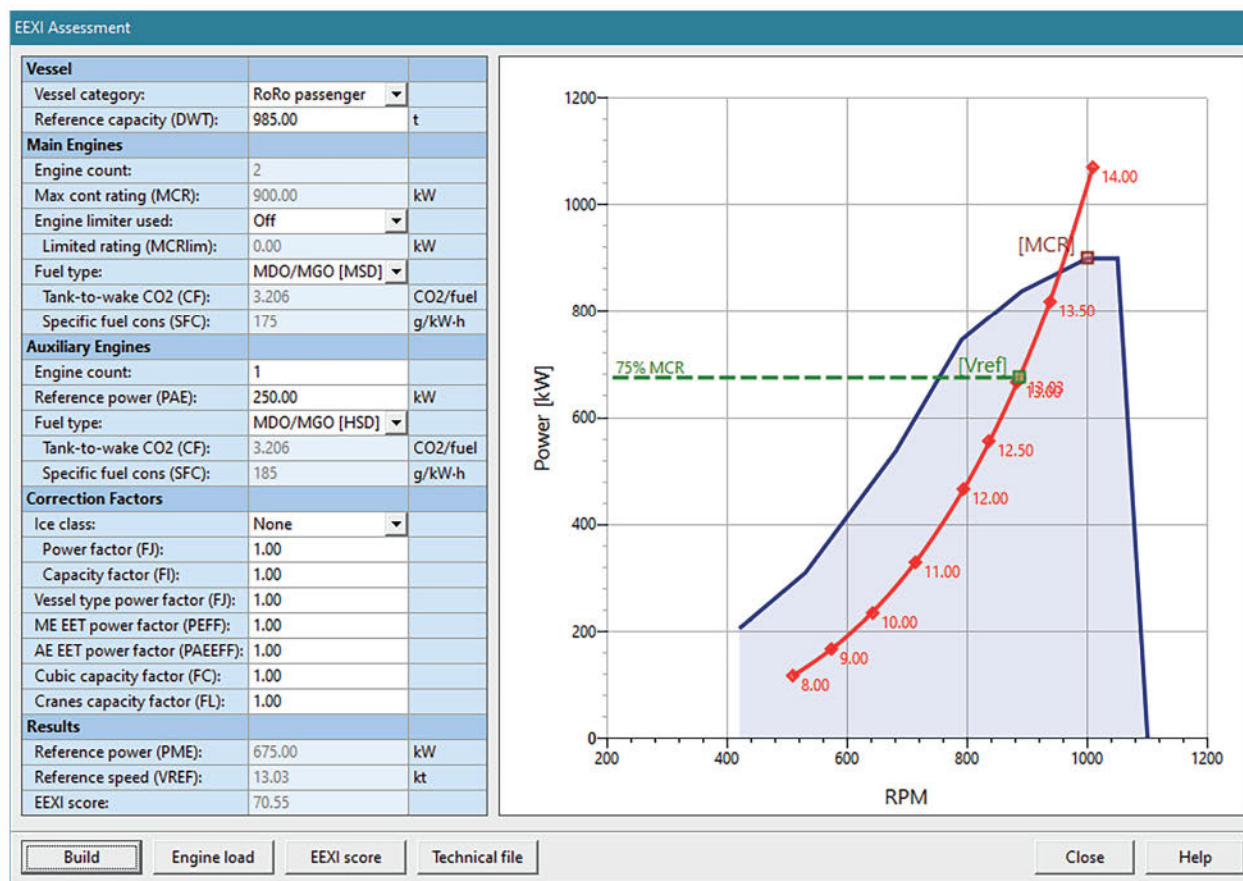


FIGURE 2. NAVCAD'S NEW EEXI ASSESSMENT UTILITY

demand – either recorded engine load percentage or fuel consumption. NavCad will determine an equilibrium propeller thrust (correlated to the recorded engine load metric) and then extract the vessel resistance at the trial condition. This can then serve as the 'reference ship' for correlation from the trial condition to the EEXI draft condition.

One then has a fully calibrated simulation model to establish a suitable speed-power curve for determination of the EEXI reference power and speed. In the case of this 70m ro-pax example, a model test was found for a similar ship of comparable corresponding speed (FN), hull parameters (such as L/B, B/T, and fineness coefficients), and significant characteristics (transom immersion or bulbous bow). An 'Aligned Prediction' then established the basis for the bare-hull resistance component in the system. Appendage and added resistances were prepared using the available prediction models in NavCad library.

Hull-propulsor coefficients (wake-fraction, thrust deduction) were predicted using a method from its library that was highly ranked by NavCad's 'Method Expert' – a utility to ensure that the prediction method conforms to the hull form, speed range, and characteristic details of the ship. Propeller performance was predicted with one of the various systematic propeller series, but with options to account not only for historical experience with the propeller model (thrust and power correlation factors), but also for explicit effects of oblique flow (from shaft angle),

added camber or cup, blade thickness, and even cavitation breakdown. The specification data for the diesel engine was obtained and entered from the manufacturer's technical sheets.

Once the system simulation model is in place and the equilibrium calculation of the speed-power curve complete, it is a simple matter to run the EEXI Assessment utility. This ship narrowly failed EEXI compliance in its existing condition, so various mitigation options could be reviewed, including engine limiters, very low sulphur fuel oil (VLSFO), propeller modifications, even hull cleaning.

In summary, the new utility calculates the EEXI score, produces plots for the speed-power curve (as shown by an engine load plot of speed, power, and RPM in the figure above), and generates an EEXI Technical File report for reference (including technical explanation of the methodologies used). This utility is easily operated by any practicing naval architect or marine engineer, is suitable for virtually all ships under EEXI restriction, generates reference documentation for future quality assurance or benchmarking of the compliance calculations, and provides quick and resource-friendly design guidance when the need comes to investigate where a ship stands regarding EEXI compliance.

The new EEXI Assessment utility will be available early 2023 as part of the Premium Edition of NavCad. For more information, please contact HydroComp, Inc. or visit www.hydrocompinc.com/eexi. ■



CONSULTANCY

LARSENS MARINE CELEBRATES 10 YEARS IN BUSINESS

By **Allan Larsen**, managing director and principal surveyor, Larsens Marine Surveyors & Consultants Ltd

We knew that it was never going to be easy to start a new surveying and consulting company in a densely populated maritime market dominated by multinational organisations and long-established SMEs. However, this was something that we were determined to try and even more determined to make a success.

The first challenge was to identify what we could bring to the maritime market, and we soon realised that we had to offer everything that we could, no matter how small an option these may be, and then to assess which services were becoming most in demand.

And so, with the decision to press ahead taken, the company was registered at Companies House on 25 January 2013 and “the Larsens” have never looked back since, as the company now reaches its 10th anniversary.

One of the biggest challenges of establishing the business was to demonstrate credibility and a commitment to the industry to provide a quality service and, as a fellow of RINA, I knew that becoming a corporate partner of the Institution would be a key element in this.

Being accepted as a corporate partner of RINA provided a level of confidence in the customers we were gaining, and for ourselves as a validation of where we were and where we were aiming to be, especially in the early days. As the RINA corporate partner certificate, which takes pride of place in our office reception, states: “Larsens Marine Surveyors & Consultants Ltd has demonstrated its commitment to achieving and maintaining high professional standards by its employees.” A statement which all Larsens Marine employees feel proud of and continually strive to achieve and improve on.

The company continues to increase turnover year on year – so our market position is improving as we continue our organic growth. We also have a long-term view of employing additional staff to develop a larger international footprint with a particularly keen eye on the IMO 2030 and 2050 ambitions, how these will be achieved, and where we fit into this vitally important matter.

New experience

In 2021, Gemma Hancock joined the company as marine surveyor and technical support which brought new experience to the team. Gemma joined the company having served for 14 years as a marine engineer officer followed by six years as a technical superintendent and



LARSENS' MANAGING DIRECTOR, ALLAN LARSEN, AND LYNSEY LARSEN, DIRECTOR

her insight into the world of ship operators has been an exceptional benefit for the company and its customers. Gaining the LMA diploma in Marine Surveying has been an important aspect of Gemma's transition from operational roles to that of a surveyor/technical support which involves an entirely different view of the ship, rules, and regulations along with a different aspect to the professional approach to tasks.

Another key element in the success of Larsens Marine is the fact that it has three main business lines: surveying, consulting, and training. With the three clear business lines we can ensure that our workload is consistent – something that was vital during the Covid months when the number of ships being surveyed dropped slightly, but at the same time the demand for training increased. We were very fortunate that we were able to grow organically in difficult times whilst providing a training service which was in demand at higher levels than we had previously experienced or predicted and our flexibility along with staff dedication allowed us to meet this challenge.

Having developed a strong working relationship with Lloyd's Maritime Academy (LMA) in 2013/2014, Larsens Marine has been able to serve some of the largest names in the maritime world and deliver distance learning courses at certificate and diploma level as well as visiting customers premises for workshop and classroom sessions – an area of the business which has grown greatly in our 10-year history. The Larsens/LMA relationship also involves RINA as many of the courses are recognised by the Institution for CPD. Something which brings an added benefit to the students whilst also providing industry visibility for the three parties. ■



BALLAST WATER TREATMENT

BWTS RELIABILITY, SERVICE AND SUPPORT GIVE SHIPS LICENCE TO TRADE

By Daniel Johnson



A WELL-FUNCTIONING BWTS CAN HAVE A POSITIVE IMPACT ON A SHIPOWNER'S POCKET

With commissioning testing now mandatory under IMO rules, having a well-functioning ballast water treatment system (BWTS) installed onboard has become a hot issue. Such testing, which requires ballast water sampling at the discharge line after treatment by the system to ensure these meet the so-called D-2 standard, is necessary to obtain an International Ballast Water Management Certificate - and this document will essentially be a licence to operate once the IMO's Ballast Water Management Convention takes effect from September 2024.

Furthermore, testing is also mandatory with an additional commissioning survey after a change, replacement or significant repair of the BWTS to achieve full compliance with the D-2 standard.

"It is one thing to have a compliant system installed and quite another to have it functioning properly wherever a ship is ballasting, also in ports with variable water quality," notes Tore Andersen, vice president of sales and marketing at Norwegian ballast water treatment system manufacturer Optimarin.

Andersen adds that to date, few ships have been operating their BWTSs on a regular basis over time and as a result a system might not be functioning properly or as intended for a variety of reasons, which can result in non-compliance, more inspections, and possible port delays.

"In the worst-case scenario, owners could be left with non-compliant vessels that are unable to trade," he warns.

Global service network

So what are the key factors to mitigate the risk of non-compliance and ensure maximum BWTS uptime to minimise costly disruption and delays at ports? It is all about the reliability of the system and consistent support through a global service network, according to Andersen.

"We have recognised this need by establishing a worldwide network of service partners with dedicated BWTS-trained engineers specialising in maintenance of our systems," he says.

With locations in the US, Brazil, the UK, Norway, Germany, Spain, the Netherlands, Romania, the United Arab Emirates, China, Japan, South Korea, Singapore and Taiwan, Optimarin's service network does indeed span the globe. In addition, the company has training centres in Norway, Manila and Mumbai with a full-scale BWTS as part of the Optimarin Academy for the purpose of crew training to ensure the system is run safely and efficiently onboard.

"The more people who are trained with our product, the less challenges we have," Andersen tells *The Naval Architect*.

He adds that a proactive approach to training is essential: "You also have to enjoy doing this as a crew. If you hate it... well, you know how it is with everything in your life, the things you hate you never learn. You have to get used to this being part of your operations."

"Very often you have to put that idea at a high level in the organisation so that a positive signal is sent down to the crew. If there is any negativity [towards BWTS operations] from management, you get the same result onboard the ship, it's quite natural I think."

In addition to a global service network, Optimarin has a centralised service centre at its head office in Stavanger, Norway, to provide aftersales support for customers and manage the global distribution of spare parts, with satellite warehouses at several locations outside Norway to enable shorter response time for parts shipments. The centre also co-ordinates service and commissioning jobs to be carried out by Optimarin engineers around the world.

Specialist certified engineers are readily available to provide round-the-clock support for Optimarin clients wherever a ship is located and whenever help is needed.

"This underpins our service-minded approach and good communication with clients. That means 24/7 availability to provide a fast response, combined with a comprehensive warranty programme that gives the client peace of mind throughout the BWTS lifecycle," Andersen says.

Digitalised support

Optimarin's service offering is enhanced with OptiLink, a cloud-based digital solution that underwent an evolution in 2022. OptiLink gives the crew access to key

performance indicators via a user interface and facilitates data transfer to the operator onshore for enhanced fleet-wide ballast water management.

Andersen points out this will also improve system reliability as diagnostic data enables around-the-clock remote troubleshooting and over-the-air software upgrades to minimise physical intervention for maintenance, saving time and money for the shipowner.

OptiLink is also set up to transfer data on ballast water quality to third parties such as port authorities and class societies so compliance certification can be more quickly obtained without the need for lab testing and inspections at ports.

Challenging waters

"Some of the most critical information we are collecting is the quality of the water that is being treated. Management, or crew on a single vessel, can use that information to make important decisions," Leiv Kallestad, Optimarin's chief executive, tells *The Naval Architect*.

Ballasting operations in different parts of the world can be challenging due to wide variations in water quality, and this could make it difficult to achieve compliance with the D-2 standard for ballast water discharges, even with a BWTS installed, he explains.

"It's important to understand that all [BWTS] manufacturers have gone through extremely stringent tests to get IMO and US Coast Guard certification," he says. "However, the water used for the tests is an 'average' of the world's waters."

Poorer water quality at certain ports, Kallestad notes, such as those with a high level of sediment load, may impede effective ballasting operations needed for compliance and thus prevent ships calling at these ports. And this could result in lost contracts and revenue for shipowners if they are not able to sail to challenging ports.

Furthermore, challenges in ensuring ballast water quality meets local standards can create logistical difficulties and delays for fleet operations.

"The main issues are transparency and predictability: being aware of the water quality at different ports to plan voyage itineraries in an optimal manner," says Kallestad.

He continues: "Analysis of big data means a ship operator can assess water quality in specific ports through 'heat-mapping' to determine the duration and difficulty of ballasting operations, which makes for better fleet planning."

Over time, as data is accumulated, Kallestad believes this digital tool will be of high value for all shipowners, who will be able to access a global heat map indicating the water quality of different ports. "The more vessels that have this system installed, the more data will be collated on the level of sediment in water at ports around the world," he concludes. ■

THE SECOND WAVE: RETROFITTING A RETROFIT

Optimarin is benefiting from the current wave of demand for BWTS retrofits as the clock ticks on installation time, with sales of its systems at an all-time high in 2022. The company signed a number of fleet agreements during the year and is in the process of finalising several more for retrofit projects over the next few years.

Tore Andersen estimates that around 25,000 vessels still need to have BWT systems installed ahead of the September 2024 deadline. "We believe some will be scrapped and disappear, but there's still a very sizeable portion left," he says.

Leiv Kallestad adds that the fallout from Covid-19, congestion in the supply chain and logistical challenges, crew changes and other operational disruption have resulted in various permit extensions that will stretch out the retrofit wave beyond September 2024. "We're not talking about years. Maybe six months or so. We think that by the summer of 2025 it will be done for the most part," he says.

"I should add," he continues, "that we think that there will be a smaller retrofit wave that will follow 2025 and that will be for shipowners who are actually replacing their original systems because they are not working or do not have the right approvals."

Optimarin recently carried out one such BWTS retrofit project for an early adopter, according to Andersen.

"The situation is that when there was an uptake of installation in 2011/12, a lot of people installed a system but never used it," he explains. "So what do you have? In your engine room is an iron thing, rusted, and it doesn't work. Finally the rules are here and... oh no, I have to switch it on! Maybe even the brand is gone, so they have to retrofit a retrofit."

"It's not going to be huge, but it is going to be an issue," says Kallestad.





THE 190M EVRIMA, THE FIRST OF THREE CUSTOM-BUILT YACHTS FROM THE RITZ-CARLTON YACHT COLLECTION, SET SAIL IN OCTOBER 2022

CRUISE SHIPS

EXPEDITION SHIPS AND CRUISE YACHTS FACE CHALLENGES GOING GREEN

By **Kari Reinikainen**, Correspondent

The global expedition cruise fleet continues to grow at a brisk pace and at the high end of the market the cruise yachts that some hotel groups are introducing mark further diversification of the cruise industry. The switch to clean fuels poses challenges for both, but these are felt more in the expedition segment.

Both of these ship types are much smaller than most of the mainstream cruise vessels – even in the luxury segment of this, few newbuildings are less than 50,000gt. However, the off-the-beaten-track nature of expedition cruising and the exclusive luxury character of cruise yachts means that in both cases the ships should not be very big, or at least not accommodate large numbers of passengers.

The cruise industry's need to decarbonise is placing owners of both types of ships in front of a challenge as CO₂-free fuels take up far more space than oil.

The Ritz Carlton group, which recently took delivery of the first of its 25,400gt cruise yacht newbuildings, called *Evrima*, decided to use LNG, the cleanest fossil fuel, on its second class of ships: the gross tonnage increased to 46,750 and capacity to 456 passengers from 298 on the first ship. Space ratio – gross tonnage divided

by passenger capacity – will increase to 102.5 from an already high 85.2, indicating that the larger ships will also have more space per passenger.

Cruise yachts like those of Ritz Carlton or Four Seasons will focus on smaller ports than mainstream cruise ships, but unlike expedition vessels, they do not sail in the most remote regions of the world, such as the Antarctic.

Expedition cruise ships frequently operate in regions where distances between places where you can bunker can be very long, notes Anders Ørgaard, chief commercial officer at OSK-Ship Tech in Denmark. Hydrogen is often mentioned as a potential future green fuel for passenger ships, but OSK-Ship Tech has carried out a study to find out how it would suit as fuel of the expedition cruise ship fleet currently in service. The result was that none of the existing ships of this type would be able to accommodate hydrogen fuel onboard.

"Fuels like hydrogen cannot be stored in square tanks in the double bottom as is the case with oil, instead it has to be kept in circular tanks above the double bottom. This alone affects the design of spaces in the hull. Together with the fact that it takes up far more space than oil, the outcome is that payload and

passenger spaces will also be affected," Ørgaard says, adding that methanol could be a more viable option for these vessels in the future.

Space and fuel availability critical in the expedition segment

For the expedition sector, the space onboard is one challenge and the availability of clean fuels in various parts of the world is at least as significant. There is no green fuel available at the moment that would suit the needs of SunStone Ships, the Miami-based provider of expedition cruise tonnage, says Niels-Erik Lund, the company's CEO. The company currently owns 12 vessels ranging from about 4,000gt to 13,000gt and it is working on an order for newbuildings of about 12,000gt.

Lund points out that some ships in the expedition sector are quite a bit larger – of up to some 30,000gt – but these operate in the very top end of the market. Many operators of expedition cruises, including those that charter tonnage from SunStone Ships, are in a different segment and operate smaller ships and Lund says he expects this situation to remain.

"LNG takes up seven times as much space onboard as MGO," Lund points out, adding that the company's ships need to operate cruises of 24 days in duration and make a voyage from Ushuaia, Argentina, to Svalbard, Norway, without passengers to go from one charter to another: the distance is roughly 11,000 miles.

These factors make two points clear. Firstly, it would be completely impossible to fit tanks big enough to hold any other fuel than MGO on the size of ships that the customers of SunStone Ships need and secondly, as expedition cruises visit some of the most remote parts of the world – north and south, east and west – no other fuel would be available in each port where it would be needed.

However, Lund sees a way forward for the expedition cruise industry. The first step is to improve the cleanliness of MGO by developing the existing technologies. The second step can be the installation of fuel cells that could partially replace diesel gensets.

"We have looked at the possibility to replace four gensets by a combination of two gensets and two sets of fuel cells," he tells *The Naval Architect*. While this step could be taken in the fairly near future, replacing diesel power entirely by fuel cells will still take time.

Nuclear power could also offer a way forward as molten salt reactors are now emerging as a potential candidate for the maritime sector. These offer much lower risks than pressurised water reactors that are used in power generation ashore and in naval vessels, Lund notes. "But this will probably be 20 years in the future," he adds.

The choice of an emission-free fuel on ships operating e.g. in Arctic and Antarctic waters can happen in two ways: firstly, the shipping industry can voluntarily opt for a certain choice or secondly, the regulators can impose

their decision on the industry, summarises Vesa Marttinen, senior advisor at the Finnish consultancy MarineCycles.

"In practice, it is likely that some fuel option will be favoured in the decision making, because it is difficult to be technology neutral. A lot will depend on how CLIA (Cruise Lines International Association) and the cruise industry as a whole can work with IMO and regional regulators," he explains to *The Naval Architect*.

Rethinking the environmental footprint

All the new CO₂-free fuels will take up significantly more space onboard than oil and as expedition cruise ships need to have a long range, it is difficult to provide enough bunker capacity on what are small vessels in comparison to the mega ships employed mainly in the contemporary market segment of the mainstream cruise industry.

On the other hand, ships are only allowed to land 250 people on Antarctica at a time, which significantly limits the size of the expedition cruise vessels.

"Perhaps we could think if the size of the ship really is a relevant way to assess the environmental impact of a cruise in these waters," Marttinen continues. He suggests that if only 250 people could be allowed to land per day, a ship with 500 passengers could operate in the region simply by allowing only half of them to go ashore each day. This would open the door for the construction of larger vessels with more room for green fuels.

In this case, the environmental impact could be measured by benchmarking all aspects of the cruise per passenger, building an index of them and then using this as "equivalent environmental impact". This could already be used today, helping operators to measure and reduce their footprint, while in the future it could allow bigger ships that can use green fuels to the region, Marttinen concludes. ■

ANDERS ØRGAARD,
CHIEF COMMERCIAL
OFFICER AT OSK-SHIP
TECH



VESA MARTTINEN,
SENIOR ADVISOR,
MARINECYCLES



RO-ROS

FUTURE-PROOF SOLUTIONS FOR LNG-FUELLED PCTCS

By **Jonathan Blicher**, product line developer, GTT

GTT has developed a new design of an LNG-fuelled energy-efficient Pure Car and Truck Carrier (PCTC) in co-operation with its long-time partner, Deltamarin. The vessel will meet the current and future environmental targets by introducing a well-studied and genuinely clean-fuel technology, incorporating advanced GTT Mark III LNG tanks and Deltamarin's expertise in developing state-of-the-art, fit-for-purpose vessels.

The shipping industry is facing environmental challenges that are urgent, yet difficult to solve. Global emissions have to be significantly reduced and actions must be taken now. Emission regulations exist for all sea areas and are becoming more and more strict. Efficiency can be improved, but other measures are certainly necessary. The next logical step and the most efficient way to comply with the new emission rules is to go forward by using low carbon fuels such as LNG.

Optimised ship arrangement with a Mark III tank

When using LNG, the operational challenge has been the autonomy of the vessel, bunkering intervals and loss of cargo space due to the larger space required for fuel storage. To find the optimal solution as well as the most effective resolution, various arrangements were studied to find the optimised size and location for the LNG fuel tank on a PCTC.

Vessel endurance and energy consumption have been simulated using known speed profiles and sea conditions on routes between Asia, Europe, Australia and New Zealand. With a 3,000m³ LNG fuel tank, the vessel can achieve up to 19,000nm of autonomy running on LNG.

This targeted volume is reached thanks to a fuel tank of cubic shape, with limited breadth to fit between the pillar rows that are essential for the ship structure. The LNG tank arrangement is shown in Figure 1, with the membrane LNG tank in blue and the pillars highlighted in red.

The tank length is scalable to adapt to required LNG capacity, which could reach up to 5,000m³ and can be adapted to specific ships profile. Mark III technology, thanks to its compactness and modularity, enables to minimise the impact of LNG propulsion on cargo loss, saving up to 2% of total CEU capacity compared with other LNG storage technologies.

Specific sloshing campaign leading to low boil-off rate

This specific and particular tank shape led to unknown sloshing behaviour inside the tank, especially in the corner areas. The containment system (CS)



THE DESIGN HAS RECEIVED AN AIP FROM DNV. FROM LEFT TO RIGHT: KNUT ØRBECK-NILSSEN, CEO OF DNV MARITIME, PHILIPPE BERTEROTTIÈRE, CEO OF GTT, AND KRISTIAN KNAAPI, SALES MANAGER OF DELTAMARIN

reinforcement has been validated by an extensive test campaign on hexapod rigs, covering the main PCTC loading conditions and many filling levels inside the LNG tank. This campaign enabled the CS reinforcement to be precisely adjusted. This limited reinforcement minimises the natural boil-off rate (BOR), which can also be further improved by using Mark III Flex technology (CS thickness increased from 270mm to 400mm). This could be particularly helpful to adjust the amount of boil-off gas (BOG) at design stage depending on the expected operational profile of the ship and her fuel gas handling system (FGHS) architecture, including type of main engine, auxiliary engine and use of shaft generator.

During the research, the designer Deltamarin has optimised the main engine output to correspond to the actual power demand of the operational profile. This includes a recommendation on how to utilise the BOG in the most efficient way by various combinations between the main engines, auxiliary engines and shaft generator on different operational conditions. Then the complete FGHS architecture has been developed and studied on a generic PCTC design with our partner Høglund Gas Solutions, from equipment sizing to 3D integration in the Tank Connection Space and Fuel Preparation Room.

2 barg maximum pressure and extended holding time duration

In order to further enhance the vessel flexibility, the GTT fuel tank solution for PCTCs features an increased MARVS of 2 barg gauge (pressure unit in excess of the atmospheric value). This increased pressure has already been successfully applied on *Le Commandant Charcot*, PONANT's luxury exploration cruise ship fitted with two

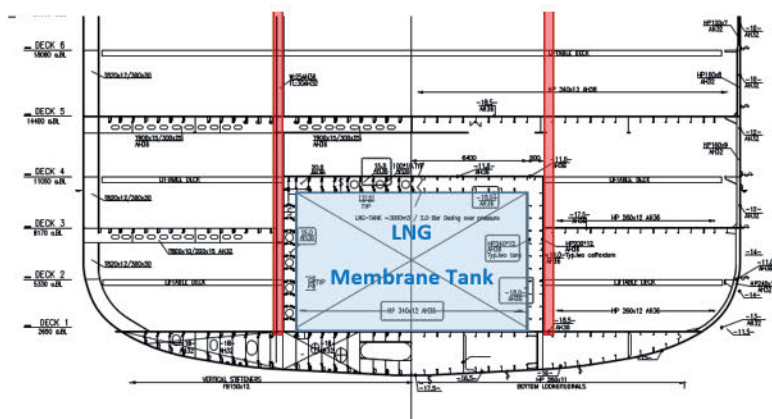


FIGURE 1. THE LNG TANK ARRANGEMENT

Mark III fuel tanks and classed by Bureau Veritas. This 2barg application for Mark III technology also received an Approval in Principle (AiP) from DNV and ClassNK.

The hull scantling in way of the LNG fuel tank has been assessed considering this increased service pressure.

As the hotel load of PCTC is usually low, the 2barg feature is then very useful in order to handle idle phases by pressure accumulation. We can see on Figure 2 that an increased MARVS improves the duration prior to safety valve opening, hence improving the safety on-board and providing a greater flexibility to operators.

The simulation has been made with the following parameters:

- Two tanks of 2,200m³ (cruise ship application)
- Starting pressure = 50mbarg
- No gas consumption
- BOR = 0.20%V/day (equivalent to 150kg/h in pure CH₄)

Offering an increased pressure range brings several advantages:

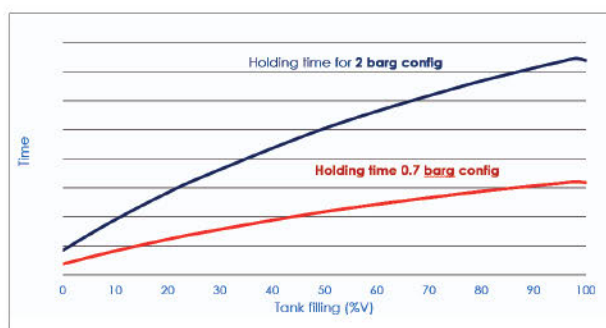
- Increased holding time (with and without gas consumption) as it can be seen from above,
- Bunker LNG with warmer temperatures (from "lower quality" supply chain) when necessary,

- More flexibility with regards to high transfer rates and vapour return management,
- Minimises risk of wasting BOG during low consumption phase or venting BOG in case of emergency situations.

This new LNG-fuelled PCTC design and all related deliverables have been reviewed by DNV and has received an Approval in Principle.

Thanks to this detailed study and the associated developments made with reliable partners, GTT is now able to offer a complete outline design package of an LNG-fuelled PCTC with a flexible concept able to adapt to shipowner's specific requirements. Such a design allows shipowners and operators to capitalise on the potential of LNG as a marine fuel in order to comply with the emissions targets without having to compromise on cargo capacity. ■

FIGURE 2. HOLDING TIME COMPARISON BETWEEN 0.7BARG AND 2BARG IN A CLOSED TANK CONFIGURATION



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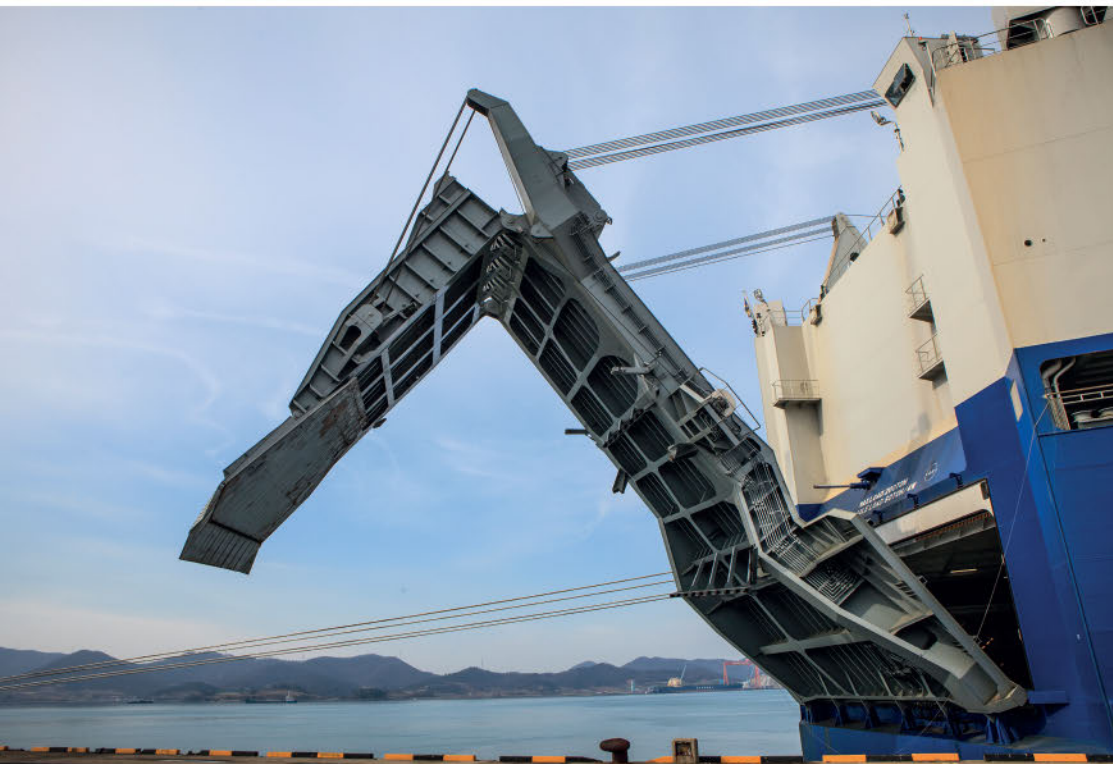


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SUSTAINED DEMAND FOR SUSTAINABLE PCTC EQUIPMENT

MacGregor solutions and innovations help to optimise new projects



ONE REASON FOR MACGREGOR'S CONTINUING STRENGTH IN THE PCTC SEGMENT HAS BEEN ITS FOCUS ON ELECTRICALLY DRIVEN EQUIPMENT

With a VesselsValue blog post logging earnings for the Pure Car and Truck Carrier (PCTC) ship type at US\$150,000 a day in August 2022 – 174% more than in January 2022 – the finished car logistics sector is “short of PCTC supply following years of underinvestment”. Demand for ship space has been going “into overdrive”, the analyst says. In September 2022, shipping news source *Lloyd's List* reported the current PCTC orderbook as standing at an exceptional 87 units.

Understandably, Björn Rosén, VP, Cargo Access Solutions, Merchant Solutions Division, MacGregor, describes market conditions as “highly positive”. A core market for MacGregor for over 40 years, around two thirds of existing PCTCs feature MacGregor cargo access equipment.

“With demand going through a major upswing, MacGregor is tasked with upholding its reputation as a partner which ensures shipbuilders can meet delivery commitments and provides owners with safe, reliable and high-performance cargo access equipment backed by global service,” says Rosén. “At the same time, however, this is a market which is prioritising sustainability in the ships it builds to service demand.”

Maritime regulators are now pressing hard for ships to cut 40% off their CO₂ emissions by 2030, with every existing ship's efficiency and carbon intensity to be

measured from 2023 – under the Energy Efficiency Existing Ship Index (EEXI) and Carbon Intensity Indicator (CII) schemes. Shipping is also being incentivised towards sustainability by measures, which include Poseidon Principles greener financing.

If these provisions frame expectations for shipping as a whole, however, those serving the specialised car and truck transport sector must go further. Alongside pledges to switch to all-electric cars by a number of automakers, Ford Motor Company and Volvo Group are prominent members of the First Movers Coalition, for example. The World Economic Forum grouping of global industrial players “aims to use purchasing power to create early markets for innovative clean technologies” across hard to abate sectors.

“One reason for MacGregor's continuing strength as a supplier of ramps, liftable decks and other ro-ro access solutions for the PCTC segment has been its market-leading focus on electrically driven equipment,” Rosén says. “As well as excluding the risk of hydraulic oil spillages, electric drives have proven their ability to save energy. Rising demand for electrically driven equipment has been a marked feature of recent PCTC orders.”

Another strength is the company's early involvement in the ship design, which has proved a distinct advantage in ensuring that MacGregor's proven solutions and

new innovations are being considered to optimise new projects, he says.

"We have long and extensive technical experience from the design phase to delivery and throughout the vessel's lifecycle. MacGregor doesn't come with a fixed arrangement for its PCTC customers. We're invited in the early stages as the cargo access partner, to offer guidance on minimising the risks of cargo damage, cargo hold arrangements, cargo flow simulations, ramp configurations and weight optimisation. All of these are vital for ship efficiency."

The role also provides early opportunities to propose innovations, such as the new MacGregor position indicator which shows whether the quarter ramp can land at a busy quay before the ship moors, says Rosén. Following its early commitment to electric lifting equipment, the company can also offer unrivalled and data-powered recommendations based on performance, power consumption and cost optimisation.

In 2022, one early engagement saw MacGregor secure orders covering eight new 'zero-carbon ready' Höegh Autoliners PCTCs, due delivery from China Merchant Heavy Industry in 2024-2025. Designed by Deltamarin, these 9,100-car capacity ships are trailed as "the world's largest and most sustainable car carriers" and will run on MGO/LNG while also attracting ammonia- and methanol-ready



BJÖRN ROSÉN,
MACGREGOR

notation. MacGregor is providing design, supply and installation support for a large stern quarter ramp and door, side ramp and door, and liftable car decks.

"The vessels' strengthened deck and internal ramps will enable carriage of electric vehicles throughout, while the tailor-made load monitoring system will allow ramp supports to adjust as load stresses change. A further example of innovation that advances sustainability and efficiency, the result will be lower weight, reduced fuel bills and emission savings," says Rosén. ■



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IWSA Secretary General, Gavin Allwright, says: "We are delighted to once again work with RINA to deliver this impactful conference. The 150 plus members and supporters of IWSA have confirmed new projects, installations, pending order confirmations or the forging of new partnerships every week during 2022 so far. As more systems are installed, and as more demonstrator vessels are launched the price and ROI of wind-assist technology is coming down. Wind propulsion is coming of age, and it is a 'Now' solution to a very 'Immediate' problem."

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MARINE 4.0

SEAPEAK LNG CARRIER SECURES CYBERSECURITY FIRST

By Daniel Johnson



SEAPEAK IS RESPONSIBLE FOR TRANSPORTING 8% OF SEABORNE GAS AROUND THE WORLD

New digital technologies, supported by developments in connectivity and the ability to transfer data in greater volumes between ship and shore, promise significant gains for ship and fleet performance. However, the deepening of onboard and onshore interconnectedness and the mixing of shipboard IT and operational technology (OT) systems also opens up new avenues for security compromises. In the evolving digital landscape, cybersecurity is an increasingly critical element for the safe operation of vessels.

"It's certainly something that we take extremely seriously," Craig Smith, senior cybersecurity specialist at Seapeak, tells *The Naval Architect*. "From a reputational point of view, it is imperative that we do everything in our power to safeguard our maritime operations, team and clients from the increasing threats posed to our industry."

Employing approximately 2,400 shore and sea staff globally, Seapeak (formerly Teekay LNG Partners) is one of the world's largest independent owners and operators of liquefied gas carriers, providing services primarily under long-term, fee-based charters through its interests in 46 LNG carriers, 20 mid-size LPG carriers and six multigas carriers.

The company has signalled plans for expansion by entering into an agreement with Jaccar Holdings to acquire Danish shipping company Evergas. Once completed, the US\$700 million-deal will add two Very Large Ethane Carriers and eight multigas/LNG carriers to Seapeak's fleet, all of which are on fixed-rate time charters to chemicals giant Ineos. Copenhagen-based Evergas also controls six LPG carriers under leases ending in 2024.

In addition, Seapeak has an order worth US\$1.1 billion in place with South Korea's Samsung Heavy Industries for the construction of five 174,000m³ M-type, Electronically Controlled, Gas Admission (MEGA) propulsion LNG carriers. Scheduled for delivery in 2027, the vessels will operate under a fixed-rate time-charter contract with US energy major ExxonMobil.

The complexities associated with the vessels in Seapeak's fleet make them particularly vulnerable to high-impact attacks, another reason that cybersecurity needs to be front and centre of the company's thinking, says Smith.

It is estimated that 95% of cybersecurity breaches are due to human error so it is no surprise that a big focus for the company is cybersecurity awareness training

of crew members as well as all the shore staff. "You can have all of the top of the range tools and spend millions on technology but if your crew and staff aren't educated, that can all be compromised in seconds," Smith notes.

He adds that crew training is moving away from the "classic, boring video presentations" to a more gamified process that includes phishing tests and simulations. "It's not practical for me or someone else to go aboard every vessel to do sessions so we are getting the crew to take the lead with their training. Gamifying the training improves crew engagement and outcomes," he explains.

Cybersecurity-certified

Seapeak recently achieved a landmark in maritime cybersecurity when one of its LNG carriers obtained Maritime Cyber Baseline accreditation from cybersecurity experts Infosec Partners, making it the world's first seagoing vessel to meet the requirements of the certification scheme.

Launched last year by Infosec Partners in collaboration with the IASME Consortium, the Maritime Cyber Baseline scheme ensures that cybersecurity plans meet the IMO's Maritime Cyber Risk Management guidelines. It is open to all ship types and is a way for operators and owners to counter emerging cyber threats, reduce the likelihood of a cyber-attack disrupting day-to-day operations and reassure supply chain partners and flag and port authorities that a vessel has suitable cybersecurity controls and processes.

"Previously, you would get cyber certifications that were done for typical office and shore locations. Infosec have a proven track record in delivering cybersecurity to the maritime industry," says Smith, explaining why Seapeak chose to take part in the scheme.

To carry out the certification process Infosec Partners' assessors undertook extensive remote audits and testing of the vessel's IT and OT environments, ensuring that all cybersecurity systems and controls put in place can detect, block and respond to known cyber-related threats to prevent a successful breach from occurring.

"It's not a simple process, there's quite a lot to it, but it is nicely streamlined and we had a lot of good support from the Infosec team," says Smith.

More than 50 different companies and organisations were consulted during the development of the Cyber Maritime Baseline scheme including departments of NATO. One of its strongest supporters has been the Royal Institution of Naval Architects itself, and a special ceremony was held at RINA's London head office to present Seapeak with its certificate.

"RINA has a deep desire to help the maritime industry improve cybersecurity across the constantly changing maritime landscape," comments RINA chief executive Chris Boyd. "We fully support the Maritime Cyber Baseline scheme and congratulate Seapeak on being the first to receive this award. It's an important step forward in demonstrating IMO compliance and in improving the cybersecurity posture of their fleet.

"Cybersecurity for the maritime industry must be taken very seriously, and it's critical that we as an Institution champion such initiatives that help our community stay up to speed with all the challenges facing the maritime industry."

"We see the certification as a real positive, it sends a strong message on Seapeak's commitment to having a secure fleet," concludes Smith. ■

FROM LEFT TO RIGHT: RINA CEO CHRIS BOYD, CRAIG SMITH, SENIOR CYBERSECURITY SPECIALIST AT SEAPEAK, AND MARK OAKTON, SECURITY CONSULTANT AT INFOSEC PARTNERS, AT THE CERTIFICATE CEREMONY



AI: TRANSFORMING THE FLEET OF TODAY AND TOMORROW

By **Angus Whiston**, communications director, DeepSea Technologies

Traditional weather routing has been used for years in shipping to “optimise voyages” by analysing weather forecasts – to plot the safest way of getting from point A to B. Now, landmark developments in artificial intelligence (AI) are rendering old weather routing practices a thing of the past. AI can unlock a wide range of new applications, influencing the design of newbuild vessels, and helping to optimise the existing fleet.

As new thinking enters this traditional field, AI technology is transforming it to such a degree that it could be classed as a wholly different solution. At DeepSea Technologies, we call this approach ‘performance routing’. Evolving weather routing into a transformative decarbonisation tool, performance routing offers powerful potential when it comes to meeting the requirements of incoming regulatory frameworks like CII and EEXI, whilst simultaneously maximising vessel profitability.

As a result of high-frequency data capture, naval architects are now able to gain an in-depth understanding of how efficiency improvement measures – such as wind assistance or propeller enhancements – affect vessel performance. This, in turn, can affect the design of future vessels, but also the optimal operation of the existing fleet, always maintaining the goals of safety and compliance in an ever-changing regulatory landscape.

As integration of this technology into shipping’s everyday operations continues, new entrants into the workforce benefit from the support these insights can offer, while the value of senior technicians’ knowledge is also enhanced – allowing for greater focus to be placed on driving innovation within the naval architecture and engineering fields.

Data-driven efficiency meets green challenges

Every ship will be required to comply with CII as early as January 2023. The new rules will effectively mean that vessels need to become less carbon intense through to 2030. According to a recent report from VesselsValue, however, more than 75% of all tankers, bulkers and containerships will not be compliant. This means that ship and cargo owners alike must urgently make use of all available efficiency solutions to avoid substantial commercial implications.

Performance routing adds layers of data-driven accuracy to weather routing capabilities, opening doors to a wealth of previously impossible applications. These new applications are allowing shipping companies to truly optimise voyages for the first time – considering not only weather conditions, but also an individual ship’s DNA. Performance routing unlocks increased fuel savings, performance and efficiency gains and enables just in time (JIT) arrivals for enhanced impact across shipping’s entire value chain.



DEEPSEA
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This technology also brings the industry closer to overcoming one of its most persistent challenges – unpredictability. AI now powers systems that adapt in real time to changing circumstances, allowing for the correct actions to be taken when unpredicted weather conditions inevitably occur. This turns the unpredictable into something that vessels and masters can intelligently manage, in real time, and offers a new, ground-breaking level of control in an era when every decision can mean the difference between success or failure.

The importance of embracing change

Compliance with incoming regulations will force change as much as the new ESG table stakes, ensuring that all opportunities for emissions reduction and decarbonisation are being utilised. That said, obstacles preventing the widespread adoption of these available solutions are delaying the progress that shipping can and must make to meet 2030-2050 environmental goals.

Historically, shipping’s decarbonisation progress has been hampered by the split incentive issue, which stems from antiquated charter party agreements that prioritised quick arrival above all else. Despite the availability of cost and performance efficiency gains offered by the likes of, for example, AI-based solutions, this dynamic divides responsibility for fuel costs between shipowners, operators, and charterers, resulting in the lack of a clear value proposition to invest in eco-efficiency technologies.

A change of tide

Previous perceptions of AI as ethereal and mysterious are now shifting. DeepSea recently announced a partnership with the market leader in global ro-ro shipping and vehicle logistics, Wallenius Wilhelmsen. This represents a watershed moment for shipping’s digitalisation, marking

WALLENIUS
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AN 18-MONTH TRIAL
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a key milestone in the mass uptake of AI and its practical application via voyage optimisation as a crucial enabler of operational efficiencies.

As Wallenius Wilhelmsen embraces DeepSea's AI-powered voyage optimisation tool, Performance Routing, as a key part of its decarbonisation strategy, it will transition to an entirely AI-based approach to voyage planning across its entire fleet. This decision, the first of its kind globally, was made after a collaborative trial period over 18 months, involving rigorous step-by-step testing.

Going forward, I look forward to seeing how AI-based solutions are utilised in maritime, and DeepSea remains committed to developing the technology for use cases across the sector. It's of critical importance that other major players within the shipping sector realise, sooner rather than later, what access to highly accurate data actually represents: an abundance of cost and carbon emissions savings. Furthermore, it can encourage better data transparency, and save latent time locked in the supply chain. This can trigger progression that runs far deeper and further than IMO regulations. ■

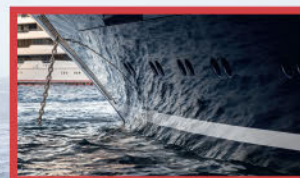
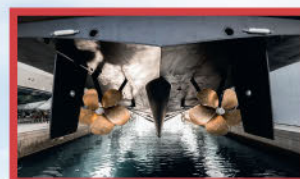


The Cayman Registry, a division of Cayman Maritime, was established in 1903 and today the Register covers the full spectrum of vessel types, including commercial ships and private pleasure yachts. The Registry maintains headquarters in the Cayman Islands and a European Regional Office in Southampton, UK, with global representation in the USA, UK, Italy, France, Netherlands, Monaco, Greece, Hong Kong, Singapore and Japan.

We are now seeking to employ a Surveyor based in Southampton, United Kingdom and reporting directly to the Regional Director Safety & Compliance (GS&C) UK.

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OBITUARY

ROBIN BURNETT 1933-2022

By Richard Halfhide

Robin Burnett, the original Editor of *The Naval Architect*, belonged to perhaps the last generation for which Britain's maritime heritage had the power to stir a deep and irrevocable calling. In his 2011 memoir, *Water Under the Keel*, he remembered how as a boy, long before he had even ventured onto a boat, he daydreamed of being at the helm of a ship as it battled the wind and waves, the words of Poet Laureate John Masefield's 'Sea Fever' ringing in his ears:

*I must go down to the seas again, to the lonely sea and the sky,
And all I ask is a tall ship and a star to steer her by;
And the wheel's kick and the wind's song and the white sail's shaking,
And a grey mist on the sea's face, and a grey dawn breaking.*

Although Robin's father was a schoolmaster, both sides of his family included relatives in the Royal Navy and he was twice unsuccessful in attempts to gain entry to the Dartmouth naval academy. At the age of 17, with the prospect of university looming, an acquaintance of his parents recommended he contact Jack Billmeir, owner of the Stanhope Steamship Co. Within weeks, the company had offered him a four-year Merchant Navy apprenticeship and he embarked on his maiden voyage onboard the 16,500dwt oil tanker *Stanwell* in August 1950.

His tenure with Stanhope, during which time he gained his first experiences of exotic locations across the globe, as well as being promoted to Third Mate, would last until the spring of 1956. A few months later, shortly after earning his Second Mate's Certificate, he joined the prestigious Royal Mail Lines (RML), initially as Fourth Officer of the 11,000grt RMS *Loch Gowan*, which operated on a route between London and Vancouver, stopping for calls in the Caribbean and US west coast via the Panama Canal.

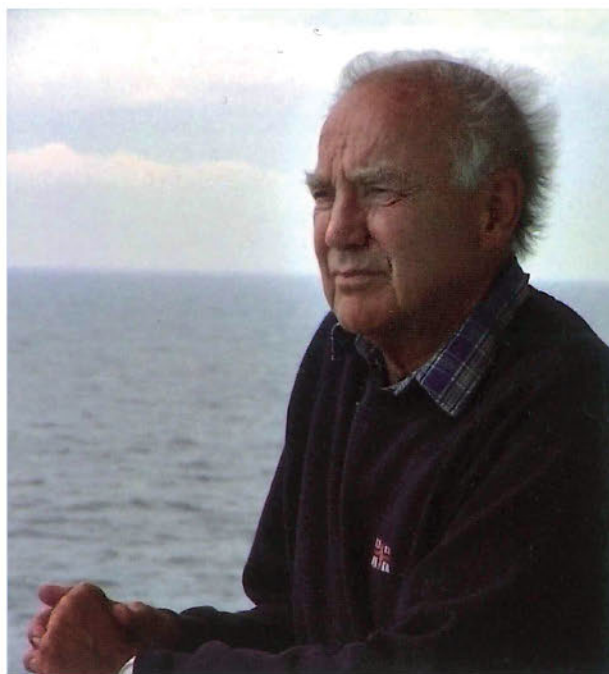
These were the twilight years of liner shipping and the RML ships carried not only cargo but passengers from across the social spectrum, before cheap air travel would render such services unsustainable. By 1958, he had progressed to working on the *Highland Monarch*, one of a series of six twin-screw diesel and twin-funnelled passenger cargo ships that were requisitioned for troop transportation during the Second World War, that boasted impressive first-class accommodation and a teak-sheathed boat deck with its own cricket pitch! Although Robin subsequently qualified as a Master he would never have the opportunity to captain an RML vessel and finally left their employ in 1965.

Following a somewhat disastrous foray into yacht ownership on the French Riviera he was accepted for a new degree course in Maritime Sciences at the University of Wales

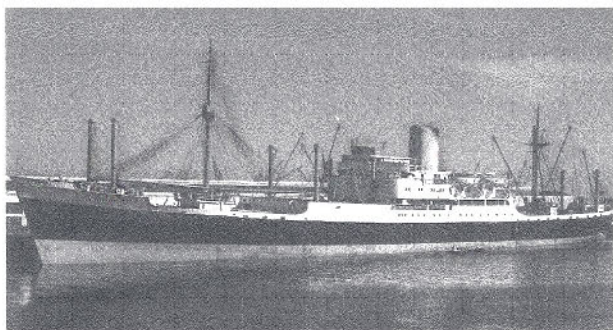
Institute of Science and Technology (UWIST), opting to specialise in technical and scientific studies, including naval architecture. Ship design was a rapidly evolving discipline, with the upscaling in tanker capacity, heavy bulk carriers and containerisation – upon which Robin would later write a thesis that would help secure him election as a RINA member – all presenting an array of technical conundrums concerning stability, weight, speed and power. Shortly before graduating he spotted a newspaper advertisement for a consultant naval architect to join the *The Motor Ship*, then published by IPC Group, becoming its regular correspondent on the design features of new ships and the latest developments at shipyards, where covered shipbuilding and prefabrication halls were fast replacing conventional slipway methods.

He had been in the role for just 15 months when RINA sought an editor for the launch of its new quarterly house magazine, intended to report more topical news that would complement its technical papers. As Robin recounted in *The Naval Architect's* 50th anniversary edition in 2021, with less than three months to create the publication and just an editorial secretary for assistance, the task was an onerous one. Nevertheless, with the support of the Institution's Secretary, Peter Ayling, and President, Sir Alfred Sims, the first edition with a print run of 7,000 copies was delivered on schedule in April 1971.

Over the following decade Robin would chronicle further dramatic evolution in international shipping with the emergence of VLCCs (with capacity 16 times that of



ROBIN BURNETT



RMS LOCH LOYAL, AT LOS ANGELES 1959. SOURCE: WATER UNDER THE KEEL


Stanwell) as well as the rapid escalation in North Sea oil exploration and the design innovations it brought to offshore vessels. During Robin's editorship, *TNA* was among the publications to highlight growing concerns about the structural stability of bulk carriers and instability of double-ended ro-ros, issues that would prove to have tragic consequences during the 1980s. Other notable ships the journal reported on at the time included the 266m barge carrier *Doctor Lykes*, the largest American cargo vessel ever built, and the 2,000-passenger capacity *Norway*, which while actually a conversion of the passenger liner *France*, was for a time the largest cruise ship ever built. There was also extensive critical discussion of warship design and in the January 1976 edition he reported on sea trials for HMS

Sheffield, the first Type 42 guided missile destroyer that later sank during the Falklands conflict.


In 1980, tiring of the grind of producing what was now a bi-monthly magazine, Robin left RINA to pursue a freelance career and became a contributor to a number of technical journals, as well as the technical pages of *Lloyd's List*. By the mid-eighties he had moved to The Hague, becoming a Scientific Editor for NATO's SHAPE Technical Center where he was soon joined by his wife Patricia, whom he married in 1988, and had the opportunity to indulge his growing passion for painting. Returning to the UK in 1990 he resumed journalistic work and became, among other jobs, editor of RINA's *Warship Technology*, a role in which he continued until 1998.

Robin and Patricia relocated to the Sussex South Downs in 1992, close to both their childhood homes, and eventually settled into retirement. A keen sailor throughout his life, he cherished their proximity to the sea and although harsh experience had taught him that a mariner's career is by no means an easy one, Robin relished the opportunities it afforded him. To quote the words with which he ended *Water Under the Keel*: 'I can only thank my stars for having had such an interesting life'.

On behalf of everyone at RINA, our condolences to Patricia and all of Robin's family and friends. ■



An Roinn Iompair
Department of Transport



NAVAL ARCHITECT (SHIP SURVEYOR)

The Department of Transport is seeking qualified Naval Architects (Ship Surveyors) to work in the Marine Survey Office (MSO). The MSO ensures the implementation of national and international legislation relating to maritime safety, maritime security, living and working conditions and the prevention of pollution of the marine environment from ship related sources.

Naval Architects (Ship Surveyors) are engaged in the initial survey and inspection of new ships and renewal surveys including surveys for registration on the Irish flag. There will be involvement in inspections on Irish and foreign vessels of different types including merchant ships, fishing vessels, passenger ships and boats, recreational craft and vessels engaged in offshore renewable energy projects. Travel abroad and throughout Ireland will be required.

They also attend meetings at national and international level including the EU and the European Maritime Safety Agency and the International Maritime Organization.

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