December 2023

MARITIME REPORTER AND ENGINEERING NEWS

marinelink.com

GREAT SHIPS OF 2023

Since 1939 | Number 12 | Volume 85

UNITED SAFETY
& SURVIVABILITY CORPORATION™

BRINGING TOGETHER
THE BEST ON THE WATER.

ALLSALT MARITIME

Allsalt Maritime features a patented and revolutionary impact mitigation design using marinized air shock technology to reduce physical impact on the passenger when traveling through rough waters.

FIREBOY®

Fireboy provides a variety of reliable, trouble-free fire detection, fire suppression and gas detection products designed specifically for the marine industry.

WANT TO LEARN MORE ABOUT OUR MARINIZED SAFETY SOLUTIONS? SCAN THE QR CODE!

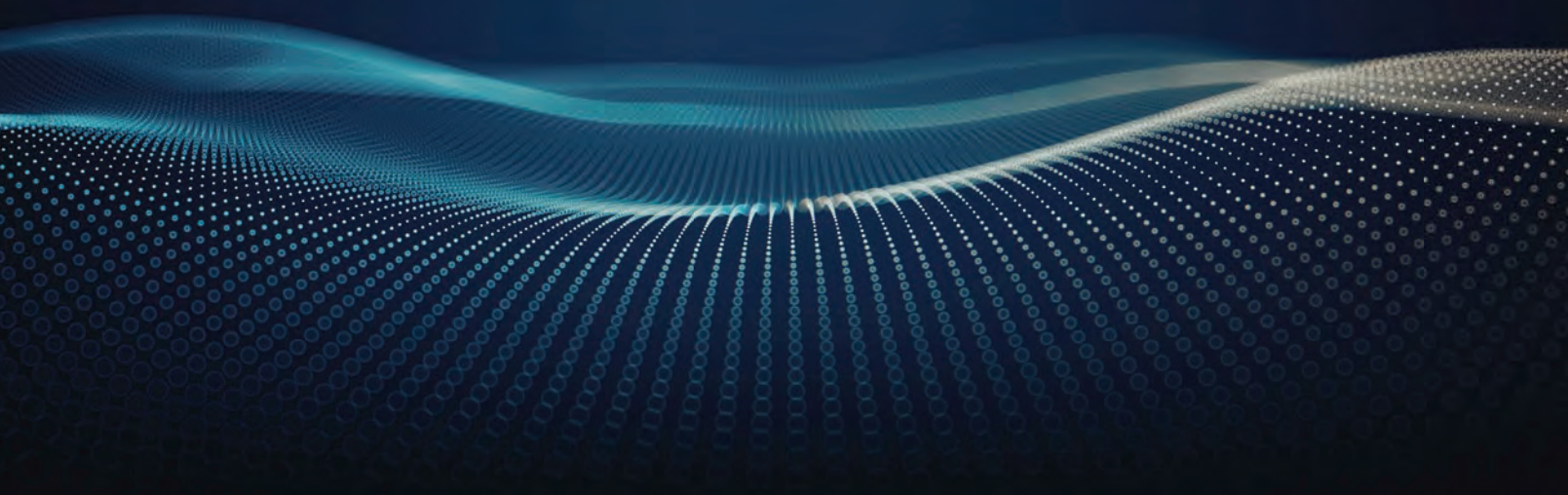
SURFACE NAVY ASSOCIATION'S 36TH

NATIONAL SYMPOSIUM

THE FIGHT, THE FORCE, THE FUTURE

9-11 JANUARY 2024

ARLINGTON, VA



REGISTRATION OPEN NOW

navysnaevents.org/national-symposium/

NO.12 / VOL. 85 / DECEMBER 2023

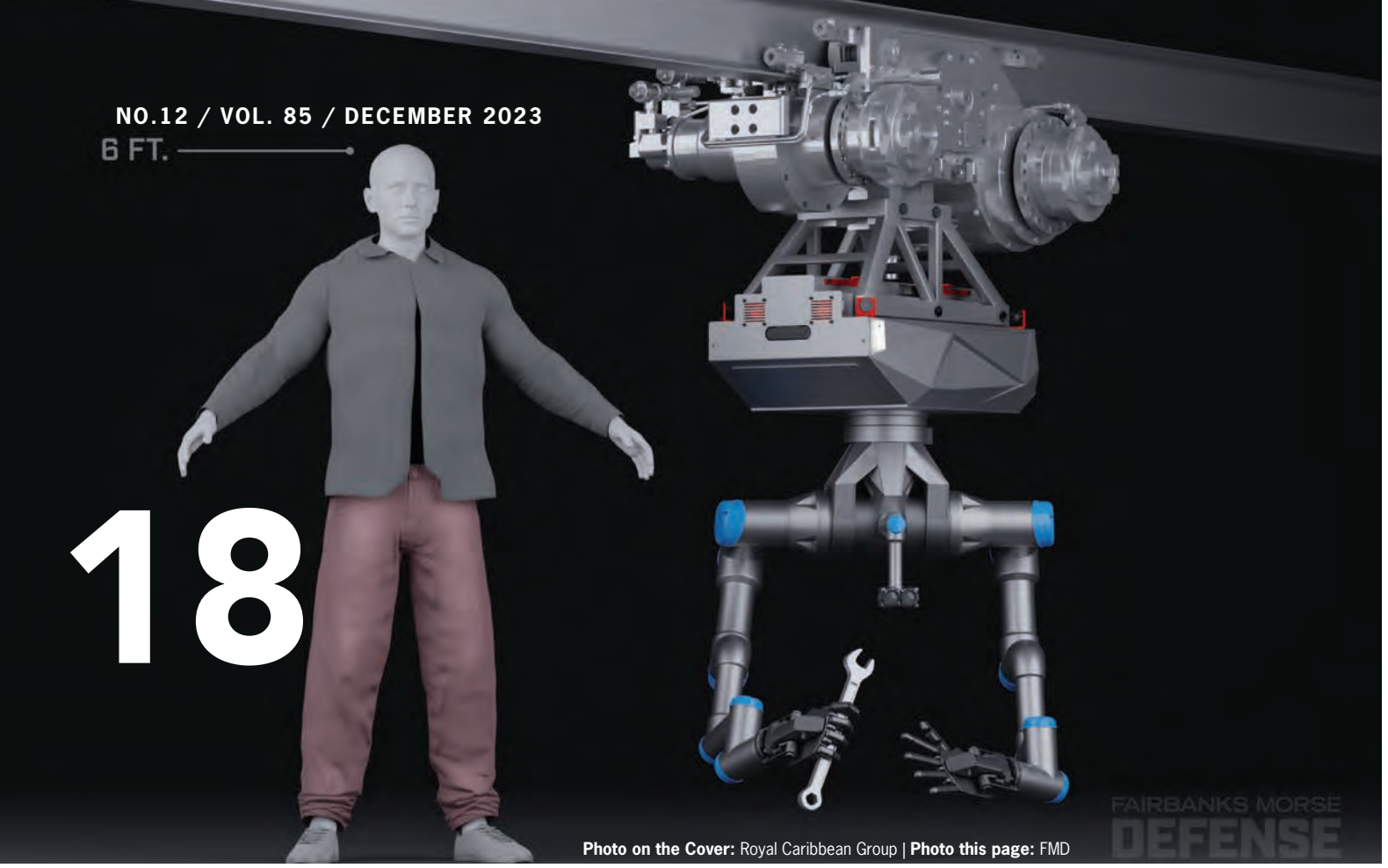


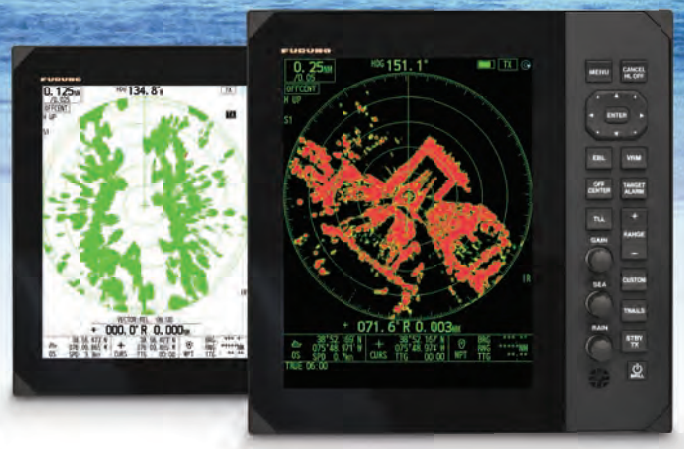
Photo on the Cover: Royal Caribbean Group | **Photo this page:** FMD

Pure Radar

The most dependable collision avoidance in any weather condition... day or night!

When You're Serious
FURUNO

Award-Winning NXT & X-Class
Radar Domes & Open Arrays



FR10 & FR12
10.4" & 12.1" Color LCD Radar Displays

Safely navigate high-traffic areas with complete confidence.

Display target speed and course in seconds with Fast Target Tracking™	New Risk Visualizer™ identifies potential collision areas	Choose Solid-State or magnetron configurations	Target Analyzer™ alerts you to potentially hazardous targets	Overlay Radar targets on charts with FR12

TARGET ANALYZER · RISK VISUALIZER · UHD Ultra High Definition

Get the whole story at FurunoUSA.com

Authors & Contributors

Ewing

Galdorisi

Goldberg

Haun

Laursen

Lundquist

Lewis

Thompson

van Hemmen

Ewing
Tom Ewing is a freelance writer specializing in energy and environmental issues.

Galdorisi
George Galdorisi is a retired naval aviator. He enjoys writing, especially speculative fiction about the future of warfare. The opinions expressed in his article are solely those of the author. Reference to any specific commercial companies, products, process, or service does not imply its endorsement by the Department of Defense or Department of the Navy.

Goldberg
Murray Goldberg is CEO of Marine Learning Systems, maker of MarineLMS.

Haun
Eric Haun is editor of Marine News. He has covered the commercial maritime and offshore industries since 2013.

Laursen
Wendy Laursen has 20 years of experience as a journalist. She has a Master of Science research degree in marine ecology as well as diplomas in journalism, communication and subediting.

Lewis
Philip Lewis is Director Research at Intelatus Global Partners. He has market analysis and strategic planning experience in the energy and maritime sectors.

Lundquist
Edward Lundquist is a retired naval officer who writes on naval, maritime and security issues.

Thompson
T. Nelson Thompson, Ph.D., recently retired at the U.S. Maritime Administration (MARAD), where he was the Maritime Environmental and Energy Technical Adviser. *His opinions are his own and not those of any U.S. government agency.*

van Hemmen
Rik van Hemmen is the President of Martin & Ottaway, a marine consulting firm that specializes in the resolution of technical, operational and financial issues.

MARITIME REPORTER AND ENGINEERING NEWS

MARINELINK.COM

ISSN-0025-3448
USPS-016-750
No. 12 Vol. 85

Maritime Reporter/Engineering News (ISSN # 0025-3448) is published monthly except for March, July, and October by Maritime Activity Reports, Inc., 118 East 25th St., New York, NY 10010-1062. Periodicals Postage Paid at New York, NY and additional mailing offices.

POSTMASTER:

Send all UAA to CFS. NON-POSTAL AND MILITARY FACILITIES send address corrections to Maritime Reporter, 850 Montauk Hwy., #867, Bayport, NY 11705.

SUBSCRIPTION INFORMATION

In U.S.:
One full year (9 printed issues) $90.00;
Two years (18 printed issues) $150.00

Rest of the World:
One full year (9 printed issues) $140.00;
two years $180.00 (18 printed issues) including postage and handling.

CONTACT INFORMATION:

Email: mrcirc@marinelink.com
Web: www.marinelink.com
t: (212) 477-6700
f: (212) 254-6271

Member BPA WORLDWIDE BRAND REPORT

Business Publications Audit of Circulation, Inc.

POWERING AHEAD

Posidonia 2024

3-7 June, Athens Greece

www.posidonia-events.com

What's in Store in '24?

It has been a literal whirlwind ride through the 2nd half of 2024. Generally, conference and exhibition halls have been fairly busy, everyone on the perpetual lookout for that next big deal. Particularly impressive was the *4th annual Offshore Wind conference* hosted by the American Bureau of Shipping, held the Tuesday after Thanksgiving in New Orleans. While it's not the biggest, it is arguably one of the best I've attended in 2023. ABS is smart in dispatching with four hours filled with 'death by Powerpoint,' and instead takes the 'panel discussion' route which – if you have the right panelists who are willing and able to be forthcoming about the trends shaping the industry – can be tremendously informative. Looking ahead to 2024 [and while I've never considered myself a great prognosticator], these are some worthy trends to watch in the coming year.

- **Offshore Wind in the U.S. is Wounded, not Dead:** Being in the media for 30+ years, even I have trouble cutting through the noise, as there are so many special interest groups with an agenda that have the funding and the know-how to make a lot of noise. Yes, there have been some monumental project cancellations; yes, there are plentiful challenges ahead. However, big picture, long term, the offshore wind market will be a solid and growing contributor to the U.S. maritime and energy markets.
- **Global Wind is 'Going Gonzo':** While the U.S. market is beset with infighting and delays, there are many markets globally that are plowing forward fast on offshore wind. This is led by China, but for the readers of these pages (mostly), that's not relevant because China is a closed market.
- **Inflationary Pressures Continue:** Interest rates are higher than they've been in decades, and to put it simply, stuff costs more. There has been a perceptible slow down in new vessel construction inquiries in the U.S.; it's slowed, not stopped. It appears that the U.S. Central Bank has concluded the interest rate hikes that were touted as taming inflation, and interest rate cuts might even be in the cards for mid-2024, which would make many markets buoyant.
- **Tightening Emission Regs will spur New Vessel Construction:** If you just read the headlines, one might assume we've already arrived at a point where a majority of vessels have 'gone green.' That's not true – not even close – and long after I'm gone and replaced by an AI bot, diesel will remain the dominate fuel. But the tide is turning, and regulation will be the hammer that puts dual fuel, batteries, wind power or some combination thereof in the driver's seat.
- **Go Digital. Now:** The proliferation of connectivity and digital technologies is transforming this business faster than all other combined. The ability to monitor, manage, refine and adjust vessel operations premised on data is here and now. Like any other technology, not all are cut from the same cloth, so do your due diligence and select wisely.

Gregory R. Trauthwein
Publisher & Editor
trauthwein@marinelink.com

MARITIME REPORTER AND ENGINEERING NEWS

MARINELINK.COM

HQ
118 E. 25th St., 2nd Floor
New York, NY 10010 USA
T +1 212 477 6700

CEO
John C. O'Malley
jomalley@marinelink.com

President & COO
Publisher & Editor
Greg Trauthwein
trauthwein@marinelink.com

Editor - MarineNews
Eric Haun
haun@marinelink.com

Offshore Energy Editor
Bartolomej Tomic
tomic@offshore-engineer.com

Production Manager
Irina Vasilets
vasilets@marinelink.com

Production & Graphic Design
Nicole Ventimiglia
nicole@marinelink.com

Corporate Staff
Manager, Marketing
Mark O'Malley
momalley@marinelink

Accounting
Esther Rothenberger
rothenberger@marinelink.com
212-477-6700 ext 6810

Manager, Information Technology Services
Vladimir Bibik bibik@marinelink.com

Circulation
Kathleen Hickey k.hickey@marinelink.com
212-477-6700 ext 6320

Sales
Vice President, Sales
Terry Breese
breese@marinelink.com; +1 561-732-1185

Lucia Annunziata
annunziata@marinelink.com;
+1 212-477-6700 ext 6240

John Cagni
cagni@marinelink.com; +1 631-472-2715

Frank Covella
covella@marinelink.com; +1 561-732-1659

Mike Kozlowski
kozlowski@marinelink.com; +1 561-733-2477

Gary Lewis
lewis@marinelink.com; +1 516-441-7258

International Sales
Scandinavia & Germany
Roland Persson
Orn Marketing AB, Box 184 , S-271 24
Ystad, Sweden
roland@orn.nu; +46 411-184 00

Founder:
John J. O'Malley [1905 - 1980]
Charles P. O'Malley [1928 - 2000]
John E. O'Malley [1930 - 2019]

MARITIME TECHNOLOGY

Maritime Technology is the newest and best way for maritime industry manufacturers and service providers to reach the global marketplace. Powered by the Maritime Network – the industry's largest and comprehensive news and information source, Maritime Technology is the cutting-edge way to connect buyers and sellers.

Setup your company profile today!

www.maritimetechnology.com

Tip #54

Enhancing Maritime Ops Through Emotional Intelligence Training

By Murray Goldberg, CEO, Marine Learning Systems

In the maritime industry, where safety and efficiency must always remain goals #1 and #2, it might seem odd to be reading an article discussing the importance of emotional intelligence (EI) in mariner training. In fact, it is not the topic which first comes to mind for me as a developer of maritime enterprise training and compliance platforms. But it should be. The fact that it is typically not top of mind for most of us in the maritime industry is a problem because enhancing EI across all levels in maritime organizations can lead to improvements in operations, safety, and workplace culture. Let's discuss what we mean by emotional intelligence, why it is a critically important skill, and how training for it could possibly generate one of the highest returns on our training dollar investment. So first, what is EI?

Emotional Intelligence (EI) refers to the ability to recognize, understand, manage, and utilize one's own emotions and those of others effectively. It is demonstrated by the effective use of interpersonal skills that govern how people perceive, process, and react to the emotional aspects of interactions with others. Individuals with high EI are able to identify and understand not only their own emotions but also the emotions of those around them. This ability enables them to respond to emotional cues appropriately and to form connections with others based on empathy and understanding.

One key component of EI is the ability to regulate one's own emotions. This self-regulation is crucial for decision-making, stress management, and communication - all of which impact personal and professional relationships. Emotional intelligence also includes skills such as empathy, social awareness, and the ability to navigate complex social situations, which are important for collaboration and teamwork. In essence, EI is not just about emotional awareness; it's about using that awareness to guide one's thinking and actions, leading to more effective interactions with others. This is all especially important in the maritime sector because of the sector's many unique and challenging realities including the presence of stress, multicultural crews, and long periods away from home. Let's look at some of the benefits that can be derived by officers and crew with high EI abilities.

One of the core benefits of a high EI is improved safety and reduced Incidents. Enhanced EI can lead to better stress management and self-regulation among crew members. This is particularly important in high-pressure situations where clear-headed decisions are crucial for safety. A crew that can manage their emotions effectively is less likely to make errors that could lead to accidents or incidents.

A high EI can also enable improved teamwork and communication. Training in EI can improve interpersonal skills, leading to better collaboration and understanding among diverse crew members. This is especially important in the multicultural and multilingual context of maritime operations. Clearer, less emotionally charged communication is also critical in times of stress or danger. The benefits of this in difficult times cannot be understated.

High EI will also result in increased crew retention and job satisfaction. Working in the maritime industry can be challenging, with long periods away from family and a demanding work environment. EI training can equip employees with better coping mechanisms. It can also make all interactions among officers and crew more supportive and less adversarial. This all leads to a far happier and healthier work environment - which produces increased job satisfaction and lower turnover rates.

And finally, high EI is especially important for officers. Leaders with high EI are more effective in managing their teams, successfully conducting difficult conversations, resolving conflicts, and motivating crew members. This all directly impacts the work environment, the cohesiveness of the crew, the respect for authority, and the operational efficiency of the vessel.

Training all maritime employees in emotional intelligence is not just beneficial, it is a necessity in the modern maritime landscape. By focusing on EI, vessel owners and operators can create a more resilient, efficient, and safe working environment. This approach to training equips crew with the emotional and social skills needed to excel in their roles. It is the lever that makes their other training all that much more effective. As the maritime industry and the world around it continue to evolve, an emphasis on emotional intelligence training will undoubtedly become a key component of how we attract excellent crew and maintain safe and performant operations.

Thanks for reading and until next time, sail safely!

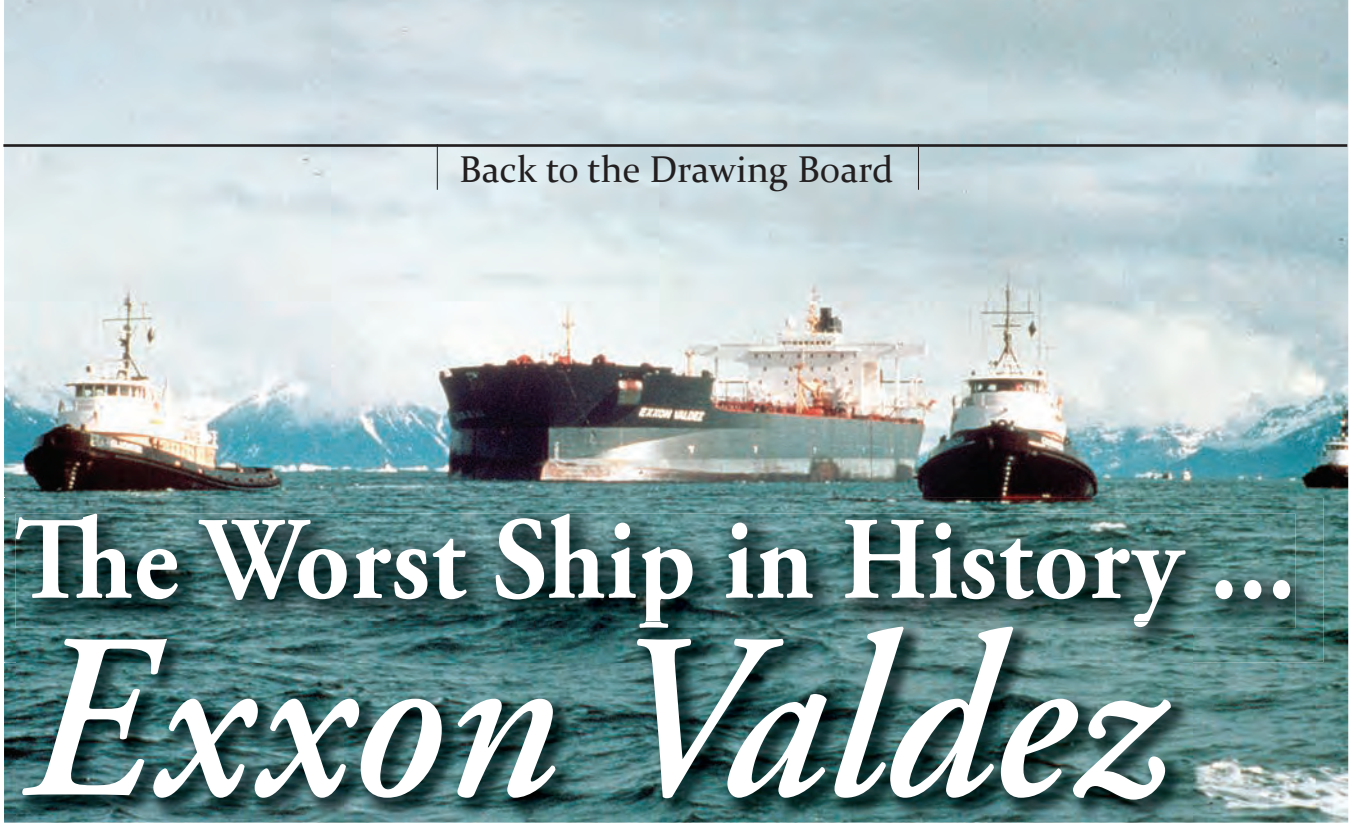
PRINT AND DIGITAL FEATURED CONTENT

A MULTI-PLATFORM MARKETING SOLUTION

LEVERAGE THE FULL POWER OF THE MARITIME MEDIA NETWORK WITH A FEATURED CONTENT PACKAGE

A multi-platform featured content package is a great way to built brand awareness to the industry's largest verified circulation - in print and digital! With this powerful marketing tool, a professional marine industry writer will help you to create an effective message and communicate it to the global maritime industry. Your message will be seen by decision-makers, purchasers and buyers through various media platforms and websites.

For pricing or to learn how *Maritime Reporter & Engineeing News* and the Maritime Network can help build brand awareness across multiple platforms, contact your sales representative today, or call +1-212-477-6700.



The Worst Ship in History ... *Exxon Valdez*

By Rik van Hemmen, President, Martin & Ottaway

While Greg Trauthwein never assigns me column subjects, each time the Great Ships issue comes around I go with the theme. However, I try to take a view askew on that subject and have found that these are the rare columns where I am criticized for my views. Greg must enjoy that, and this year he asked me to write a column on the worst ship designs. That was the entire assignment, and it was unclear if he asked me to discuss the worst ship designs for 2023, or in the history of ship design. Oddly if I assumed it to be for 2023, there was a very short list and a clear winner; *the Titan submersible*, but that has been discussed in a prior column. If one assumed the assignment to cover all of ship design history, the choice becomes more difficult.

In the course of history what does bad design mean?

In pondering that I discovered that many designs that are touted as bad designs, in actual fact, are not bad designs. Instead, they were ships that were unlucky or were innovative approaches that did not work out.

When an innovative ship design does not work out, it is more likely that the actual failure was related to a lack of will by the actual vessel operators to try a little harder, or from unfounded badmouthing by competitors. Most of all, true innovators (not mindless curb side promotors) should get the benefit of the doubt. Innovation is hard, really hard.

Sometimes a design fails because of a design mistake. That is unfortunate, but we are all human and mistakes get made. To call a design bad because of a mistake is easy to do, but not terribly illustrative of bad design.

I came to realize that a bad design has to be bad from the first moment of conception. I can think of other more recent less well-known recent examples too, but none is as obvious as the Exxon Valdez. When the TAPS (Trans Alaska Pipeline System) trade started opening, the Carter Administration indicated that all TAPS tankers should have double bottoms for safety and environmental reasons. This compelled the first generation of TAPS trade ship operators to build a number of double bottom Jones Act crude oil tankers. However, during the Reagan administration, the double bottom requirement was no longer discussed and never enacted, and that left the field open for construction of new single skin TAPS tankers. And Exxon decided to build the single skin Exxon Valdez and Exxon Long Beach. hat was perfectly legal, but resulted in the weird irony of older double bottom tankers operating alongside newer single skin tankers in the TAPS trade.

Double bottom tankers were a little more expensive to build (at the time I estimated 5%), but this is balanced against substantially lower operating costs, which had already been proven with the operation of the older TAPS tankers.

The Exxon Valdez was designed and built in the middle 1980's, despite the fact that that double bottom tankers had been discussed and built since the middle 1970's and that oil pollution was a central concern for the TAPS trade.

Instead of simply copying the older double bottom tanker designs (but with diesel engines instead of steam plants), somebody, somewhere, must have said: *No Boys, let's not do that, let's make a new design that reaches back to prior inferior designs. A double bottom tanker costs no more over its lifetime, but, hey, why bother with something that reduces the risk of oil spills if nobody makes you do it?* So unnecessary

design money was spent to create the Exxon Valdez and, as they say, the rest is history.

Whatever the reason, somewhere out there a designer put pencil to paper and nobody ever said: *What the hell is going on here?* And created, what I consider to be, the worst ship design in history.

Right after the Exxon Valdez disaster, I was asked to perform a study and determine how much less oil would have been spilled if the Exxon Valdez had been designed with a double bottom. I estimated about 50% less oil would have been spilled. I was mercilessly grilled in deposition by opposing attorneys and their experts fiercely argued against my findings. However, later studies showed I was dead on, not because I was particularly brilliant, but because I was young and afraid of embarrassing myself. Therefore, I meticulously stuck to real analysis.

The older opposing experts fiercely expounded on the advantages of single skins, but, as per the Max Planck Maxim, are now mostly dead, and nobody any longer argues that single skin tankers are better. And double hull tankers are much better than anybody could have even imagined! We know, because oil spills from tanker hull breaches have been virtually eliminated.

But here comes the irony. If the Exxon Valdez had been built with a double bottom, there still would have been a very bad oil spill in Prince William Sound, which I personally believe, on a nice day, is the most beautiful place in the world. There still would have been a massive uproar, but would anybody have suggested that all single skin tankers need to be retired and all new tankers should be double hull?

One can imagine the comments of the doyens: *Well, here is proof that double bottoms don't work, we might as well keep building single skin tankers.*

Is it possible that the worst ship design in history actually, singlehandedly, eliminated oil pollution from tanker hull breaches?

For each column I write, ***MREN*** has agreed to make a small donation to an organization of my choice. For this column I will donate the money to myself and buy a bottle of extremely nice Scotch. I will leave it in my office and whenever a ship designer or engineer visits me, I will share a dram with her and toast to Capt. Hazelwood's memory. Capt. Hazelwood was a very capable ship captain, and his drinking problem had absolutely nothing to do with the Exxon Valdez spill. At worst he made a mistake, and he was unfairly vilified for it. We all make mistakes, but choosing a bad design over a good design is not a mistake.

Time is Running Out For Some Fi-Fi Foams

A new IMO resolution will see the phase-out of foam firefighting systems that use fluorinated foams containing perfluoro-octane sulfonic acid (PFOS) as the foam-producing component. The new rules come into effect under a rolling programme beginning in 2026, but Swedish maritime engineering specialist Scanunit believes that a proactive replacement strategy should be put into effect now.

Foam firefighting systems on ships typically make use of a family of synthetic chemical compounds known as perfluoroalkyl and polyfluoroalkyl substances (PFAS). They are used in a variety of applications aside from firefighting because of their very useful properties but their use is now being questioned as they have been shown to be toxic, bio-accumulative, and very persistent substances in the environment.

The common PFAS-compound in foam systems is perfluoro-octane sulfonic acid (PFOS), although other PFASs may also be used. PFOS has been restricted in most Western countries since 2009 under the Stockholm Convention because of its impact on human health. These restrictions have led to an industrial transition and replacement of PFOS, although some of the replacements are other PFASs that may also be considered hazardous after more study.

Following work by the SSE sub-committee at the IMO, the MSC adopted resolutions MSC.530(107) amending SOLAS Chapter II-2 and resolutions MSC.534(107) & MSC.535(107) amending the HSC Codes (1994 and 2000) to prohibit the use of firefighting foams containing PFOS. This ban applies to both fixed and portable systems and comes into effect for new ships on 1 January 2026. Systems on existing ships will need to remove the PFOS and dispose of them safely ashore no later than the first survey date on or after January 1, 2026.

The IMO is also looking at extending the ban to other fluorinated substances, in addition to PFOS, and for this reason, the changes to SOLAS and the HSC Codes have been done by the addition of a new section, “Fire Extinguishing Media Restrictions”, in each text making it easier to include future prohibitions or limitations of extinguishing media.

“Shipowners need to understand the implications of the rule changes for existing ships and to consider how best to comply with the impending and future rules as there are some pitfalls to avoid”, says Mikael Laszlo, Sales Director, Scanunit.

It should be noted that shore systems in most countries have already transitioned to new chemicals. The requirements of regulatory bodies such as the ECHA in Europe and the EPA in the US suggest that PFAS in fire-fighting foam and equipment be limited to 1 ppm (in the foam). Shipping is likely to follow along this path so with the possibility of a future ban on other fluorinated substances by the IMO, the choice of replacement needs to be carefully considered from the outset.

It may not be immediately apparent as to whether the foam contains PFOS or PFAS. There should be some mention in the foam certificate or product safety data sheets, but this is not always the case. It is, therefore, important to analyze the particular foaming agent currently in use to ascertain its composition.

The IMO guidelines for testing detailed in MSC.1/Circ.1312 may have comprehensive instructions for testing the operational aspect of firefighting foam concentrates but do not contain any mention of their chemical composition. Similarly, the type-approval certificates for foam concentrates supplied by classification societies and testing laboratories are

equally unenlightening.

Another point to consider is that manufacturers are already switching to alternative products and there is always a possibility that supplies of foaming agents will dry up before the IMO ban comes into effect. If that happens ships will be required to make an immediate change in any case and perhaps have trading opportunities restricted until this is done.

For existing ships affected by the IMO rules, replacing the foaming agent is not simply a matter of emptying the tank and exchanging the agent with one that does not contain PFOS. To ensure that no restricted substances are released during testing or deployment the whole system will need to be decontaminated.

Scanunit, in partnership with compatriot Swedish company LifeClean, is offering a turnkey solution for decontaminating and replacing the foam onboard vessels. The process need not be done in drydock and can be arranged to suit the vessel's schedule.

The process involves removing the old foam and then refilling the whole system with Sani A, a cleaning fluid developed by LifeClean, that remains in the system for around four hours. The system is then emptied and the process repeated. A sample is then taken from the hoses and tested to ensure that the level of PFOS is at or below 1 ppm. Ragnar Krefting, Founder, Lifeclean explains that the process is perfectly safe and produces less wastewater than other methods. Importantly, independent tests have shown that 99.97% of all PFAS substances in the tanks and foam system have been removed.

Occasionally, a system may need to be upgraded for use with the replacement fluorine-free foam or perhaps because the owner considers this desirable. Scanunit can handle all the arrangements and documentation necessary to do this.

In such cases, it only needs the vessel to provide a copy of the current system manual and it will then design and source any necessary new components. This is done in conjunction with the ship's classification society to ensure that necessary approvals are granted. After obtaining approval, installation is arranged at a convenient place and date with Scanunit supplying materials and personnel to carry out the fitting.

"We have the experience and ability to help owners meet all their obligations under the new IMO rules and we would urge them to go the extra mile and meet the ECHA/EPA standards now rather than wait or carry on with a time-compromised system, says Mikael Laszlo, Sales Director, Scanunit.

Photo by Greg Trauthwein

Passenger Vessel Safety

How to design, implement, and improve your SMS

It's been four years since the fatal Conception dive boat fire claimed 34 lives off the California coast, prompting the National Transportation Safety Board (NTSB) to renew its efforts to improve passenger vessel safety requirements. In light of this move, all passenger vessel operators should consider reevaluating their safety programs and procedures to ensure relevant and all-encompassing protocols govern their vessels, offices, facilities, and anywhere else they may do business. This can be accomplished by ensuring a strong Safety Management System (SMS).

Developing a robust SMS, which provides a framework for minimizing risks related to safety, security and environmental dangers at every level of an organization, can help leaders begin on this journey. An SMS outlines the organization's approach to managing risk, plans to mitigate health and safety issues, and roadmaps for addressing incidents that occur. It also serves as a guide for employees, communicating the organization's commitment to a safety-conscious culture.

The elements of a strong SMS

Maritime, aviation, rail, and other intermodal transportation methods serving critical infrastructure face a unique set of risks and liabilities when accidents occur. Incidents in this principal can have far-reaching consequences on employees, operations, and could impact surrounding areas. As such, commercial and passenger transportation operators are required by law to have a functional SMS that addresses their unique operations.

A comprehensive SMS helps ensure the well-being of your employees, protects your assets, and maintains safe, secure environments for business operations. Per regulatory guidance, it must include clearly defined safety and environmental protection policies, safe operating procedures, and the business' levels of authority, alongside other specific guidance that ensure ongoing safety in the enterprise. This document acts as a guiding light for employees at all levels and establishes executive leadership's commitment to compliance and continual improvement.

Though safety policies are unique to each business, there are three key features (aside from the components required by law) that all SMSs should include to guarantee safe, productive work environments:

- ***Continual improvement measures:*** Sometimes called "safety assurance" measures, continual improvement measures are designed to evaluate the ongoing effectiveness of the SMS and any implemented risk control strategies.
- ***Risk management program:*** The safety risk management program includes procedures that help safety leaders identify new risks and hazards as they arise, develop new controls, and assess their efficacy.
- ***Cultural supports:*** Corporate culture is key to curating a safe working environment. SMSs must include clear guidance on the company's plans for training, communication, and values to ensure that all employees understand the importance of workplace safety; why certain rules, regulations, and protocols are in place; and the potential consequences of not adhering to the SMS' guidance.

Step by Step to a stronger SMS

To improve existing protocols, companies must engage in a robust implementation process:

1. Establish a baseline of current performance.

The first step is an audit that examines current procedures and practices. This will help to ensure the highest level of safety and compliance standards throughout your organization by conducting internal reviews to determine the legitimacy and effectiveness of your organization's existing SMS. This involves a review of your manual's governance, management of change, and review and approval processes for alignment with applicable regulatory guidance.

2. Identify opportunities for improvement.

Using the insights gained from the audit and their extensive experience in building safer operational models, companies can identify compliance gaps, benchmark performance against industry standards, and opportunities for other improvements that can help reduce incidents and costs, enhance productivity and efficiency, improve reputation, and build a strong safety culture that helps maintain stakeholders' confidence.

You can use this as a guide to ensure that your new SMS framework both aligns with current International Organization for Standardization (ISO) standards and includes additional measures that help to protect your assets.

3. Develop and/or update standard operational procedures (SOPs) and checklists

You can now begin updating existing operational documentation and identifying areas for supporting checklists within each SOP. It may also be valuable to conduct working sessions with various internal stakeholders to inform further SOP and checklist updates to ensure compliance with all internal policies and regulations. This is imperative for promoting standardization across all internal documents, which will ease the overall implementation process.

4. Gain approval and implement efficiencies to drive widespread adoption.

Once you've developed a functional and actionable SMS, you can begin to roll-out the new SMS throughout the enterprise and attain buy-in from various business areas. It may also be helpful to explore technological supports that streamline outlined processes like data entry, reporting, or any other administrative work that may arise from updated policies. Investing in automation tools like these may help departmental leadership get up to speed faster and adhere to new guidance more effectively.

5. Pursue continual improvement and optimization.

Safety management is a continual process. As risks and threats change, so too do the controls needed to address them. Leadership should conduct regular assessments of compliance, address corrective and preventive actions, engage in root cause analyses (RCAs), and adjust their Quality Management Systems (QMSs) as needed to meet evolving operational requirements. They should also be sure to update training and cultural initiatives to reflect any changes that may arise.

Safety and beyond

A robust SMS not only enhances transparency and stakeholder communication, but also allows you to better optimize your operations and improve your bottom line – all while adhering to local and federal regulations.

In the long term, an effective and efficient SMS system will help create a strong corporate culture which better supports scaling strategies in a safer environment and reduces the risk of systematic failures, ultimately setting the company up for success from a business and financial perspective.

SMS helps organizations achieve these objectives while maintaining compliance with evolving local and federal standards so their fleets—whether comprising ferries, leisure ships, freight trains, towing or any other type of vessel—stay safe and compliant.

The Author

Grotsky

As Vice President, Engineering at ABS Consulting, Steve leads our Global Engineering team across multiple sectors including Offshore and Marine. The team specializes in complex CAPEX and OPEX engineering projects that support the risk management needs of our clients serving the global critical infrastructure.

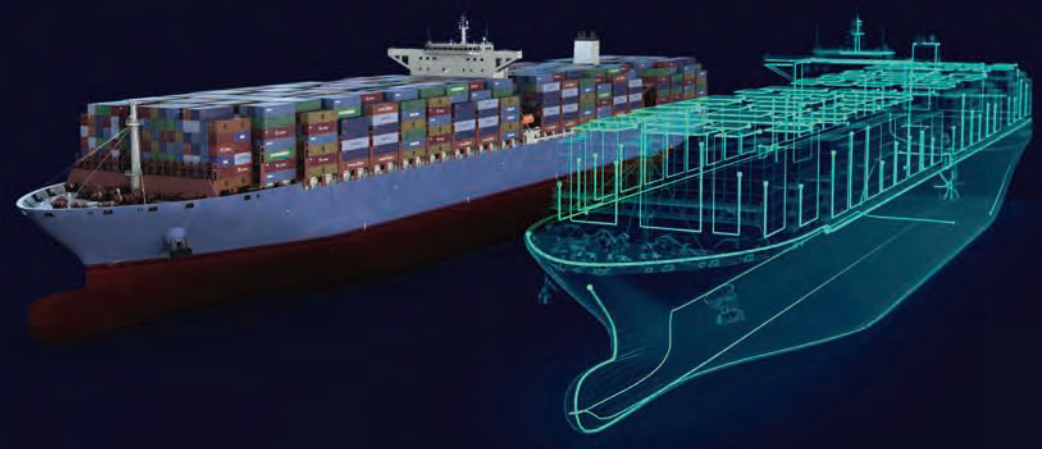


Image credit: Siemens

Achieving Digital Transformation in the Marine Industry

Like so many other industries in transportation, the marine industry is being challenged on multiple fronts—from a shortage of manpower and emerging digital technologies to sustainability requirements. In the face of these growing pressures, ship designers increasingly rely on digital transformation to stay competitive and deliver higher-quality products. Digital transformation offers many solutions across a ship's lifecycle, from design and crew training to interconnectivity and automation, providing the marine industry with the flexibility to implement changes at its own pace and in its own way.

Challenges

Without a doubt, the most significant driver of the marine industry today is sustainability. The extent of its significance is demonstrated by the International Maritime Organization's (IMO) strategy to reduce industry emissions by forty percent by 2030, with a later goal of zero emissions by 2050. Everybody in the industry, from shipbuilders to classification societies, must comply with the IMO strategy.

As a result, the marine industry is taking sustainability very seriously, so expect ships of tomorrow to reflect that.

Other major trends in the industry include increased efficiency, cost-effectiveness, and product complexity. Efficiency is heavily tied to sustainability as companies strive to gain as much energy from sustainable sources. Meanwhile, past crises like COVID-19 cut deep into the industry's pockets, encouraging efforts to reduce the cost of operations as much as possible among ship operators. Last but certainly not least, new technologies like renewable or "green" propulsion systems and interconnective software impose entirely new requirements on ship designs, increasing the complexity of new ships. All these trends combine to add multiple challenges to marine engineers' design processes.

Digitalize Ships with Simulation

Of these challenges, the one likely keeping many in the marine industry up at night has been the disparate engineering efforts used in ship design processes. Massive ships, like LNG carriers or naval vessels, have complex systems requiring mechanical, electrical and software engineering development; however, the established design spiral engineering approach cannot keep pace. This step-by-step design approach results in slow data exchanges, preventing efficient coordination between each domain's engineering team.

Additionally, multiple organizations participate in the design of a ship, including shipbuilders, ship owners, and classification societies, and ensuring quick and easy communication between them all can be difficult. As a result, the deliveries of new ships are delayed, and the designs of those ships them-

selves are sub-optimized.

Digital transformation can solve both issues, and the foundation of this approach is the digital twin. As a virtual representation of a product, engineers can build a digital twin of their ship virtually before putting anything together physically. This allows engineers to rely on powerful simulation capabilities to plan and test their designs much earlier in the ship's lifecycle, giving them more time to optimize the final product. Furthermore, the digital twin can act as a single source of data and an easy-to-access location for all organizations involved in a ship's design, ensuring all entities have the most up-to-date information on the design. With the digital twin, the design process becomes much quicker, allowing optimized ship designs to reach the ocean faster.

This is especially crucial as the industry seeks to transition to a sustainable future. The IMO's recently revised requirement to reach zero emissions by 2050 has significantly increased the need for new green ship designs. The digital twin can be an invaluable tool in creating these new designs, giving engineers a faster and more reliable method for optimizing the newer sustainable aspects of ships, including efficient hull designs and alternative propulsion systems. Digital transformation could not be happening at a better time.

Simulation can also go beyond ship design and be leveraged to help train sailors before they ever set foot on a vessel. This training can be done by applying the same technology to augmented or virtual reality, creating a digital environment where sailors can interact with their own two hands. They could walk ship corridors to memorize layout, repair simulated malfunctions, and operate onboard machinery, all without the risk that training on a physical ship would entail. Physical training would not disappear entirely, but training sailors virtually would save money and resources while preparing sailors for their voyages faster.

Interconnected Fleets

Another tremendous asset of digital transformation is interconnectivity. With onboard Internet of Things (IoT) sensors, a ship operating on the ocean can feed data back to its digital twin in real-time. This data can be used in a number of ways. For example, ships at sea can be tracked and monitored from their operators' home base with ease, giving them knowledge of the present status of their ships. More important, however, is how engineers can continually use that data to optimize a ship's designs. With readings from aspects such as energy efficiency and water resistance, they can use real-time data to continually optimize their designs long after the initial launch.

Once again, this technology gives another advantage in efforts to make the marine industry more sustainable. By monitoring ships' energy efficiency and emissions, engineers can explore new designs that incorporate the real-world conditions that active ships are encountering, thereby optimizing the effectiveness of sustainable technologies they integrate. Between the digital twin and onboard sensors, the design of sustainable ships can be shaped into an incredibly streamlined process.

Moving Toward a more Autonomous Future

Automation is rapidly growing throughout multiple industries, and the marine industry is no exception. About one-third of a ship's operation cost is dedicated to the crew aboard a vessel. Additionally, the industry is in the middle of a global shortage of sailors. Delegating ship tasks to automated systems will reduce the number of sailors required aboard a ship, reducing the impact of the shortage and dramatically lowering operating costs.

As exciting as fully automated globe-trotting ships may sound, full automation to the point of having no crew aboard will likely remain something for the distant future. Many international regulations require at least a small crew aboard vessels and traveling without a crew across the ocean is far riskier in the event of an incident. If there was a breakdown aboard a ship far out at sea, sending a repair party from shore would take too long to arrive, so an onboard crew, albeit smaller, would be vital to keep the ship afloat. That said, coastal ships or inland water vessels that stay within the bounds of a single country or zone are better candidates for full automation, or at least further automation, than their international counterparts. In any case, automation is expected to spread throughout the industry in the next few decades.

Operating more autonomous ships requires the digital twin of the vessel to be continuously updated with near real-time data from actual operations. With smaller crews, ship operators need to be in control at all points to receive operational data while at the home base and run simulations that will help the vessel operate. The digital twin provides these capabilities, acting as a single source of truth for ship operators to continuously monitor semi-autonomous ships and respond quickly when something goes wrong onboard. The digital twin lets operators maintain constant communication with semi-autonomous fleets worldwide, ensuring their success despite massive distances.

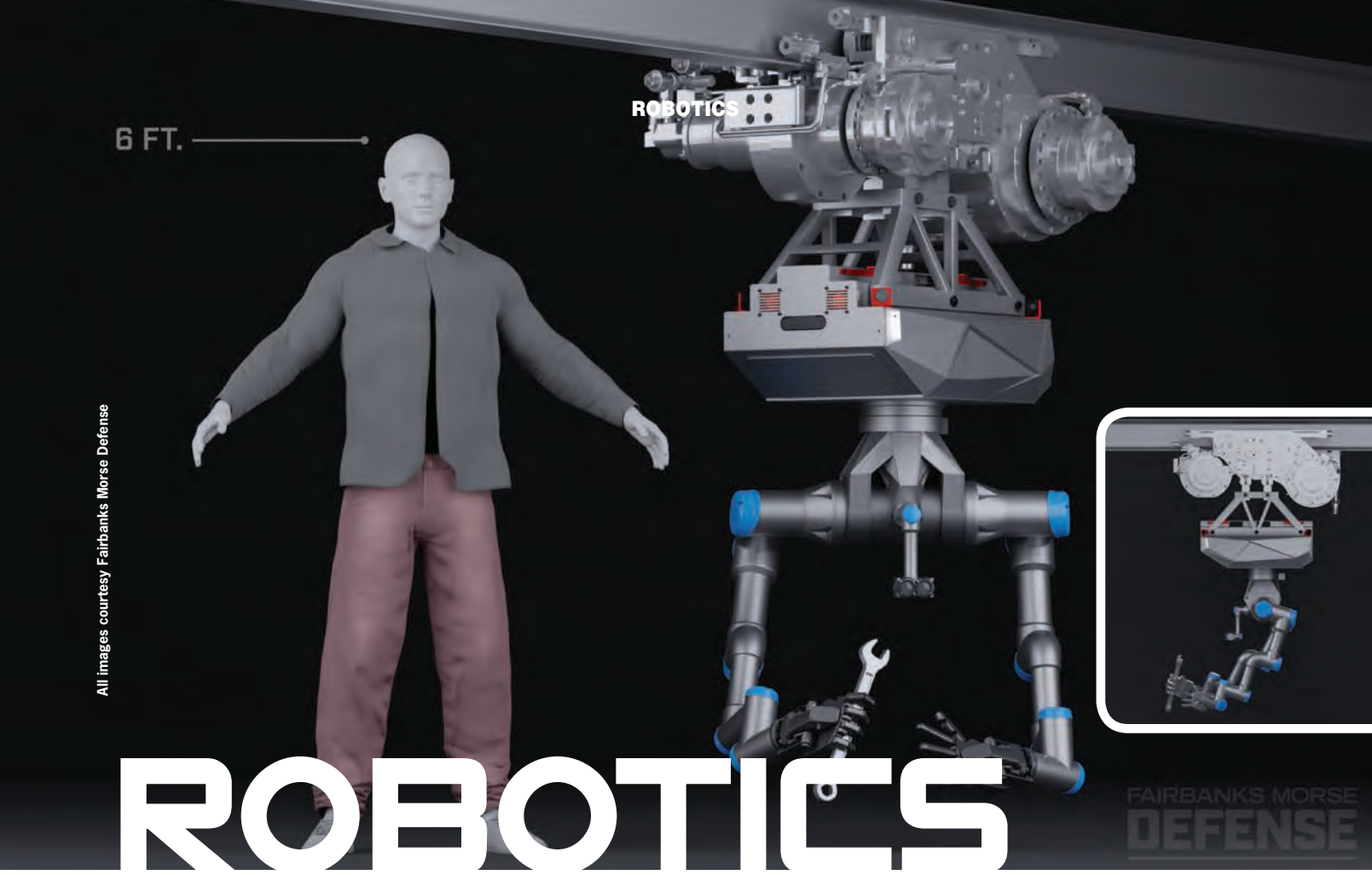
Digital Horizons

Digital transformation offers many opportunities to improve the marine industry in tangible, cost-effective ways, from simulation to optimizing ship designs and training sailors to increase fleet interconnectivity and automation. The technologies described in this article are only a few of the many possible applications of digital technology in the marine industry. No matter what, though, the future of marine lies in digital transformation.

The Author

van Os

Jan van Os is the vice president of the Marine Industry for Siemens Digital Industries Software. He joined Siemens in 2017 and is currently responsible for the strategy of the marine portfolio and solutions and the go-to market at Siemens.



All images courtesy Fairbanks Morse Defense

ROBOTICS in the engine room

When talk turns to autonomous ships, a first question usually centers on how routine and emergency repair and maintenance will be conducted with no crew.* Trey Taylor, *Director of Digital Innovation, Fairbanks Morse Defense, discusses FMD's research and development efforts on next-gen engine room robotics.

By Greg Trauthwein

The FMD team that Trey Taylor leads is relatively new, kicking off in 2019 with a baseline product that was looking at monitoring equipment, "being able to provide that information back to our technical teams for diagnosis and also to give some data to the end customer for self-support." But that was just the start, and in 2020 Taylor's team pitched the executive team for more. The result was "a roadmap for five product verticals that we were interested in: AI, autonomy, robotics, mixed reality capability and secure communications."

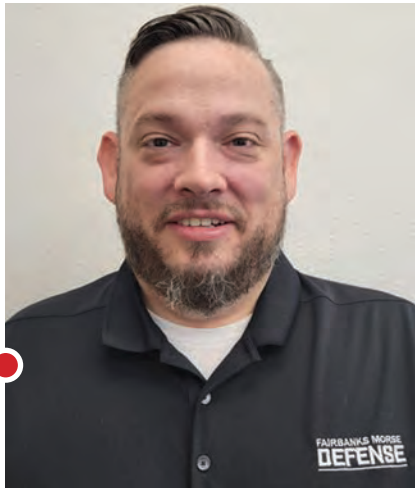
In the development of robotic solutions for routine and emergency work and repair in the engine room, Taylor credits his boss, FMD CEO **George Whittier**, for instilling his principle: *"Don't aim at the target, aim where the target's going to be."*

So, Taylor and his team of 22 started looking more closely at one of its prime customers – the U.S. Navy. "We know that the Navy has a need, a desire to fill uncrewed assets sometime later this decade, and the timeframe that they want these assets to be on deployment without intervention is today only about 30 to 60 days," said Taylor. "But the long-term goal is 180 days, so our team started looking at systems for how to help the Navy achieve that goal. We quickly came to the conclusion that we're going to have to do maintenance, but how do we do maintenance when there's not a human on board?" *Enter the robot.*

Today, FMD's work centers not on a single solution, rather a number of different manifestations of how engine room robotics will look and work. "We decided a robot platform is probably going to be the right approach, but we

"You're going to need different capabilities at different times. I might need to be able to lift and support 150-200 pounds; but I may also need some very fine manipulation of small fittings to remove that part. So I may have a robot that can support itself for that heavy lift, and it may have four arms, two that can handle the heavy lift, and then two fine skilled arms."

– Trey Taylor, Director of Digital Innovation, Fairbanks Morse Defense



want to make sure that we understand the problems and we understand the actual product requirements that a robot would have to facilitate," said Taylor, a process which meant understanding the Navy's long-term roadmap.

Per usual in the maritime space, there is rarely if ever a 'one size fits all' technical solution premised on the broad variety of ship designs. "There's a lot of key challenges working in a marine environment," said Taylor. "I have bulkheads that I have to pass through; I have confined spaces and open spaces. In some cases, I might want to have a robotics platform that's mounted on a bulkhead; in some cases, I will transit on a rail; in some cases I'll be asked to move through the space with either tracked or walking design. So when we are looking at the robotics platform, we're really focused today on the modularity and those sub components."

Apart from the mechanical, the operational environment is a consideration. "How do I do service when I'm in a six foot trough on a vessel that's moving at 20 knots through it?," asks Taylor. "A human's very good at figuring out their own stabilization, three points of contact, one hand holding a tool. A robot's got to be able to do the same thing." In bringing it down to its core essence, Taylor said to envision it as Legos.

"There are core components that every robot's going to need: some basic autonomy, some basic AI, the way that you train it to move, the way you control it remotely, vision systems, et cetera, that are common platform items. But then when I think about all the pieces of equipment I'm going to change or interact with, I might need 15, 20 different tools of different sizes. I'm going to need different lifting capacities; and all of that requires the ability for our platform to be able to adapt to it; self-change parts to go to a specific work location or different configurations on that robot. But I want a common control methodology; I want a common charging methodology; I want a common autonomy methodology."

Ultimately, it boils down to the guiding principle surrounding any complex technology: keep it simple, which is far easier said than done.

"You're going to need different capabilities at different times," said Taylor. "For instance, if I'm doing something on an engine, I might need to be able to lift and support 150-200 pounds; but I may also need some very fine manipulation of small fittings to remove that part. So I probably won't have a bipedal two-armed robot. I will have a robot that can support itself either on a rail or a bulkhead for that heavy lift, and it may have four arms, two gross movement arms that can handle the heavy lift, and then two fine skilled arms that are doing the fine fixture movements."

Ultimately, if successful with broad adoption, the use of robotics in the engine room could change the actual design of the engine itself. At the outset, the robotics must be designed to conduct its business as if it were a human, so at a minimum FMD is designing [robotics] to be human equivalent in strength and range in motion.

But as autonomy gains steam, there will be a gap. "It'll be a bit of a gap between when these uncrewed vessels start to be launched before there's enough of them in the fleet that the capital equipment suppliers will redesign their systems for robotic support," said Taylor. "So we have to bind a gap where we have human equivalent performance in a lot of cases, for tool manipulation, for reach, for degrees of freedom of movement, the kinematics of actually moving parts on and off a piece of equipment, for example: we're taking that into account in our designs today."

"Today, we're at what we call generation 0.2, where we have a prototype that moves. We have control features with limited sensing on board, but there's a lot of data-driven research that we need to do to influence the next generation. Right now we're going through a scientific evaluation of the basic and major maintenance procedures on an engine, where we're doing mapping: What are the number of fittings? What are the sizes? What's the volume that I have to perform the services as a human? How much torque do I need on any individual fitting in these maintenance procedures? We're doing that documentation right now, as we speak, on our engines, which will probably take us through this entire year [2023]," with the plan to have a basic platform by 2025.

JUHA KYTÖLÄ, Director of R&D and Engineering, Wärtsilä

*As maritime faces transcendent changes in terms of decarbonization and automation, **Juha Kytölä**, Director of R&D and Engineering, Wärtsilä, discusses how this Finnish maritime technology powerhouse is investing in the technologies and facilities that will drive the maritime industry for the coming generation, including insights on its unique arrangement for a future fuel engine testbed onboard Wasaline's MS Aurora Botnia.*

By Greg Trauthwein

To start off, can you give a scope of the Wärtsilä R&D investment?

We invest heavily in research and development, about 4.1% of our annual turnover. So last year $255 million was used for research and development activities; not only for engines activity, but the major part of that does go into the engine R&D.

This is a transcendent time in the maritime industry. How do you see it?

The transition taking place in the industry is huge [offering many] challenges, [and also offering many] opportunities. My 34-year career has always been closely linked to technology development, and I have been involved in introducing new fuels [to market]. We put a lot of focus on introducing liquefied natural gas as a fuel for shipping, which was a very big step [and has made] a big contribution toward decarbonization.

Today ship owners have the will to optimize their operations, not only for economical drivers, but especially for the environment. These are fantastic times for people in research and development; it's motivating for our people, working to contribute to decarbonization in a global business.

Wärtsilä has a relatively new sustainable technology hub in Vaasa, Finland. Can you tell us about the new facility; specifically, what does it add to Wartsila's overall capability in helping to create and deliver decarbonization technologies in the maritime sector?

We indeed have made great investment within Wärtsilä for developing the facilities and the infrastructure so that we can make steps forward in developing new products and solutions. Here in Finland, in Vaasa, we have a long industrial heritage with more than 100 years operations on the same site, which consists of older and modern facilities. Wärtsilä made a bold decision a few years ago to completely build new facilities, to relocate the activity about two kilometers from the older place, close to the harbor of Vaasa City. It's a $272 million investment which brings us about 60,000 sq. m. space under one roof, serving our research, development, testing and validation, as well as the production for producing our engine products to the markets, both of the marine market but also on the land-based energy markets. It's a fantastic facility, inaugurated in mid-2022, with a lot of modern facilities.

Can you discuss the challenges in manufacturing and customer support while you're planning for the future, a future that still has many questions, while supporting the legacy technology and those that rely on it?

Climate regulation is pushing for continuous improvement, fuel efficiency, and also the fuels that are being used. Today the marine industry is using around 300 million tons of fossil fuel per year, and there is a great need now to replace that with solutions which are not causing climate impact. One of those fuels we are developing to be used for marine is methanol. Methanol is a good fuel. It can be produced from bio sources or also from synthetic basis. So using hydrogen and capturing CO2 or carbon. Today there is production of methanol already in the world. If we count in the global production, that's around 90 million tons per year, but that is used by other industries, too. So at the same time we develop the technologies for using methanol, we need to find ways to ramp up the production volumes for these alternative fuels, where methanol is one candidate.

There are still so many unsettled questions on the fuel and technology transition we're undergoing now, so it might seem a bit premature but 'what's next?'

It's a great question about the longer-term future, what's coming and where's our focus. When we started [the path to-

ward] decarbonization, we had our eyes on the year 2050 [premised on rules from the International Maritime Organization]. Now our programs – short-, medium- and long-term – are all developed to support achieving that [2050] goal.

The first step is looking at the process to make the transition possible; it's not an overnight change, it's not black and white.

We start from energy efficiency, lowering the fuel consumption of vessels, which not only helps the environment but it's helping the economics case [for shipping] too.

LNG is a very good transition fuel from well to wake, with 5 to 20% [efficiency] improvements.

The next steps are fuels which are carbon neutral, fuels like methanol on biosynthetic basis. Eventually [we'll move to] fuels that don't have any carbon in the fuel itself. A lot of focus is put now already to support the long-term development of fuels like ammonia and hydrogen, too. So, there are many steps in the transition, which are ongoing, with all focus on supporting the industry to take the pollution down to zero by 2050.

Can you put in perspective how AI with all of its promise and peril will impact the work that you do within the walls of Wärtsilä research and development center?

Artificial intelligence and machine learning are indeed, in some segments, a powerful way to further improve operations. The engines being produced today for ships have very powerful automation and control functionality built-in, computers and sensors monitoring the operation continuously.

And we are also controlling functions. These engines typically have from six to 20 cylinders in one engine, and already now combustion is being controlled in every single cylinder separately, every single combustion separately.

Already now, machine learning and artificial intelligence is applied into these technologies to have the feedback loop. They're controlled as efficiently as possible for learning how the product is operating in that environment. Artificial intelligence is also used for controlling operation of installed engines and systems onboard of ships. With remote monitoring it's possible to get the signals from ships to operational centers, where we are able to use artificial intelligence to monitor the signals, to learn the real condition, helping to discern what is normal, what is abnormal. In our current system it takes two weeks for the AI to learn an installation, a ship, and thereafter it can give guidance on what would be beneficial for the ship to modify. It also gives hints on how to further make savings on fuel or operating costs, even learning about how to further extend the service intervals. So artificial intelligence is already a big part of activities.

Can you point to one recent project, either internally at Wärtsilä or externally on one of your client's ships that most clearly illustrates Wärtsilä's decarbonization aspirations in maritime?

Yes, this collaboration is best evidenced with the collaboration we have in this vessel from Wasaline, Aurora Botnia, where we collaborate on new technologies. [We have an engine on the ship] which is running on natural gas, and we have developed and validated onboard on a ship a technology which is cutting the methane emissions from such an engine by about half. So it's taking the cleanest engine in the world, and make it even better. Thanks to the collaboration and the operation onboard a vessel, we could validate and prove the concept.

[Read more about the project and the ship in the related story on page 23]

Inside Wärtsilä's Sustainable Technology Hub

Wärtsilä

"If we are to state our strategy in one word, it's decarbonization," said Juha Kytölä, the director of R&D and engineering at Finnish tech company Wärtsilä. "What we are going toward is to supply the market with a portfolio of products that are ready for zero-carbon fuels."

In order to achieve its sustainability goals—including a 2030 target for carbon neutrality in its own operations—Wärtsilä has been taking big strides in research and development, having ramped up its investment on this front in recent years, Kytölä said. In 2022, the company dedicated €241 million (about $255 million) to R&D expenditure, or 4.1% of its net sales, up from €165 million (about $175 million) and 3.2% in 2018.

In particular, the company has been working to maximize the efficiency of its portfolio of gas, diesel and dual-fuel engines, while also developing its next wave of products capable of running on carbon neutral and carbon free fuels. In 2022, it introduced the Wärtsilä 32 methanol engine, and an ammonia concept is slated to be ready by the end of this year, followed by a hydrogen concept expected in 2025.

To help reach its decarbonization objectives, Wärtsilä invested €250 million in the creation of its state-of-the-art Sustainable Technology Hub (STH) in Vaasa, Finland, officially opened in June 2022 to foster innovation, collaboration and production of green technologies.

The facility features a modern fuel laboratory, technology and engine testing facilities, remote monitoring center, as well as a state-of-the-art production system with high levels of automation and flexibility for meeting tomorrow's evolving technologies. The center itself, which employs about 1,500 people, is also energy efficient, with advanced energy recovery systems that enable self-sufficiency for heat energy. Electricity produced while testing is used in the hub's own processes, while remaining power is fed to the grid, and residue heat is stored and used.

Juha Päivike, Wärtsilä's director of logistics chain management and STH facility stream, said the first element of the STH to be launched was its partner campus, which serves as an "ecosystem of collaboration" by brining groups of experts together to drive meaningful innovation.

"What we want to see is that we accelerate this [shift to green technologies]. We want to be in the driver's seat. We need to then have the proper facilities for our experts to be close to the innovation, to collaborate with other companies, other bid partners, customers, even universities and academia, research institutes," he said. "The innovation cycle is getting faster and faster, so you need to adapt to new ways of how you tap onto these possibilities—and not always using your own efforts to develop something uniquely for yourself, but looking at partnerships where you can jointly benefit from the innovation."

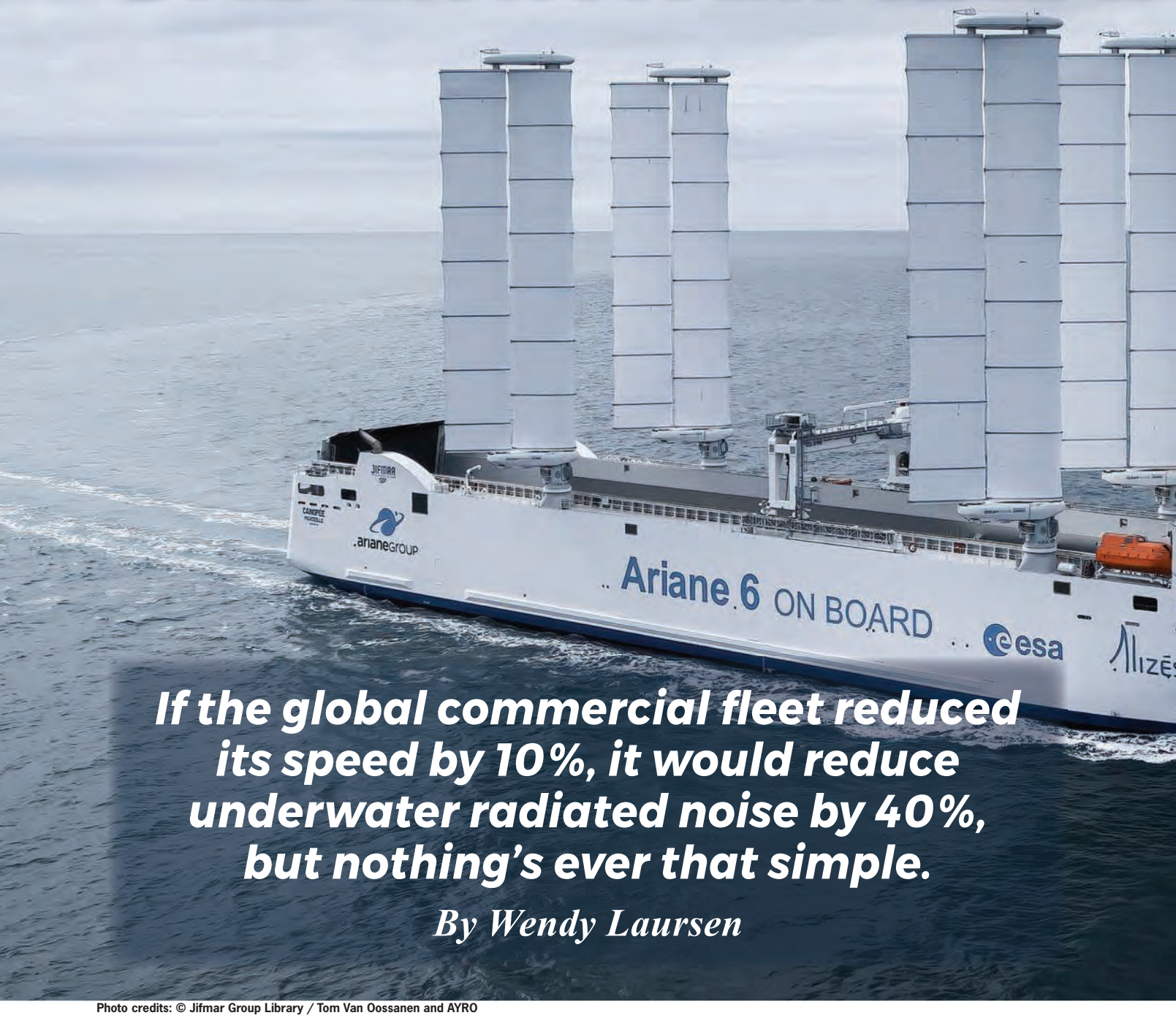
An example of the type of collaborative work underway is the Wasaline dual-fuel LNG ro-pax ferry Aurora Botnia, which makes daily transits between Umeå, in Sweden, and Vaasa, docking a short distance from the STH facility.

The 150-meter-long vessel, touted by its operator as one of the world's greenest, features an integrated package of Wärtsilä solutions, including four Wärtsilä 31 engines; exhaust treatment; LNGPac technology for LNG storage, supply control and monitoring; tunnel thrusters; catalysators; integrated electrical and automation systems; and NACOS Platinum combined control system for navigation, automation and dynamic positioning as well as power and propulsion. All the Wärtsilä equipment and systems aboard the Aurora Botnia are covered by a 10-year Wärtsilä Optimized Maintenance agreement, and through an additional agreement with Wasaline, Wärtsilä is able to utilize the vessel as an R&D test platform and technology demonstrator—"a floating test lab" Päivike said.

Another important element of the STH is its unique manufacturing and logistics set up, which can be quickly adapted to meet new demands as technologies evolve and new products are created. "Flexibility has been a cornerstone for everything we do," Päivike said. "Instead of having product specific assembly lines, we are actually having assembly based on size of products and also having a lot of focus on new product introduction so that the manufacturability, quality, also the safe operations, etc., are all considered in the launch of any new product."

Wärtsilä is looking more at how it can link from product design and engineering all the way through manufacturing and operations, Päivike said, opening up new opportunities in areas such as 3D-based assembly simulations. "We are creating a more solid line from planning to manufacturing operations. This means that all the way from the design level we are directly linked to the shop floor, which means that there are more ways to improve efficiency." – by Eric Haun

THE PROBLEM WITH UNDERWATER RADIA



If the global commercial fleet reduced its speed by 10%, it would reduce underwater radiated noise by 40%, but nothing's ever that simple.

By Wendy Laursen

Photo credits: © Jifmar Group Library / Tom Van Oossanen and AYRO

REDUCING ATED NOISE

Wind-assist will likely take load off the propeller.

The main thing holding the shipping industry back from reducing its underwater radiated noise (URN) is not a lack of appropriate technology. It's argued that many of the technologies being implemented today to reduce fuel consumption also reduce noise. So, the noise reductions could essentially come at no net cost to the shipowner, but there's a lack of regulation and a lack of targeted incentives, so it's not being prioritized.

A new version of the IMO guidelines on URN were approved in July 2023 as circular MEPC.1/Cir.906 with the aim of changing the situation. They apply, voluntarily, to new and existing ships, and key among the suggestions is the development of a Noise Management Plan for a ship. The guidelines include lists of suitable techniques for measurement of URN, explains **Chris Waddington, Technical Director at the International Chamber of Shipping (ICS).**

Shipowners can define their own targets or adopt the goals of quiet ship notations offered by class. "Many of the fuel efficiency measures adopted by shipowners to meet the IMO GHG regulatory requirements are also known to reduce URN," says Waddington. "If considered at an early stage, and by careful consideration of the adopted GHG reduction measures, it is likely that significant URN reductions can also be achieved with no additional cost."

Propellers are the main source of URN, and he cites some promising remedies: air lubrication could reduce fuel consumption by 7% and URN by over 10dB; propeller cleaning could reduce fuel consumption by 3-4% and URN by up to 5Db and wind-assisted propulsion could reduce fuel consumption by 10-30% and URN by over 10dB (all figures are approximate).

Gavin Allwright, Secretary General, International Windship Association (IWSA), says wind-assist will likely take load off the propeller when operating at moderate levels and quite significantly with higher levels, and this can also be deployed in combination with a slowing of the vessel which also significantly lowers URN. "Having wind onboard also enables range to be extended for the vessels without increased fuel consumption, thus creating the potential to avoid more sensitive regions/channels, or there is an option to build these sensitive areas into the routing for wind software that may enable that portion of the voyage to be undertaken using wind power alone or significantly reduced propellor loads."

Shipping sustainability expert **Dr. Seyedvahid Vakili, University of Southampton**, highlights the significant potential to reduce URN from commercial vessels by complying with IMO GHG emissions regulations. He estimates that a 10% reduction in speed could result in a 40% reduction in sound energy generated by global shipping because cavitation noise levels is speed-dependent. He notes, though, that this projection only relates to vessels with fixed pitch propellers (FPP).

Chris Waddington: If considered at an early stage, and by careful consideration of the adopted GHG reduction measures, it is likely that significant URN reductions can also be achieved with no additional cost.

Dr. Seyedvahid Vakili estimates that a 10% reduction in speed could result in a 40% reduction in sound energy generated by global shipping because cavitation noise levels is speed-dependent.

Jesse Spence: *It's not just a case of picking out a technology from a shopping list.*

Gavin Allwright: Having wind onboard also enables range to be extended for the vessels without increased fuel consumption, thus creating the potential to avoid more sensitive regions.

Reducing speed with controllable pitch propellers (CPP) can tend to increase propeller noise, but as one OEM explains, that's an over-simplified generalization mainly valid for constant rpm operation. FPPs can usually be built with more propeller blades than CPPs, because the mechanism to change the pitch of the blades takes up space in the propeller hub. Hence the lack of space might be a limiting factor for the blade-count of CPP-systems in some cases.

More blades can reduce noise emissions, if they are built in a way in which they can distribute the pressure field more evenly, but this doesn't automatically mean, that every five-blade propeller is better than a four-blade propeller. It all strongly depends on the thruster and what it is optimized for, which usually depends on the operational profile of the vessel it is used in.

Since a CPP can adapt to different operating conditions by changing the pitch of the blades, it can also reduce URN by adjusting the pitch. In some cases, this capability might outweigh all possible advantages of a FPP.

With the introduction earlier this year of ABB's DynaFin propulsor, there's another option available. Janne Pohjalainen, ABB's Global Product Line Manager, ABB Dynafin, says the system's individual blade control allows flexibility in blade trajectories to maximize propulsion efficiency and responsiveness in all operational situations. It also allows for the use of optimized trajectories to reduce propeller noise.

"Unlike screw propellers, ABB Dynafin does not generate vertical pressure pulses against the vessel's hull, which results in lower levels of propeller-induced noise and vibrations, and thus also in improved passenger comfort. Furthermore, gearless design minimizes mechanical noise and vibrations in the ship hull," says Pohjalainen.

Jesse Spence, President of Noise Control Engineering (NCE), says that today's commercial vessel specifications don't set URN targets. This is an opportunity lost. "It is typical to develop designs, particularly for propellers, where you're squeezing out every last ounce of efficiency, with inadvertent negative impacts to URN. This is simply because the designers have not been instructed to include UWN in the design spiral."

ABB

ABB's DynaFin propulsor will be designd to allow for the use of optimized trajectories to reduce propeller noise.

There are many technologies available to reduce URN, some of which may also reduce fuel consumption. However, Spence says it's not just a case of picking out a technology from a shopping list. Vessel designers are in the best position to identify the design features that will work for a given vessel. Some noise control technologies are only effective if the vessel suffers from a particular symptom. For example, applying a technology that would reduce propeller hub cavitation to a vessel that does not have hub cavitation would not improve URN.

Moreover, there are fundamental design decisions that will have a greater impact noise and efficiency, such as the shape of the hull form. This will determine the flow into the propeller, and ultimately determines what an optimized propeller design will look like. These are factors that need to be decided by the specialists that are working on the vessel design.

There's a process for ensuring the right decisions are made to control URN alongside other related non-acoustic factors: include an underwater noise limit in the vessel specification. This simple act will enable engineers, naval architects and acoustic specialists to be involved in the design process, working together to develop an effective design. He cautions: "Without having some sort of line in the sand for engineers to design towards, you're going to make design decisions that are likely to adversely impact URN."

GREAT SHIPS *of* 2023

NSMV 1: EM

Empire State VII is the first in a series of five National Security Multi-Mission Vessel (NSMV), built at Philly Shipyard, powered by Wabtec Tier VI diesel engines. The project to design, build and deliver the NSMV series is one of the most exciting shipbuilding programs in the U.S. – a government shipbuilding project leveraging commercial shipbuilding efficiencies.

Five ships will be built for five maritime academies – Empire State VII for SUNY Maritime; Patriot State for Massachusetts Maritime Academy; State of Maine for Maine Maritime Academy; Lone Star State for Texas A&M Maritime Academy; and Golden State for California State University Maritime Academy – and each had input on the design, from the size and configuration of classrooms and berthing areas, all the way down to the mess deck.

Seafarer training is an ample mix of centuries of traditional seafaring skills melded with new and emerging technologies aimed at making a difficult and potentially dangerous job more efficient. The technology on this new series of ships is the show stopper, and in the case of Empire State VII the upgrade is radical, as it replaces a ship that is more than 60 years old.

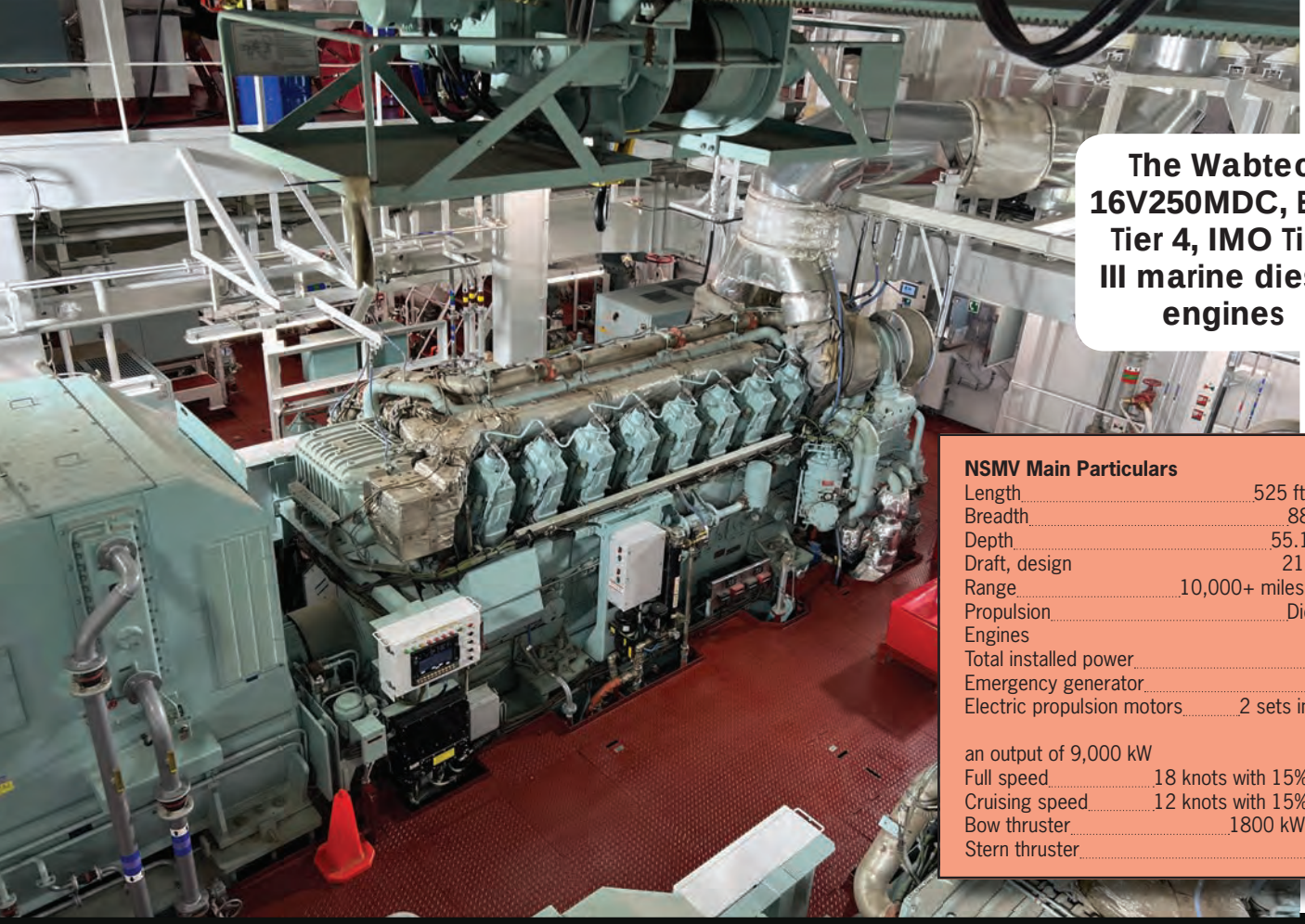
Starting in the machinery space, Empire State VII has a modern diesel-electric power plant, built with redundancy in that there are two separate engine rooms with a pair of diesel generators in each, both feeding dual high voltage switchboards and dual propulsion motors.

Anchoring the platform are Wabtec's 16V250MDC, EPA Tier 4, IMO Tier III marine diesel engines, a total of 20 powerplants – four per ship – designed to provide the power generation for the ships' electric grid, including the power and propulsion system. The marine diesel engines plus accessories were delivered to Wabtec channel partner Cummins Sales & Service, who in turn package the engines into marine gensets for the five ships. The cumulative package is delivered by GE Power Conversion.

"It's built from a redundancy for the safe return to port feature, but it also helps for training because we'll be able to take off equipment 100% offline for teaching," said Captain Morgan McManus the Ship's Master. "I think more importantly, the engineering students are going to get such a great working knowledge of power management systems and the computerization of the machinery, learning how reliant and how integral computer software is to engine management and power management," which is what they're going to see when they go out into the job market.

Getting schooled on the new system is a process for the

Photo above courtesy Captain Morgan McManus; Photo next page Greg Trauthwein



The Wabtec 16V250MDC, EPA Tier 4, IMO Tier III marine diesel engines

NSMV Main Particulars

Length	525 ft. (160.05m)
Breadth	88.5 ft. (27m)
Depth	55.1 ft. (16.8m)
Draft, design	21.4 ft. (6.5m)
Range	10,000+ miles @ 18 knots
Propulsion	Diesel Electric
Engines	4 x Wabtec
Total installed power	16,800 kW
Emergency generator	900kW
Electric propulsion motors	2 sets in series with an output of 9,000 kW
Full speed	18 knots with 15% sea margin
Cruising speed	12 knots with 15% sea margin
Bow thruster	1800 kW, retractable
Stern thruster	890 kW

IPIRE STATE VII

instructors, too, and started well before the first ship was launched. "Training wise, we've been going through GE Power Conversion training," said Captain McManus. "My engineers have gone out to Wabtec training school, and MarAd has been very supportive with funding training," from the power to the bridge.

In addition, the SUNY team has been in Philadelphia at the yard since December 2022, observing testing and commissioning. "As systems were coming online, if you're right there in the beginning, you get a lot of knowledge just by watching the technicians," said Captain McManus. Directly before our interview Captain McManus and his team participated in sea trials. "It's [taking a deep dive], immersing ourselves in design review and reviewing the blueprints and going over the ops manuals, the tech manuals for all the equipment."

On the deck side, the ship sports a dual bridge, a separate training bridge from the main bridge "so we get more interaction going on with more students and that makes a big difference," said Captain McManus. "The ship has a bow and a stern thruster, so the deck students are going to be able to get ship handling [experience] and familiarization with operating thrusters, firsthand in the ocean, real-world time."

While the NSMV is purpose built for training plus emergency response when needed, Captain McManus said the vessel feels familiar to the deep water drill ships that he led previously.

"Ironically, from working on the deep water drill ships, a lot of the structure is similar, the forward house and the diesel-electric propulsion. So there are parts of the ship where I walk on, it reminds me very much of a drill ship."

While the new ship is a bit shorter than Empire State VI, it's beamier, giving it a more spacious feel for everything from berthing areas to training facilities to classrooms.

In addition to regular watches and classroom training, the new ships are outfitted with dedicated simulator rooms, simulators for everything from ship handling to automation to high voltage simulators for the engineers.

Captain McManus emphasizes that another big differentiator with the new ship are the aforementioned dual bridge and the dual engine room. "You can manage more students safely for training; you can have dedicated supervision that doesn't interfere with operations; but you could also have that blend where the cadets are involved in the operations, in a controlled environment," said Captain McManus. "An engine instructor can be in the offline ECR reviewing everything that's going on in the online ECR with a whole class, and it's going to really help transfer knowledge."

GREAT SHIPS *of* 2023

SHIP OWNER/OPERATOR	
Ship Owner	Mitsui O.S.K. Lines, Ltd.
Shipbuilder	Oshima Shipbuilding
LOA	235m
Breadth	43m
Deadweight	About 100,422 tons
Flag/Port of registry	Japan/Port of Noshiro

WIND CHALLENGER SPECIFICATIONS	
Height	Up to about 53 m (4-tier)
Width	About 15 m
Sail material	Fiber Reinforced Plastic

MOL WIND

Japanese maritime companies historically have maintained strong leadership in both maritime technologies and environmental matters. Driven by new and emerging regulations aimed at decarbonizing the maritime sector, Mitsui O.S.K. Lines (MOL) has melded the two, partnering on a pair of ship innovation projects – Wind Challenger and Wind Hunter – that aim to harness the power of the wind as a means to help it meet and beat its own rigid emission reduction mandates.

While next-generation maritime technology is most often seen in the R&D lab, Wind Challenger is sailing commercial routes today. In late 2022, Oshima Shipbuilding delivered Shofu Maru, the world's first vessel equipped with the Wind Challenger hard sail, designed to transport coal, mainly from Australia, Indonesia, and North America as a dedicated vessel for Tohoku Electric Power Co.

Makoto Yamaguchi, Chief Technical Officer Director General, Headquarters of Technology Innovation, MOL, said that Shofu Maru is the result of an eight-year Joint Industry Project (JIP) with academia, including four years to take the 100,000-dwt bulk carrier from basic design to delivery. In address the primary challenges to bringing the project from the drawing board to the commercial waterways, he was blunt: "There was no past experience; everything is a challenge."

In looking back on the project's origin, he said the first hurdle to cross was taking into account the range of the ship's motion plus the wind pressure and thrust generated by the hard sale. "The combination pattern of ship's motion and wind force is almost infinite," said Makoto Yamaguchi. " We have solved this kind of, lots of "unknown" design matter one by one."

As designed, Wind Challenger was expected to reduce greenhouse gas (GHG) emissions about 5% on a Japan-Australia voyage and about 8% on a Japan-North America West Coast voyage, compared to a conventional vessel of the same

CHALLENGER

type. While Shofu Maru has been operating since October 2022, Makoto Yamaguchi said that "We are collecting and analyzing data. The sail is performing as we expected both mechanically and in terms of fuel savings."

Wind Challenger is a system developed mainly by MOL and Oshima Shipbuilding, using a telescoping hard sail that harnesses wind power to propel the vessel. Controlled from the bridge of locally, too, it takes 10 minutes to fully deploy or retract the sail. The Wind Challenger sail is automated, designed to make it easy for a normal crew to use the wind to maximum efficiency. Via sensors, the sail detects the strength and direction of the wind and automatically rotates. When the wind is weak, the sail is extended (unfolded); when the wind is strong, the sail is retracted (curved sail).

Operated via a hydraulic system, the hard sail doesn't pose any special or unique maintenance problems. The Wind Challenger system is intended for use by MOL, and Makoto Yamaguchi said the company has started to commercialize the engineering of the system, planning for larger scale production.

Makoto Yamaguchi could not disclose the total additional cost of this first R&D prototype sail for Shofu Maru, but noted that the investment in this first R&D prototype included additional investment in auxiliary equipment and systems, such as updated weather routing systems.

The Wind Challenger Project started in 2009 with the "Wind Challenger Plan," an industry-academia project led by The University of Tokyo. Since 2013, the team was chosen to receive a subsidy on next-generation marine environment-related technology research from MLIT, and in January 2018, MOL and Oshima Shipbuilding took charge of the plan.

MOL is aiming to equip a second bulk carrier with the Wind Challenger system, and it is also examining the feasibility of adopting Anemoi Marine Rotor Sails in combination with Wind Challenger a duo by which preliminary calculations show an expected 20% reduction in greenhouse gas (GHG) emissions.

GREAT SHIPS *of* 2023

GLDD HOPPER DREDG

Image courtesy GLDD

"One of the best features of the Galveston is her relative shallow draft for her capacity. So that allows her to get closer to the beach, to be more efficient, and to use less energy to get the work done. She's got the latest suite of dredge controls in automation, and over time, those automations will help the vessel remain as efficient as possible."

– Chris Gunsten, SVP, Project Services & Fleet Engineering, GLDD

Earlier this year Conrad Shipyard launched Galveston Island, the first of two newbuild hopper dredges being built for Great Lakes Dredge & Dock Corporation, a 6,500-cu.-yd.-capacity trailing suction hopper dredge.

The dredge is equipped with a direct high-power pump-ashore installation, dredging system automation, dynamic positioning and tracking, U.S. EPA Tier 4 compliant engines, and have capabilities of running on biofuel to minimize the environmental impact.

Great Lakes hopper fleet renewal program will be complete in 2025 with the delivery of the sister ship to the Galveston Island.

Inside Galveston Island

GLDD's new hopper dredge Galveston Island was built by Conrad Shipyard. "One really important factor of that type of work is being close to shore to limit your pumping distances," said Gunsten. "One of the best features of the Galveston is her relative shallow draft for her capacity. So that allows her to get closer to the beach, to be more efficient, and to use less energy to get the work done. She's got the latest suite of dredge controls in automation, and over time, those automations will help the vessel remain as efficient as possible."

Central to Galveston Island's efficiency are its Wabtec EPA Tier 4 powerplants, engines that achieve performance without the need for urea.

"We wanted to get as efficient as possible without the need for the urea after treatments that are at costly and cumbersome to manage at times," said Gunsten. "These engines also have the biofuel capacity. That's not widely available in a lot of markets [now] but they have that option."

The removal of aftertreatment, according to Patrick Webb,

"[Urea tanks are] big structures that are very expensive to build; that goes away with the Wabtec Tier 4. We don't have those tanks, so designers can use that space for carrying capacity. If it's a hopper dredge, they can have larger hoppers. If it's a vessel that carries cargo, they can have more cargo, they have more machinery space like with the Galveston Island,"

– Patrick Webb, Senior Director Sales - Global Marine and Stationary, Wabtec

Image courtesy Wabtec

Image courtesy GLDD

GE GALVESTON ISLAND

Senior Director Sales - Global Marine and Stationary, Wabtec, makes the system smaller and simpler for the customer the cost and maintenance of extra equipment, as well as urea which is a consumable. "So we reduce that cost, that operation complexity and make it much simpler to operate with a plug-and-play medium speed 900 RPM engine system," said Webb.

In designing and building the engines that will power both of GLDDs new hopper dredges, Webb said compatibility in space and ease of use were central themes.

"We've tried to make build and design this engine to fit in a lot of our competitor's footprints from the last 50 years of legacy engines," said Webb. "So that makes it easy for designers and operators to have a very simple setup." In emphasizing the importance of "no urea", Webb noted that some of the urea tanks can range up to 10,000 gallons, compounded by a USCG requirement for crawl spaces around the tanks in the event of a leak. "[Urea tanks are] big structures that are very expensive to build; that goes away with the Wabtec Tier 4. We don't have those tanks, so designers can use that space for carrying capacity. If it's a hopper dredge, they can have larger hoppers. If it's a vessel that carries cargo, they can have more cargo, they have more machinery space like with the Galveston Island," said Webb.

In confirming the engine choice, Gunsten said, "In essence, the hopper dredge is a cargo vessel and it works on a cyclical basis multiple times per day. So the more sand we can carry, the better off we are. Minimizing weight is an important consideration for that type of vessel and it links right into the reduced weight of the engine as well as the lack of the after treatment (weight)."

While dredges are indeed the very definition of 'Monster Machines', Gunsten reckons that more than ever software and cloud computing are central to dredging efficiency. "Having a new modern vessel with a modern dredge control and monitoring system (DCMS) allows us to optimize," he said. "Bridging on that and working into this new cloud-based world, she can broadcast that data and we can access that anywhere in the world, specifically here at our headquarters in Houston, where we plan to set up a data center to look at that information and have our experts analyze that real time. [This means] there's no lag in those optimizations [and we] get the most out of the investment in this new vessel."

GALVESTON ISLAND MAIN PARTICULARS

Name	Galveston Island
Type	Trailing Suction Hopper Dredge
Capacity	6,500-cu.-yd.
Shipowner	Great Lakes Dredge & Dock (GLDD)
Shipbuilder	Conrad Shipyard
Main Engines	Wabtec Corporation 2x12V250MDCx6L250MDC
Naval Architect	C-Job
Genset Integrator	Cummins

Image courtesy Wabtec

GREAT SHIPS *of* 2023

"Turku is building the real big ships"

– Tim Meyer, CEO, Meyer Turku

By Eric Haun

Meyer is not exaggerating. The yard's latest newbuild, Icon of the Seas—the first ship of Royal Caribbean's Icon class—is 248,655 GT, making it the largest cruise ship ever constructed.

In general, the cruise ships rolling out of the nearly 300-year-old Finnish shipyard have been steadily increasing in size since the Meyer Group took full ownership in 2015. "We are proud to say Turku has been a first-mover in building these big new classes for Royal Caribbean, which are game-changers in the cruise industry," Meyer said.

First announced in 2016, the record-breaking Icon of the Seas was floated out in December 2022 and delivered in November 2023. The construction cost is reportedly in the ballpark of $2 billion.

The 365-meter-long cruise ship has 20 decks (including 18 guest decks) and surpasses the previous record holder, Royal Caribbean's Oasis-class Allure of the Seas. With 2,805 staterooms, the ship is able to carry 5,610 passengers at double occupancy, or up to 7,600 passengers if every cabin is maxed out—another cruise industry record. It has capacity for a crew of 2,350.

"Icon of the Seas is the world's largest, but above all, the world's most advanced cruise ship. Together with Royal Caribbean, we set the bar exceptionally high in terms of design, technology, safety and reducing energy consumption," Meyer said. "Icon of the Seas is a revolutionary ship and at the same time a significant step towards the green transition, which is the shipyard's most important competitive advantage."

The state-of-the-art cruise ship is being touted as Royal Caribbean's most environmentally friendly, as the operator makes strides toward its goal to have a net zero carbon vessel in its fleet by 2035.

Icon's six multi-fuel Wärtsilä engines can run on liquefied


Royal Caribbean Group

Icon of the Seas

natural gas (LNG), and the ship also utilizes fuel cell technology for some of its onboard power needs. According to Royal Caribbean, this is expected to slash carbon emissions by approximately 30%. Other notable green features include a Foreship-designed air lubrication system to reduce hull friction as well as a robotic hull cleaner that removes debris and slime when the ship is docked in port to prevent increases in drag. Icon is also equipped with a shore power connection and a first-of-its-kind waste heat recovery system to turn waste heat into up to 3 megawatts of extra energy.

At the time of the ship's delivery, Royal Caribbean Group CEO Jason Liberty said, "Today we are celebrating much more than just a ship being completed. We also celebrate that the innovations and dreams created by Royal Caribbean during over 50 years have reached a new peak. Icon of the Seas represents everything that can be achieved in responsible vacationing thanks to commitment and strong partnerships."

The ship features the largest waterpark at sea, with six slides, as well as nine whirlpools and seven pools on board, including the first suspended infinity pool at sea. The vessel has 40 places to eat and eight distinct "neighborhoods" that offer a variety of experience options for passengers. One of the neighborhoods is the "AquaDome", featuring the single largest glass and steel structure to be lifted onto a cruise ship. Another innovation is the ship's "Pearl", a 15-meter-diameter round thrill staircase that is part of the ship's load-bearing structure. Following delivery, the Panamanian-flagged ship set sail to Cadiz, Spain, where the cruise line is completing finishing touches ahead of Icon's first voyage from its home port of Miami at the end of January 2024.

After Icon of the Seas, Meyer Turku will also build Royal Caribbean's next two Icon-class cruise ships for delivery in 2025 and 2026, having already started production of the series' second vessel, Star of the Seas.

Eastern Shipbuilding

OPC: A "GAME-CHANGER"

The much-needed replacement for the Coast Guard's long-serving medium endurance cutters (WMECs) took a giant step closer to joining the fleet as the first Offshore Patrol Cutter (OPC) was launched and christened at Eastern Shipbuilding Group (ESG) in Panama City Florida in late October 2023. The Coast Guard plans to procure up to 25 of the 360-ft., 3,700-ton OPCs. Along with the Polar Security Cutter (PSC) program, the Coast Guard officials describes the OPC program as one of the service's highest acquisition priorities. The OPC joins the 11 planned 418-foot National Security Cutters, nine of which are in service, which are the replacements for the 378-foot Hamilton-class high-endurance cutters (the last of which left service in 2021), and the planned 65 154-foot Fast Response Cutters, of which 54 are active, which are replacing the 110-foot Island-class patrol boats. The OPC will accommodate a crew of up to 126—compared with the 270s and 210s with crews of 100 and 75 respectively--and are capable of eight-week patrols. OPCs will have a rage of 10,200 nautical miles at 14 knots, providing an estimated 70% of the Coast Guard's offshore presence. In addition, the OPC are designed to be better able to operate with the Navy and other partners. They will be capable of deploying independently or integrated as part of task groups and serving as a mobile command and control platform for surge operations such as hurricane response, mass migration incidents and other events. The cutters will also conduct operations in the Arctic by helping regulate and protect emerging commerce, support fisheries enforcement and energy exploration in Alaska.

The OPC is based on the Vard Marine Inc., VARD 7 110 Offshore Patrol Vessel design. Vard has been working with ESG on the OPC program for the past 11 years, beginning with concept design and continuing through the preliminary and contract design phases, as well as detail design and construction. Northrop Grumman is the system integrator for the C4ISR and control systems, which includes the integrated bridge, navigation, command and control, computing network, data distribution, machinery control, and propulsion control system.

The OPC is armed with the BAE Systems MK 110 57 mm gun, which is the same gun found on the NSC and the U.S. Navy's littoral combat ships. Like the NSC, the OPC has a flight deck to accommodate helicopters and unmanned aerial systems. However, while the NSC and FRC have stern ramps to launch and recover their interceptor boats, the OPC uses over-the-side davit cranes for launch and recovery.

The first four OPCs are being built by ESG at Panama City. The lead ship is expected to be delivered to the Coast Guard towards the end of fiscal year 2024.

The OPCs are referred to as the Heritage class, and the 25 ships will be named for famous cutters.

The first ship in the Heritage class is named for the Revenue Cutter Argus. She was one of the first 10 ships that entered service with the newly formed U.S. Revenue Cutter Service, one of the predecessor services to what is today the Coast Guard. Revenue Cutter Argus began 13 years of service to the young United States of America, making her first patrol in 1791 and serving until 1804.

–By Edward Lundquist

BLUE WIND

The Self-Elevating Platform vessel Blue Wind was built by Japan Marine United for Shimizu Corporation, a ship with the size and the lifting capacity to help ensure that Japan meets and exceeds its offshore wind energy aspirations.

The vessel has a 'largest in class' crane with a lifting capacity of 2,500 tons (1,250 tons with the boom extended) and a maximum lift of 158m, able to install the foundation and offshore wind turbines in the 14-15 MW range.

Blue Wind sports a 4,600-sq.-m. deck capable of carrying all parts at once, including the tower, nacelle and blades for 7MW turbines or three 12MW turbines, with the capability to – including preparation time – install seven 8MW wind turbines in 10 days, and three 12MW units in five days, improving transport and construction efficiency up to 50% according to Shimizu Corporation. With the 60m working radius of its crane, the ship is capable of efficient loading in port even with obstructions at the quay.

The ship is equipped to work in varying sea conditions, outfitted with 90m legs, able to be modified to 109m legs which allow it to work in depths to 65m. Even in significant wave heights of 2.5 m at 10 second intervals, the ship is designed to work at 85% efficiency.

Another feature of Blue Wind is its self-propelled navigation, a propulsion system which includes six thrusters (three 3,800kW units and three 3,200kW units) with a maximum navigation speed of 11 knots, or twice as fast as typical barge-type SEPs pulled by tugboats. The ship is also fitted with dynamic positioning to help maintain its position on site. Construction on Blue Wind began in 2020 at JMU's Kure shipyard, with outfitting at JMU's Ametech's Aioi plant, where it stayed for months of operational training. The unit was available and ready for work in March 2023.

GREAT SHIPS *of* 2023

Photo courtesy Hapag-Lloyd

BERLIN EXPRESS

Hapag-Lloyd welcomed Berlin Express into its fleet, the first ship of its new Hamburg Express class and the first of a dozen large container ships will be put into service by 2025. The dual-fuel vessels will also be able to operate using non-fossil fuels, such as bio-methane and e-methane, generating minimal CO2 emissions. For now, LNG will be used, which will reduce CO2 emissions by up to 25% and soot emissions by 95%. In addition, advanced components – such as an optimized hull and a highly efficient propeller – will help the vessels to reduce fuel consumption and thereby greenhouse gas emissions, the company said. All the vessels in this class will sail under German flag and thereby make an important contribution to strengthening Germany as a shipping hub." The "Berlin Express" was built at the Hanwha Ocean shipyard in South Korea. With a length of almost 400 meters and a capacity of 23,600 TEU, it is the largest cargo ship ever to sail under German flag. The container ships in the Hamburg Express class will exclusively operate on the cargo-intensive Far East route between Asia and Europe.

SERI DAMAI

MISC welcomed two of its latest new generation of Liquefied Natural Gas (LNG) carriers, Seri Damai and Seri Daya to its fleet of LNG carriers. These 174,000 CBM LNG carriers are equipped with smart and sustainable technologies and were built for MISC by Samsung Heavy Industries Co., Ltd. (SHI). These new LNG carriers will be on long-term charters to ExxonMobil's wholly-owned subsidiary, SeaRiver Maritime LLC (SRM) and will be managed by Eaglestar Shipmanagenent (S) Pte.Ltd.

With the addition of Seri Damai and Seri Daya MISC now has 31 LNG carriers in its GAS Business, in addition to six Very Large Ethane Carriers (VLECs) and two LNG Floating Storage Units (FSUs), which has a combined deadweight tonnage (dwt) capacity of over two million tons.

Seri Damai and Seri Daya have enhanced cargo tank insulation with the GTT Mark-III Flex PLUS cargo containment system which is designed to reduce the boil-off rate to 0.07% of cargo volume per day for improved efficiency.

Powered by WinGD X-DF propulsion, the vessels fulfill the IMO Tier-III emission requirements without any external exhaust gas after-treatment system. It also complies with the Energy Efficiency Existing Ship Index (EEXI) standard while the eco-efficient vessels are also certified with ENVIRO Notation, a voluntary adoption of integrating ABS requirements with international conventions for environmental protection. The ships use the Samsung SVESSEL technology for enhanced safety and efficiency through remote monitoring of vessel performance and operations.

Photo courtesy MISC

EAGLE VELLORE

AET delivered its newest vessel, the first of three Very Large Crude Carrier (VLCC) powered by dual-fuel liquefied natural gas (LNG) engines, on long-term charter to Shell Tankers (Singapore) Private Limited. The Malaysian-flagged Eagle Vellore was named at a ceremony at the MMHE Pasir Gudang yard. Built by Hanwha Ocean (formerly Daewoo Shipbuilding & Marine Engineering) in Geoje, South Korea, the ship is classified by Lloyd's Register.

Eagle Vellore's two sister vessels are currently under construction by Hanwha Ocean and due to be delivered later this year on long-term charter to Shell Tankers (Singapore) Private Limited. Both AET and Eaglestar site teams have been working closely together with the yard to ensure the safe delivery. Eaglestar is also the appointed ship manager of Eagle Vellore and its two sister vessels.

The three ships are designed with state-of-the-art technologies, optimized hull forms and propellers, wake improvement ducts and rudder bulbs to further improve vessel's energy efficiency. Being among the most eco-friendly VLCCs available today, they comply with IMO's 2025 EEDI Phase III and with a 99% reduction in sulphur oxides, 85% reduction in nitrogen oxides and 95% particulate matter.

LAURA MAERSK

Maersk has taken delivery of the world's first container feeder to be fueled by methanol. The 2,100 TEU vessel was built at Hyundai Mipo Dockyard and Hyundai Heavy Industries and features dual fuel main and auxiliary engines from MAN Energy Solutions that are able to operate on methanol.

The ABS-classed vessel, HMD Hull #4168 is named Laura Maersk. The Danish shipping giant has signed a deal with Dutch producer OCI Global on the delivery of green biomethanol for the 21,500-km journey.

Maersk said the introduction of its newest container vessel is a significant step toward realizing its commitment to becoming carbon neutral.

The dual-fuel vessel will pause in Copenhagen right outside the Maersk headquarters on its way to the Baltic Sea, where it will be operating going forward. The feeder vessel will bring real experience for Maersk seafarers in operating the new type of fuel as the company prepares to receive a fleet of new, large oceangoing dual-fuel engine powered ships from 2024. Maersk currently has on order 24 additional green methanol-powered ships, including a dozen 16,000 TEU and six 17,000 TEU ships at South Korea's Hyundai Heavy Industries, plus six 9,000 TEU ships ordered from Yangzijiang Shipbuilding in China. The company is also planning to retrofit existing vessels with dual-fuel engines capable of running on methanol.

Photo courtesy A.P. Moller-Maersk

One-on-One with "Mr. ECDIS" – Tor Svanes, CEO, NAVTOR

Your reputation in e-Navigation as 'Mr. ECDIS' is well established, but can we discuss performance? Where are you today? Where would you like to be?

We want to be a leading company within performance, which is why we acquired Tres Solutions [in 2021]; to speed up that development. At the same time, we are listening to our customers, developing new functionality, and, of course, now we have the CII and emission [regulations]; they are [drivers]. But the biggest part is consulting with customers. They hear a lot of buzzwords, but it's still hard for them to imagine what, exactly, this technology can do for them. So we are learning, they are learning, and that's a good combination for us to make solutions.

How does NAVTOR fit into that sustainability discussion?

First we set up a person to be '*the*' sustainable person within NAVTOR. With that, we are talking to banks, financial institutions, as we already have customers with so-called 'green loans' because they can show, over time, savings on fuel and a reduction of emissions.

We talk incessantly about data, the need for more and more data; then what to do with it. Increasingly too, we talk about Artificial Intelligence. Can you discuss what you see in terms of data and AI in maritime today?

There has been a lot of focus on 'big data'. We don't talk much about big data. We talk about the important data. You don't need all the data they're talking about, and you don't need that data in the frequency they talk about. But machine learning and AI is definitely something we have to, and are already, implementing in our product and services. And that is to make the life easier for the people onboard ships and the people on shore.

Images courtesy Navtor

MR TV caught up with Tor Svanes, CEO, NAVTOR, earlier this year in Oslo.

Where are we in terms of the use of data, the effective use of data in maritime?

Somewhere in the middle, I would say. The biggest challenge for all companies is to get hold of the right data. Today we talked to somebody doing hull cleaning with a robot. We discussed how we could interface with that, show it on a screen onshore, so they [also] can see what the hull looks like and the kinds of fouling they have? So that's an example of a new technology, [the first of many] coming into maritime that can help the whole performance side of business.

As you know in the technology space, the question is perpetually 'what have you done for me lately.' Can you tell us where you see the company going in the next 12 to 24 months?

First of all, this is all about technology, but it's also all about making technology in a way that is useful for the user. With the technology, we have to build better systems, and one big thing is, of course, cybersecurity. So we have also put in place one person, a security officer within the company, to take care of that and all the [new and emerging] regulation, as regulation will [continue to] drive a lot of these things. There's a lot of confusion about fuel, the fuel of the future. That's a challenge because our software, our systems have to relate to what's going on in the ship. So the challenge is [continual] software development, while building in machine learning and AI, which are crucial elements.

NAVTOR, Voyager Worldwide to Merge

Keeping with the trend that has shaped his 30+ year career in maritime, no dust settles under Tor Svanes feet when it comes to developing his company's solutions for the maritime sector. With that, highlights since our interview in June 2023 in Oslo include:

- **NAVTOR and Voyager Worldwide agreed to merge,** and the combined company will deliver products and solutions to approximately 18,000 vessels globally. The transaction is expected to close by December 2023. "This is perhaps the biggest day in NAVTOR's history, and a major development for the maritime technology industry," said Svanes when the deal was announced in early November 2023. "Together with Tor, I see this as an incredible opportunity," said **Kent Lee, CEO** of Voyager Worldwide.

- **NAVTOR is aiming to simplify CII compliance** with the latest release of its NavFleet ship operations platform. Featuring an advanced Emissions Simulator, designed to help shipping companies predict and optimize environmental impact and performance across entire fleets, NavFleet 1.8 delivers operational insights built on high-quality, dual-validated data.

- **NAVTOR Digital Logbooks** have become one of the first solutions in the market to receive formal approval from the United States Coast Guard (USCG). NAVTOR digital logbooks are designed to streamline log-keeping routines and assist in ensuring compliance with regulations. By embracing digital log keeping practices, mariners can simplify their daily tasks and focus on what matters most – delivering safe and efficient operations.

Where is the IMO?

Tasked to fight climate change, what's up with United Nations ocean shipping agency charged with the responsibility to regulate GHGs?

By T. Nelson Thompson

Why can't global ocean shipping, an industry that transports more than 80% of the world's trade goods, clean up its act? Because it can't, doesn't want to, and won't, even with global shipping currently producing just over 3% of the world's total greenhouse gas (GHG) emissions, mainly carbon dioxide, and including 9% of the sulfur dioxide and 18% of nitrogen oxide.

Simply put, there's no political will to do much at the International Maritime Organization (IMO), a clubby UN agency based in an unassuming brown building on the River Thames in London. It's the IMO that has the responsibility for regulating global shipping. As such, the IMO, composed of 135 heterogenous member countries, is a product of a centuries old prevailing norm that countries favor minimal regulations at sea in pursuit of their strategic and economic interests. The consequent lack of political will to regulate much is partially driven by that history, which reveals a murky, constantly up-for-debate IMO mandate.

The IMO Convention was adopted in 1948, but only came

into force in 1958, and only gave the IMO broad and, vague powers "to deal with" the regulation and practices "relating to technical matters of all kinds affecting shipping in international trade…" of water-bound international trade. That has given industry players lots of leeway over how to organize self-interest, for example even through their own banks and insurance companies, the choice of national jurisdiction in the form of flags of convenience, and even until recently through loosely regulated industry (essentially cartels).

The Kyoto Protocol in 1997 only pointed out the shipping industry was accountable for decreasing the sector's emissions. Shipping was excluded from the Paris Agreement in 2015. The IMO of course has its critics, as well as its champions, but hardly anybody disagrees that the IMO hasn't done enough to regulate GHG emissions. Even critics recognize the use of scrubbers, low sulfur fuels, cold ironing/ shoreside power, more efficient propulsion hull upgrades and bulbous bows, wind sails, engine monitoring, slow streaming, hull coats, and propeller design matter. None of these, however, substitutes for political will to regulate GHGs.

To shift from having regulated the same cheap residual heavy fuel oil for more than 50 years is maybe beyond the IMO's grasp. Thus far the IMO has left it up to the shipowner to make the decision around which propulsion technology to use. Thus, obeservers' frustrations with the past year's summary agreement – the "2023 IMO Strategy on the Reduction of Greenhouse Gas Emissions from Ships" – with countries agreeing to reach net zero "by or around, i.e. close to 2050" depending on "national circumstances." The plan also includes an ambiguous heading called "indicative checkpoints" for "striving targets."

The problem is that the modest innovations I've listed don't compensate for rapid growth in shipping and the additional GHGs. How so? Because in the aggregate the environmental impact of the industry is accelerating no matter what the greater efficiencies are that are incorporated.

IMO insiders are disingenuously quick to compare emissions with a 2008 baseline for a reason; It was a year of extremely high emissions. Global trade volumes are expected to triple by 2050. Regulation of carbon intensity is essential. And no national government has regulated to control either black carbon or methane shipping emissions from LNG propulsion. Shipping's GHG emissions are projected to quadruple from 1990 to 2050. There are projections that this could be more than 10% of the entire planet's GHG emissions.

There's not currently much public concern or protest. Shipping hardly gets the attention it needs. Far removed from the average person's life, shipping is very much "out of sight, out of mind" life. And IMO insiders like it that way. For the shipping companies, opposition to regulation is predictable. It's the U.S. and the E.U. that are pressing for significant regulation. But shipbuilders, oil companies, miners, chemical manufactures and others with huge financial stakes in shipping, are among the delegates appointed by member nations and they are quick to drown out the voices favoring regulation.

Meanwhile, ships belch out millions of tons of greenhouse gases every year. But if the IMO doesn't curb shipping missions, it's unclear who will.

** The opinions expressed are those of the author's. They do not purport to reflect the opinions or views of the publisher.*

The Author

Thompson

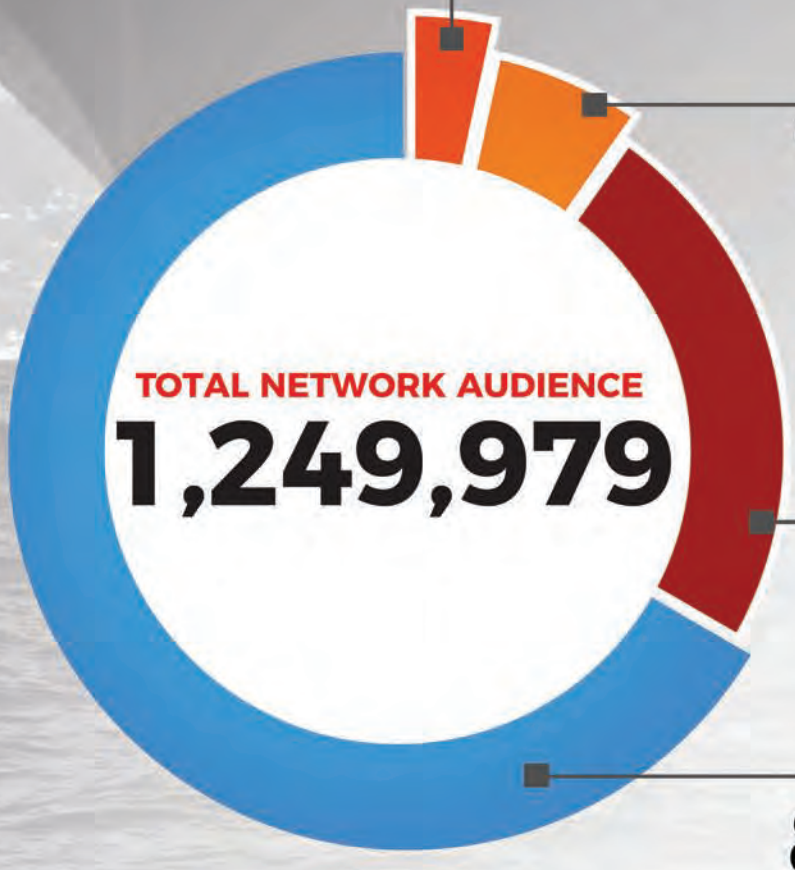
T. Nelson Thompson, Ph.D., recently retired at the U.S. Maritime Administration (MARAD), where he was the Maritime Environmental and Energy Technical Adviser. His opinions are his own and not those of any U.S. government agency.

MARITIME REPORTER AND ENGINEERING NEWS

Marine News

MARINELINK

THE INDUSTRY'S LARGEST PORTFOLIO OF PRINT, DIGITAL & SOCIAL MEDIA IS GROWING LARGER EVERY DAY



MAGAZINE CIRCULATION:
70,849
SUBSCRIBERS

MOBILE APPS:
77,498
DOWNLOADS

SOCIAL NETWORKS:
258,426
MEMBERS

WEB TRAFFIC:
843,204
PAGEVIEWS/MONTH

WWW.MARINELINK.COM

MARKETPLACE

Employment

www.MaritimeJobs.com

Professional

www.MaritimeProfessional.com

MARKETPLACE

Professional

www.MaritimeProfessional.com

Products & Services

www.MaritimeEquipment.com

Vessels, Barges & Real Estate for Sale/Rent

BUYER'S DIRECTORY

This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR assumes no responsibility for errors. If you are interested in having your company listed in this Buyer's Directory Section, contact Mark O'Malley at momalley@marinelink.com

ANCHORS & CHAINS

Anchor Marine & Supply, INC., 6545 Lindbergh Houston, Texas 77087 , tel:(713) 644-1183, fax:(713) 644-1185, david@anchormarinehouston.com

BATTERY CHARGERS

Britmar Marine LTD, 102 2433 Dollarton Hwy N. Vancouver V7H OA1 BC Canada, North Vancouver , Canada

ENGINE ORDER TELEGRAPH

Prime Mover Controls, 3600 Gilmore Way Burnaby B.C. V5G 4R8 Canada , tel:604 433-4644, fax:604 433-5570, Michael.Combs@pmc-controls.com

INERTIAL SENSING SYSTEMS

Silicon Sensing Systems Ltd, Clittaford Road Southway, Plymouth, Devon PL6 6DE United Kingdom , UK , tel:+44 (0) 1752 723330, sales@siliconsensing.com

MEMS MOTION SENSING

Silicon Sensing Systems Ltd, Clittaford Road Southway, Plymouth, Devon PL6 6DE United Kingdom , UK , tel:+44 (0) 1752 723330, sales@siliconsensing.com

METEOROLOGICAL INSTRUMENTS

R.M. Young Company, 2801 Aero Park Drive Traverse City, Michigan 49686-9171 , tel:(231) 946-3980, vsherman@youngusa.com contact: Viola Sherman

NAVAL ARCHITECTS, MARINE ENGINEERS

JMS Naval Architects, 70 Essex Street, Mystic, CT , USA , tel:(860) 536-0009 EXT 2, fax:(860) 536-9117, RickF@JMSnet.com

NAVIGATION AND CONTROLS

Prime Mover Controls, 3600 Gilmore Way Burnaby B.C. V5G 4R8 Canada , tel:604 433-4644, fax:604 433-5570, Michael.Combs@pmc-controls.com

REMOTE OPERATIONS TECHNOLOGY

Harvest Technology Group Limited, 7 Turner Avenue, Technology Park Bentley WA 6102, Australia , tel:61 429498089, alice.lewis@harvest-tech.com.au

REMOTELY OPERATED VEHICLES

Harvest Technology Group, 7 Turner Avenue Technology Park Bentley, Australia 6102 , tel:61 429498089, alice.lewis@harvest-tech.com.au

SENSORS

Silicon Sensing Systems Ltd, Clittaford Road Southway, Plymouth, Devon PL6 6DE United Kingdom , UK , tel:+44 (0) 1752 723330, sales@siliconsensing.com , www.siliconsensing.com

ADVERTISER INDEX

The listings above are an editorial service provided for the convenience of our readers.
If you are an advertiser and would like to update or modify any of the above information, please contact: productionmanager@marinelink.com

IGP

INTELATUS

GLOBAL PARTNERS

OFFSHORE WIND MARKET INTELLIGENCE

Intelatus offers solutions to grow your business globally.

- **U.S. Offshore Wind Market Report**
  The monthly report and database contains all of the latest developments and information on the projects that will lead the U.S. to deploy 30 GW of offshore wind by 2030 and 110 GW by 2050.

- **Polish and Baltic States Offshore Wind Market Report**
  Intelatus forecasts that over 30 projects accounting for over 30 GW of offshore wind capacity are likely to be committed by 2035.

- **International Wind Turbine and Foundation Market Forecast**
  We provide a forecast of the bottom-fixed offshore wind turbine and foundation installation vessel demand and identify supply gaps in the market.

- **Floating Wind Turbine Installation Vessels Market Forecast**
  Intelatus provides a forecast of floating wind turbine installation vessel demand and identifies supply gaps in the market.

Get all the information you need to access this growing multi-billion dollar market today!

VISIT US

WWW.INTELATUS.COM

ABS WAVESIGHT™

Manage Your Fleet from Anywhere with Nautical Systems Mobile Applications

Learn more at
abswavesight.com