February 2026

MARITIME REPORTER AND ENGINEERING NEWS

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FERRIES

Japan's Long-Haul Ferry Fleet is a Model of Sustained Reinvestment

Since 1939 | Number 2 | Volume 88

Inside Gotland Horizon X
A Large, Hydrogen-Ready Ferry

Joseph Farrell III
Building on Resolve's Legacy

Cobots
Fix the Navy's Maintenance Crisis

Coatings
Beyond the Paint Can

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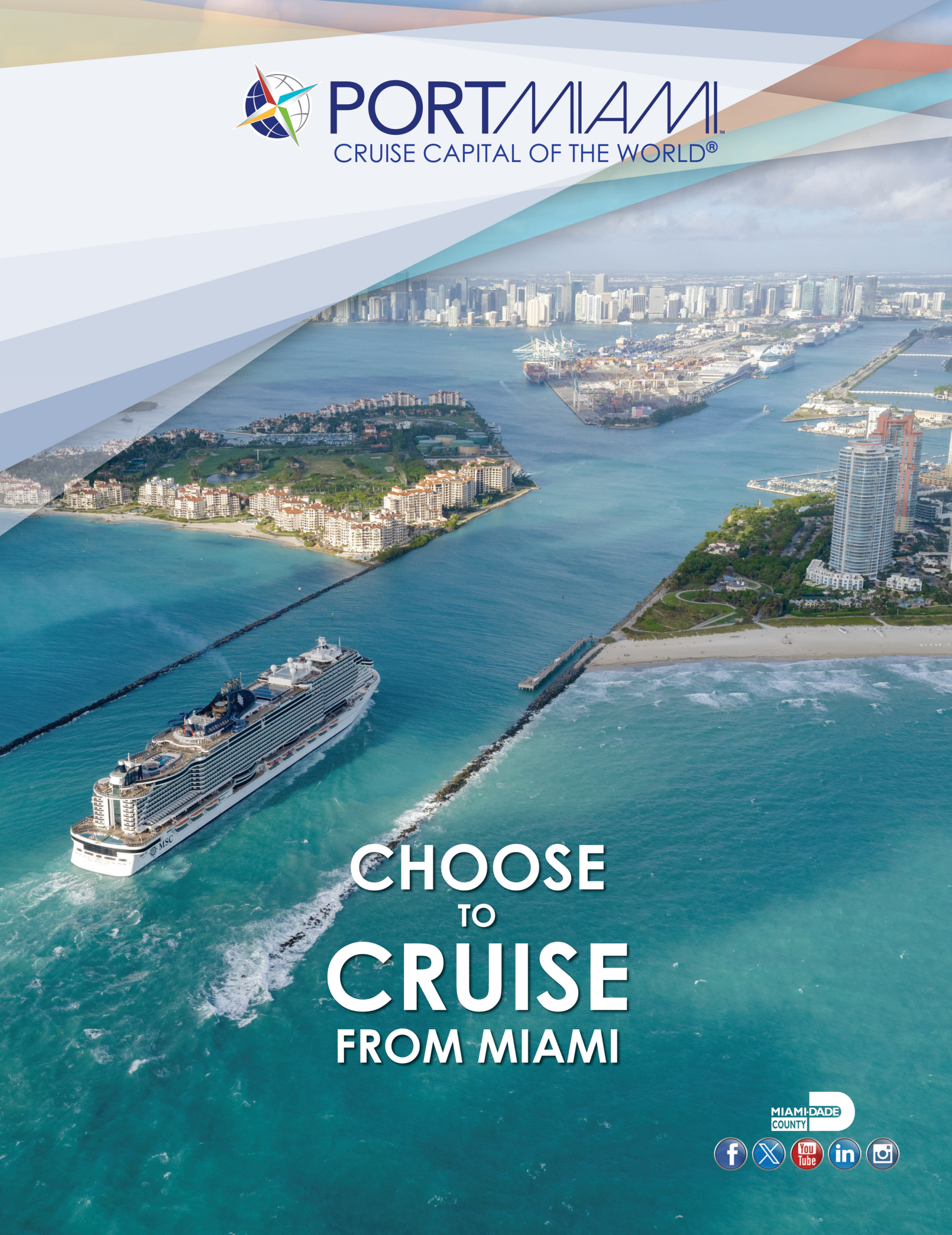

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Photo on this page: Austal

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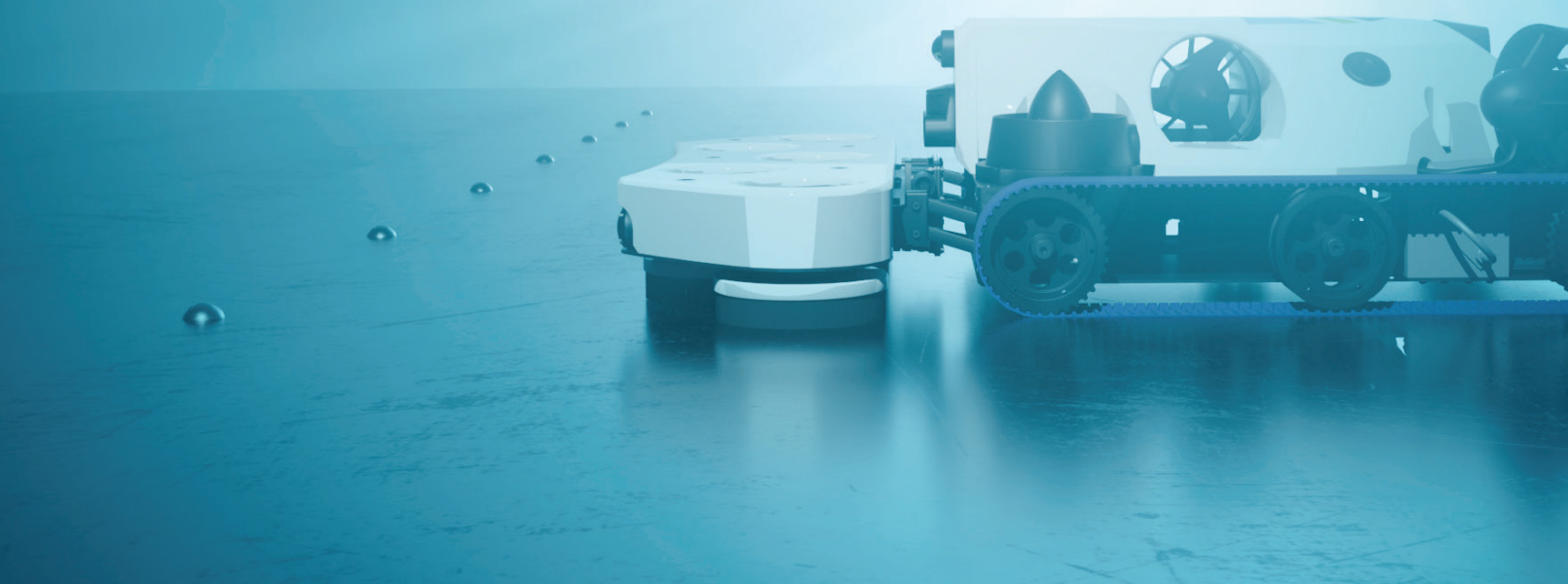

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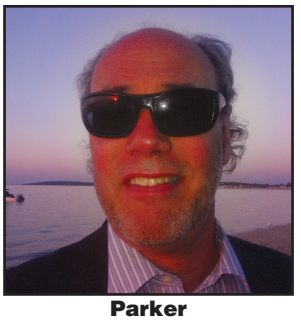

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Editorial



Photo Justin Zurre

This year has started out fast, and there is a real energy across the U.S. maritime sector, from revitalizing the shipbuilding and industrial infrastructure to an influx of modern tonnage to the dredging fleet to the fast-evolving icebreaker program That said, much of the energy is premised on talk and projection rather than dollars and action, and when the U.S. Maritime Action Plan – already long overdue and still pending release at press time – comes out, it's universally hoped that those who 'talked the talk' now 'walk the walk' backed by a long-term investment plan and commensurate war chest.

This is our first year hosting the **Port of the Future** conference and exhibition in Houston, an event that we picked up mid-last year and now in it's 7th rendition. Port of the Future is a relatively small but strategically important event, with the tagline **"50 Ports in 2 Days."** It has been a pleasure to work alongside my colleague, our new event director **Kevin Clement** – the man who founded the event – as the conference program is packed tight with a broad variety of port, maritime, dredging and offshore energy topics that cumulatively conspire to shape how ports and terminals invest and operate. Visit **https://portofthefutureconference.com/** for full details.

Though I am loathe to play favorites, looking at this edition there are several features I'd like to highlight. The first is from **Rik van Hemmen**, CEO of Martin & Ottaway and a regular columnist in our pages. Rik takes a deep dive into the recently scuttled U.S. Navy Constellation Class frigate program. This was not a shipyard problem, rather a ship design [and re-design] problem, taking the promise and efficiency that comes with adopting a standard design and replacing it with the inherent problems that come with endless re-design.

Next up I'm truly happy to welcome David Tinsley back to our pages. I've known David for most of my 30+ years tenure, and he was a regular contributor to our pages in the 1990s and early 2000s. A seasoned U.K.-based maritime journalist, David is a true professional, something that comes through in our cover story of the Japanese Long-Haul ferry fleets starting on page 32.

Last, but certainly not least, I'm happy to present my interview with **Joey Farrell III,** CEO of Resolve Marine. I've done the South Florida editorial run for many years, with our former sales office strategically placed in Boynton Beach, with hundreds of interesting maritime companies and leaders to visit on the ride from West Palm Beach to Miami. Personally, I had not taken the at South Florida run since March 2020 and the start of Covid, and the last time I'd been to the offices of Resolve Marine was when **Joe Farrell Jr.**, Joey's father and the company founder, sat at the helm. The visit with the Resolve Marine team and subsequent interview with Joey more than made the trek worthwhile. As I've said many times, marine salvors have some of the very best stories, and in the case of Resolve Marine we got a taste of some recent jobs as well as insights on how the company continues to diversify to help soften some of the revenue curves premised on the unpredictable nature of marine salvage.



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Photo credit Italian Navy

Italian Navy Carlo Bergamini-class FREMM frigate ITS Carlo Margottini (F 592).

CONSTELLATIONS OF DISASTERS

By Rik van Hemmen

After spending about 3 billion dollars, the Constellation frigate program has now been shut down with absolutely nothing to show for it. The *New York Times* produced an Op-Ed titled "America can't make what the Navy Needs."

That title may indicate the United States does not have the technical ability to build ships for the US Navy. However, the article itself clearly shows that the issue relates to the Navy not being able to figure out what it wants US shipbuilders to build. **The Navy wanted US shipbuilders to build a standard design. They contracted with a US builder who had proposed a standard design and then the Navy proceeded to modify the design to death.**

The article has an excellent animated graphic that shows how the design changed, and to an engineer it is scarier than Jack Nicholson screaming "Here's Johnny" in the Shining.

I posted the article on LinkedIn and it received a personal record amount of comments, likes (actually expressions of shared disgust), and reposts.

From the comments it appears that at the outset hardly anyone thought this was a good idea, which leaves one to wonder why the decision to adopt a foreign design for US Navy consumption was ever made. It might have been a desperation move, noting that recent attempts at native designs had been deemed failures.

I actually feel bad for our Navy. They have become the whipping boy for a system that develops naturally when large amounts of time and money are available in a risk averse environment with too many cooks spoiling the broth.

The US Navy simply no longer is an environment for experimentation and innovation. It has gotten too large, risk averse, bureaucratic and beholden to its contractors to go from a concept to an actual ship in a reasonable amount of time at a reasonable cost.

In wartime these obstacles disappear, but decades since last actual naval combat has resulted in a massive counterproductive morass. To describe the morass would take too long for this column, but note that for the Italian job the Navy was required to run the design through their proprietary CREATE-SH computer aided design system. This system, developed over decades at massive cost, was supposed to simplify Navy ship design, but it actually makes ship designs grow out of control. It is rumored that when the Arleigh Burke design was run through that CAD system it required over 30% additional displacement to carry the same combat systems.

It is easy to criticize, but it is much harder to come up with solutions. I am sure that there is no single answer (short of becoming involved in a war that requires naval combat), and the resistance to change will be immense because there are too many players that benefit from the system's disfunction. However, if there is motivated leadership for change, they may want to listen to those who actually know how to design Navy

ships. I did, and this is what I heard.

- **Design depends on design leadership.** Design leaders are unique professionals who have a solid grasp of the process and the willpower to say "no" ten times before they will allow a design to be modified. They are still out there. I am even sure that there are quite a number of those people working at NAVSEA and for US Navy design contractors. The problem is that they are not allowed to say "no". Ship design is very complicated, but relatively simple in process terms. The process simply consists of getting a good team together of no more than 30 generalists and specialists and lock them up for 6 months with an unalterable design assignment. They will come out with something that is just as good, if not better, than when there are hundreds of people over multiple years working on one project. Nothing is worse than a design team that is larger than needed and takes more than the absolute minimum amount of time.
- **It is also good cost control.** 30 Engineers for six months should be budgeted for no more than $6M, and that allows for the best of the best to work on the project with money for late night pizza to spare.
- **I used the term "unalterable design assignment".** What I mean is that before the design effort starts, there has to be a clearly defined mission. If the mission changes, the design should not be altered to suit the new mission. Instead, the design should be scrapped and a new design should be started. This puts a heavy burden on the Navy, but it will teach the Navy discipline, because changing missions will simply start a new 6 month cycle and if they don't stop changing missions, they will never get to build a boat.

There is another way to install discipline and that can be driven by legislation. The Navy can simply be told that they are allowed to have vessels of certain maximum displacement, top speed and top speed range. Maybe they are allowed to have 80,000 ton vessels, 13,000 ton vessels, 9000 ton vessels and 5000 ton vessel, etc. all with specified speed and range. There will be a fixed fleet procurement budget and it is up to the Navy to pick the mix. However, if the prototype vessels do not make the speed, range, or go over displacement, funding will stop automatically for the next vessel to that design. It is up to the Navy to figure out how they will fix a design. In this approach the designers have a stronger barrier against mission creep, and it will be more attractive to design a simpler ship that will be certain





Credit: Marinette Marine Illustration

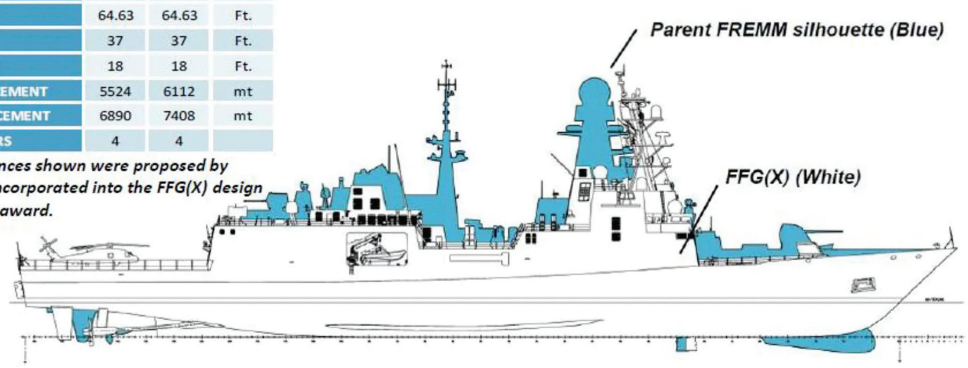
Artist's rendering of the Constellation (FFG 62)-class guided-missile frigate.

FFG 62 vs FREMM Parent

	FREMM	FFG 62	
LOA	472.44	496.06	Ft.
LBP	434.71	462.27	Ft.
BEAM ON WATERLINE	55.77	59.38	Ft.
BEAM OVERALL	64.63	64.63	Ft.
DEPTH MAIN DECK	37	37	Ft.
DRAFT WATERLINE	18	18	Ft.
LIGHTSHIP DISPLACEMENT	5524	6112	mt
FULL LOAD DISPLACEMENT	6890	7408	mt
DIESEL GENERATORS	4	4	

NOTE: All differences shown were proposed by Fincantieri and incorporated into the FFG(X) design prior to contract award.

Naval Combatant Design Standards implemented to ensure survivability performance meets USN standards for Combatants.



- Hull lengthened 23.6 feet to accommodate larger generators and future growth
- Bow design modified to remove sonar dome and enclosure deck for stability
- Generator rating has been increased to support transit speed and future growth
- Propeller changed to Fixed Pitch for improved acoustic performance
- Displacement increased by ~500 tons for margins and future growth
- Topside modified to accommodate USN warfare systems

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to meet the constraints and then to build out the concept in later versions.

Remarkably this is what has actually occurred with the Arleigh Burke destroyers. The original Burkes were quite conservative and did not even have a hangar, but later versions have become much more capable (although the displacement increases would not be allowed in the above approaches, and later Flights also suffered from design dithering delays).

There is no guarantee that any design will be a raging success, regardless of who designed it and how many people provided input. That means that we simply have to accept that some designs work better than others and just learn from it and carry on. In that light we do not have to think of the LCS and Zumwalt designs as failures. The only failure in those projects is that it took forever to actually build those boats to see how good or bad they were.

The American engineering (tinkering) approach of building something and then making it better is a valid concept in complex designs with rapidly changing technology. However, that means that there has to be strong pushback against second guessers when things don't work out in the first pass. Innovation is hard work. If it were easy, everybody would be doing it.

I often think back on watching TV coverage of one of the Space X rockets failing to land on its feet. To me it registered as: *"Oh, well it did not work this time, but I am sure they learned something."* However, the TV voiceover said: "For the sixth time in a row Elon Musk's Space X rocket failed to land on its feet."

I ended up screaming at the TV: *"Well what did you expect? This is really really hard! The only way to make it work is to keep trying! Just let them do their job and shut up!"*

For every column I write *MREN* makes a small contribution to an organization of my choice. For the foreseeable future I am selecting SL7Expo. An industry wide effort to develop a Smithsonian level exhibit center for commercial maritime on a ship that is a paragon of a fast design process. https://sl7expo.org/members/



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LEADERSHIP AT THE SHARP END OF MARITIME SECURITY

With guidance in place and inspections underway, the challenge for maritime security now is leadership. Turning vessel hardening from intent into a mindset is where confidence, consistency and protection are built.

By Russell Pegg, Security Adviser, OCIMF

Maritime security guidance has matured significantly in recent years. The industry BMP Maritime Security (MS) publication clearly sets out how ships can identify threats, assess risks, plan effectively and apply vessel hardening measures that are proportionate and practical. What matters most now is how consistently guidance is translated into action on board in day-to-day operations, particularly when conditions are uncertain and time is limited.

Vessel hardening is often associated with visible measures, such as barriers rigged on deck, doors secured, and hoses laid out. These elements are important, but BMP MS is clear that vessel hardening is a system, not a collection of items. Its effectiveness depends on how measures are selected through the identification of threats and risk assessment, integrated into routine operations and reinforced through effective leadership.

The guidance emphasises a layered approach. Early detection through enhanced situational awareness, vigilant watchkeeping, physical barriers to delay boarding, controlled access to accommodation and machinery spaces, and clearly defined security muster points all work together. No single measure is sufficient in isolation. Leadership is what helps ensure these layers remain coherent, functional and maintained over time.

Consistency: The Real Measure of Vessel Hardening

BMP MS stresses that security measures should be practical, sustainable and understood by the crew. Razor wire that is poorly secured, access points that are routinely left open, or alarms that are not distinctive or regularly rehearsed can undermine the entire vessel hardening plan.

The guidance is explicit. Access to accommodation should be controlled and minimised. External doors should be secured and checked as part of watch routines. Windows and portholes that present potential entry points should be protected where appropriate. Physical barriers should delay access without compromising escape routes or emergency response.

Human factors are equally critical. BMP MS highlights the importance of additional lookouts, clear alarm signals and regular drills that reflect realistic threat scenarios. Crews should know instinctively where to muster, what equipment to take and how to communicate under pressure. These actions are not exceptional; they are the fundamentals of effective vessel hardening.

They form the mindset that underpin consistent readiness.

Inspection as Insight

OCMIF's SIRE 2.0 Focused Inspection Campaign for maritime security, launched in October 2025, examines how these principles translate into everyday practice. By looking closely at vessel hardening and access control arrangements, the campaign helps to build a clearer picture of whether BMP MS and vessel hardening guidance is being applied as intended, and where gaps may exist.

This insight moves the conversation beyond compliance. It highlights whether crews are familiar with their Vessel Hardening Plans, whether mitigations are rigged with intent, and whether procedures align with the realities of the ship's layout and operation.

This knowledge is central to OCIMF's role. OCIMF provides guidance, promotes best practice and, through verified

data, helps the industry understand how well those practices are being applied on board. A Focused Inspection Campaign supports that understanding by feeding directly into the ongoing development of guidance and engagement with the sector.

Confidence Onboard

BMP MS recognises that ships cannot remove maritime threat and risk entirely but they can reduce the likelihood of incidents through preparation, awareness and discipline. Vessel hardening, when applied properly, buys time, reduces vulnerability and gives crews options.

Confidence on board comes from knowing security measures are appropriate, proportionate, maintained and rehearsed. It comes from leadership that treats security as part of normal operations, not as a reaction to incidents elsewhere.

Because the guidance exists and insight is being gathered follow up discussions are focused on application. Responsibility sits with leaders across the industry to ensure that vessel hardening is embedded, understood and effective in practice.

That is the point at which maritime security is no longer defined by documents or processes, but by confident crews, clear leadership and measures that are proven to work under pressure. Security is an integral part of safety – security is a mindset.

BMP Maritime Security is downloadable for free at ***https://www.ocimf.org/publications/information-papers/bmp-maritime-security.***

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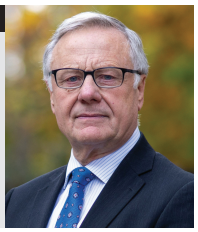
Pegg

Russell Pegg is a maritime security specialist at OCIMF, providing threat and risk advice to members and overseeing the work of the Maritime Security Committee.



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UNITE, PREPARE AND ENABLE MARITIME CYBER READINESS

By Annie McIntyre

The maritime transport industry, the backbone of global trade, is at a pivot point amid shifts in economic, political, and technological conditions. Advances in technology have entered the industry, thereby improving efficiency and enabling innovative solutions for various onboard operations, including remote cargo monitoring, advanced energy management systems, and overall automation.

Digitization via interconnected IT/OT systems, however, expands attack surfaces, opening the door to increasingly sophisticated adversaries and cybercriminals determined to breach them for financial gain or disruption. Both ports and ships are experiencing an increase in malware, phishing, ransomware, GPS spoofing and social engineering designed to disrupt operations, steal data, or hold systems hostage.

- **In 2024, the Port of Seattle was attacked by the ransomware group Rhysida.** The criminals encrypted data, resulting in widespread, sustained outages across multiple systems that affected check-in kiosks, baggage systems, and Wi-Fi.

- **In 2023, the Port of Nagoya, Japan, was subject to a ransomware attack by LockBit,** a notorious Russia-based cybercriminal group. Container terminal operations were crippled for more than two days. Trade was disrupted, affecting major companies like Toyota, and highlighting critical infrastructure vulnerabilities, following an earlier DDoS attack in 2022.

- **From 2011 through 2017, Port of Antwerp, Belgium, was exposed to drug cartels** that hit the port with malware to spy on its container management system, which gave them access to credentials and other data. The port has since become a gateway for illegal narcotics to enter Europe.

New technologies also expose legacy system vulnerabilities and a shortage of skilled professionals.

On January 17, 2025, the USCG published a new final rule that establishes regulations requiring all U.S. shipowners and operators, as well as those operating within U.S. jurisdiction, to implement cybersecurity measures to protect against threats. Effective July 2025, the final rule mandates the development of cybersecurity risk management programs and cyber incident response plans, and the implementation of protocols for reporting cyber breaches. Cybersecurity plans must also align with international standards set by the IMO. This rule aims to en-

hance the resilience of the marine sector, ensuring the security of critical infrastructure and mitigating risks to safety, operations, and global supply chains in an increasingly digital world.

The next mandated compliance deadline is January 2026, when all personnel with IT/OT access must undergo cybersecurity training. Subsequent phases will extend to July 2027 for complete plans, assessments, and a dedicated officer, covering all U.S.-flagged vessels, OCS facilities, and MTSA-regulated shoreside entities.

Deploying cybersecurity plans and processes is a big, complex, and ongoing responsibility that requires significant resources and expertise. Not all things being equal, implementing security measures for large organizations will typically require more time for risk assessments and policy development, given their complexity. In contrast, smaller ports can implement more quickly but often lack the resources for comprehensive security measures. Whether large or small, maritime operators can experience organizational fatigue from the prolonged security implementations and process changes.

Adding insult to injury, at many terminals and ports, there is a lack of clear responsibility and ownership of new cyber requirements within the organization. The USCG now requires a Facility Security Officer (FSO) who manages physical security and a Cyber Security Officer (CySO) who is responsible for the technical infrastructure. Because most maritime environments do not have a CySO, there is an assumption among operators that an FSO can do what's required as an add-on responsibility. On the other hand, the FSO assumes the corporate IT department is managing matters. At the 11th hour for compliance, often no one is managing cybersecurity initiative. Operators may assume that regulations do not apply to them or that they are not a potential target, which can appear negligent. It also precipitates a situation where someone must inform an inspector that protocols are not being followed.

As nation state adversaries escalate threats and continue to actively target critical infrastructures, the maritime industry is wise to consider a comprehensive cyber-physical approach. Operators should seek help in leveraging proven security methodologies, policy templates, and vetted measures. This increases efficiency and effectiveness. The new regulations underscore that OT is not the same as IT and ensuring secure and stable operations requires expertise in maritime operations.

By consistently applying advanced frameworks and training, the maritime industry can help ensure global trade routes remain secure, efficient, and dependable in an increasingly connected world.

The Author

McIntyre

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A NOVEL COANDĂ WATER JET CONCEPT FOR SHIP RESISTANCE REDUCTION

By Kal Karmous & Mohamed Hussain

The maritime sector faces increasingly strict environmental regulations such as the Energy Efficiency Existing Ship Index (EEXI) and the Energy Efficiency Design Index (EEDI). These frameworks are compelling ship owners and designers to achieve measurable gains in energy efficiency and fuel economy. While progress has been made through improved hull designs, propulsion upgrades, and energy-saving devices, these solutions are reaching practical limits.

To meet the rising regulatory and environmental pressure, a fundamentally different concept is required. It is within this context, this article covers a new hydrodynamic vessel skin friction reducing concept: a high-pressure water jet system that leverages the Coandă effect to create a stable, self-sustaining vacuum air sheet along the hull surface, leading to a significant reduction in wetted area and viscous drag. The drag is zero wherever an air sheet exists.

This article presents the physics, conceptual system design, computational results, and operational implications of this innovation. The resulting vacuum air sheet and the hydrodynamic phenomena have never been observed in other resistance reduction devices.

A New Concept: Coandă-Effect Water Jets

For most vessels, frictional resistance accounts for 50–92% of total resistance, depending on speed and hull type. Even small improvements in skin friction, on the order of 5–10%, translate into significant fuel savings: lower propulsion power demand, lower specific fuel oil consumption (SFOC), reduced emissions, greater regulatory margin under EEXI/EEDI, lower operational costs, and reduced environmental footprint. This article focuses on and highlights the fuel saving side; however, the technology can be used to increase the vessel speed dramatically and would help overcome the hydrodynamic barrier.

The innovation uses high-pressure water jets positioned above the waterline. The jets are directed at a small angle toward the ship hull. The jet adheres to the hull via the Coandă effect, entrains air from the surrounding environment, and carries that air below the waterline where it forms a stable sheet of air along the hull, as long as the vessel is moving forward. Alternatively, the jets can be below the waterline using a habitat to create an atmospheric environment that allow air supply that eventually form the vacuum air sheet.

This process achieves a form of dynamic air lubricating sheet, in a vacuum condition. In essence:

- *The jet acts as the "carrier" of air*
- *The Coandă adhesion controls trajectory and stability*
- *The entrained air forms a lubricating vacuum air sheet*
- *Vessel forward motion and pressure gradients keep the film attached*

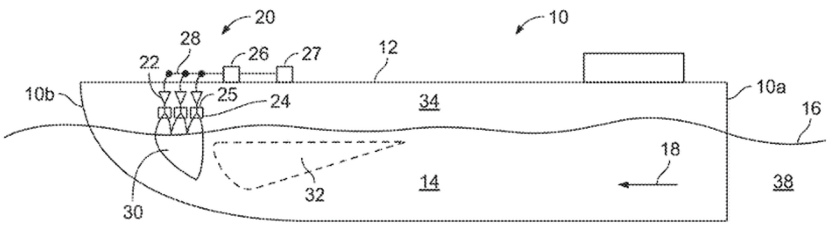


Figure 1: Concept of Coandă-Effect Water Jets on ship hull (reproduced from patent, US 12,280,854 B2, System and Method for Reducing Drag on the Hull of a Vessel, 2024).

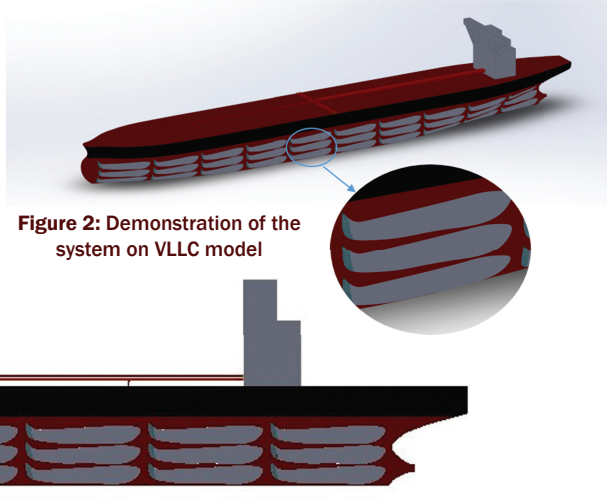


Figure 2: Demonstration of the system on VLLC model

Physics of the Jet–Air–Hull Interaction

The Coandă effect describes the tendency of a fluid jet to adhere to a nearby straight or convex curved surface due to entrainment-induced pressure drop. When the pressure difference becomes sufficiently large, the jet "bends" toward and follows the contour of the adjacent surface.

The novel insight in this system is that the same mechanism can be exploited not only in air but also across the air-water interface and underwater, enabling entrained air to form a lubricating air sheet along a submerged hull surface.

A small nozzle angle, typically 1–5 degrees, ensures smooth jet adhesion and momentum preservation. As the jet flows along the hull surface, entrainment reduces static pressure, forming a continuous low-pressure line that draws atmospheric air toward the hull.

Before entering the water, the free jet entrains a volume of air due to the shear layer. When crossing the water surface, the jet penetrates and carries air downward, forming a submerged vacuum air sheet.

The high-speed entrained air on the Coandă effect flow eventually slows down enough such that the vessel's speed water can dislodge it from the Coandă flow and push the entrained air aftward. Any air aft of this Coandă flow is under a lower pressure compared the pressure in the flow domain without the presence of the jets.

External water is in contact with the outer side of the vacuum air sheet, while air entrainment continuously feeds it. It is possible that the external water flow on the outer side of the vacuum air sheet acts as a pressure barrier due to the relative motion of the air sheet to the external water, at vessel speed. The vacuum air sheet has a pressure gradient, being a lower vacuum pressure at the forward end and a higher pressure at the aft end. Regardless of the ship and hull design, the developed vacuum air sheet adheres to the hull and follows the hull form contours. This contributes to the ease of retrofitting of the system for all existing hull shapes.

CFD Modeling: Multiphase Flow Insights

Proof of concepts was conducted using high-fidelity CFD simulations with VOF multiphase modeling, and k–ω SST turbulence models were used to study jet adhesion, air entrainment, air-sheet formation, and pressure-field characteristics.

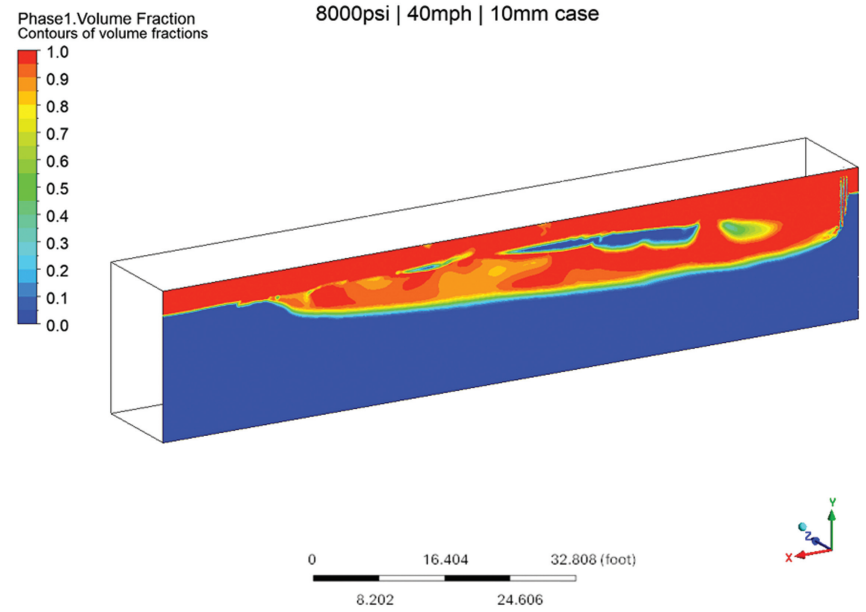


Figure 3: CFD analysis for the generated air sheet represented by contours of volume fractions, 0 being water and 1 being 100% air (reproduced from patent, US 12,280,854 B2, System and Method for Reducing Drag on the Hull of a Vessel, 2024).



The simulations show:

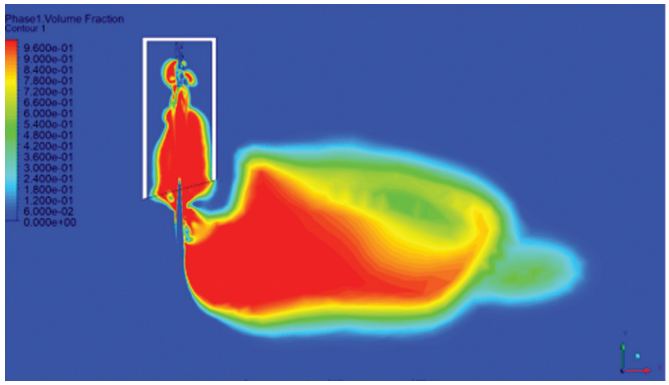
- consistent jet attachment,
- robust, continuous air entrainment,
- stable vacuum pressure within the air sheet,
- and formation of a stable air sheet that adheres to the hull.

Initially, the vacuum air sheet was observed at high-pressure cases, including cases where the nozzles were specified as capable of 8000 psi and 10mm nozzle orifice diameter. Initially, 3 nozzles were used to develop an air sheet (Figure 3). More recent cases have focused on using single underwater jet and pressures as low as 300 psi and nozzle orifice as low as 0.5mm (Figure 4). Figure 4 (right) also shows the differences between excess air bubbles emanating from the habitat (in red) and the vacuum air sheet (in blue) attached to the hull. The vacuum air sheet is stable and unique to this system, while the pressurized air bubbles are not stable as they are not attached to the surface.

Future CFD work will also examine the use of pulsating Coandă jets as an alternative to continuous jet operation. Prior studies indicate that pulsed liquid jets can form stable Coandă-attached flows while propagating further underwater due to vortex structures that reduce jet-core friction. For the same nominal power, pulsed jets may generate higher instantaneous pressures and lower average energy consumption because no power is used during the off-cycle. This behavior entails potential for improved air sheet generation efficiency, which will be investigated through further CFD studies.

System Configurations

Nozzles may be placed along the bow, midship, bottom, and stern sections, depending on hull form. Pump configurations



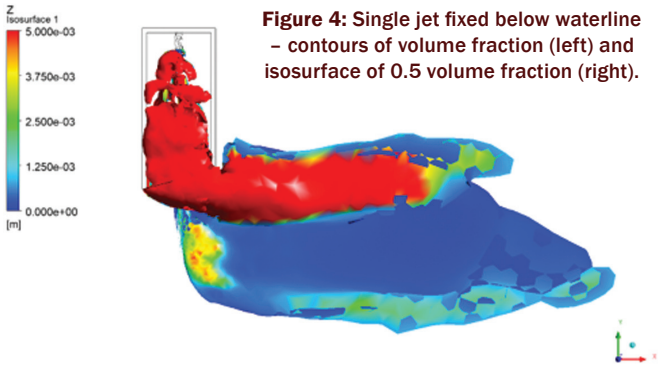
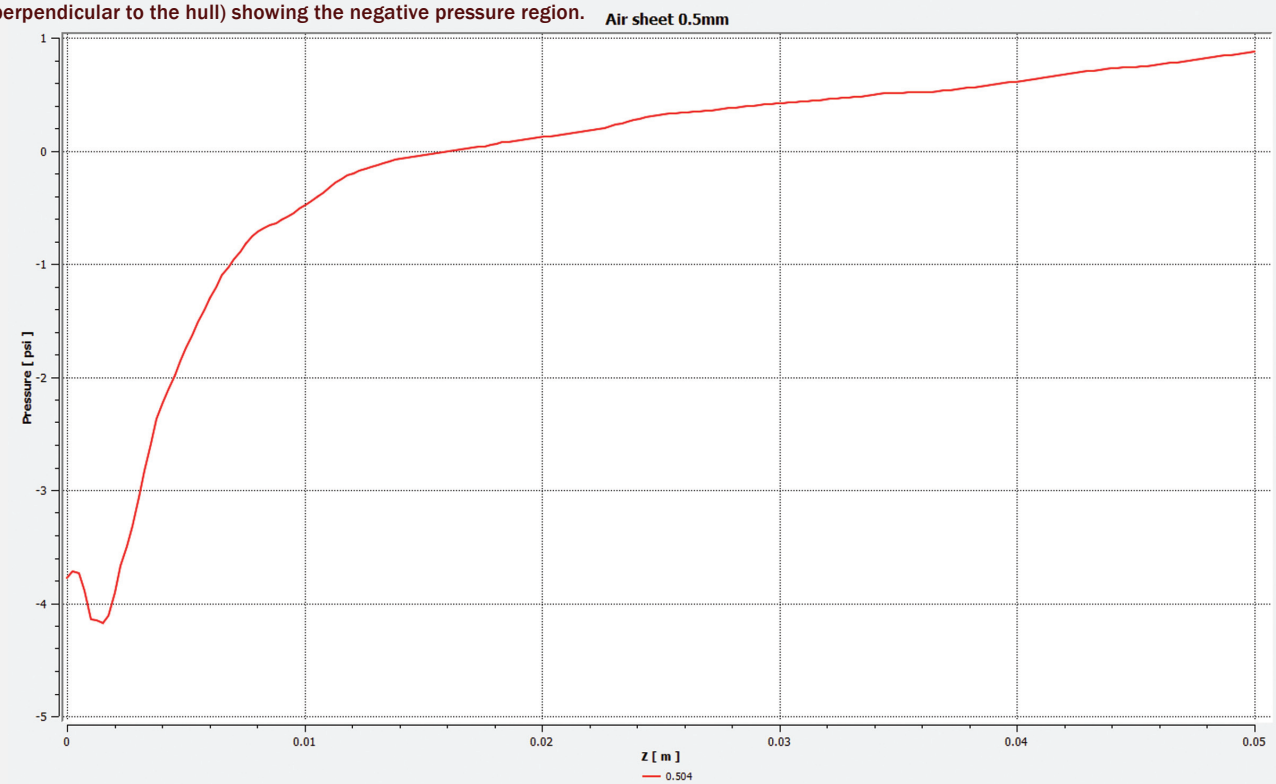


Figure 4: Single jet fixed below waterline – contours of volume fraction (left) and isosurface of 0.5 volume fraction (right).

Figure 5: Pressure distribution across the air sheet (perpendicular to the hull) showing the negative pressure region.



can support selective activation. Operating pressures, diameters, and jet incidence angles can be tuned to balance power consumption and air-sheet characteristics. Current industrial high-pressure waterjet systems demonstrate the feasibility of operating in the required ranges.

Research is ongoing on optimizing nozzle configuration, pressure tuning, and jet inclination angles. Future work includes physical experiments on hull panels, model testing, scaling studies for full-size vessel applications, and sea trials.

Advantages of the Coandă Jet System configuration:

- Retrofit-friendly (external installation)
- Low sensitivity to sea state
- Multi-regime operational flexibility
- Minimal mechanical complexity
- Potentially significant drag reduction

Conclusion

The Coandă-effect jet system represents a new class of hydrodynamic flow-control technology for ships. By combining jet adhesion, natural air entrainment, low-pressure driven air-sheet formation, and multiphase boundary-layer manipulation, this concept offers a transformative method for reducing hull friction, representing a major step change in resistance reduction. By decreasing viscous drag and propulsion power demand, the system allows vessels to reduce operational fuel consumption, reduce carbon emissions, improve EEXI margins, meet EEDI targets for new builds, and directly support IMO carbon-intensity reduction goals. Its simplicity, stability, and retrofit potential distinguish it from existing air lubrication solutions. The technology offers a promising pathway toward measurable drag reduction and compliance with IMO decarbonization requirements. In addition, the system can be used to necessarily achieve higher vessel speeds when fitted to the existing vessel using the same amount of propulsion power.

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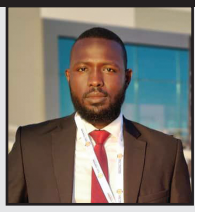
Hussain



Mohamed Hussain, PhD, PE, specializes in marine hydrodynamics, multiphase CFD, and innovative energy-saving concepts, with a focus on reducing hull drag and improving energy efficiency solutions for the shipping industry.

Karmous



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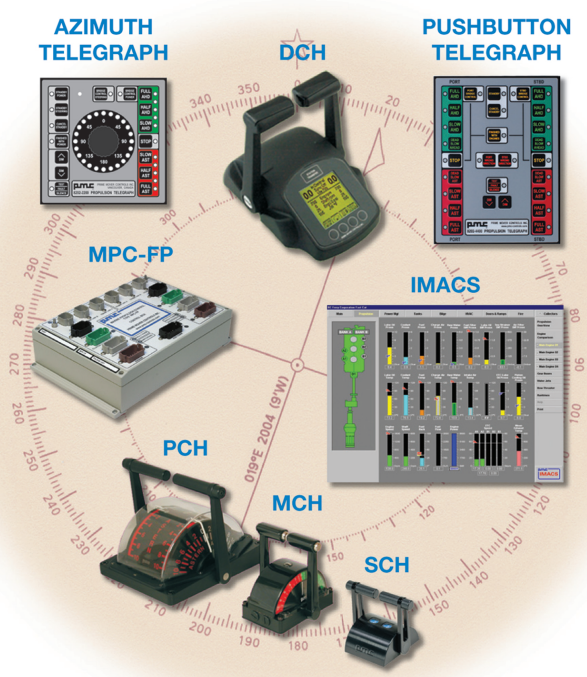

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TRAINING THE SHORE TO THINK LIKE THE SHIP

By Heather Combs, CEO, Ripple Operations

In many maritime organizations, the most effective people in shore-based leadership roles are those who have spent meaningful time onboard. Designated Persons Ashore and Port Captains often earn their positions not because of spreadsheets or policy expertise, but because they understand the realities of life at sea. They know how decisions made ashore ripple through watch schedules, maintenance routines, weather windows, and crew fatigue. That onboard experience is precisely what makes them so valuable to management. Yet as organizations grow, a widening gap can form between shore teams and vessel operations. Bridging that gap requires deliberate training that helps shore-based staff think like the ship.

Why the Shore–Ship Disconnect Happens

The disconnect between shore and vessel is rarely intentional. Shore teams are often focused on compliance, efficiency, cost control, and customer commitments. Mariners are focused on safety, weather, equipment limitations, and human factors. Both perspectives are valid, but without shared context they can work at cross purposes.

Shore staff may underestimate how long a task truly takes at sea, how weather affects execution, or how crew workload compounds over a voyage. Decisions that look reasonable from an office desk can become risky or impractical onboard. Training that exposes shore personnel to these realities helps prevent assumptions from turning into pressure on the vessel.

Why Onboard Experience Matters in Shore Roles

The reason DPA and Port Captain roles are so attractive to management is simple. These individuals translate between two worlds. They understand regulatory expectations and company policy, but they also understand what it takes to execute those expectations safely onboard.

Their value comes from lived experience. They know when

a request is reasonable and when it crosses into unsafe territory. They recognize early warning signs that paperwork alone cannot reveal. Training shore teams to think like the ship does not require everyone to sail, but it does require structured exposure to operational reality.

Training Shore Staff Using Vessel Scenarios

One of the most effective ways to bridge the gap is scenario-based training built around real vessel operations. Instead of abstract policy discussions, shore teams should work through realistic scenarios that mariners face.

Examples include responding to a failed inspection item while offshore, balancing maintenance schedules against weather delays, or managing crew rest when voyages run long. Present these scenarios as decision exercises. Ask shore staff what they would do, then walk through the operational consequences onboard.

This type of training builds empathy and practical judgment. It shifts conversations from what should happen on paper to what can happen safely in practice.

Learning from Incidents Caused by Misaligned Assumptions

Many incidents and near misses trace back to misaligned assumptions between shore and ship. A compliance deadline that ignores voyage realities. A maintenance request that assumes spare parts are immediately accessible. A crew change plan that overlooks immigration or weather constraints. Training programs should analyze these incidents openly and without blame. Focus on how assumptions formed and where context was missing. Use real examples, anonymized if necessary, to show how small disconnects escalate into operational risk. This approach turns incidents into training assets and reinforces the idea that safety depends on shared understanding.

Making Compliance Decisions Safer Through Context

Compliance is a major driver of shore-based decisions, but compliance without context can undermine safety. Training should emphasize that regulations are not abstract requirements. They are applied within real operational constraints.

Teach shore teams how compliance decisions affect crew workload, timing, and risk exposure. Encourage questions such as whether a request can be delayed, staged, or supported differently. Context-driven compliance is not about lowering standards. It is about applying them intelligently.

When shore staff understand the ship's reality, compliance becomes a partnership rather than a source of friction.

Building a Two-Way Training Culture

Training the shore to think like the ship does not diminish the importance of shore expertise. Instead, it strengthens it. The goal is alignment, not hierarchy. Shore teams bring regulatory knowledge, resources, and strategic perspective. Mariners bring operational judgment and situational awareness.

Effective organizations train both sides to appreciate the other. That means creating regular touchpoints, shared training exercises, and open channels for feedback. Over time, this builds trust and improves decision quality across the organization.

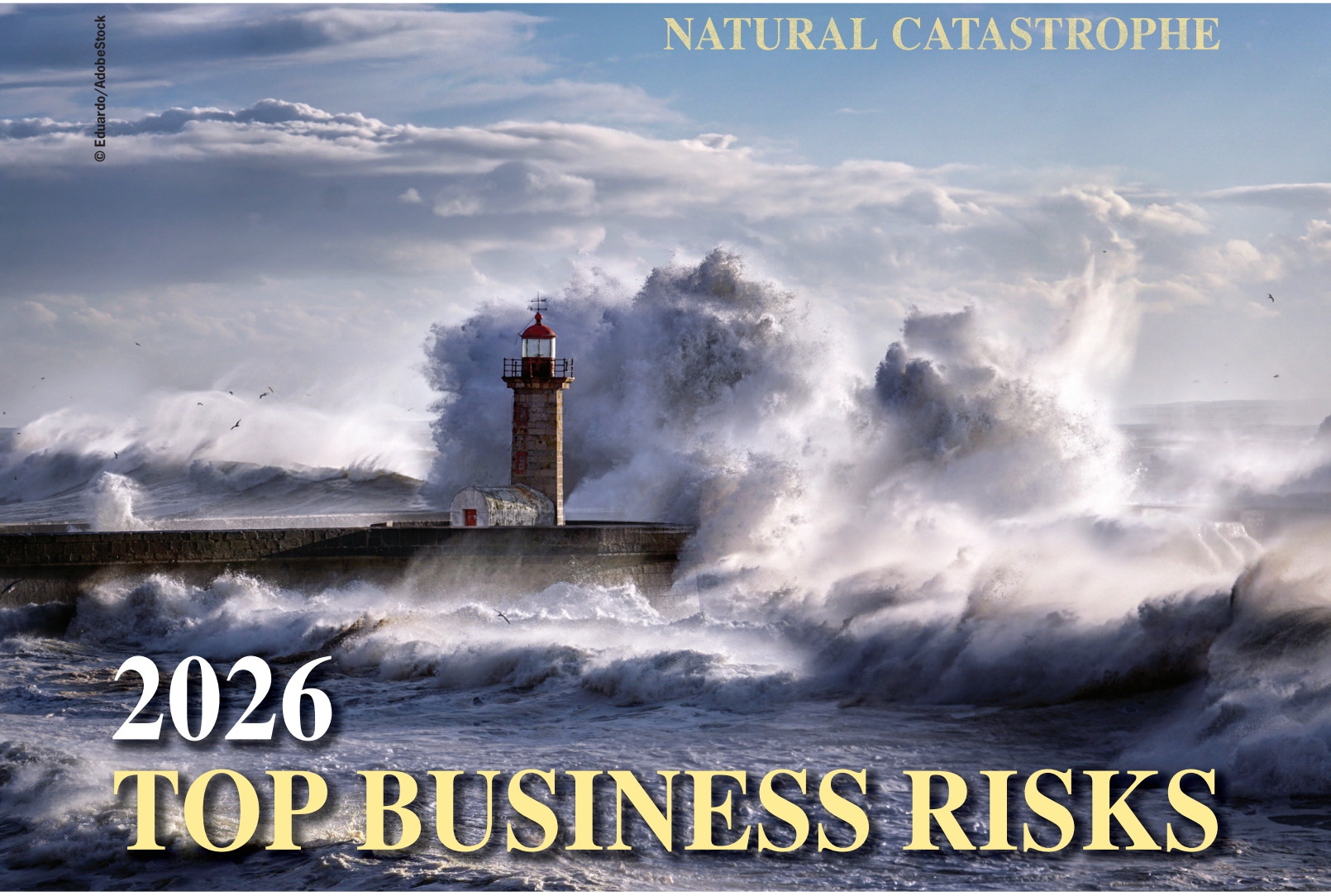
Closing the Gap

The most successful maritime organizations recognize that safety and efficiency depend on how well shore and ship understand each other. Roles like DPA and Port Captain exist because that bridge matters. Training shore teams to think like the ship extends that value across the entire organization.

When shore decisions are informed by operational reality, training becomes more relevant, compliance becomes safer, and crews feel supported rather than pressured. Bridging this gap is not a one-time effort. It is an ongoing training commitment that pays dividends every day at sea.

Thank you for reading, and until next time, sail safely.





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2026 TOP BUSINESS RISKS FOR MARINE AND SHIPPING COMPANIES

By Capt. Randall Lund, *MBA, NAMS-CMS, Senior Marine Risk Consultant, Allianz Commercial*

The 2026 Allianz Risk Barometer revealed some surprising findings for the maritime industry. Now in its 15th year, this annual business risk ranking by corporate insurer Allianz Commercial incorporates the views of 3,338 global risk management professionals on the main perils on their radar for the year ahead. Survey respondents included Marine and Shipping risk experts who identified the threats keeping them up at night. Here is how they ranked the top Marine industry risks for 2026:

Changes in Legislation and Regulation

There is a new entrant in the top risk spot this year for Marine and Shipping companies. *Changes in Legislation and Regulation*, which includes tariffs, new directives, and sustainability requirements, comes in at first place with 40% of industry respondents citing this as the leading risk for the industry.

Many businesses are clearly concerned about the strategic divergence in how major economies are recalibrating digital, financial and sustainability frameworks. While the US appears



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set to continue its broad deregulatory push aimed at lowering business costs and boosting competitiveness, Europe is likely to pursue selective regulatory simplification while maintaining its longstanding commitment to robust rules and safety. Meanwhile, China is expected to maintain its calibrated approach, seeking to foster innovation while preserving state oversight and strategic control of key sectors. All maritime related shipping industries are keeping a close eye on the weekly and sometimes daily changes related to these evolving frameworks in attempts to safely keep their business navigating on the best course.

The EU is easing parts of its environmental, social, and governance (ESG) agenda by narrowing the obligations of the Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD). 80% of companies are now outside the scope, reporting requirements have been vastly simplified, and obligations relating to the civil liability regime and transition plans have also been scrapped.

Meanwhile, the US is backing away from several federal climate commitments, and other jurisdictions are pausing or recalibrating their sustainability trajectories. The result is a fragmented global ESG environment. Multinationals face compliance asymmetry, whereby they may be judged against the strictest global standard, regardless of local requirements. This creates legal uncertainty and reputational exposure, as well as strategic misalignment between subsidiaries and markets. Maritime businesses involved in global trade are especially exposed to the brunt of these changes.

Natural Catastrophes

Dropping from first to second place this year is Natural Catastrophes with 32% of marine respondents citing this risk as a leading concern for 2026. From the insurance perspective, economic and insured losses remained high, albeit lower than the 10-year average. The evolving nature of natural catastrophes continues to pose significant challenges to businesses and the (re)insurance industry. Insured losses from natural catastrophes are set to reach US$107bn for 2025, according to Swiss Re – the sixth year in a row they have exceeded $100bn, while economic losses are well in excess of $200bn.

A close-to-average North Atlantic hurricane season undoubtedly helped moderate losses this year. Of the 13 storms that formed, only three made landfall and, for the first time in 10 years, no hurricane made landfall in the US. Hurricane Melissa, however, was a reminder of the devastation a single storm can cause. Although all four major ports were officially reopened by mid-December, the Ports of Montego Bay, Falmouth, and Black River are all still recovering from the damages caused by Melissa.

Natural catastrophes should remain a fixture on the business risk radar. Climate change makes large tropical cyclones, like Hurricane Melissa and Super Typhoon Ragasa, more likely. It only needs one typhoon hitting in the right place to disrupt global supply chains.



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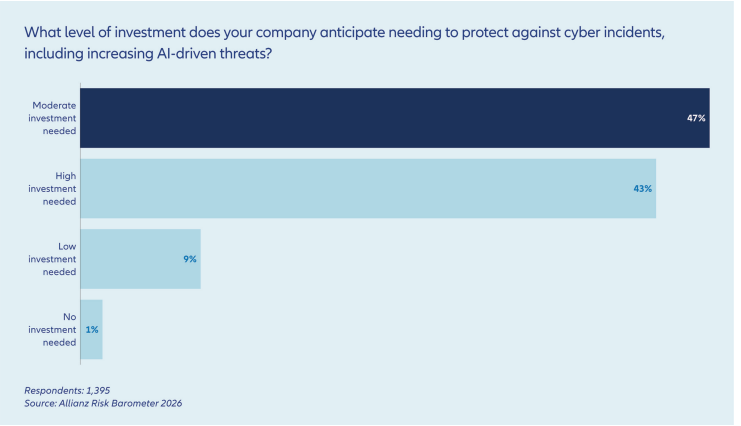

Artificial Intelligence

Artificial Intelligence (AI) is another new entrant on the Marine and Shipping risk rankings this year coming in at #3 with 24% of industry respondents identifying this as a key concern.

AI's rapid ascent up the rankings is a reflection of both the risks associated with AI and its potential wider societal, political and economic implications. In just a few years since the launch of ChatGPT in 2022, AI applications and automation have become widespread, with new solutions and use cases in the maritime pipeline. For example, AI monitoring and alerting systems, such as thermal imaging cameras (TIC) to monitor vessel cargo holds and provide the earliest possible warnings for vessels carrying EVs or other types of Lithium-ion batteries, are being explored, if not already in use. AI is also being used on vessels and shore-side infrastructure and operations, such as predictive and condition maintenance of vessel machinery, for cargo planning and stowage, and for other hazard detections such as incompatible or mis-declared hazmat cargoes, vessel collision avoidance, and for autonomous vessel navigation. All with an end result of a safer and more efficient marine industry.

Looking ahead to 2026, as AI adoption accelerates and becomes more deeply embedded in core business operations such as the maritime industry, respondents expect AI-related risks to intensify. The rapid spread of generative and agentic AI systems, paired with their growing real-world use, has raised awareness of just how exposed organizations have become.

As more firms attempt to scale in 2026, they will face



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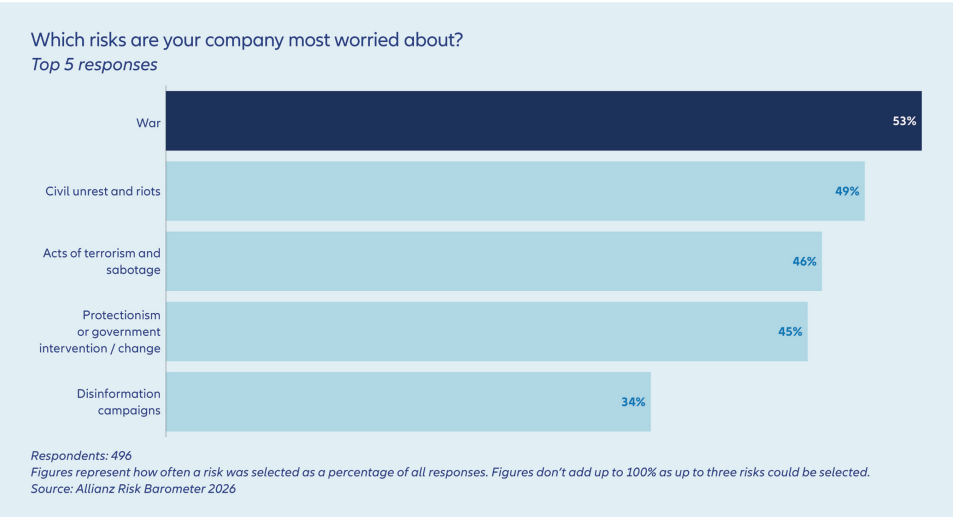
greater exposure to system-reliability issues, data-quality constraints, integration hurdles, and shortages of AI-skilled talent. Staying stuck in pilot mode carries its own risks too – investments and expectations rise, but the business value may not follow. Meanwhile, new liability exposures are emerging around automated decision-making, biased or discriminatory models, intellectual-property misuse, and uncertainty over who is responsible when AI-generated outputs cause harm. For vessels on the high seas, when AI-generated outputs cause harm, shore-side assistance to mitigate the problem will likely be hundreds of miles away, while the responsible entity may likely be buried in the layers of third party participants that are involved in the global supply chain.

Concerns about the resources required to manage these risks are also growing. Nearly half of Risk Barometer global respondents (47%) say the investment needed to handle AI- and cyber-intensified threats is "moderate," while another 43% rate it as "high," underscoring the expanding operational burden of AI adoption. And although many organizations still see AI as delivering more benefits than risks, a rising share now views it as a distinct and increasingly complex risk category.

To read the full report, please visit:
2026 Allianz Risk Barometer



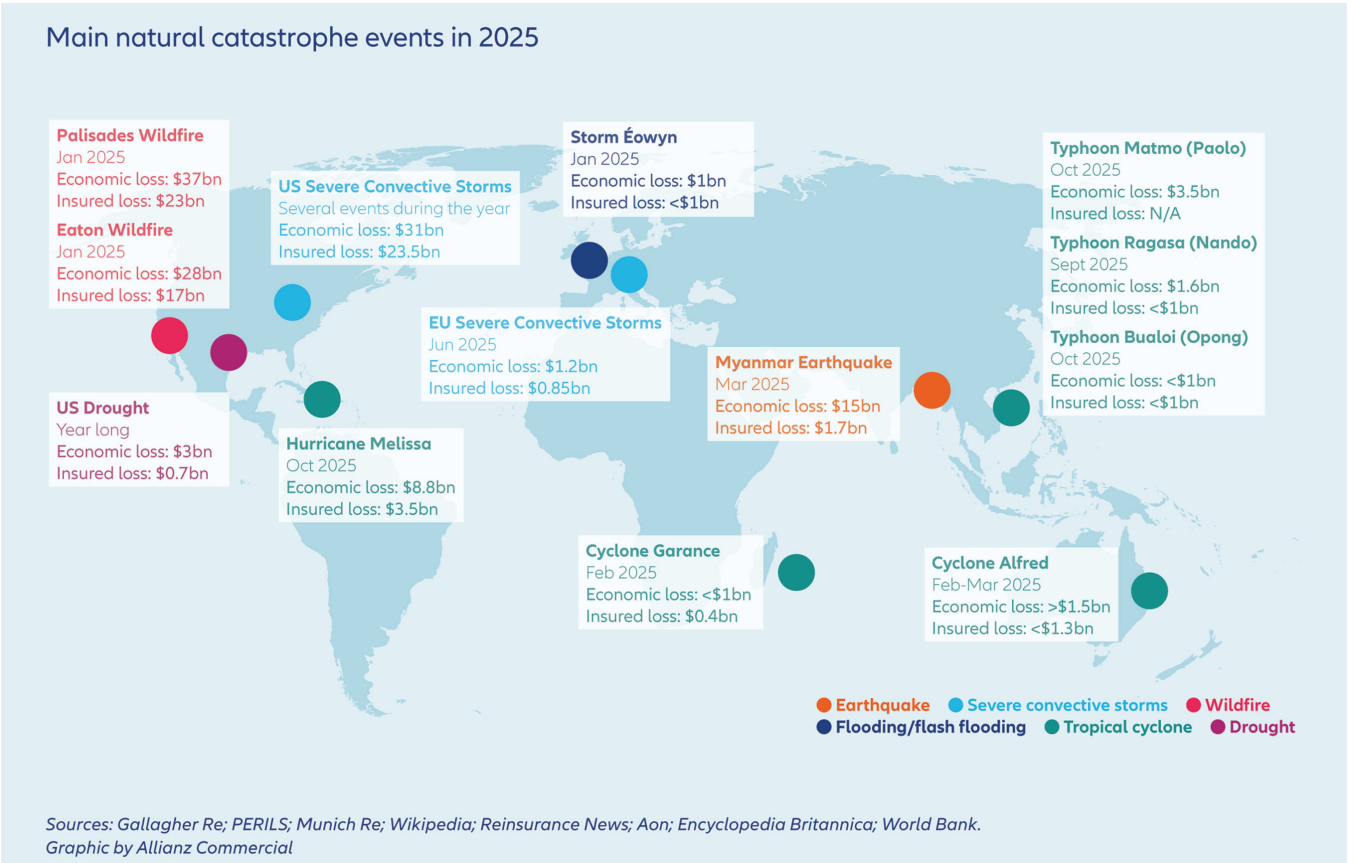


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Figure 1. Gotland Horizon X will be the world's first large-scale catamaran capable of operating on 100% hydrogen fuel.

Courtesy Austal

Inside the GOTLAND HORIZON X HYDROGEN-READY LARGE CATAMARAN

With a growing focus on mitigating climate change and progressing toward the International Maritime Organization's (IMO) 2050 net-zero target, the marine sector is under intense pressure to decarbonize. Today, maritime transport emits nearly one billion tons of CO2 annually, representing roughly 2-3% of all energy-related carbon emissions worldwide .

Substantial progress has been made over the past decade in reducing emissions from small commercial and coastal vessels via all-electric and diesel-electric propulsion (DEP) systems. However, decarbonizing larger ocean-going and cargo-carrying ships that travel hundreds or even thousands of miles between stops has proved more difficult.

In 2025, Siemens Energy, Swedish ferry line operator Gotlandsbolaget, and Australian-based global shipbuilding company, Austal, took a significant step forward in addressing this challenge with the development of the Gotland Horizon X: a high-speed catamaran that aims to provide zero CO2 emissions crossing between the island of Gotland and the Swedish mainland.

The vessel will feature Siemens Energy's SGT-400 high-efficiency gas turbines in a combined cycle configuration. The gas and steam turbines will drive Kongsberg water jets and provide the ferry's electrical loads via power take-offs (PTOs) on the main gearbox.

The vessel will operate with a fuel efficiency of close to 50% – significantly outperforming traditional marine diesel engines. Additionally, its multi-fuel capability opens the possibility for operation on LNG, bio-LNG, methanol, biodiesel, and 100% hydrogen in the future, paving the way for zero-emission maritime transport.

Zero-emissions Transport

Gotlandsbolaget aims to achieve fossil-free ferry crossings between the island of Gotland and the Swedish mainland with no impact on crossing times by 2045, a goal designated "Destination Zero."

The company formulated its first concept for a low-emission ship in 2009. Since then, Gotland Tech Development has worked to incorporate and promote the latest technological advances in shipping to reduce CO2 emissions. While the long-term goal is to use hydrogen-based propulsion technologies, current design concepts pursue solutions that allow the use of low-carbon fuels until a complete hydrogen fuel supply chain is developed.

In 2021, these developments led to the launch of Gotlandsbolaget's first zero-emission concept ships: the Horizon series. Further work has culminated in the vision becoming reality with the order placement in February 2025 with Austal for the multi-fuel, hydrogen-ready Gotland Horizon X high-speed catamaran.

Horizon X is scheduled to enter service in 2029 and will be able to carry 400 cars and 1,500 passengers. With a top speed of 30 knots, the ship will make the ~140-kilometer crossing in just over three hours.

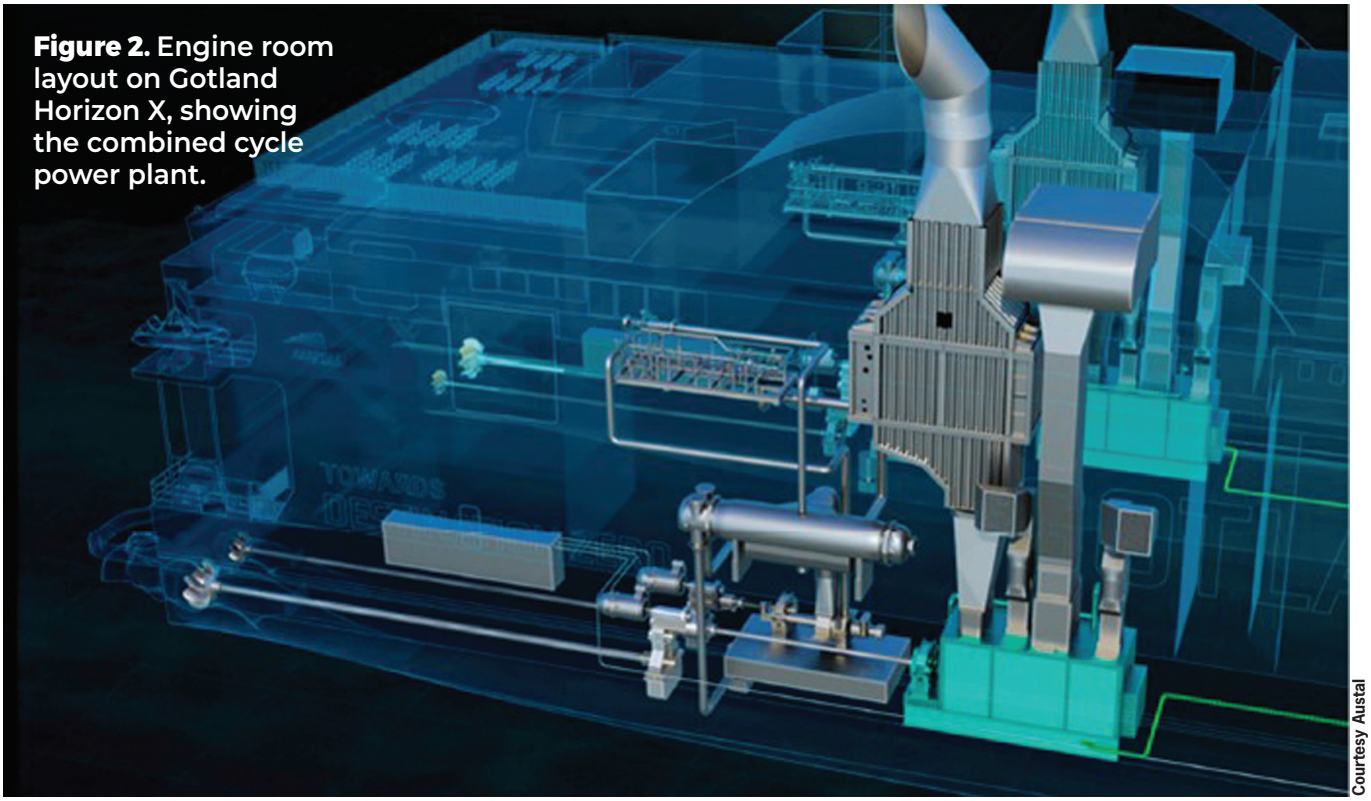


Figure 2. Engine room layout on Gotland Horizon X, showing the combined cycle power plant.

Courtesy Austal

Propulsion System & Engine Room Design

The Gotland Horizon X engine room is a derivative of Siemens Energy's Ocean Green Hybrid Combined Cycle concept, which is a low-emissions propulsion solution introduced in 2022.

Each hull of the catamaran will contain a combined-cycle power plant based on a Siemens Energy SGT-400 gas turbine, with a guaranteed power output of 13 MW at an ambient temperature of 10-20°C (as shown in Figure 2). The SGT-400 is a proven light industrial gas turbine launched in 1997. Today, there are 400+ units in operation worldwide, with more than 7 million operating hours, including many in offshore environments.

The gas turbine is installed on an underbase that houses the lubricating oil tank, and all required auxiliary systems, creating a compact unit with simple installation. Only the fire extinguisher bottles and the lubricating oil cooler are located off-package.

Building on the experience and designs utilized in the oil and gas industry, Siemens Energy has worked closely with DNV over the past two years to ensure compliance with marine requirements. Today, the core gas turbine itself, complete package, and the control system are all type-approved for marine applications by DNV.

Waste heat in the gas turbine exhaust is recovered using a once-through steam generator

(OTSG), which provides steam at up to 55 bar and a design inlet temperature of 510°C to drive a 5.3 MW condensing steam turbine. An OTSG was selected because of its low weight, compact size, and reduced make-up water consumption compared to traditional marine boilers.

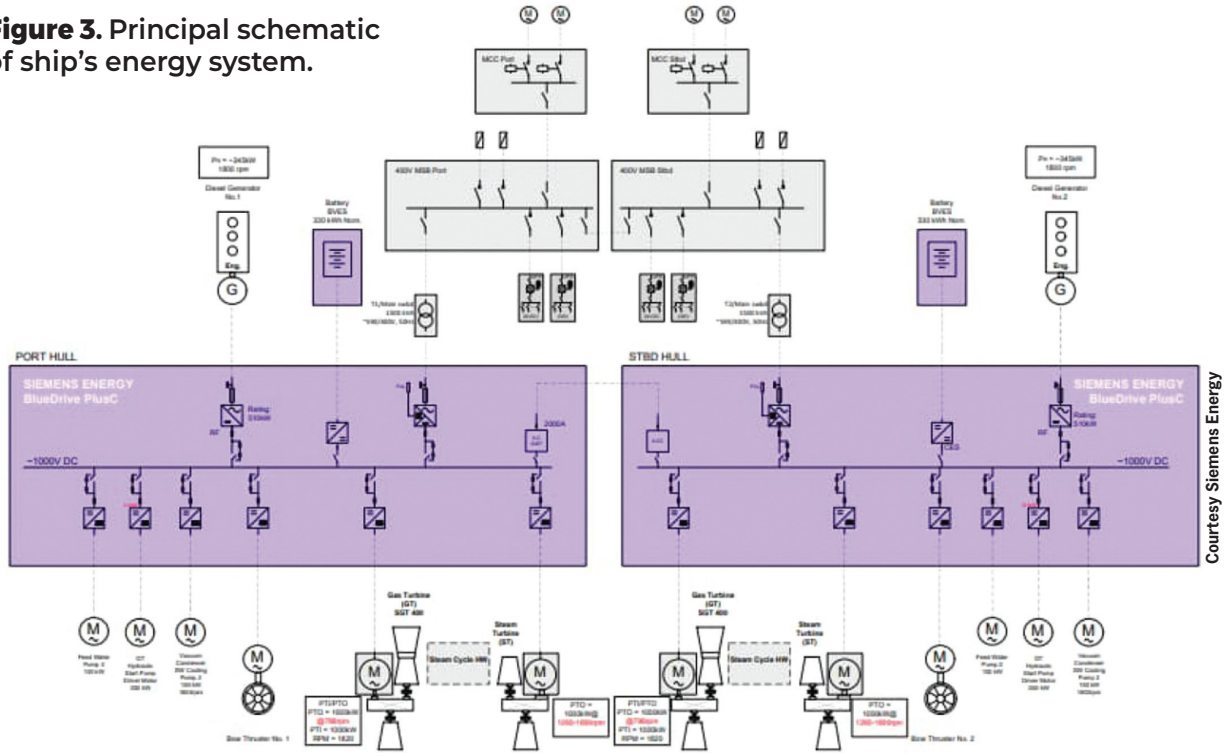
While it is more conventional for this type of combined cycle configuration to drive generators and supply power for electric propulsion motors (known in marine applications as combined gas-electric and steam, or COGES), for Gotland Horizon X to maximize efficiency and reduce weight, both the gas turbines and steam turbines will drive waterjets through a gearbox arrangement.

The gas turbine package includes a gearbox that reduces the power turbine speed from a nominal 9,500 rpm to 1,800 rpm. A second "main" gearbox then reduces the speed from the nominal 1,800 rpm to the speed required by the water jets. A similar arrangement is used on the steam turbine packages. The gas turbines drive steerable water jets while the steam turbines drive booster water jets. This concept provides a total of 36.4 MW of shaft power into the main drive gearboxes with an overall fuel efficiency close to 50%.

To supply the ship's electrical loads, the main gearboxes are fitted with 1 MW PTI/PTOs, supplemented by a Battery Energy Storage System (BESS) and reciprocating auxiliary generator sets. A shore connection enables a lay-up period with the system cold and without the generators running.

Because the gas turbine is installed within its own ventilated acoustic enclosure for noise and fire protection, heat rejection into the engine room compartment is reduced. Combustion air and enclosure ventilation air are ducted from outside into the gas turbine package, with appropriate filtration and silencing to ensure reliable operation of the gas turbines and passenger comfort.

Figure 3. Principal schematic of ship's energy system.



Courtesy Siemens Energy

Emissions Performance & Hydrogen Operation

Fuel flexibility and low emissions were two of the main drivers behind Gotlandbolaget's decision to use SGT-400 gas turbines on Horizon X.

As standard, the SGT-400 comes equipped with a Dry Low Emissions (DLE) combustion system. The units for Gotland Horizon X will be dual-fuel and capable of operating on LNG and diesel, while demonstrating compliance with IMO's Tier III NOx emission requirements (<2g/kWh) for the E2 and E3 duty cycles without the need for a selective catalytic reduction (SCR) system.

The gas turbines operate with a continuous flame and relatively long residence time within the combustor. Methane slip is negligible, with levels expected to be below 0.014g/kWh when the gas turbine is operating between 50% and 100% of its maximum continuous rating (MCR).

Recent combustion rig testing has demonstrated that, with a modified fuel injector, the combustion system can operate on methanol.

The long-term goal is for Gotland Horizon X to operate on 100% hydrogen fuel.

Hydrogen combustion characteristics differ from those of natural gas, with wider flammability limits and higher flame speeds, which exacerbate the risk of flashback. Without significant modifications, standard DLE combustion systems on gas turbines are typically limited to 20-50% hydrogen by volume blended with natural gas.

Siemens Energy's work to develop a 100% hydrogen-capable combustion system started over a decade ago. In 2023, the 100% target was achieved on the SGT-400 during the EU-funded HYFLEXPOWER demonstration project in France. Additional testing will take place over the next few years as part of the follow-on HyCoFlex project at the same location.

The new combustor will be capable of operating not only on 100% hydrogen, but also 100% natural gas (or LNG) and any blend of hydrogen and gas/LNG in between, while still meeting IMO NOx requirements without an SCR. The combustor is slightly longer than the standard DLE variant but can be retrofitted with minimal changes to the gas turbine core.

Tech to Decarbonize Ocean-going Vessels

Long-haul shipping currently accounts for the majority of the maritime sector's emissions footprint. As these vessels are required to travel long distances and remain away from ports for extended periods, hybrid propulsion designs with alternative fuel capabilities represent the most practical option for decarbonization.

The primary challenge of applying hybrid technologies to these vessels is the need to conserve space to maximize the carrying capacity of goods and fuel (due to the lower fuel densities of low-carbon fuels compared to HFO and other marine diesels). While the business case for installing a diesel- or gas-electric system, power conditioning equipment, and batteries remains difficult, the economics are improving.

Particularly on LNG carriers, the Ocean Green concept, using a hybrid combined-cycle with electric propulsion (like the system that will be installed on Gotland Horizon X), is highly applicable. The compact engine room layout and reduced weight allow for a 7-11% increase in cargo carrying capacity, resulting in up to a 17% decrease in unit freight costs compared to a conventional 2-stroke 174,000 m3 LNG carrier or a smaller tanker.

The use of hydrogen fuel cells in hybrid systems is also gaining traction as a decarbonization pathway over the longer term. Siemens Energy is currently working with partners to apply hydrogen fuel cells on marine vessels of various types and sizes.

Using the inherent fuel flexibility and efficiency of a gas turbine, Gotland Horizon X is a true multi-fuel-capable fast ferry, offering both low CO2 and NOx emissions without sacrificing crossing speed or passenger and cargo capacity. The vessel provides a scalable blueprint for high-performance, sustainable vessel design. It paves the way for zero-emission, ocean-going ships – accelerating the industry's transition to a low-carbon future.





MOL's dual-fuel Ro/Pax Sunflower Pirka has a carbon footprint 35% lower than that of her predecessor.

Image courtesy MOL

A BOOST TO JAPAN'S LONG-HAUL FERRY FLEET

By David Tinsley



Long-distance ferry routes form a key part of Japan's national transport infrastructure, connecting the archipelago's four major islands and littoral centers of population, commerce and industry.

RoRo passenger (RoPax) ferry fleet renewal and development has been a constant process over the past two decades in particular, driven largely by freight demand in combination with the pursuit of cost efficiencies and in response to new legislative edicts and rising customer expectations. A cohesive Japanese approach, founded on enduring commercial ties between compatriot shipowners, builders and suppliers, continues to see construction focused on Japanese yards.

Sustained reinvestment by the companies involved has better ensured the competitiveness of the sea transport option, allied in more recent years with a national strategy of fostering a modal shift from the congested highway system to sea transport. Initially promoted by government on environmental and efficiency grounds, the move to transfer more domestic trade to the coastal seaways has assumed greater importance due to the lack of truck drivers.

In addition, and relative to the rather utilitarian nature of their forebears' interior design, new-generation vessels reflect greater consideration of onboard standards for passengers --a sign of the sector's increased patronage and scope for leisure travel rather than simply for necessary transportation.

HOME-GROWN TONNAGE

The fact that fleet renewal and development remains concentrated on Japanese shipyards highlights the industry's capacity to demonstrate resilience in target fields through a discipline of continuous improvement in design and productivity. Mitsubishi Shipbuilding's Enoura plant at Shimonoseki, at the westernmost end of the Seto Inland Sea, is a consistently leading force in large ferry construction. Naikai Zosen's Setoda yard near Innoshima is also increasingly prominent in the sector.

Setting a new benchmark in efficiency and comfort among Japan's fleet of long-haul, coastal ro-pax ferries, the 14,157 gt Keyaki made her debut in November on the route linking Otaru, on the northernmost island of Hokkaido, with Maizuru, in the Kyoto Prefecture of central Honshu.

As the first of a pair jointly contracted from Mitsubishi by Shin Nihonkai Ferry Co and Japan Railway Construction, Transport & Technology Agency (JRTT), the 199-metre Keyaki incorporates a raft of measures promising a 5% cut in energy consumption relative to her predecessors.

Keyaki is the ninth vessel built by Mitsubishi under contract to Shin Nihonkai, and the collaboration is scheduled to yield the 10th ferry during mid 2026, the sistership Hamanasu. In each case, ro/ro intake corresponds to some 150 trucks plus 30 cars, or equivalent mix, with provision for 286 passengers in a broader range of berths than has hitherto been available on the 21-hour passage.

FLEET MILESTONES

Viewed as 'milestone' vessels in the context of a distinct market segment largely on the grounds of operational economy, the 28-knot newbuilds will supersede two nonetheless more technologically complex, and still faster ships dating from 2004.

The 224-metre Akashia and current Hamanasu commissioned two decades ago by Shin Nihonkai from Mitsubishi's Nagasaki yard, and now due to be displaced by the newbuild duo, were remarkable vessels from a technological standpoint.



Blue Grace embodies two-stroke power for Tsugaru Strait transits in northern Japan.

Image courtesy Naikai Zosen



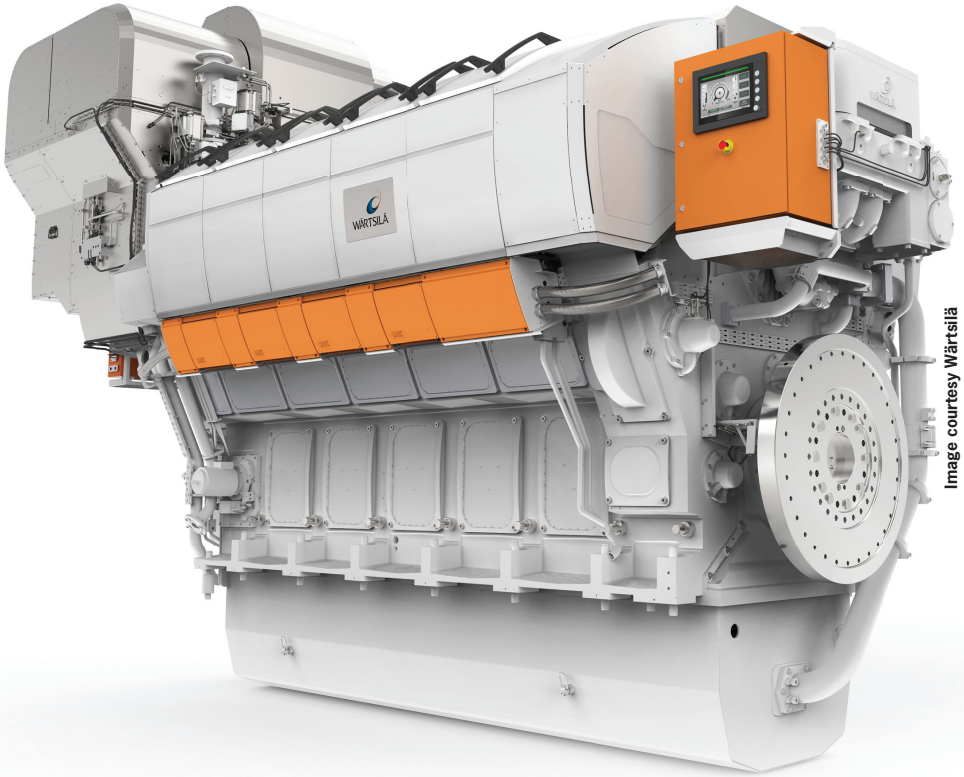


Image courtesy Wärtsilä

Vee-form models of Wärtsilä's 31 engine platform have found favour in the Japanese ro/ro ferry market.

They are distinguished by a hybrid diesel-mechanical/diesel-electric propulsion arrangement and capability for a 31-knot service speed.

However, the incoming ships signify an altogether more pragmatic approach. Rather than replicating the previous generation's status as a master class in marine engineering, the new Keyaki and follow-on Hamanasu embody an efficiency-led strategy that blends a four-engine, diesel-mechanical driveline solution with an optimised hull form featuring a Katana Bow and buttock-flow sternship with a ducktail. Propulsion resistance, speed keeping in adverse conditions, and onboard habitability and comfort are enhanced by an anti-roll tank and fin stabilizers.

Together with the power concentration and speed scale-down to 34,160 kW and 28 knots, respectively, and adoption of the Wartsila 31-series medium-speed engine platform, the vessels are forecast to not only yield a 5% energy saving, but also through-life reductions in maintenance compared with the outgoing generation's complex, expensive powering and propulsion solution. The primary power plant consists of four 14-cylinder vee-type examples of the W31 engine family, as chosen in recent years by a number of other Japanese ferry operators.

TWO-STROKE UPTAKE

Traditionally the province of powerful medium-speed machinery, notably the Pielstick marque, and now with more recent penetration by Wartsila, the sector has also witnessed increased nomination of two-stroke propulsion.

A case in point is the latest fleet project of Mitsui OSK Lines' subsidiary MOL Sunflower, which specified an MAN dual-fuel, low-speed main engine



28-knot **Keyaki** sets a new benchmark in efficiency on a long-distance Sea of Japan route.

Image courtesy Mitsubishi

for each of two 199-metre ro-pax newbuilds booked with Naikai Zosen. First-of-class Sunflower Kamuy was phased into service in January 2025, linking the Hokkaido port of Tomakomai with Oarai, northeast of the Tokyo metropolis, followed by sister vessel Sunflower Pirka during June.

As well as virtually eliminating SOx emissions, regular ingestion of LNG by the single MAN 12-cylinder S50ME-C8.5-GI two-stroke engine will contribute 25% to the prospective, overall 35% diminution in CO2. Produced by licensee Mitsui E&S, the 21,240 kW installation meets the service speed requirement of approximately 24 knots.

Efficiency promoting elements include a streamlined hull shape featuring a fo'c'sle windshield and aerodynamically-rounded bow form, and the attachment on both sides of the bow above the waterline of a rectangular device known as a spray tearing plate (STP), to reduce wave-induced resistance.

The new vessels' principal role on the dedicated service is freight transportation, catered for by a 155-truck intake, to shift fresh produce southbound to the densely populated Tokyo/Yokohama region, and return northbound with mixed goods. Each ship also has 157 passenger berths, expected to be most regularly used by truck drivers and business travellers.

Naikai Zosen's 2025 output from its Setoda yard also encompassed the 144-metre Blue Grace, commissioned by Tsugaru Kaikyo Ferry for the seven-hour Muroran/Aomori route connecting Hokkaido with northern Honshu. Powered by an MAN low-speed 6S50ME-C main engine of 8,300 kW, Blue Grace can load 64 x 12-metre trucks and 30 cars, and has capacity for 422 passengers.

The new ship's arrival has led to the release by Tsugaru Kaikyo of its 2020-built Blue Luminous for a logistic role with Japan's Ministry of Defense, to enable rapid deployment of troops and equipment to remote parts of the country in the event of an emergency or disaster. Likewise, Shin Nihonkai's current Hamanasu, in the aftermath of the delivery of the newbuild Keyaki, has also been engaged for sealift duties.

There are indications that the sealift fleet may be expanded from two up to eight ro/ro equipped vessels over the coming years, reportedly in the light of increased regional tensions.

2026 Editorial Calendar

MARITIME REPORTER AND ENGINEERING NEWS

January 2026
Ad close: January 7, 2026

MARITIME POWER

e-Magazine Edition

From diesel to hybrids, alternative fuels to electric/battery, changes in the maritime powertrain impact everything from design to construction to lifecycle maintenance.

Tech In Focus:
Fuels & Lubes

February 2026
Ad close: January 22, 2026

PORTS & LOGISTICS

- Passenger Ferries
- Icebreaker Design, Construction & Equipment
- Offshore Renewable Energy
- Coatings & Corrosion Control

BONUS DISTRIBUTION
- Port of the Future – Houston, TX
- CMA Shipping – Stamford, CT
- IPF 2026 – New York, NY
- Sea Japan – Tokyo
- Asia Pacific Maritime (APM) 2026 – Singapore
- PVA Maritrends – Covington, KY
- Breakbulk Europe 2026 – Rotterdam

March 2026
Ad close: February 28, 2026

DIGITALIZATION

e-Magazine Edition

From Weather Routing to Cargo Loading to Voyage Tracking to Condition-Based Monitoring, the digital revolution continues to revolutionize the waterfront.

Tech In Focus:
Robotic Hull Grooming Solutions

April 2026
Ad close: March 22, 2026

CRUISE SHIPPING

- Offshore Energy
- Floating Power Production
- Towboat, Tugboat, Barges
- Deck Machinery & Cranes

BONUS DISTRIBUTION
- Seatrade Cruise Global – Miami
- Posidonia – Athens, Greece
- Sea-Air-Space – National Harbor, MD
- Offshore Technology Conference – Houston, TX
- Wind Europe 2026 – Madrid
- Mari-Tech 2026 – Victoria, BC
- Inland Marine Expo 2026 – Nashville
- Electric & Hybrid Marine World Expo North America

May 2026
Ad close: April 30, 2026

GREEN MARINE

e-Magazine Edition

From Hull Design to Machinery Optimization to Alternative Fuels, the maritime 'green' push is premised on fuel economy too.

Special Feature:
Thought Leadership: Classification Roundtable

June 2026
Ad close: May 22, 2026

DREDGING

- Marine Salvage
- Ship Repair & Conversion Projects
- Maritime Safety Equipment
- Waterjets, Thrusters & Propellers

BONUS DISTRIBUTION
- WEDA Dredging Congress & Exhibition
- Green Marine – Quebec City Convention Centre
- Cruise Ship Interior Expo – Miami, FL
- Marine Money Week 2026 – New York
- MACC 2026

July 2026
Ad close: June 30, 2026

U.S. NAVY, COAST GUARD & GOVERNMENT SHIPS

e-Magazine Edition

In Focus:
Fast Attack & Patrol Craft Builders

August 2026
Ad close: July 22, 2026

SHIPBUILDING

- Hybrid Propulsion Solutions
- The Modern Marine Bridge
- Ballast Water Management
- Shipyard Tools: Cutting & Welding Equipment

BONUS DISTRIBUTION
- SMM – Hamburg, Germany

September 2026
Ad close: August 30, 2026

MARINE DESIGN ANNUAL

e-Magazine Edition

From Alternative Fuels to Autonomy/Automation to Digitalization, transcendent technologies that continue to change vessel design, construction and outfitting.

In Focus:
Artificial Intelligence & Maritime

October 2026
Ad close: September 22, 2026

MARITIME TRAINING & EDUCATION

- Thought Leadership: U.S. Maritime Academy Leadership
- Cyber Security
- Cruise Port & Terminal Innovation
- Ferry Boat Review

BONUS DISTRIBUTION
- Interferry 2026
- SNAME

November 2026
Ad close: October 22, 2026

WORKBOAT EDITION

- Marine Engines
- Emission Reduction Technology
- Deck Equipment, Winches, Cranes
- Marine Gears & Transmissions

BONUS DISTRIBUTION
- Intl. Workboat Show 2026 – New Orleans, LA

December 2026
Ad close: November 30, 2026

GREAT SHIPS of 2026

e-Magazine Edition

Review and report on the most significant ships delivered in 2026.

In Focus:
Energy Efficiency Devices:
From Sail to Batteries to Bubbles

EXHIBITIONS
- Surface Navy Association 2027 — Washington, DC



Image courtesy DHT

PORTS & LOGISTICS: ENERGY SHIPPING

Few sectors sit closer to the intersection of geopolitics, energy security and capital markets than the maritime transport of oil and gas. The global tanker and LNG fleets — long accustomed to cyclical swings — are now navigating a market shaped as much by political risk and trade realignment as by traditional supply-and-demand fundamentals, drawing unprecedented attention from investors well beyond the shipping industry.

By Barry Parker

Ocean movements of crude oil, refined products, natural gas and liquid petroleum gas have been vital links in energy supply chains for decades. Not surprisingly, diverse and divergent origins and destinations of these energy-related cargoes, and fluctuating quantities moving can all drive the freight markets and investors' views of company prospects.

In recent years, media coverage, by traditional outlets, but also by emerging reporting channels and by commentators plugged into social media circuity or online channels, have given far greater visibility to tanker markets outside of the industry.

There has been plenty to be watching, with front page geopolitical fires fueled by restrictions on Russian crude oil and LNG shipments, activity in the Red Sea, along with seizures of vessels outbound from Venezuela. The markets dodged one major bullet, on hold until late 2026 when decision-makers on Capitol Hill and in Peking regroup. Restrictions on Chinese-linked vessels by the United States, coupled with retaliatory measures on U.S. linked ships by China, would have disrupted normal flows across shipping sectors, including those in the energy trades. But, as 2025 closed out, increased oil quantities available from OPEC+, in the face of shipowners generally avoiding voyages through the Suez Canal, brought about a classic more demand/less supply scenario.

A Strong Finish to 2025

Daily hires for large crude carriers and for LNG tankers were surging as 2025 ended.

For crude carriers (which had bubbled upwards starting mid-year) with hire equivalents on voyages to the Far East getting up towards $140,000/day in late October. As year end approached, hires were still holding at above $115,000/day. These vessels are able to transit the Suez Canal "in ballast" (empty) on European voyages; the longer course around Africa lowers the supply by adding as much as two weeks to voyages.

Savvy investors, studying supply and demand, are keenly aware of the importance of market cycles- which are typically eight to 10 years duration. Connecticut based Ridgebury Tankers had invested in international tankers on behalf of institutional clients (notably private equity powerhouse Riverstone Holdings), starting in 2013, and had built up a fleet of 30+ vessels at its peak. Ridgebury, operating vessels for financial investors, began selling off its fleet following the surge that began in 2022 (fueled initially by the hostilities in Ukraine), and by early 2025 was no longer operating any vessels. Ridgebury's founder and CEO, Bob Burke, speaking in late 2025 at a Marine Money event, explained to the audience, "If the market is too high, I don't want to invest, there's too much downside. We can only control the entry point and the exit point … if the entry point is too high, it's a steep cliff … we've all seen those graphs; it's completely uncontrollable." He added, "If it's really low, then it's time to buy … you just have to be patient."



Image courtesy Marine Money/Tom Butler photography

> ***"If the market is too high, I don't want to invest, there's too much downside. We can only control the entry point and the exit point … if the entry point is too high, it's a steep cliff … we've all seen those graphs; it's completely uncontrollable."***
>
> **– Bob Burke, CEO, Ridgebury Tankers**

Listed companies that have benefitted from the late 2025 surge for large tankers have included DHT (NYSE: DHT) , Frontline (NYSE: FRO) and International Seaways (NYSE: INSW). Each of these stocks reached its 2025 peak in early December (mirroring the rates on large tankers), backing down slightly to year-end.

Svein Moxnes Harfjeld, CEO of tanker owner DHT, said in end October, responding to an analyst question on its Q3 2025 earnings talked about demand for larger tankers (DHT owns 26 crude carriers), and alluded to pressures on the sup-



Image courtesy Hyundai Samho.

LNG carrier "DIAMOND GAS METROPOLIS" 174,000 cubic meters, under construction at Hyundai Samho.

ply side. He told call participants, "As you all have likely noticed, the VLCC market is demonstrating significant strength. This strength should positively impact our earnings for the latter part of the fourth quarter. The current freight market strength is driven by growing demand for seaborne transportation of crude oil in combination with increasingly aging and fragmented structure of the fleet."

In a November, 2025 conference call presentation, Lois Zabrocky, CEO of INSW, with a fleet of 75 tankers (evenly split between crude and refined product carriers) , in discussing the demand side of the tanker space, told investors, "… we believe demand fundamentals are solid and continue to support a constructive outlook for seaborne transportation. Oil demand growth remains healthy at 1 million barrels per day of growth for this year and next. OPEC+ is supplementing 1 million barrels per day of production growth from outside the group with their own production increases that we have not seen the full scope of what could be on the water soon."

In discussing supply, Zabrocky opined that: "In practicality, based on actual ship deliveries, there is a significant number of removal candidates that were built in the golden age from '04 to 2010. By the time the order book delivers fully in 2029, nearly 50% of the fleet will be over 20 years old and likely excluded from the commercial trade. There are simply not enough tankers to replace the current aging fleet."

Smaller Tankers

For smaller tankers, typically hauling refined products, the market saw a big push upwards in 2022, and has remained healthy, though prone to up and down whipsaws. By 2022, the orderbook in the product sector had shrunk to a historical low, with some estimates putting tonnage on order at around 5% (by carrying capacity) of the existing fleet. Market strength at that time led to more confidence, and renewed ordering of newbuild vessels. By late 2025, one indicator of product tanker hires reflecting a basket of rates in the Atlantic markets pegged daily earnings at just under $30,000/day, a healthy number, but down from a year earlier (end 2024) value closer to $40,000/day.

Listed companies in the "MR" (Medium Range) sector include Scorpio Tankers (NYSE: STNG), Torm (Nasdaq: TRMD) and Hafnia (NYSE: HAFN), tied to the BW Group, a major shipowner. In recent months, TRMD and HAFN, both Denmark based, have been in the news with Hafnia (controlling close to 200 product tankers) buying a 14% stake in Torm (controlling roughly 90 ships), worth around $300 million, from private equity investor Oaktree Capital. After the deal's closing in late December 2025, Oaktree is still holding roughly 25% of TRMD shares reflecting the continued presence of private equity (PE) buttressing shipping company balance sheets.

The healthy environment over the past few years has allowed entities to make savvy financial moves.

A mid-November, 2025 panel at a conference hosted by Capital Link featured top executives from a handful of listed tanker equities. Panelist James Doyle, representing STNG, with nearly 100 product carriers in its fleet, highlighted the company's efforts to pay off debt over the past two years, saying "By year end, we could be net debt free" referring to a measure that compares cash (and equivalents) to debt on a company's books. On the financial front, he cited "…a low cash breakeven of $12,500/day including interest and principal…" With hires daily hires approaching $30,000/day (time charter equivalent), cash generation to drive down debt (or to pay dividends, another strategy deployed by listed companies) continues.

Moving LNG

In Q4, hires on large LNG carriers had burst up to around $130,000/day on spot voyages from US Gulf export terminals to Europe, after lingering at around $30,000- $40,000 for much of 2025. Moves into Asia (particularly China) had fallen while molecules destined for Europe (which normally sees seasonal stock-piling, including some on-water storage, prior to winter) had sharply increased. Lower prices for nearby gas futures positions could potentially bring more floating storage, reducing available vessel supply for actual cargo deliveries, and possibly keeping upward pressure on the market.

In a November 2025 webinar presented by Poten, Meredith Freeman, a senior editor, presented a longer term view of LNG market dynamics. Shipping is vital- but future flows are not easily predictable. In her remarks, Freeman highlighted the role of geopolitical uncertainties looming in back of an underlying gas market facing potential commodity oversupply in the coming years as new projects come online, notably in the U.S., Argentina and Mozambique, with demand from China, South Asia, and Southeast Asia being the largest source of market expansion "defining LNG's growth trajectory".

On the buy side, questions were raised about whether the LNG marketplace (where, traditionally, long-term contracts have been the norm) could become more flexible, and how well LNG could compete "…on cost and optionality". The U.S. will be leading the expansion, in Poten's view, with U.S. supply for export almost doubling, by 2030, to in excess of 200 million metric tons per annum available. However, trade policies (with tariffs being an example) could "affect the U.S. image as a supplier." European demand, a cornerstone of the marketplace, is expected to peak by 2027; trade patterns may shift as Russian gas continues to move to rapidly growing Asian markets (rather than into Europe- which is taking a hard look at decarbonization, generally).

For individual investors seeking to participate in the sector, major Greek owner Capital Clean Energy Carriers (Nasdaq: CCEC, spearheaded by Evangelos Marinakis), with a fleet of 12 modern LNG carriers, and another 10 vessels (including six LPG carriers and four set to carry liquid CO2) are under construction for delivery 2026- 2027. Additionally, six LNG's are set to acquired in 2026- 2027, and (in a $769 million order announced in the waning days of 2025), another three, incorporating "latest technology", for delivery in 2028- 2029. Flex LNG (NYSE: FLNG) operates 13 vessels. Dynagas LNG Partners (NYSE: DLNG, tied to Prokopiou interests), operates six LNG carriers, on long-term charters. Like many other sectors, retail investors are seeing fewer alternatives for owning shares in maritime companies; with financial investors who seek long-term deals with credit-worthy counterparties, taking control of fleets. Long-time industry stalwart Gotaas Larsen evolved into Nasdaq listed Golar LNG, a specialist in floating production facilities.

Institutional investors have a stake in the previously listed GasLog (led by Peter Livanos, and now partly owned by a Singapore investment fund which bought out a Blackstone stake) and Teekay LNG Partners (now branded as Seapeak), tied to the large Canada based owner, had been taken private in 2022 by Stonepeak Partners. Energos Infrastructure, another vessel owner also involved in terminal infrastructure, is closely linked to Apollo Group (with previous ties to New Fortress Energy). Other owners active in the sector include Maran (Angelicoussis family), and TMS Group (linked to well-known shipowner/investor George Economou).

Looking Ahead

With a messy intersection of economics and geopolitics, what lies ahead for seaborne energy moves in 2026? An end 2025 research report from analysts at Deutsche Bank pointed to "…fundamental conditions…primed for further oil price downside early next year. We see the rise in floating storage and the decline in Middle East selling prices as corroborating oversupply…" The analysis, from the team led by Singapore-based analyst Michael Hsueh, also hinted at the possibilities for "unforeseen supply disruptions and China's strategic oil stockpiling." As 2026 unfolded, market participants and analysts alike were wondering how developments in Venezuela might unfold, and what the impacts on commodity flows might be. LNG is also seeing more than ample supplies, with analysts from Goldman Sachs, in their 2026 Commodity Outlook, recommending a "global gas glut trade"- with the "largest LNG supply wave ever" likely bringing down prices in Europe (as measured by the "TTF" indicator) by 35% by 2027. For vessel trades, the confluence of more cargo availability and vessels acting, effectively, as floating warehouses could bring reduced supply for cargo moves, and healthy hires, if history provides any guidance.



Courtesy Resolve Marine

RESOLVE IN THE REAL WORLD

JOEY FARRELL III AND THE NEXT-GENERATION OF MARINE SALVAGE

By Greg Trauthwein

When things go wrong at sea, they usually go wrong quickly, publicly, and often at enormous cost. Enter the marine salvor, a wholly unique maritime breed that is called into action and sometimes tasked to engineer and problem-solve on the spot and on the fly. While the industry historically has, in some corners, had a 'cowboy' mentality and reputation, today's quality marine salvor depends on detailed planning and execution at its core, and few companies understand this better than **Resolve Marine**, and few leaders have grown up closer to that reality than **Joseph "Joey" Farrell III**.

Headquartered in Fort Lauderdale, Florida, Resolve Marine has spent decades operating at the sharp edge of maritime risk, responding to casualties, stabilizing vessels, protecting the environment, and, increasingly, navigating a world where ships are larger, fuels are more complex, and tolerance for error is near zero.

Today, Resolve Marine operates a global footprint that reflects both scale and readiness. The company maintains a fleet of more than 40 specialized vessels, supported by hundreds of full-time personnel and an expandable bench of technical specialists. Its reach spans the Americas, Europe, the Middle East, and Asia, enabling rapid mobilization for emergency response, salvage, wreck removal, firefighting, and subsea operations.

But numbers alone don't tell the story. What differentiates Resolve is not just capacity and horsepower, rather accrued years of salvage, engineering and business experience across the organization.

GROWING UP IN SALVAGE

For Farrell, the path into maritime salvage was evolutionary rather than preordained. Raised around the business founded by his father, he absorbed the culture long before he understood the balance sheets.

"There's a difference between knowing the company and knowing the work," Farrell explains. "Once you've been offshore during an emergency, you understand what this business really is."

That exposure shaped both respect for the technical expertise required and appreciation for the human dimension of salvage work: long hours, high stress, and absolute dependence on teamwork.

Now roughly two years into the CEO role, Farrell describes leadership less as command and more as orchestration. Resolve Marine, he notes, is built on specialists — divers, engineers, naval architects, mariners — whose judgment often determines outcomes in real time. "My job isn't to be the smartest person in the room," he says. "It's to make sure the smartest people have what they need to succeed."

Under his leadership, Resolve has emphasized internal communication, cross-functional coordination, and investment discipline, recognizing that emergency response effectiveness is shaped long before an incident occurs.



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> ***"Salvage today happens in real time, under a microscope," said Farrell. "You're working alongside federal agencies, regulators, and multiple contractors, all while the public is watching. Preparation and coordination matter just as much as horsepower."***
>
> **– Joseph "Joey" Farrell III,**
> Resolve Marine

A BUSINESS BALANCING ACT

Salvage work is inherently unpredictable. Some years bring multiple large-scale incidents; others are quieter. Resolve has responded by deliberately diversifying its revenue base.

While emergency response remains core to its identity, the company has expanded planned-service offerings, including subsea construction support, government contracting, offshore engineering, and military logistics. This balance allows Resolve to maintain readiness without relying solely on crisis-driven revenue. "You can't turn readiness on and off," Farrell notes. "It has to be sustained."

Recent projects underscore how salvage has evolved. Today's incidents rarely involve a single stakeholder or straightforward solution. Instead, they demand coordination across regulators, insurers, environmental agencies, shipowners, and local authorities — often under intense public scrutiny. Resolve's role increasingly extends beyond physical operations into orches-



Effective response starts with organizational structure. Resolve Marine ensures that the organization of its warehouses, globally, are familiar to all.





Images courtesy Resolve Marine

tration and risk management. Engineering, modeling, and scenario planning now play as large a role as brute-force capability.

REGULATION AND REALITY

Farrell acknowledges that regulatory oversight has intensified, particularly around environmental protection and hazardous materials. While supportive of strong standards, he cautions that regulation must remain grounded in operational reality.

The emergence of a palette of potential alternative fuels serving the maritime industry's future, from ammonia to methanol to hydrogen and battery-electric systems, amongst others, introduces risks that legacy salvage frameworks were never designed to address. Resolve has responded by investing in training, hazard modeling, and specialized equipment to prepare for incidents that may look very different from those of the past.

While there is a never-ending list of evolving trends that tend to shape the workload of Resolve Marine and the industry as large, two trends dominate Farrell's outlook: scale and complexity.

Ships continue to grow, increasing both the technical challenge and the potential consequences of failure. At the same time, propulsion and energy systems are diversifying, bringing unfamiliar behaviors into emergency scenarios. "Physics hasn't changed," Farrell says. "But what we're applying it to has." That reality is driving Resolve to rethink everything from asset sizing to crew training to digital simulation.

INVESTING IN THE FUTURE

Over the past year and looking forward, Resolve Marine has prioritized investment in people, equipment, and technology. Training remains paramount, particularly as new fuels and systems enter service. Equipment investments focus on versatility and rapid deployment. Digital tools enhance planning, visualization, and decision-making under pressure.

The objective is straightforward: ensure Resolve is prepared not just for known risks, but for the unknowns that will define the next generation of maritime casualties.

Ultimately, Resolve Marine's value lies in trust—earned over decades, tested under pressure, and renewed with every successful response. Under Joey Farrell III's leadership, the company is not redefining salvage so much as reinforcing what has always mattered most: readiness, expertise, and the ability to perform when failure is not an option.

For an industry where the worst days demand the best performance, that focus may be Resolve Marine's most important asset of all.

SALVAGING M/V DALI & REOPENING THE PORT OF BALTIMORE

When the container ship M/V Dali struck and brought down a section of the Francis Scott Key Bridge in the Port of Baltimore, salvaging the ship was only a part of the problem: Clearing the path of a vital trade artery, a trade artery key to national commerce and local employment, was central to the effort.

"The objective wasn't just dealing with the ship, it was reopening a critical shipping channel as safely and quickly as possible," said Farrell. "That meant focusing first on debris removal and navigational access, even while the vessel itself remained constrained."

No small task considering that this accident involved loss of life and infrastructure, with a scale, visibility and national economic implications that arguably made it one of the most complex maritime casualties ever handled in U.S. waters.

"This was not a traditional salvage case. The scale of the bridge debris, the vessel, and the national importance of reopening the Port of Baltimore meant every decision had to be engineered, sequenced, and executed with zero margin for error," said Farrell.

Resolve Marine was mobilized as part of the unified response to support wreck removal and channel clearance efforts, working alongside federal authorities, engineers, and other salvage and construction contractors under a complex incident command structure.

From the outset, the challenge was not limited to refloating or removing a vessel. The DALI was pinned amid massive bridge debris, with thousands of tons of steel truss material resting on and around the hull, across the federal navigation channel. Any misstep risked secondary collapse, further obstruction, or environmental harm. Resolve's contribution centered on its core strengths:

- *Heavy marine response capability*
- *Engineering-driven salvage planning*
- *Rapid mobilization of specialized vessels, barges, and personnel*
- *Experience operating within multi-agency command frameworks*

One of the defining characteristics of the DALI response was the emphasis on engineering-led sequencing. Before major cuts were made or large sections lifted, teams conducted extensive modeling and analysis to determine load paths, stability risks, and safe removal sequences.

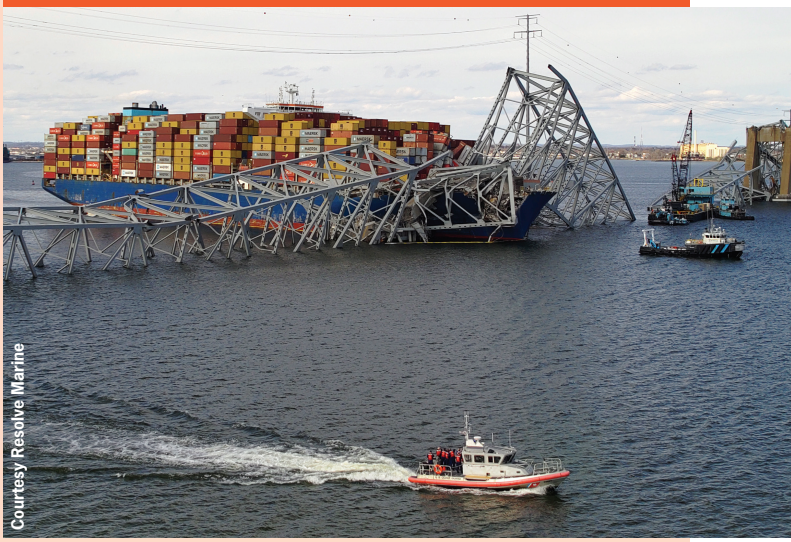
Resolve Marine personnel were involved in planning and executing operations that balanced:

- *Structural stability of the remaining bridge debris*
- *Vessel integrity and residual stresses on the DALI hull*
- *Clearance requirements for phased reopening of the channel*
- *Environmental protection and debris containment*

"Before you move anything in a job like DALI, you have to understand exactly what loads are being transferred and where the risks are. Engineering drove every step of this operation."

A key operational priority was restoring navigational access as quickly and safely as possible, even before final disposition of the vessel. That meant:

- *Clearing debris to establish temporary and then permanent channels*
- *Coordinating lift operations to avoid recontamination of cleared areas*
- *Working in parallel with dredging and survey teams to certify depths and safe transit corridors*


Courtesy Resolve Marine

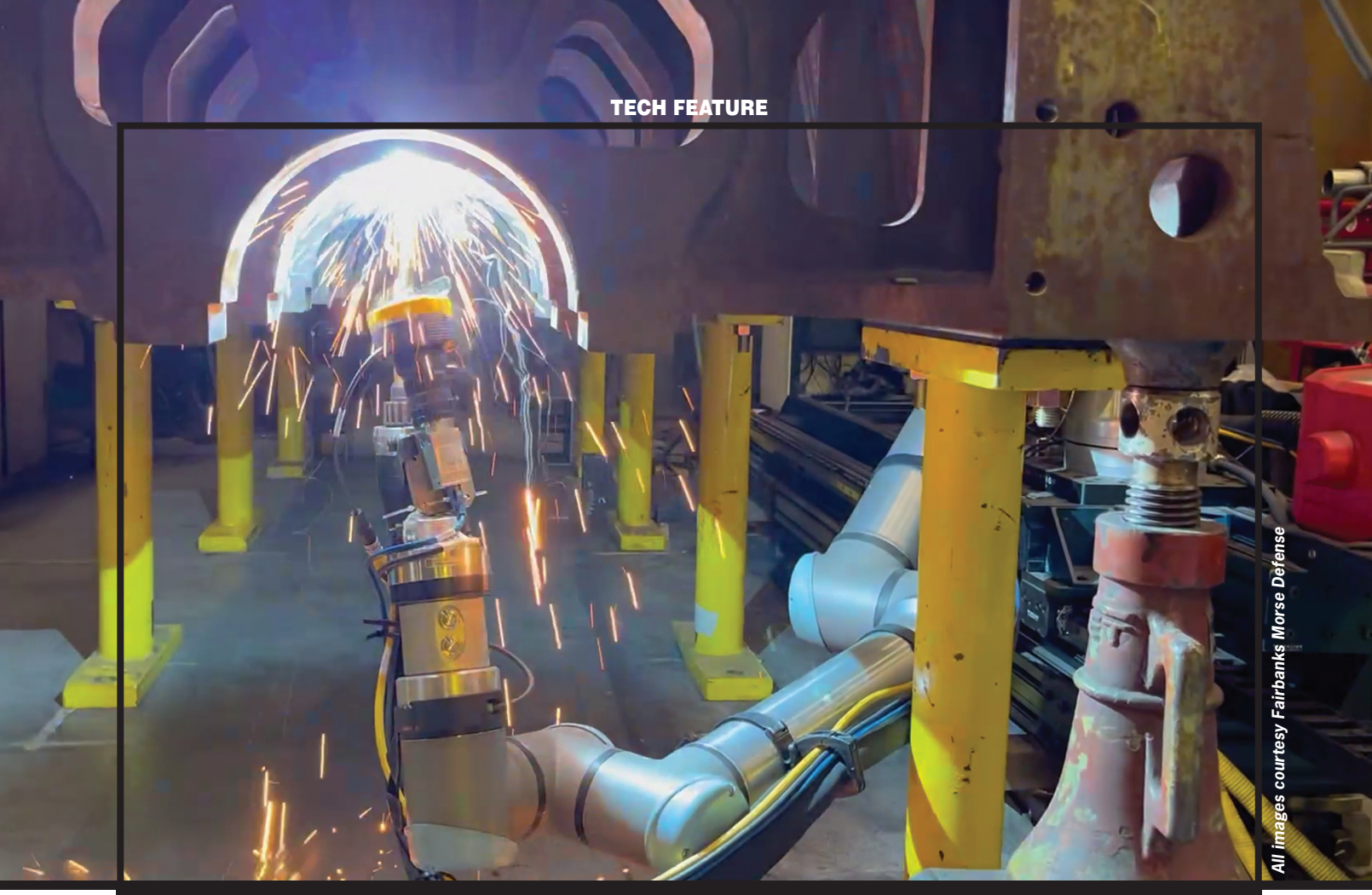
This approach reflects a broader evolution in modern salvage: success is measured not only by what is removed, but by how quickly critical maritime commerce can resume.

SALVAGE IN THE PUBLIC EYE

The maritime industry is largely "out of sight and out of mind" to the general public, that is until something goes terribly wrong. In the case of the M/V Dali, things went spectacularly wrong, and the incident underscored how salvage has changed in a world of instant visibility. Every major decision — cutting, lifting, refloating — was executed under intense scrutiny from regulators, media, and the public.

For Resolve Marine, the Baltimore response highlighted the importance of preparation long before an incident occurs: trained crews, pre-positioned assets, established relationships with authorities, and the ability to integrate seamlessly into a large, multi-contractor response.

"Salvage today happens in real time, under a microscope," said Farrell. "You're working alongside federal agencies, regulators, and multiple contractors, all while the public is watching. Preparation and coordination matter just as much as horsepower."



All images courtesy Fairbanks Morse Defense

HOW COBOTS CAN HELP FIX THE NAVY'S MAINTENANCE CRISIS

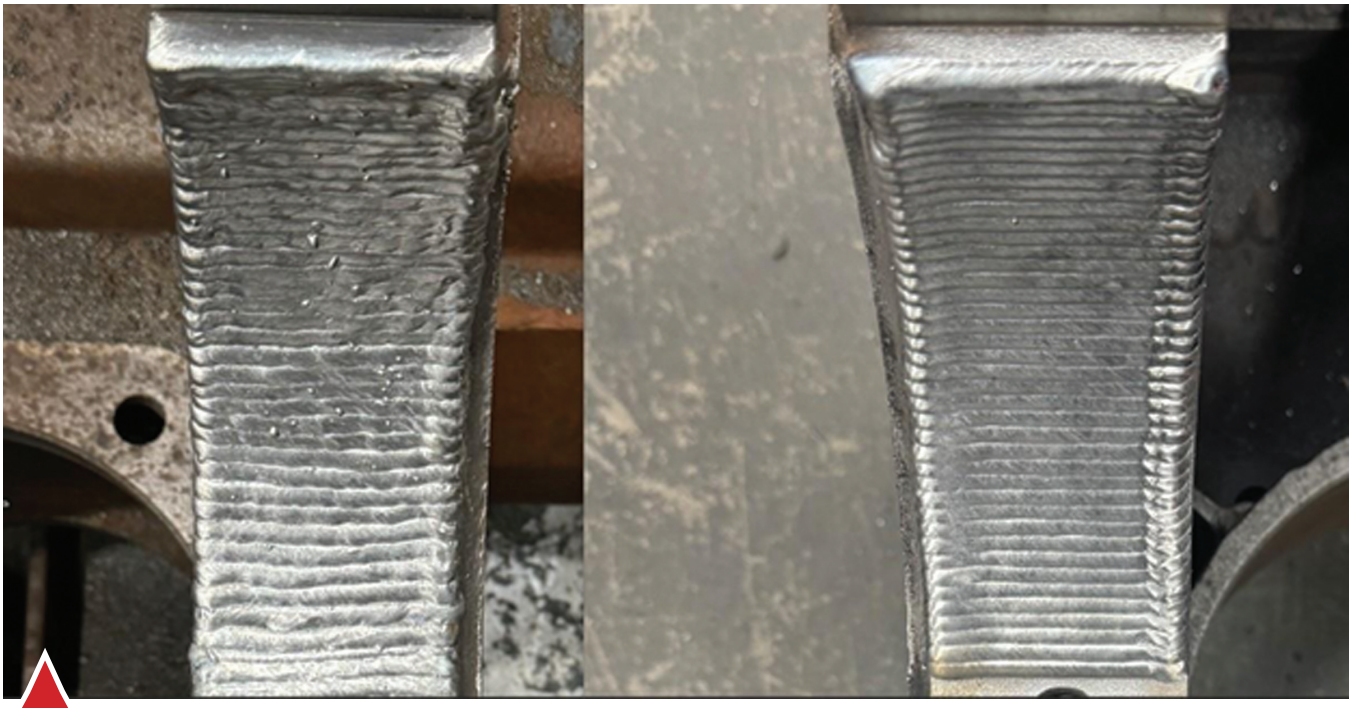
By Nirav Patel

Navies around the world are under pressure to extend the lifespan of their fleets at a time of increased deployment cycles and labor shortages. Fleet readiness is paramount, and maintenance has become one of the biggest bottlenecks.

A recent demonstration for the U.S. Navy showed that traditional welding methods can no longer keep pace with the demands of fleet sustainment. But a new ally is emerging in repair yards: the cobot.

Collaborative robots, or cobots, are portable systems designed to work alongside skilled human technicians to enhance the safety, speed and precision of their work. These dynamic, modular platforms are not replacing workers, but providing invaluable support with repetitive, high-stress repairs.

"Robotic welding represents a fundamental shift in how we approach fleet sustainment," said Keith Haasl, President of Fairbanks Morse Defense (FMD) Service and Technology. "It allows us to complete repairs faster, more accurately and more safely than ever before. That fundamental shift is already delivering measurable results in naval repair operations."



This image of a crank line saddle repair compares the work of a master human welder working in ideal, temperature-controlled conditions (left) with the work of a robotic welder.

This image shows a typical crank line weld in the field under challenging conditions.



A Cobot in the Engine Room

The Navy is championing the shift toward robotic platforms through its Maritime Industrial Base (MIB) Program, a collaboration between industry, government and academia to revitalize U.S. shipbuilding and sustainment. The MIB has been providing vital funding for automation programs, like advanced robotics, additive manufacturing and AI, to fuel efficiency, speed and supply chain resilience.

A successful automation implementation starts with a targeted scope, rather than trying to revolutionize everything at once. The key is identifying a specific, high-impact process, proving measurable results and then scaling. For FMD's robotics program, that sweet spot was a 75% efficiency gain on a repetitive, high-precision welding job for an aging fleet of nuclear submarines.

As a long-time principal supplier of propulsion systems for the U.S. nuclear navy, FMD is responsible for sustainment of a fleet of diesel engines that provide emergency backup power to onboard nuclear reactors. These 30–35-year-old engines pose a unique welding challenge. Years of service have degraded the engine blocks and the series of crank line saddles.

Traditionally, repairing these components meant a human welder had to squeeze into a tight engine room to operate a multi-thousand-degree welding arc and achieve precision within a thousandth of an inch. Completing repairs on a single engine block with about a dozen crank line saddles would take around three weeks of grueling work. Robotic welding is reducing that time down to one week.

A recent demonstration on a U.S. submarine featured a successful crank line repair on a diesel backup engine. The robotic platform was lowered into the engine room and oriented on a track. The cobot was outfitted with a camera and trained on a library of thousands of images of expert welds. Using a machine learning algorithm, the cobot was able to grade its work and flag questionable welds.

Human operators remained in the loop to help the cobot determine whether to rework an area or move on to the next. The cobot completed the job in one-third of the time it would have taken an experienced welder. While the welder oversaw the operation, they avoided the cramped quarters, fatigue and exhausting heat of a summertime repair job.

A Technology Edge for Workers

Skilled workers are in short supply. The U.S. Navy is millions of labor hours behind what it needs to build and maintain the submarine fleet, and it's actively recruiting more than 140,000 workers to the submarine industrial base. Workers



who are on the job face extreme conditions that impact safety, retention and the ability to produce consistent, precise work. Yet, there are still pockets of skepticism about integrating new technologies into traditional workflows.

"A lot of people are afraid of automation and robotics. I think it just enhances and makes the workers' jobs easier," U.S. Secretary of the Navy John Phelan said at the 2025 Reindustrialize conference. "And we need to start equipping them [workers] with the tools that they need to get their job done easier."

Rather than replacing human workers, cobots are extending their capabilities. Robotic platforms handle repetitive, high-risk tasks without tiring or losing focus, freeing human technicians to solve complex problems and provide critical oversight.

The results of human-robot collaboration are not marginal; they represent decisive gains in speed and precision. Every day a vessel is deployable, instead of stuck in maintenance, is a gain in operational capacity. And every welding inconsistency is a loss in the operational lifespan of the component, the subsystem and the ship itself. For the military, this translates into fleet readiness. For commercial operators, it can mean the difference between profit and loss.

The Human Advantage

Beyond improvements in productivity, this division of labor is having tangible effects on worker safety. These benefits have been documented across industries where robotics have been adopted. In a 2025 working paper, European researchers found that for every 10% increase in the use of robots, companies saw a reduction in fatalities and a nearly 2% decline in injuries.

The technician remains at the center of the process. By taking people out of exhausting environments, they can avoid prolonged exposure to hot metals, toxic fumes and repetitive physical strain.

AI and Machine Learning

Initially, FMD developed a prototype robotic platform to align with the Navy's fully autonomous vessel program. As priorities shifted, there was an opportunity to tackle the more immediate, high-impact challenges in fleet maintenance. This led the robotics team away from custom-made platforms toward modular, open-source, programmable cobots—the Lego of advanced robotics.

These robotics platforms are increasingly "teachable." AI and machine learning algorithms are enabling continuous process improvement and fault detection. Cameras and processors allow for automated visual matching to identify masterful or faulty welds. But increasingly, intelligent sensors monitor material variations, heat distribution and surface inconsistencies to achieve even more consistent output.

Through AI and machine learning applications, robotic platforms are effectively digitizing the rigorous documentation required by navies to ensure quality control. While traditional welding jobs get bogged down by administrative overhead, integrated robotic welding platforms can generate real-time, traceable data logs. Each weld is digitally logged, capturing data for quality assurance and predictive maintenance.

Better documentation means timely interventions to anticipate failure and increase the service life of a ship. While it may seem like a low-level workflow improvement, it can shift the emphasis from reactive repairs to proactive fleet management for greater readiness.

Looking Ahead

The U.S. Navy is the smallest it's been since World War I and faces a significant gap in readiness driven by maintenance requirements. The time it takes to complete repairs on surface and amphibious vessels is often 20-100% longer than anticipated. Recent maintenance delays for Navy attack submarines have been so severe that roughly one-third of the fleet is non-deployable at any given time.

As the Navy seeks to grow its total fleet to 381, the maritime industrial base is being stretched between new builds and critical maintenance and service life extensions. However, debating the number of labor hours required for repairs misses a critical point. The tools exist today for fleet managers and operators to accelerate maintenance cycles and begin to restore readiness and lethality to the U.S. Navy.

Robotic platforms have been proven to cut dry-docking timelines by weeks. They have been demonstrated at scale on maritime propulsion systems. This goes beyond marginal improvement; it represents a broader technological shift with far-reaching implications.

Like any technology transformation, taking full advantage of robots in the repair yard requires methodical implementation. Greater integration of skilled workers and robotic platforms is all but inevitable. So, it is critical to build a stable framework. That means enhanced training for operators to collaborate effectively with cobots. It requires human operators to identify specific areas where a robotic platform has the comparative advantage over human labor in speed, precision and safety. Finally, successful automation means narrowing the focus to specific problem sets, proving viability in context and then expanding from there.

For suppliers working with U.S. and allied navies, there is a heightened sense of responsibility for mission readiness. Through speed, precision and programmability, robotic platforms are helping industry step up to meet that goal.

The Author

Patel

Nirav Patel is the Nuclear Navy Segment Director at Fairbanks Morse Defense. In his role, Nirav manages the aftermarket efforts to meet the Navy's needs across the Fairbanks Morse Defense portfolio. A retired submarine officer, he received his bachelor's degree in systems engineering from the Naval Academy and an MBA from Naval Postgraduate School.





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BEYOND THE PAINT CAN

MARINE COATINGS TECH HELP REWRITE THE ECONOMICS OF HULL AND TANK PROTECTION

Marine coatings are literally on the front line of protection for commercial ships and boats, and the product category rarely attract attention unless something goes wrong. Few technologies exert more influence over a vessel's long-term operating cost, regulatory performance and asset value. Hull resistance, fuel consumption, emissions compliance, drydock duration, cargo flexibility and even off-hire risk are all shaped, often decisively, by what is applied between steel and seawater.

Over the past year, leading commercial marine coatings suppliers have quietly rolled out a series of developments that reflect a broader shift in the sector. The focus has moved away from incremental formulation changes and toward measurable, verifiable performance, supported by data, third-party validation and application innovation. The result is a new generation of coatings designed not simply to protect steel, but to improve vessel economics across an entire service interval.

From Claims to Verification

Few metrics matter more to operators than speed and efficiency loss. Historically, antifouling performance has been described in general terms, fuel savings, smoothness, fouling resistance, often without standardized proof. That is changing.

Chugoku Marine Paints (CMP) has introduced **SEAFLO NEO SL ZX**, an ultra-low friction antifouling based on advanced silyl methacrylate chemistry. Building on earlier SEAFLO NEO SL variants, the new formulation targets sustained hydrodynamic performance over a full five-year service interval. The technical emphasis is not on initial smoothness alone, but on maintaining low average speed loss over time, aligned with ISO 19030 measurement methodology. CMP's approach reflects a growing recognition that average performance, not best-case performance immediately after drydock, is what determines real fuel consumption, CII scores and voyage economics. By reducing long-term speed loss, the coating directly influences fuel burn, emissions intensity and schedule reliability, particularly for globally trading vessels with varied operating profiles.

A similar emphasis on independently verified performance underpins **Jotun's SeaQuantum X200 antifouling**. The coating has achieved DNV verification of an average speed loss of just 1.0% over a dock-to-dock period, measured in accordance with ISO 19030. This compares with an industry baseline of approximately 5.9% average speed loss.

From a technical standpoint, that difference is substantial. Using the standard 3:1 relationship between speed loss and hydrodynamic efficiency, SeaQuantum X200 translates to roughly 14–15% lower fuel consumption versus the industry average. The significance lies not only in the performance itself, but in the fact that it has been validated across a fleet of 41 vessels operating under normal commercial conditions, moving antifouling performance from theoretical benefit to documented outcome.

Silicone Tech Expands

Silicone fouling-release coatings have long been associated with premium performance, but their adoption has been constrained by application challenges. Controlled environments, strict curing requirements and post-delivery application windows have limited their use, particularly in the newbuild phase. **Hempel** completed the first ever applications of its next-generation silicone hull coating, Hempaguard NB, with one of the newbuilding vessels being Tangier Maersk - the first in a new series of six 9,000 TEU vessels ordered by Maersk. Applied at Yangzijiang Shipyard (YZJ) in China in October 2025.

The successful application is viewed as a significant achievement for Hempel, Maersk and YZJ. Building on the strong results achieved during the project, additional vessels under the same contract are scheduled to be coated with Hempaguard NB during 2026. **Ole Graa Jakobsen, Head of Fleet Technology at Maersk** said: "As fuel efficiency remains one of our top priorities, we are continuously refining coating solutions on our vessels to ensure optimal hydrodynamic performance."

Application Innovation

Coating performance does not depend solely on chemistry. Application quality, film thickness consistency and surface smoothness are equally critical. Over the past year, **PPG** has demonstrated how application technology itself can become a differentiator.

PPG recently completed its 100th drydocking using **electrostatic coating application** for marine hulls. Borrowed from automotive and aerospace sectors, the technique electrically charges paint particles and draws them uniformly to the grounded steel hull. Compared with conventional airless spraying, electrostatic application significantly improves transfer efficiency, reduces overspray and creates an exceptionally smooth, uniform film.

To support the method, PPG developed coatings specifically formulated for electrostatic application, including **PPG Nexeon 810 antifouling** and **PPG Sigmaglide 2390 fouling-release coating.** The combination of low-friction chemistry and precision application directly contributes to reduced hull roughness, improved fuel efficiency and lower greenhouse gas emissions—while also delivering a cleaner, safer working environment in drydock.

Biocide-Free Coatings

Environmental performance is no longer a niche concern. Regulatory pressure, customer scrutiny and corporate decarbonization targets are pushing biocide-free technologies into mainstream consideration.



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AkzoNobel's Intersleek 1100SR exemplifies this shift. The silicone-based, biocide-free fouling control coating incorporates patented slime-release technology to reduce hull resistance without relying on traditional biocides. Its adoption by Winning Shipping in China, across multiple drydockings, underscores a key point: sustainability arguments only gain traction when backed by operational performance.

In parallel, **Nippon Paint Marine** continues to advance biocide-free and low-friction technologies through **AQUATERRAS** and **FASTAR**. AQUATERRAS employs patented polymer and micro-domain structures to prevent fouling adhesion, while FASTAR uses hydrophilic-hydrophobic nanodomain architecture to reduce resistance.

What distinguishes Nippon Paint Marine's recent developments is its decision to subject both coatings to independent long-term performance assessment by Lloyd's Register Advisory, using ISO 19030 methodologies and multi-source vessel data. This reflects an industry-wide move toward transparency, where coating performance must stand up to third-party scrutiny across vessel types, routes and operating conditions.

Real-world results support the approach. Carnival Corporation's experience with AQUATERRAS—most notably on AIDAdiva: demonstrated fouling-free hull conditions after three years of operation without underwater cleaning, even through extended idle periods. Reduced propulsive power demand and lower emissions followed naturally.

Protecting the Parts

Hull coatings dominate discussion, but rudders, nozzles, thrusters and running gear often account for disproportionate maintenance costs. Cavitation erosion and galvanic corrosion can extend drydock duration and trigger expensive mid-cycle repairs.

Hydrex's Ecoshield takes a fundamentally different approach. Rather than relying on conventional paint systems, Ecoshield uses a thick vinyl ester barrier reinforced with high concentrations of glass platelets, forming a mechanically robust, cavitation-resistant layer. Applied ideally at newbuild, but equally effective as a repair system, it is designed to remain in place for the lifetime of the vessel, with no need for repainting. At typical dry film thicknesses of 1,000–2,000 microns, Ecoshield absorbs and resists the pressure pulses generated by collapsing cavitation bubbles. Its compatibility with Ecofix filler allows damaged components to be rebuilt without welding, reducing hot work and drydock time. A 10-year warranty further reflects the shift toward lifecycle thinking rather than interval-based maintenance.

Tank Coatings as a Commercial Lever

For chemical and product tankers, cargo flexibility and cleaning time directly affect earnings. **Advanced Polymer Coatings (APC)** continues to expand the footprint of its **MarineLINE** coating system, selected last year for multiple IMO II newbuilds for Champion Tankers.

MarineLINE's strength lies in its exceptional chemical resistance, low absorption and high-gloss finish. These properties reduce cleaning time between cargoes, minimize contamination risk and enable faster turnaround—often outperforming stainless steel and conventional epoxy systems on a cost-performance basis.

With more than 700 vessels coated and approximately 12% of the global chemical tanker coating market, APC's recent investments — including a major expansion of its U.S. manufacturing facility — underscore sustained demand for coatings that enhance cargo optionality while reducing water, chemical and energy consumption during cleaning.

A Clear Direction

Across hulls, tanks and appendages, the direction of travel is unmistakable: more so than ever ship and boat owners are demanding quantified performance, verified data and lifecycle economics.

The technologies introduced over the past year — from ultra-low friction antifoulings and newbuild-compatible silicones to electrostatic application and lifetime running gear protection — reflect an industry aligning coating selection with fuel efficiency, emissions compliance and asset longevity.

In an environment of volatile freight markets and tightening regulation, the humble coating system has become a strategic decision, one that increasingly separates vessels that merely operate from those that consistently outperform.

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Electrifying the Mississippi

Associated Terminals and Liebherr Maritime Cranes celebrated the christening of two CBG 500 E cranes in New Orleans, introducing the first all-electric transshipment cranes of their kind on the Lower Mississippi River.

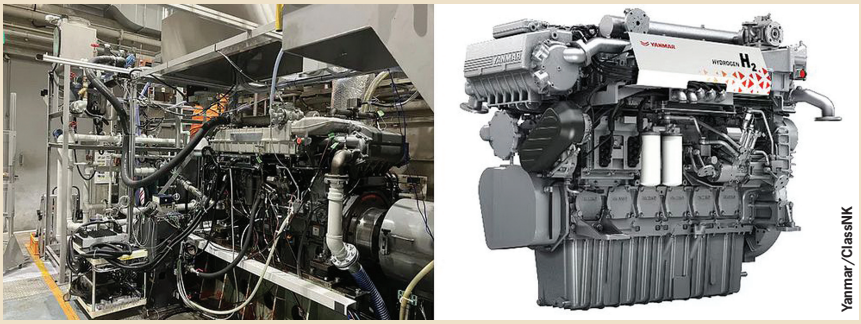
Each crane is engineered for high-volume bulk handling, offering maximum grab capacities of 90 tons in sheltered waters and up to 65 tons in open water, complemented by a lattice boom design with up to 50 meters outreach. Integrated LiCaTronic energy recovery systems improve efficiency by recovering energy generated when braking or lowering loads, while remote diagnostics and ergonomic cabins enhance operational safety and reliability.

The two CBG 500 E cranes are installed on Associated Terminals' next-generation barges, purpose-built with hybrid-ready power systems, an intelligent load management and reduced fuel consumption. Keel cooling technology further minimizes maintenance needs and environmental impact.

The first crane, delivered in the summer of 2025, has already gone into service and quickly proved itself as a key asset for bulk handling, earning strong praise from Associated Terminals after commissioning.

Yanmar's Hydrogen 4-Stroke High-Speed Engine

Yanmar Power Solutions became the first engine manufacturer in Japan to obtain both type approval certificate and NOx certificate from ClassNK for its pilot-ignition hydrogen-fueled 4-stroke high-speed engine for power generation for domestic coastal vessels as part of the Nippon Foundation's Zero Emission Ships Project. In 2025, Yanmar Power Solutions was intensifying its land-based demonstration tests utilizing a small amount of Hydrotreated Vegetable Oil (HVO) as a pilot fuel, while preparing for planned demonstration operations. As a result of the inspection by ClassNK, the company successfully obtained type approval certificate in October 2025 and NOx certificate in December 2025, both of which are required for demonstration operations. The engine specifications covered by these certifications are designated as "Electronically Controlled Gas Only Engine (Hydrogen)."



Yanmar/ClassNK

Left: Demonstration model of a pilot-ignition hydrogen 4-stroke high-speed engine; Right: Rendering of the Pilot-Ignition Hydrogen 4-Stroke High-Speed Engine.

Beetronics Displays

Beetronics received DNV Type Approval for a wide selection of its metal monitors and touchscreens,which supports the use of Beetronics displays across a wide range of environments, from commercial shipping vessels to offshore installations and high-speed craft. The lineup covers sizes from 7- to 32-inches in multiple aspect ratios, available in both touch and non-touch configurations. The DNV-approved Beetronics models are engineered with:

• Conformal-coated PCB boards to protect critical circuitry against moisture, salt deposits, and conductive airborne particles.

• Specialized grounding and shielding to ensure stable EMC and EMI performance in electrically dense environments, such as radar consoles and engine control rooms.



Beetronics

• Dimmable backlight control (including potentiometer support) for night operations on the bridge.

All models in the series share a uniform mechanical and electronic design, enabling marine integrators to standardize on a single display platform for both newbuilds and retrofits, simplifying engineering, documentation, and fleet-wide maintenance.

Tech Files

Latest Products & Technologies



ICS Launches Deck Procedures Guide

The International Chamber of Shipping (ICS) released its new *Deck Procedures Guide*, a publication that addresses a gap in maritime safety guidance by providing the industry's first comprehensive resource dedicated specifically to deck operations. Covering the full spectrum of deck-side activities, the guide includes practical procedures for cargo operations, mooring and anchoring, bunkering, heavy weather preparations, and maintenance of core equipment across all ship types. It also features guidance on compliance with the International Maritime Solid Bulk Cargoes (IMSBC) Code and the International Maritime Dangerous Goods (IMDG) Code, as well as an interactive risk assessment tool and adaptable checklists to support safe and efficient operations. One chapter addresses the emerging challenge of alternative fuel bunkering, including LNG, methanol, and ammonia, developed in collaboration with leading operators and reviewed by the Society for Gas as Marine Fuel (SGMF).

To order, visit:

www.ics-shipping.org/publications

ESAB Ruffian EMP 270G

ESAB introduced the Ruffian EMP 270G engine-driven welding generator, which offers a multi-process welding output of 270A at 100% duty cycle and 11kW of generator power through its multiple 120VAC and 240VAC auxiliary outlets. The Ruffian EMP 270G combines ESAB's next-generation inverter with the proven reliability of a made-in-America 23.5-HP KOHLER Command Pro CH730 gasoline engine. The Ruffian EMP 270G features a uniquely designed, next-generation inverter which provides an easy-to-start arc in all welding modes, advanced controls to fine-tune the arc (such as Arc Force for Stick and Cables Calibration for MIG welding), in addition to synergic lines for fast and easy set-up. Ruffian delivers best-in-class performance for all processes and electrode types, including not only 7018, but also 6010/6011 and hardfacing electrodes. It can also carbon arc gouge with 3/16-in. carbons. It weighs 425 lbs. with base mounting bolt holes and an 11-gallon fuel tank for hours of run time.



ESAB

Anschütz Nav System Refit for RV



Jenna Plank – BAS

Anschütz completed the refit of Integrated Navigation System for RRS Sir David Attenborough.

Since entering service in 2021, the polar research vessel RRS Sir David Attenborough has been equipped with navigation systems from Anschütz. As part of a recent refit, Anschütz has supplied the vessel with a new, state-of-the-art SYNAPSIS NX Integrated Navigation System (INS), along with upgrades to the radar systems. The new technology enhances the stability and performance of the bridge system, supporting safe navigation even under the most challenging polar conditions. Built by British shipyard Cammell Laird, the RRS Sir David Attenborough is among the world's most advanced polar research vessels. Measuring 129 meters long, the vessel operates in Antarctica under the stringent requirements of Polar Code ice class 4 and the LR NAV1 IBS notation.

The updated software provides the bridge with improved situational awareness and an expanded set of navigation tools, presented via modern, intuitive user interfaces.

2+4: Next-Gen RoRo Vessels



Peter Mild

STENA C-FLEXER MAIN PARTICULARS

Length:	200 m
Beam:	31 m
Dwt:	about 15.000 ton
Draft:	7.5 m
Speed:	21 knots
Lm: 3-deck version:	3.400 lane meters
Lm: 4-deck version:	4.750 lane meters

Stena RoRo placed an order for a new generation of RoRo vessels comprising two firm vessels of the C-Flexer type with options for an additional four, vessels developed by Stena RoRo and Italian design company NAOS Ship and Boat Design.

The first two C-Flexer RoRo vessels are scheduled for delivery in March and June 2029 respectively, with optional vessels delivered at three-month intervals thereafter.

The ships will be built at China Merchants Industry (CMI) Weihai Shipyard, extending a decade-long partnership between Stena RoRo and China Merchants Industry has so far resulted in 17 vessels ordered. The cooperation began in 2016 with an order for four E-Flexer RoPax vessels and has since grown to a total of 15 vessels, 12 of which have already been delivered. In addition, two RoRo vessels of the Stena NewMax concept have been delivered.

The new C-Flexer design offers a high degree of flexibility, enabling Stena RoRo to provide customers with vessels tailored to their specific operational needs. A highly developed hullform, multi-fuel engines and a scalable battery-hybrid system ensures that the vessels are future-proofed and can be progressively "greened" in line with both technological advances and regulatory developments.

"In the future the C-Flexer will be able to operate entirely on batteries. Until then, the installed diesel-battery hybrid system will provide the necessary flexibility and redundancy for many years to come," said Per Westling, CEO of Stena RoRo AB.

CMA CGM Monte Cristo

CMA CGM's Monte Cristo was set to enter commercial service on January 29, 2026 in Ningbo, on the BEX2 – Phoenician Express service. This ship is significant, as it's the 400th owned vessel for CMA CGM and the first in a series of six methanol container ships. Globally, the group has a fleet of more than 650 vessels worldwide. CMA CGM Monte Cristo has a maximum capacity of 16,204 TEU, including around 1,000 reefer plugs, and measures 366 meters in length and 51 meters in beam. The vessel will sail under the Maltese flag. The vessel has a crew of 23 seafarers and is under the command of Captain Predrag Vojvodic. It meets high standards in terms of safety, comfort and accommodation. The CMA CGM MONTE CRISTO becomes the 11th methanol container ship in the CMA CGM fleet, out of a total of 24 such vessels on order. Committed to achieving Net Zero Carbon by 2050, the CMA CGM Group is deploying the best available solutions to reduce the environmental footprint of maritime transport and logistics. The Group is preparing to operate, by 2031, around 200 dual-fuel LNG and methanol container ships, that can be powered with low-carbon energy.

Built at DSIC Tianjin Shipyard, the v held its naming ceremony on 21 January 2026 in Tianjin, with Liu Liping, Deputy General Manager of EPPEN BIOTECH, as godmother.



CMA CGM

RMC and the Pohjanmaa Class Corvettes


RMC

For Rauma Marine Constructions (RMC), the year has had a strong start, and recently a significant milestone was reached in the Squadron 2020 project with the start of production of the fourth multi-purpose corvette and the keel-laying of the third one. This also means that all four multi-purpose corvettes of Pohjanmaa class are now simultaneously under construction at the RMC shipyard. In addition, preparations are in full swing for the production of the two icebreakers ordered by the United States at the end of 2025.

"We are very pleased to now have all the multi-purpose corvettes of Pohjanmaa class under construction at the Rauma Shipyard. We have industrialized our procedures and construction processes to meet the requirements of our clients' demanding projects. This is reflected in the progress we have made in the basic shipbuilding activities, in other words, hull construction," said Mika Nieminen, CEO and President, RMC.

The direct employment impact of the Squadron 2020 project is about 3,600 person-years in Finland. RMC is building a total of four multi-purpose corvettes of the Pohjanmaa class to the Finnish Navy. The Pohjanmaa class is one the most capable vessel types in the Baltic region. The vessels are designed for year-round operation in all conditions encountered in the Baltic Sea.

USCG Icebreakers Ahead

The icebreaker contract awarded to RMC by the U.S. Coast Guard at the end of 2025 is proceeding towards production start. The projected direct employment impact of the two icebreakers is about 2,000 person-years, and the total impact is expected to be about 5,000 person-years. The icebreakers will be delivered in 2028 for operation in the harshest marine environments in the world. The corvette and icebreaker projects are temporally overlapping.

"Squadron 2020 is a strategic project for Finland, and the icebreaker project opens a whole new dimension for our marine industry. RMC has become a leading supplier of government vessels and military vessels in Finland. Together the projects boost economic activity significantly, particularly in Rauma region and Satakunta," said Matias Marttinen, Finnish Minister of Employment. "The efficient execution of the projects, safeguarding mutual interests, is of crucial importance to the whole of Finland. I believe that RMC will provide interesting job opportunities to numerous professionals also in upcoming years."

MV Isle of Islay



CMAL

Caledonian Maritime Assets Limited (CMAL) has taken ownership of MV Isle of Islay following a handover ceremony at Cemre Marin Endustri in Yalova, Turkey, where the vessel was built.

MV Isle of Islay, the first of four ferries being constructed at the yard, will serve Islay and Jura when she enters service, and will be joined by her sister vessel MV Loch Indaal later this year.

The vessel received Maritime Coastguard Agency (MCA) approval and passenger certification, and will now be prepared for the repositioning voyage from the Sea of Marmara back to Scotland. This will be undertaken by operators CalMac and is expected to take around two weeks. The new vessel is equipped with the capacity for up to 450 passengers and 100 cars, or 14 commercial vehicles. This boosts vehicle and freight capacity on the Islay routes by 40%, improving the overall resilience of the wider fleet.



Manson Construction

Hopper Dredge Frederick Paup

Key highlights:

- Largest Self-Propelled Hopper Dredge in the U.S. – 420' length x 81' beam, with a 15,000+ cubic yard hopper capacity
- Powerful and Agile – Self-propelled with 25,000 horsepower, triple azimuthing stern drives, and twin bow thrusters
- Sustainable – Tier 4 Wabtec Diesel-Electric Engines and an advanced hull form for reduced emissions and improved fuel efficiency
- The vessel is designed with smart features that allow for dynamic positioning, power management, and integrated dredging systems.
- The vessel will support the US Army Corps of Engineers' goal of achieving 70% beneficial reuse of dredged material by 2030.

Designed and built specifically to meet the needs of the U.S. dredging market, she boasts 25,000 HP -- 3x Wabtec 16V250MDC + 2x Wabtec 12V250MDC -- and volumetric capacity of over 15,000 cubic yards.

Utilizing her triple Z Drives and twin Bow Thrusters enables the Frederick Paup to maneuver and dredge within the tightest channels. This further enhances her capability to minimize operational delays as she can maintain performance in the event a Z Drive or bowthruster has a mechanical failure.

The Dynamic Positioning feature adds additional flexibility to hold stationary position or track a designated course while performing dredging operations. The utilization of sealed underwater motors enhances the dredging operation by reducing the suction distance between the drag head and the pump thus making it more efficient.

With her two in-hull pumps, the Frederick Paup will enhance Manson's competitiveness on beach nourishment and coastal restoration projects and help the US Army Corps of Engineers (USACE) meet their goal of 70% of dredged material being beneficially reused by 2030. Being diesel electric and having Tier 4 engines, the FREDERICK PAUP is very fuel efficient and environmentally friendly at a lower cost per unit.

FREDERICK PAUP MAIN PARTICULARS

Ship Name:	**Frederick Paup**
Ship Type:	**Trailing Suction Hopper Dredge**
Ship Builder:	**Seatrium AmFELS, LLC**
Material:	**Steel**
Ship Owner:	**Manson Construction Co.**
Ship Operator:	**Manson Construction Co.**
Ship Designer:	**Hockema Group, Inc.**
Delivery Date:	**2026**
Classification:	**ABS**
Length, (o.a.) :	**419.83 ft.**
Length, (b.p.) :	**396 ft.**
Breadth, (molded):	**81 ft.**
Depth, (molded):	**32.5 ft.**
Draft, (designed):	**31.02 ft.**
DWT (at design draft):	**16,870**
Speed:	**14kt**
Fuel Type:	**No. 2 Diesel; Diesel-Electric**
Main engines:	**Wabtec: 3xGE16V250MDC, 2xGE12V250MDC**
Total installed power:	**25,000HP**
Bow Thrusters:	**Brunvoll**
Propellers:	**Schottel**
Generators:	**Wabtec**
Radars:	**Furuno**
Depth Sounders:	**Furuno FE-800**
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Coatings:	**Carboline**

In the Shipyard

From Design to Delivery

VLGC Lucent Pathfinder



NYK

A new very large gas carrier (VLGC) was named Lucent Pathfinder at a ceremony held at Kawasaki Heavy Industries' Sakaide Works, marking the seventh dual-fuel LPG carrier using LPG ordered by NYK.

The vessel, which will be chartered by United Arab Emirates-based LPG trader BGN INT DMCC, is designed for the global transportation of liquefied petroleum gas and is capable of operating on both heavy fuel oil and LPG. Lucent Pathfinder is equipped with a dual-fuel engine and a shaft generator system that uses rotational energy from the main engine to generate electricity. The vessel is also designed to transport ammonia, a fuel expected to play a growing role in the energy transition due to its zero carbon emissions during combustion. he ship measures 229 x 37.2 x 21.9m, with a summer draft of 11.6m.

It has a cargo tank capacity of 86,938 m3, placing it among the larger vessels in the VLGC segment.

MV Ocean Explorer

Sallaum Lines received its latest Pure Car and Truck Carrier (PCTC) vessel, MV Ocean Explorer as part of its Ocean Class fleet. The newbuilding's arrival represents a milestone in the company's ongoing fleet expansion. MV Ocean Explorer was built by Fujian Mawei Shipbuilding and measures 199.9 x 38m. Designed to accommodate up to 7,500 car equivalent units (CEU) across 13 decks, it is powered by an LNG fuel system with a total capacity of 3,536.21 cubic meters.





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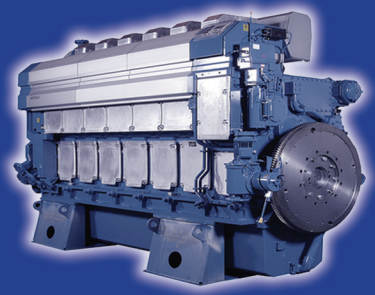

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