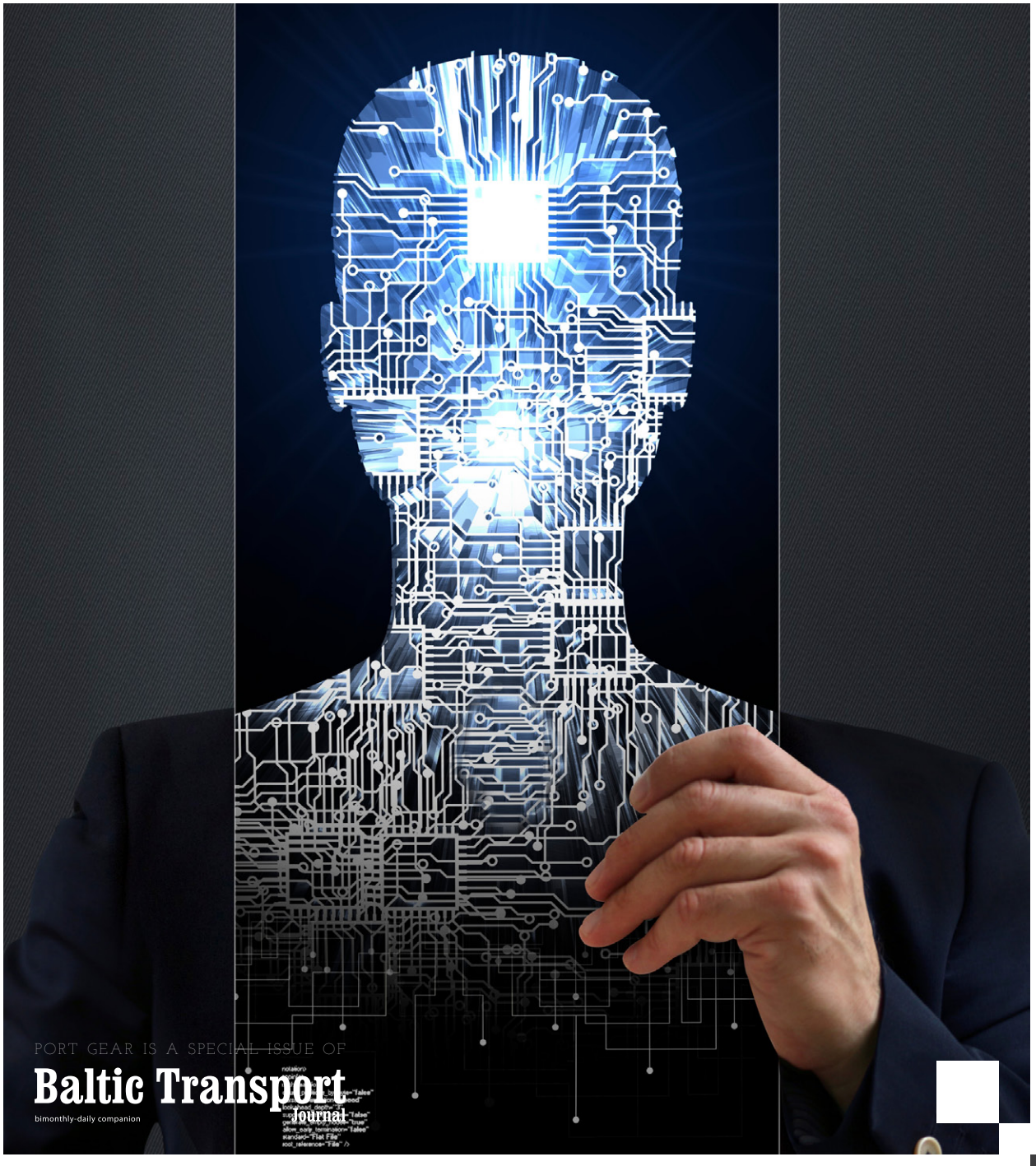
PORT GEAR

– hard- & software for better operations –

1 – 24



PORT GEAR IS A SPECIAL ISSUE OF

Baltic Transport Journal

bimonthly-daily companion

ISSN 1733-6732

PORT OF HAMINAKOTKA

The Port of Opportunities

The Port of HaminaKotka is a versatile Finnish seaport serving trade and industry. The biggest universal port in Finland is an important hub in Europe and in the Baltic Sea region.

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DEAR READERS,

Przemysław Myszka

We have prepared something special for you this – TOC Europe 2024 – time around! This concrete issue focuses on the various technological aspects of the transport sector, both soft- and hardware (and anything in between, say, remote-towards-autonomous trucking in container terminals), and does so from multiple angles, including legal and safety. Speaking of the latter, there's a special round-up of news specifically revolving around all things safety, courtesy of TT Club (who is again setting up the Safety Village to raise awareness as well as spread best practices and spotlight life-saving tech – bravo!). To top things off, other news bits are very much venturing forth how the industry of transporting goods and people will change in the face of, e.g., the energy transition. Proven likewise pioneering technologies will certainly play an instrumental role in making the transport business more data-driven towards greater efficiency, be it performance-wise, for the sake of the environment, or to retain and attract new talent.

With that, I wish you nothing but a savvy read! May this special issue of the Baltic Transport Journal kick whatever you're doing into high gear! Oh, and don't shy away from visiting our stand at M4 (vis-à-vis the Info Hub)!

UN PATRON OR THE LESSON OF THE APPRENTICE (FRAGMENT) BY EUGÈNE BULAND, PHOTO: ARTVEE

PORT GEAR

Publisher
BALTIC PRESS SP. Z O.O.
Address: ul. Pułaskiego 8
81-368 Gdynia, Poland
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www.baltictransportjournal.com
www.europeantransportmaps.com
www.linkedin.com/company/baltic-transport-journal

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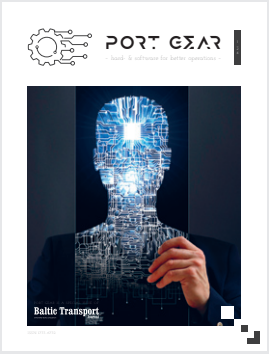

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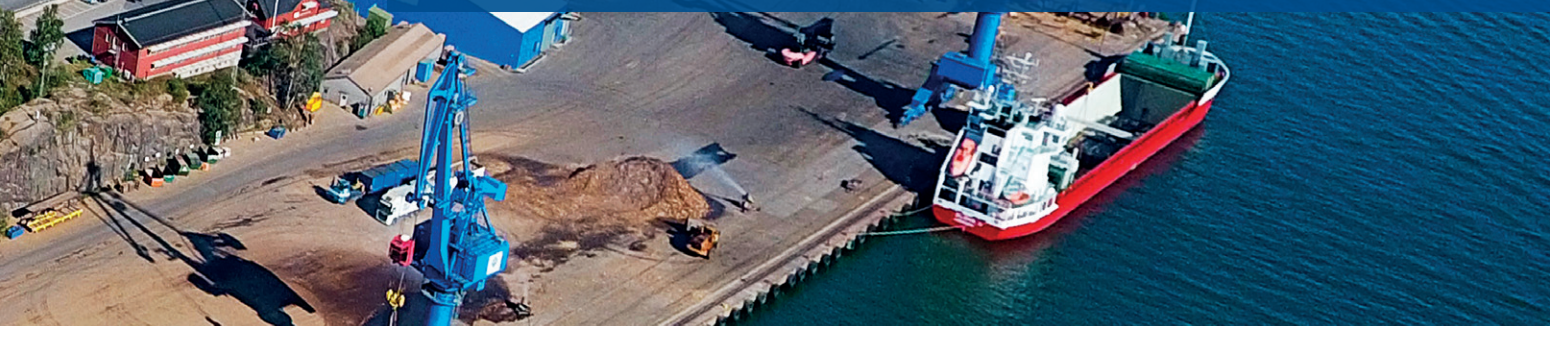
THE ALL INCLUSIVE PORT

Location, location, location.

Let's repeat that one more time. Location. It's important for every property. And perhaps especially so for ports. Take the Port of Oxelösund for example. Draw a circle around the whole Baltic Sea and we're pretty much in the middle. Close to everything. Convenient for transports. And speaking of logistics, how about our direct access to both railway and motorway E4? And our 16,5 meter port depth, ice-free all year round? That's what we call location, and it's worth saying more than once.

The Port of Oxelösund is more than a port. We are a business partner who solves your logistical challenges and helps optimize your goods' journey, from start to finish. Our goal is to be the Baltic's leading port terminal, with Europe's best stevedoring services.



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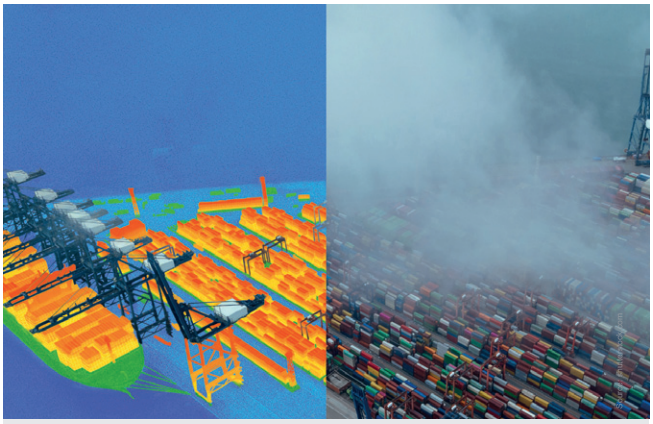
Port of Oxelösund

8

safety news by TT Club

8 Spyder Netting wins TT Club Innovation in Safety Awards 2024
Guidelines to Develop and Implement a Safety Management System for Alternative Fuels On Board Ships – published
The Joint Industry Guidelines for Combatting Illegal Wildlife Trafficking – released
9 A Year in Focus – a focus on safety culture for the years to come
The European Ports Alliance Public Private Partnership
Maritime Security – A Practical Guide for Mariners
Training seafarers for a decarbonised future
10 TT Club introduces Risk Bytes
The CTU Code – surveyed
The WSC Whale Chart
11 Password? Password
'Navigating the future: safety first!'
Harbour masters add weight to a group seeking action on crucial safety issues
UCIRC – revised



12

high gear news

12 Kalmar's e-machinery goes to the US
Hirtshals eyes more wind energy…
… and becoming a CCUS hub
Gasum-Nordic Ren-Gas e-methane deal
Norsepower scores twice
13 Tailwind for Szczecin-Świnoujcie
The Stockholm-Turku Green Corridor
Helsingborg's e-reachstacker – delivered
14 The Lübeck-Trelleborg Green Shipping Corridor
Norsepower scoops a new order
The FIN-EST Green Corridor initiative kicks off
Scanlog to provide Löfbergs with fossil-free sea transport
Sweden's first hydrogen truck
Unifeeder charters two more methanol feeders
Green hydrogen tested in Gothenburg for off-grid electricity supply
Electrochaea-Erik Thun e-methane LoI
15 Port-shipping green corridors MoU
DFDS orders 100 e-trucks
Finland's first OWE farm to get stronger
Green hydrogen to be produced in Hirtshals
17 Steel cut for the first green hydrogen container ship
Green Balance Mechanism – proposed
Kalundborg to lower the carbon footprint of its container operations
Wind Energy Initiative – launched
Luleå and Piteå chose Grieg Connect
Helsinki's new smart check-in gate system
19 HHLA CTA's AGV fleet is now entirely green
Copenhagen's container terminal to go greener with HVO

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20

reads for (port) gearheads

20 AS SAFE AS PORTS?
– *Advances in technology aiding seaport and terminal security*
NEIL DALUS

22 HIGH WAVES, HIGH CLAIMS
– *New study on container losses*
KUNAL PATHAK, SIDDHARTH MAHAJAN, ARE SOLUM, AND HELGE A. NORDAHL

27 PRECISE POSITIONING WITH RADAR
– *Symeo at TOC Europe 2024*
BENJAMIN WUTTKE

28 HOW TO BORROW & LEND
– *Good neighbour agreements – the risk implications*
MIKE YARWOOD

30 FROM THEORY TO PRACTICE
– *The hydrogen economy gives ammonia and methanol export trades the green light*
STUART NICOLL

32 THE HOLY BOSS CAP
– *How innovation drives efficiency gains by eliminating the hub vortex*
BATUHAN AKTAS

34 THE WAY TO GO (IN SPITE OF A FEW ROADBLOCKS)
– *Results of a global survey on the current state of automation in container terminals & the trends shaping its future*
PETER SZELEI

38 FORGE AHEAD
– *Gradual automation of container yard trucking for better performance & heightened safety*
MARTIN ISIK

40 ROCK-SOLID SHIPPING
– *A surge in lithium demand raises stability concerns over transporting its minerals*
JOHN SOUTHAM AND LEE STENHOUSE

42 KNOW THE DIFFERENCES TO MAKE A DIFFERENCE
– *The challenges with decarbonising bulk carriers*
KOSTAS GKONIS AND EMMANUEL VERGETIS

44 THE ENERGY TRANSITION'S NEW DUCK IN THE POND
– *Collecting solar power – offshore*
ALEXA IVY

46 TURN UP THE VOLUME!
– *Addressing the storage challenge of methanol as a marine fuel*
FITZWILLIAM SCOTT

48 WELL, DUH!
– *Can a single maritime artificial intelligence (AI) research project cut 1% of total global emissions?*
ALEXA IVY

50 WHAT HAPPENS NOW
– *The end of the Consortia Block Exemption Regulation*
MIKE GARRATT AND ANTONELLA TEODORO

54 NAVIGATING NEW WATERS
– *Ethical AI in terminal operations*
JÖRG HERBERS AND EVA SAVELSBERG

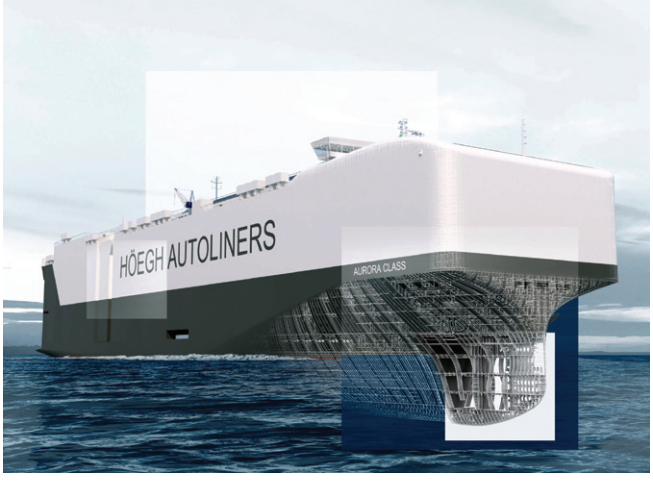
56 IN SAFE HANDS
– *Revolution in safety – now also available for terminal cranes*
JÉRÔME LACROIX

58 KEEPING A WEATHER EYE
– *How to transform dry bulk inventory management with automation and drones*
FITZWILLIAM SCOTT

60 MEASURING WHAT MATTERS
– *The importance of data strategy in terminal operations*
CHAD VAN DERRICK

62 PLANTING A SEED
– *How to help the transport industry make green corridors a reality*
PANOS KOUTSOURAKIS

64 GOODBYE, ANALOGUE!
– *Using 3D models is a ship designing game-changer – but what does it mean in practice?*
JOONAS MÄÄTTÄNEN



SPYDER NETTING WINS TT CLUB INNOVATION IN SAFETY AWARDS 2024

Out of 28 entries and then three shortlisted candidates, the judges decided to distinguish the product that came from the partnership between **Cross Currents 88** (the solution's developer) and **G2 Ocean** (a break-bulk shipping company wanting to increase the safety of vessel loading). The winning **Spyder Netting** is a thin layer of plastic film netting – a fall barrier system – that can be rolled out across gaps and secured between layers of cargo. The challenge stems from when paper reel products are loaded in the cargo holds of break-bulk vessels, with stowage resulting in gaps between the cargo (particularly along the hold edges where the freight meets the bulkheads). These gaps present a significant fall risk to stevedores working in the cargo holds. The gaps can extend many metres down through the cargo, and, unfortunately, falls into these gaps have resulted in fatalities and severe injuries. "Falls from height during cargo operations is a vitally important risk to be managed. Spyder Netting [...] has already saved lives. Cross Currents 88 has been personally thanked by a stevedore whose fall was arrested by the netting," **Richard Steele**, CEO of **ICHCA International**, commented on presenting the award to Cross Currents 88-G2 Ocean. The two other shortlisted parties were **Royal HaskoningDHV** and **Trendsetter Vulcan Offshore**. The former entered **Smart Mooring** into the competition, a system addressing the safety of moored vessel operations in sheltered and exposed ports by predicting excessive ship motions and mooring line forces. The latter came with the **Next Generation Lashing System** that reduces container motion and controls the dynamics of container stacks. A detailed overview of all the entries can be found in a digest prepared by TT Club and ICHCA. Mike Yarwood, TT Club's Managing Director, Loss Prevention, underscored, "We want to nurture widespread and varied advances in safety innovation, so we seek to give all entrants the oxygen of visibility in the marketplace to help develop and grow their initiative to benefit cargo handling operations globally." As such, his and Steele's organisations will, for the third time, set up the **Safety Village** at **TOC Europe** this June.

GUIDELINES TO DEVELOP AND IMPLEMENT A SAFETY MANAGEMENT SYSTEM FOR ALTERNATIVE FUELS ON BOARD SHIPS – PUBLISHED

The Maritime Technologies Forum (MTF), an organisation of Flag States and Classification Societies established to provide technical and regulatory expertise to benefit the maritime industry, has released the *Guidelines* in question with recommendations for developing and implementing the Safety Management System (SMS) under the International Safety Management (ISM) Code for safe onboard handling of the potentially more hazardous alternative fuels. "Safe operations with alternative fuels will require an assessment of the competency, training, familiarisation and resources relevant to the specific alternative fuels. The human element in the operations associated with the handling, storage and utilisation of alternative fuels is critical and should be considered to ensure safe operations," MTF underscored in a press brief. **Nick Brown**, CEO of **Lloyd's Register**, added, "These guidelines and recommendations from the MTF are an important step forward to achieving safe and sustainable operations and a great starting point to begin preparing for the use of alternative fuels. The ISM Code provides a top-down approach to safety and is the ideal vehicle through which to drive training and skills for the safe handling of these fuels, not only under routine operations but also during emergencies such as equipment failures, fires, collisions, and malicious attacks. Our biggest strength, however, will be learning from each other throughout the energy transition, ensuring we have a solid foundation to promote safety for our people at sea and in port."

THE JOINT INDUSTRY GUIDELINES FOR COMBATTING ILLEGAL WILDLIFE TRAFFICKING – RELEASED

The initiative – led by the **World Shipping Council** and supported by the **United Nations Development Program**, the **Global Environment Facility**, and the **Global Wildlife Program**, in collaboration with **TRAFFIC** and **WWF**, and co-sponsored by **BIC**, the **Global Shippers Forum**, the **International Fund for Animal Welfare**, and **TT Club** – saw the release of the *Guidelines* in question. This toolbox for all supply chain participants includes advice on measures to take, questions to ask to help identify criminal wildlife trade, and guidance on reporting suspicious activities. An accompanying *Red Flags* document serves as a daily reference for all individuals involved in the supply chain. "Maritime traffic, in particular, remains vulnerable to the trafficking of illegal goods. With the vast volume of trade carried by sea, the demand for faster, just-in-time deliveries and the increasing complexity of intermodal supply chains, criminals increasingly exploit weaknesses in global maritime supply chains to traffic contraband items," the parties said in a press release. They also stressed, "Wildlife crime continues to pose a significant threat to biodiversity, local and national economies, as well as national and international security. The illicit trafficking of wildlife not only endangers countless species but also undermines the stability of ecosystems and jeopardises the livelihoods of communities worldwide. […] Illegal wildlife trafficking is not only decimating endangered species worldwide but also fuelling organised crime and threatening global security. The coalition's joint effort underscores the shared responsibility of all stakeholders in combatting illegal wildlife trafficking. By uniting their expertise and resources, these organisations demonstrate their commitment to protecting wildlife and promoting sustainable trade practices."

A YEAR IN FOCUS – A FOCUS ON SAFETY CULTURE FOR THE YEARS TO COME

TT Club released its latest review of current and ongoing risk trends. The publication includes a variety of studies and reports, including, among others, an analysis of the insurer's own claims data, as well as detailed research into and advice on mitigating invasive pests in containers, increased cybersecurity risk as ports automate, increasing customs documentation errors; clandestine immigration threats; dangers of plastic micro pellet spillages; and what safety & security aid can drone technology provide. "TT has recently witnessed a renewed focus and commitment towards loss prevention activities, with additional emphasis placed on the Club's mission statement to make the industry safer, more secure and more sustainable," comments **Mike Yarwood**, TT Club's Loss Prevention Managing Director. He furthered, "Greater safety goes hand-in-hand with enhanced security and consequently sustainability. TT's mutual ethos demands that we guide those we insure – and indeed the wider industry – in all aspects of risk through the container transport and global logistics supply chain. Via our latest Year in Focus, we aim to add to the large cannon of knowledge and guidance." **Josh Finch**, TT Club's Logistics Risk Manager, also underscores, "The importance of culture within an organisation, particularly where safety is concerned, cannot be underestimated. Safety is everybody's responsibility, and everyone has a voice in safety matters. A strong safety culture will positively impact safety performance."

THE EUROPEAN PORTS ALLIANCE PUBLIC PRIVATE PARTNERSHIP

The cooperative has been launched to fight organised crime and drug trafficking by leveraging the collective resources and expertise of multiple stakeholders to enhance security measures and enforce stringent controls within port facilities. Praising the initiative, the **Federation of European Private Port Companies and Terminals** (**FEPORT**) warned that "[…] we are reaching a situation where criminal networks are using extreme violence, corruption and intimidation that require exceptional mobilisation from public and private stakeholders in ports, national authorities, and law enforcement agencies. Seizures of cocaine in the EU have reached record levels, with more than 300 tonnes seized on an annual basis in recent years." The Federation also notes that many effective solutions are already in place, such as screening, intelligent cameras, virtual fences, port worker identity checks, and others. Still, closer international cooperation will be needed as we "[...] should also be aware that the creativity on the side of drug traffickers is huge and that it is going to be a race, a long marathon." **Ylva Johansson**, European Commissioner for Home Affairs, stresses, "The vast majority of illicit drugs into the EU are trafficked along maritime routes. 70% of drug seizures are in EU ports. That is why cooperation between national & EU authorities and EU ports is vital. Organised crime is adept at moving from one port to another as opportunities rise and fall. To challenge this network, we must build a network. The violent consequences of drug trafficking are as big as the threat of terrorism."

MARITIME SECURITY – A PRACTICAL GUIDE FOR MARINERS

The Nautical Institute has published its new compendium of essential maritime security advice, guidance and insights. The publication includes a broad range of topics, among many, a detailed examination of the ISPS Code and its implications. Author and global security expert **Steven Jones** AFNI FRSA, adds to the list, "The book tackles many of the issues that we have previously focused on within *Maritime Security*, such as coping with piracy, stowaways at sea and migrants. It also covers other challenges faced by officers, such as cybersecurity and criminality at sea, in ports and across the entire supply chain. This has made it a real focal point, a book that can be relied upon to illuminate some of those darker issues within the industry." Master Mariner and Maritime Consultant **Dariusz Godźik** MNI shares, "I have learned a great deal from reading this updated and extended edition of *Maritime Security*. The book is written in an engaging and accessible way that makes it an essential reading for mariners everywhere."

TRAINING SEAFARERS FOR A DECARBONISED FUTURE

The **Maritime Just Transition Task Force** has launched a collaborative project tasked with creating a framework to equip seafarers with skills as shipping transitions to zero-emission operations. Research commissioned by the organisation identified that 800 thousand of seafarers may require additional training by the mid-2030s in order to operate vessels running on zero- or near-zero emission fuels. The project will be run by the **International Maritime Organization** (**IMO**) and the Maritime Just Transition Task Force Secretariat. **Lloyd's Register** (whose Foundation will fund the framework alongside IMO) will develop the training framework for seafarers and officers, as well as an instructor handbook for maritime training institutions. The **World Maritime University** will provide academic expertise, while a large number of organisations will be involved through a global industry peer learning group to provide knowledge-sharing. "Moving towards a low-emission future will require new green jobs and re-skilling, and the global maritime industry is no different. Future alternative fuel technologies, such as hydrogen, ammonia and methanol, means there is a vital need to upskill all seafarers," highlights **Ruth Boumphrey**, CEO of **Lloyd's Register Foundation**. **Sturla Henriksen**, Special Advisor Ocean of the **United Nations Global Compact**, adds, "Decarbonising shipping is essential to combat the climate crisis. The global nature of this transition means that no one is alone in tackling this issue, and the Maritime Just Transition Task Force is committed to providing resources to support stakeholders making this journey." **Stephen Cotton**, General Secretary of the **International Transport Workers' Federation**, shares, "We have heard the message loud and clear from seafarers around the world: they are ready to lead, they are ready to shape the training frameworks for the zero carbon fuels of the future." In light of these future demands, IMO is reviewing and revising the **International Convention on Standards of Training, Certification and Watchkeeping for Seafarers**, with input from the industry and seafarer unions.

TT CLUB INTRODUCES RISK BYTES

PHOTO: TT CLUB

The international freight transport and cargo handling insurer released the first of a series of advice documents designed to provide a snapshot of the risks associated with day-to-day operating dangers that may not be recognised or, if they are, not sufficiently covered by the relevant insurance policies. Risk Bytes are aimed at simplifying complex risk issues by providing easily digestible information and guidance. The first publication tackles good neighbour agreements, outlining provisions that should be made in a formalised written contract, clarifying where the risk and liability rests during the operation of any shared asset and allowing thorough due diligence to be carried out before the agreement is signed. While **TT Club** applauds equipment-sharing agreements as an efficient use of resources, the organisation also flags potential liability issues if appropriate insurance coverage is not in place. "Sharing infrequently used equipment gives greater flexibility in operations and has significant cost savings. Usually reciprocal arrangements, they are not always formally outlined in well-defined contracts," TT Club noted in a press release. **Mike Yarwood**, the insurer's Managing Director, Loss Prevention, underlined in this regard, "In such circumstances, the casual nature of the arrangement, though often workable and agreeable to both parties, can lead to potential risks where liability and responsibility in the unfortunate event of an incident or breakdown may not be clear." He furthered, "[The primary risk is] in the event of the equipment or machine being lost or damaged during the period of the loan leading to financial exposure for the owner. In addition, this might severely impact business operations and cancel out any benefit gained from the arrangement, and severely damage years of a good working relationship with the neighbour." Yarwood additionally underscored that through Risk Bytes on good neighbour agreements, TT Club is also "[…] offering advice on adequate staff training, health and safety provision and include a readily recognised case study of a typical asset sharing operation."

THE CTU CODE – SURVEYED

The Polytechnic University of Turin carried out a study into the **Code of Practice for Packing of Cargo Transport Units** (**CTU Code**; jointly published by the **International Maritime Organisation**, the **International Labour Organization**, and the **United Nations Economic Commission for Europe**) and its application by shippers and forwarders. According to the research, the benefits of adhering to the CTU Code include improved safety, reputation, and supply chain coordination; decreased cargo damage, environmental impact, and operational inefficiencies; those using the CTU Code incurred no extra costs in employees, contractors, or vehicles; any increase in loading and waiting times were typically offset by CTU Code-related efficiencies overall; annual costs and penalties reduced from €670k pre-implementation of the Code to €13k post-implementation; and extra costs as a percentage of revenue reduced from 37% to 10%. Authors of the study also underlined that the "[…] use of the CTU Code provides an increase in safety with a drastic reduction of loading accidents and damage to goods, as well as important benefits in terms of costs, improved efficiency, corporate image and reduced environmental impact." Commenting on the results, **Richard Steele**, CEO of the **International Cargo Handling Coordination Association**, said, "As far as we are aware, this is the first example of publicly available empirical evidence about the use of the CTU Code made by forwarders, shippers and others responsible for safe packing. Notwithstanding the regional focus of this particular survey, we believe the results to be genuinely encouraging. They show that good operational management, efficiency and safety are partners, not opposites." The **Cargo Integrity Group**, gathering seven industry bodies dedicated to container safety, published a Quick Guide to the CTU Code to facilitate a greater understanding and broader use of a lengthy and complex document. The Guide includes an editable and saveable checklist of actions and responsibilities for the guidance of those packing cargo in containers.

THE WSC WHALE CHART


PHOTO: CANVA

The **World Shipping Council** (**WSC**) launched a navigational aid called the WSC Whale Chart, the first worldwide mapping of all mandatory and voluntary governmental measures to reduce harm to whales from ships. "With the WSC Whale Chart, seafarers will, for the first time, have a comprehensive global resource offering critical navigational coordinates and concise graphics to identify routing measures and areas subject to static speed restrictions designed to protect whales and other cetaceans. We hope that by compiling this unique navigational aid, keeping it updated and making it available for free to all navigators, we can help reduce ship strikes and safeguard endangered whale populations across the globe," highlighted **John Butler**, President & CEO of the WSC.

PASSWORD? PASSWORD

NordPass has conducted research according to which transport and logistics sector employees use very poor passwords to secure business accounts. The top three include the company's name, "password," and "123456." The researchers shared in a press release, "The world's wealthiest companies' employees love passwords that directly reference or hint at the name of a specific company. The full company name, the company's email domain, part of the company's name, an abbreviation of the company name, and the company product or subsidiary name are common sources of inspiration. These passwords comprise over half of the transportation and logistics list." **Jonas Karklys**, NordPass' CEO, commented, "On one hand, it is a paradox that the wealthiest companies on the planet with financial resources to invest in cybersecurity fall into the poor password trap. On the other hand, it is only natural because internet users have deep-rooted unhealthy password habits. This research once again proves that we should all speed up in transitioning to alternative online authentication solutions." According to **IBM**'s *Cost of a Data Breach Report 2023*, stolen or compromised credentials remained the most common cause of a data breach in companies in 2022, accounting for 19%. To stay on the safe side, NordPass recommends ensuring company passwords are strong by creating random combinations of at least 20 upper- and lower-case letters, numbers, and special characters; enabling multi-factor authentication or single sign-on; critically evaluating whom to grant account credentials; and deploying a password manager/vault.

PHOTO: CANVA

'NAVIGATING THE FUTURE: SAFETY FIRST!'

It will be the **International Maritime Organization**'s **(IMO)** 2024 World Maritime Theme, as its Secretary-General **Kitack Lim** proposed at the 129th meeting of the IMO Council. "This theme would allow us to focus on the full range of safety regulatory implications arising from new and adapted technologies and the introduction of alternative fuels, including measures to reduce GHG [greenhouse gas] emissions from ships as IMO strives to ensure the safety and efficiency of shipping are maintained, and potentially improved so that the flow of seaborne international trade continues to be smooth and efficient," he underscored. The Organization shared in a press release that it's working on several safety issues, such as the goal-based Code for Maritime Autonomous Surface Ships (MASS Code) or the assessment of safety risks that come with the introduction of new technologies and alternative fuels, likewise the development of regulatory measures to address and mitigate those risks. Next year also marks the 50th anniversary of adopting the International Convention for the Safety of Life at Sea.

HARBOUR MASTERS ADD WEIGHT TO A GROUP SEEKING ACTION ON CRUCIAL SAFETY ISSUES

The **International Harbour Masters Association (IHMA)** has signed a memorandum of understanding, joining the **Cargo Incident Notification System (CINS)**, the **Confidential Human Factors Incident Reporting Programme (CHIRP)**, the **Container Owners Association (COA)**, the **International Cargo Handling Coordination Association (ICHCA)**, and the **Ship Message Design Group (SMDG)** in their joint work on improving safety during the global transport and handling of goods that have the potential to cause injury to the workforce and/or damage to the environment. Thanks to the MoU, the industry bodies will be better able to coordinate data and share research and best practices across global cargo supply chains to further develop awareness throughout the freight industry amongst operators, regulators, and policymakers as to practical and effective measures to improve safety. "It is a first-class addition to have the IHMA on-side because harbour masters play a crucial role in both maritime safety and the ship-shore interface. Their leadership on navigational safety, along with an essential contribution to wider operational safety, security and environmental protection, puts them at the crossroads of the activities that the MoU partners are seeking to continuously improve," **Richard Steele**, CEO of ICHCA, said while welcoming IHMA to the initiative.

UCIRC – REVISED

Bureau International des Containers (BIC), the **International Chamber of Shipping (ICS)**, and the **World Shipping Council** (WSC) have joined forces to update the **Unified Container Inspection & Repair Criteria (UCIRC)**, which now includes inspection criteria for container depots and other container handover facilities to address pest contamination on and in containers. "Just as any major structural deficiencies must be repaired, any pest contaminants must be taken care of prior to the dispatch of the empty container to the shipper. The revised UCIRC make this clear and also expressly reference the recently updated **Prevention of Pest Contamination of Containers: Joint Industry Guidelines for Cleaning of Containers** by BIC, COA [Container Owners Association], IICL [the Institute of International Container Lessors] and WSC. The two publications in tandem demonstrate the commitment of the container shipping industry to play a proactive role in minimizing pest contamination via the sea container pathway," BIC, ICS, and WSC said in a press release.

KALMAR'S E-MACHINERY GOES TO THE US

Wallenius Wilhelmsen has ordered four heavy forklift trucks and two reachstackers, all of them electric, as well as three heavy terminal tractors for the company's US operations. The deal also includes the Kalmar Insight fleet performance management tool. The order is part of Wallenius Wilhelmsen's onshore emission reduction activities, in which the company switches to zero-emission equipment wherever practicable.

PHOTO: KALMAR

HIRTSHALS EYES MORE WIND ENERGY…

The Danish seaport has initiated a dialogue-based tender to erect up to nine additional turbines at its premises. These could come online in 2027, joining the existing four turbines (4.2MW; Denmark's first set up on commercial terms – in 2019). The new turbines will be from 150 to 180 or 200 metres tall (nine, six, and four pieces, respectively), producing 169/174/135MWh/year. The energy from the existing and future wind turbines will be used for power-to-x purposes. "[…] Hirtshals is perhaps the first port in the world to require that the electricity generated by its wind turbines be used to produce the green fuels of the future," the Danish seaport underlined in a press brief.

… AND BECOMING A CCUS HUB

The EU Just Transition Fund has supported the establishment of a CO_2 storage and shipment hub in the Port of Hirtshals with 109 million Danish crowns (€14.6m). The facility can be up and running in 2025/2026, with an initial capacity for handling 0.5 million tonnes per year for permanent storage in empty oil & gas fields in the Greensand area of the Danish part of the North Sea. If provided with a pipeline for transporting CO_2 to the Port of Hirtshals, the carbon capture, utilisation and storage (CCUS) project of Greenport Scandinavia would be able to take care of 3.0mt/year of CO_2 in 2029, up to beyond 15mt/year in the early 2030s should the Danish and European infrastructures be integrated.

NORSEPOWER SCORES TWICE

First, the Lübeck-headquartered Oldendorff Carriers chose Norsepower to retrofit the company's post-Panamax bulk carrier *Dietrich Oldendorff* with three 24 m tall and 4.0 m in diameter Rotor Sails. The installation will be carried out in Q2 2024 and finished by mid-year. Next, Louis Dreyfus Armateurs (LDA), a French shipowner who works on a fleet to be chartered by Airbus, will see these con-ros equipped with Rotor Sails. Each of the three dual-fuel (e-methanol) freighters will be outfitted with six 35-metre-tall sails. LDA's Rotor Sails will feature the brand-new patented Norsepower Sentient Control™, a real-time force measurement, control, and savings reporting system that will allow controlling the rotors individually. In addition, routing software will optimise the vessels' journey across the Atlantic, maximising wind propulsion and avoiding drag caused by adverse ocean conditions. Estimations say that the new con-ros, expected to set sail in 2026, will halve the carbon footprint of LDA-Airbus' Transatlantic voyages by 2030 vs 2023 levels (from 68kt to 33kt/year).

PHOTOS: NORSEPOWER

GASUM-NORDIC REN-GAS E-METHANE DEAL

The two have signed an offtake agreement, according to which Gasum will buy the entire output of Nordic Ren-Gas' Tampere Power-to-Gas plant, set for launch in 2026. The facility (developed, built, and operated by Nordic Ren-Gas) will produce 160GWh/year of e-methane (35 thousand tonnes) by using renewable electricity from Finnish wind energy farms and biogenic CO_2 captured from existing power plants (110kt). The Tampere plant will be located next to the existing Tammervoima waste incineration plant, from which CO_2 will be captured from the flue gas. In addition, excess process heat from production will be provided to the Tampere district heating network (600GWh/y). "In the power-to-gas process, hydrogen is first produced [18kt/y in case of the Tampere facility] using renewable electricity and water. The hydrogen is then further processed into e-methane by combining the hydrogen with biogenic carbon dioxide. E-methane produced in this way is fully renewable and will replace fossil fuel usage in transportation, maritime and industrial sectors," Gasum detailed in a press release.

TAILWIND FOR SZCZECIN-ŚWINOUJCIE

First, Vestas announced it plans to invest in a new plant producing blades for the V236.15.0MW wind energy turbine model. The facility, which could come online in 2026, will be located on a site acquired by the company in February 2023 and situated near an island where Vestas will have its nacelle assembly factory (expected to start operating in 2025). Second, the Spanish Windar Renovables and the Port of Szczecin-Świnoujście ratified the October 2023-signed preliminary land concession agreement. The company will now establish an offshore wind energy tower production centre in the Port of Szczecin. The factory and its storage area will occupy 17 ha. The towers produced by Windar Renovables in Szczecin will be designed to support the new generation turbines with 20MW of installed capacity. Third, the Port of Szczecin-Świnoujście joined the Offshore Wind Port Alliance. The Polish duo has become the seventh member of an organisation that aims to cooperate to provide sufficient handling & storage capacity for Europe's offshore wind energy industry. "Specifically, the collaboration between the seven ports consists of ongoing coordination and knowledge sharing, which enables them to optimise capacity utilisation between the ports to build wind farms more efficiently. Wind turbines require a lot of space at the ports, so lack of space is a specific challenge the ports are working to solve together. If one port only has space for half a project, another port may have space for the other half. In this way, the offshore wind farm can be built as scheduled, and the client will not have to wait for space at one specific port," the Offshore Wind Port Alliance underscored in a press release.

THE STOCKHOLM-TURKU GREEN CORRIDOR

The ports of Stockholm and Turku, alongside Viking Line, have signed an agreement to make the crossing between them fossil-free by 2035 at the latest. The partnership will act as an innovative platform to develop scalable solutions for phasing out fossil fuels. The initiative will also leverage the advances and solutions from the Decatrip project, a collaboration between Rauma Marine Constructions, Viking Line, Åbo Akademi University, and Kempower. The Stockholm-Turku Green Corridor – 'green' as per the Clydebank Declaration, of which Finland and Sweden are signatories – is open to onboarding other stakeholders from the shipping and port industries, as well as cargo owners, freight forwarders, and others.

HELSINGBORG'S E-REACHSTACKER – DELIVERED

After around one year of delay, the Swedish seaport finally got hold of the Kalmar 587kWh battery-capacity machine. The cargo handling gear, rolling on Continental tyres, can stack containers up to five high. The loading capacity is 45, 32, and 16 tonnes for the first, second, and third row, respectively. The e-reachstacker joins the Port of Helsingborg's four all-electric terminal tractors from Terberg. The deal with Kalmar also includes supporting the port's mechanics with training. Bart Steijaert, the Port of Helsingborg's CEO, highlighted, "An important part of our sustainability work is the development of climate-neutral, electrified port operations. We aim to have 75% of our work machines running on electricity by 2026, which is a demanding target within our ambition of being the most modern port in the Nordics."

THE LÜBECK-TRELLEBORG GREEN SHIPPING CORRIDOR

The ports of Lübeck and Trelleborg, the port operator LHG, and the ferry company TT-Line have partnered to make the crossing fossil fuel-free by 2040 at the latest. The parties underlined in a press release, "The cooperation will not only serve as an innovative platform and exchange of information, but the aim of all partners is to decarbonize transport in the partners' direct sphere of influence as well as to influence the entire transport chain of the goods in question." The first initiative across the Lübeck-Trelleborg Green Shipping Corridor will see the set-up of additional onshore power supply connections in both seaports. At the same time, TT-Line will retrofit four of its ferries with cold ironing connectors.

NORSEPOWER SCOOPS A NEW ORDER

The Finnish manufacturer of auxiliary wind propulsion will see one of its Rotor Sails installed on board Baltrader's under-construction in China cement carrier. The 24-m-tall and 4-m-diameter gear will reduce *CEMCOMMANDER*'s fuel consumption by up to 14%. The investment will be supported by the German Federal Ministry of Digital and Transport through its Sustainable Modernisation of Coastal Vessels funding directive. Bureau Veritas will classify the wind propulsion system, and the ship will get the WPS2 class notation.

THE FIN-EST GREEN CORRIDOR INITIATIVE KICKS OFF

The ports of Helsinki and Tallinn, Rederi AB Eckerö, Tallink Grupp, Viking Line and Estonia's Ministry of Climate, with support from the Finnish Ministry of Transport and Communications, have teamed to reduce greenhouse gas emissions from transport & logistics. The memorandum of understanding the parties have signed aims at making the Tallinn-Helsinki and Vuosaari-Muuga crossings climate-neutral for passenger and cargo traffic, on- and offshore. The initiative will put forth several roadmaps containing milestones for different actors towards zero-emission operations. At the same time, making the Helsinki-Tallinn 'sea bridge' a green corridor is intended to sharpen the competitive edge of the twin-city region. The parties will conduct joint scientific studies to enhance project activities as well as increase knowledge and share that expertise. Around nine million passengers and two million vehicles are carried between Helsinki and Tallinn yearly.

SCANLOG TO PROVIDE LÖFBERGS WITH FOSSIL-FREE SEA TRANSPORT

The logistics company from Sweden will see the Swedish coffee maker's shipments carried by vessels using bio-liquefied natural gas (bioLNG) per the mass-balanced approach. This move will reduce Löfbergs' sea freight carbon footprint by 100%. The company, which will pay for bioLNG, imports some 36 thousand tonnes of raw coffee each year. Kajsa-Lisa Ljudén, Head of Sustainability at Löfbergs, commented, "Biogas costs more than fossil fuels, but we think we cannot afford to do otherwise. We have to reduce emissions across the entirety of our value chain. That we are financing the fuel switch 100% means that we see a functioning solution, which will hopefully contribute to others making a change, too." Matilda Jarbin, Scanlog's Chief Sustainability & Communications Officer, added, "Sea transportation has long found itself under the radar. It is, therefore, important that companies like Löfbergs dare to go further, seeing it's possible to reduce emissions here & now. We hope this will inspire other firms, speeding up the necessary transition within the transport sector."

SWEDEN'S FIRST HYDROGEN TRUCK

MaserFrakt, a road haulier from Borlänge, started operating its first (out of two ordered) diesel-turned-hydrogen fuel-cell DAF lorry. The other one, also converted by the Dutch Holthausen Clean Technology, will arrive later this year. Both offer a range of up to 680 kilometres. The Swedish retailer ICA employed MaserFrakt's first hydrogen truck to transport goods between its regional warehouse in Borlänge and shops in Dalarna, Västmanland, and Gävleborg. Per Bondemark, MaserFrakt's CEO, commented, "It is highly satisfying that we received our first hydrogen truck. The second will arrive later in the year. But it's just the beginning. Should these two run well, we intend to exchange many of our diesel lorries for hydrogen vehicles." The company has also commissioned a hydrogen tanking station (at the final expense of SEK17.7 million, approx. €1.55m, up from the 2020-envisaged cost of SEK11m, €960k). The Borlänge-located facility went into operation towards the end of February 2024 (around one year later than initially planned). The Climate Leap investment programme of the Swedish Environmental Protection Agency supported the set-up.

UNIFEEDER CHARTERS TWO MORE METHANOL FEEDERS

The Aarhus-headquartered feeder & short-sea shipping line has secured the long-term charter for another pair of 1,250-TEU-capacity carriers. The deal comes atop the October 2023 agreement for an identical duo. All four are scheduled for delivery in 2026, with three coming from the German Elbdeich Reederei and the remaining from the Norwegian MPC Container Ships. Unifeeder will use the container vessels in its decarbonisation plans, reducing its carbon footprint by 25% by 2030 on the company's way towards net zero in 2050.

GREEN HYDROGEN TESTED IN GOTHENBURG FOR OFF-GRID ELECTRICITY SUPPLY

The Port of Gothenburg, Skanska, PowerCell, Hitachi Energy, Linde Gas, Volvo, and Skagerak Energi used Hyflex, a containerised hydrogen fuel cell & battery, for heavy-duty construction needs. The 100kW fuel cell by PowerCell – with green hydrogen provided by Linde Gas and Hitachi Energy supplying the generator to produce electricity from hydrogen – was used on 4-17 March 2024 on the Arendal 2 construction site to run a Volvo excavator. The plug-and-play solution includes fuel cell modules, power electronics, cooling, auxiliary systems, and an intelligent control system. Richard Berkling, CEO of the PowerCell Group, highlighted, "The Hyflex has the potential to replace diesel generator sets across multiple platforms, as well as take on new power generation applications. The current demonstrator has been developed with construction sites in mind; however, we also recognise the need for marine and port electrification applications, such as sustainable ship-to-shore power."

ELECTROCHAEA-ERIK THUN E-METHANE LOI

The German provider of tech for synthetic methane production and the Swedish shipping line have entered off-take negotiations. The talks concern e-methane production by Electrochaea's Danish subsidiary, BioCAT Roslev, which is working on establishing a power-to-gas facility in the municipality of Skive. There, renewable wind power will be used to produce green hydrogen that will be mixed with the CO_2 from biogas production at Rybjerg Biogas in a bioreactor to produce e-methane using Electrochaea's patented bio-methanation technology. Erik Thun plans to use Electrochaea's RFNBO-compliant e-methane to replace liquefied natural gas as a marine bunker.

PORT-SHIPPING GREEN CORRIDORS MOU

X-Press Feeders and six North European ports – Antwerp-Bruges, HaminaKotka, Helsinki, Klaipėda, Riga, and Tallinn – have joined forces to establish two North Sea-Baltic green (methanol) corridors. Following the agreement, X-Press Feeders will, as of Q3 2024, run two sea container routes powered by green methanol. The Green Baltic X-PRESS (GBX) loop will connect the ports of Rotterdam, Antwerp-Bruges, Klaipėda, and Riga. The Green Finland X-PRESS (GFX) service will link Rotterdam, Antwerp-Bruges, Helsinki, Tallinn, and Hamina-Kotka. X-Press Feeders' green methanol, made from green hydrogen and the decomposition of organic matter (waste and residues), will be sourced from the fuel supplier OCI Global (whose green methanol is certified by the International Sustainability and Carbon Certification Association). X-Press Feeders says that green methanol as an alternative marine fuel produces at least 60% less greenhouse gas (GHG) emissions vs conventional bunker. Additionally, the parties will work together to further develop infrastructure for the provision and bunkering of alternative fuels; encourage the development of supply chains for fuels that are zero or near-zero in terms of GHG emissions; provide further training programmes for port workers and seafarers with regards to the handling of alternative fuels; leverage digital platforms to enhance port call optimisation; and hold regular meetings to update and discuss progress on actions to continue developing green shipping corridors.

DFDS ORDERS 100 E-TRUCKS

Volvo will deliver the FH Electric and FM Electric models, upping the Danish shipping & logistics company's heavy-duty electric truck fleet to 225. Already, 95 e-trucks are running across Belgium, Denmark, Lithuania, the Netherlands, and Sweden, with the remaining 35 due for delivery this year. The newest batch will be deployed in Ireland, Norway, and the UK. DFDS' e-truck fleet, the biggest one in Europe, will help the company become net-zero by 2050. DFDS shared that the e-truck investment (October & December 2021) reduced its greenhouse gas emissions by 1,516 tonnes (well-to-wheel) by the end of 2023. The company plans to have at least 25% of its truck fleet electrified by 2030.

FINLAND'S FIRST OWE FARM TO GET STRONGER

Suomen Hyötytuuli has obtained the building and water permits for adding new turbines to the 42MW Tahkoluoto offshore wind energy (OWE) farm off the coast of Pori. The so-called demonstration project, supported by NextGenerationEU funding, will see the addition of two at least 15MW-strong turbines (the current ones, 11, have a capacity of 2.3-4.2MW). The project aims to demonstrate the construction of new-scale offshore wind turbines, likewise testing foundations capable of withstanding harsh sea conditions (Tahkoluoto is the world's first OWE farm erected in freezing waters). The entire expansion project assumes placing 40 new turbines, thus increasing the farm's capacity by 600-800MW by 2027-2029.

GREEN HYDROGEN TO BE PRODUCED IN HIRTSHALS

The Danish seaport will house a 5.0-megawatt electrolyser facility of Norwegian Hydrogen, set to produce 500 tonnes per year. The decision follows the authorisation of a €9.0-million grant by Horizon Europe for the five-year CONVEY project, which aims to establish an integrated hydrogen ecosystem at the Port of Hirtshals.

STEEL CUT FOR THE FIRST GREEN HYDROGEN CONTAINER SHIP

The steel cutting ceremony for the first – in a series of two – 500-TEU vessels took place at Cochin Shipyard in India. Once delivered, the 3.2-megawatt fuel-cell, 135-metre long duo will serve the Oslo-Rotterdam crossing, sailing on green hydrogen and thus sparing the environment some 25 thousand tonnes of CO_2 emissions per year. The pair was ordered by Ocean Infinity, scheduled for delivery in 2025 and operated by Samskip under a long-term charter.

GREEN BALANCE MECHANISM – PROPOSED

The World Shipping Council (WSC), backed by a number of heavyweight carriers, has tabled the Green Balance Mechanism to even out the price spread between fossil and low/zero-emission marine fuels. "The global shipping regulator, the UN International Maritime Organisation, has set a target of net-zero carbon emissions by 2050 for the industry, and now needs to develop climate regulations by 2025 that make it possible to reach that target. A core challenge is how to craft a global greenhouse gas pricing regulation that can bridge the price gap between the cleanest fuels and fossil fuels, driving investments in green fuels, without imposing an outsized cost on the global economy," said WSC in a press brief. Through the proposed Green Balance Mechanism, fees are taken from fossil fuels and allocated to green fuels used so that the average cost of fuel is equal. The greater the greenhouse gas (GHG) emission reduction a fuel delivers – on a well-to-wake lifecycle basis – the greater the financial allocation received. The monies collected in any given year are determined by the amount of green fuels used, allowing for a relatively low fee at the start of the transition. The minimum fee necessary to offset the price differential in a given year is collected and allocated to ships using green fuels that meet a specific GHG threshold: this ensures that green fuels can be produced and used and does so with the least possible cost to transportation. The emission reductions required for fuel to receive a price-balancing allocation are linked to IMO decarbonisation requirements (increasing in stringency towards the 2050 net-zero goal). WSC also says its Green Balance Mechanism is adaptable and fully integrated with a GHG fuel-intensity standard. It can be used as a targeted GHG pricing mechanism or a possible addition to an integrated measure. The organisation also underlines that other fees can be added to raise funds for climate mitigation initiatives and research, development & demonstration projects to provide a just and equitable transition.

KALUNDBORG TO LOWER THE CARBON FOOTPRINT OF ITS CONTAINER OPERATIONS

The Danish seaport will electrify all cranes in its deep-water (15 metres draft) container handling facility, operated by APM Terminals, within several months. The gantry fleet consists of three Konecranes Gottwald mobile harbour cranes, two capable of lifting 100 tonnes and the third – 150t. Meanwhile, APM Terminals Kalundborg has committed to using hydrotreated vegetable oil as fuel, which is said to reduce CO_2 emissions by up to 90%. The announcement was made on the occasion of *Laura Mærsk*, Maersk's first methanol-run feeder, calling to Kalundborg. "With the measures we are taking, we can offer a green gateway to the Zealand market," underlined Mikael Gutman, CEO of APM Terminals Nordics. The 50k-TEU/year-capacity Kalundborg joins Gothenburg and Los Angeles, the two other sites in the APM Terminals family that use biofuel.

WIND ENERGY INITIATIVE – LAUNCHED

EcoVadis, ENGIE, Hitachi Energy, Siemens Gamesa, Statkraft, WindEurope, and Vestas have joined forces to identify and adopt common sustainable business practices to enhance supply chain transparency and improve the wind energy sector's environmental-social-governance (ESG) performance standards. To that end, the members of the Wind Energy Initiative have set four strategic goals forth. First, they want to bolster the wind industry's contribution to the global effort in combating climate change by prioritising carbon emission reduction, emphasising the integration of renewable energy, and embracing circular practices. Second, to continue advancing the well-being and fair treatment of all individuals involved in the wind energy supply chain. Third, to promote biodiversity conservation to protect ecosystems impacted by activities related to the wind energy sector. Lastly, to foster substantial membership growth in the coming years. To achieve these goals, the Wind Energy Initiative will implement the EcoVadis sustainability ratings methodology as a voluntary standard for assessing their suppliers and supporting them in their sustainability journey by communicating a clear strategy and targeted enhancements to drive their ESG performance improvement. Meanwhile, the European Commission has launched an inquiry into Chinese suppliers of wind turbines under the new Foreign Subsidies Regulation. Giles Dickson, CEO of WindEurope, commented, "Chinese wind turbine manufacturers are offering much lower prices than European manufacturers [up to 50%] and incredibly generous financing terms with up to three years deferred payment. You can't do that without unfair public subsidy. What is more, the European manufacturers aren't allowed to offer deferred payment like that under OECD rules." Announcing the inquiry, Margarethe Vestager, EU Commissioner for Competition, said that the EU must avoid repeating the mistakes it made in losing its solar manufacturing industry.

LULEÅ AND PITEÅ CHOSE GRIEG CONNECT

The two seaports from Sweden's north have together signed a contract with Grieg Connect to digitalise their operations. Digitalisation will help them improve data exchange for better quay and resource planning. The transition will also see the ports' operational areas visualised with different map views and GPS points to monitor how the port infrastructure is used over time. Additionally, work orders will be conveyed digitally, likewise back reporting.

HELSINKI'S NEW SMART CHECK-IN GATE SYSTEM

With the help of Visy, the Finnish seaport has put in place a solution that weighs, measures, and photographs passenger cars & trucks at the West and Katajanokka harbours. The system – consisting of scanner-based preliminary vehicle identification points, automatic barriers, and display panels guiding drivers to the right lane – identifies the vehicles using a camera and automatically verifies their permits when they approach the check-in area. All vehicles are measured, while lorries are also weighed and have their condition recorded. The Port of Helsinki has received EU financial support for implementing the project, with the funds used for planning, placing the infrastructure, developing the system, and procuring & installing the required hardware.

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HHLA CTA'S AGV FLEET IS NOW ENTIRELY GREEN

The company bid farewell to the last diesel automated guided vehicle (AGV), meaning that its 95-strong AGV fleet is all but battery-powered now and running on green electricity. As a result, the container handling from ship to storage is fully electrified at Container Terminal Altenwerder (CTA). According to HHLA, exchanging diesel for battery AGVs will help avoid the consumption of around three million litres of fossil fuel per year, sparing the environment some 8.0kt/y of CO_2 emissions. In August 2023, CTA again received TÜV NORD climate-neutral company certification. The 14 container gantry cranes for seaborne handling, the 52 portal cranes in the container block storage facility, and the four rail gantries are already powered by green electricity. The use of battery-powered tractor units is currently being tested at CTA with the intention of completely electrifying the terminal's tractor fleet. "We will also continue to invest in the electrification of the equipment of the other HHLA terminals in order to achieve climate-neutral operations across the Group by 2040," Oliver Dux, Director of Technology at HHLA, underlined. The last processes at CTA that still result in CO_2 emissions are offset with compensation certificates (supporting projects certified according to the Gold Standard of Voluntary Emission Reductions). The conversion of the CTA AGV fleet was supported by Hamburg's Ministry for Environment, Climate, Energy and Agriculture using funds from the European Regional Development Fund.

COPENHAGEN'S CONTAINER TERMINAL TO GO GREENER WITH HVO

Copenhagen Malmö Port (CMP) began switching its fossil fuel machinery to run on hydrotreated vegetable oil (HVO100) in November 2023. The facility's newer terminal tractors, rear loaders, and industrial trucks will be the first to phase in HVO100. The move will avoid consuming 60 thousand litres of diesel per year, reducing CMP's footprint in Denmark by some 130t of CO_{2e}/y. The new battery-hybrid straddle carriers CMP ordered in April 2023 will also tank HVO100. The terminal's ship-to-shore gantries and other work vehicles run on green electricity. In 2025, the container terminal in Copenhagen will move to Ydre Nordhavn, and CMP expects that all fossil fuels will be phased out at all facilities by that time. In Malmö, phasing in HVO100 reduced emissions by approximately 840t CO_{2e}/y. CMP intends to make its operations CO_2-neutral and climate-positive by 2025 and 2040, respectively (in accordance with the Science Based Targets initiative). The Danish-Swedish port authority cut its scope 1 and 2 greenhouse gas emissions by 57% in 2020-22, thus avoiding the release of 1,231t of CO_{2e}. "The green transition of CMP's operations is not something we are only planning for in the future – it is already happening now, and the phasing in of HVO100 at the container terminal in Copenhagen is a very important and natural step in our efforts to be one of the world's most sustainable ports," highlighted Povl Dolleris Røjkjær Ungar, CMP's COO. He also underlined, "The phase-in of HVO100 follows the replacement of CMP's machinery and means that CMP can also support our customers' demand for fossil-free and CO_2-neutral transport chains."

AS SAFE AS PORTS?

by Neil Dalus, Risk Assessment Manager, TT Club

Security is key for container terminals and ports generally. The threat horizon is vast, incorporating cargo theft and illicit trades alongside operational safety and the prevention of terrorist attacks. Inevitably, land and water interfaces are needed to be taken into account. Let us then consider some fundamental aspects of modern-day port security challenges and offer some guidance.

A central reference in the context of security for port operators is the International Ship and Port Facility Security (ISPS) Code, a supplement to the Safety of Life at Sea Convention. It sets minimum security arrangements for ships, ports and governmental agencies.

Dating back to 2004, the ISPS Code ascribes responsibilities to a variety of stakeholders, including port personnel, related to detecting threats and taking preventive measures affecting ships or port facilities used in international trade. The Code also specifies the appointment of a port facility security officer responsible for the development and maintenance of a port facility security plan.

Barrier fundamentals

Physical security will be a primary consideration. Getting the simple things right, such as perimeter fencing, is fundamental. Measures that go beyond that will need to be proportionate to the risks assessed, inevitably influenced by volumes, throughput, the type of cargo being handled, the layout of the terminal and the technology available.

There is an array of options and combinations to consider for perimeter fences; some designs may be more secure than others. It is recommended that palisade-style fencing, for instance, be avoided as it may be more easily manipulated, allowing access. A mesh style of fencing is generally thought to offer greater levels of security. The height of the perimeter fence (influenced by local topography) is another critical factor. A minimum of 2.4 metres is recommended to deter bad actors from scaling or being able to pass items over. Higher fences or topping with electric fencing or razor wire for added security may need to be considered.

Accessibility

Controlling access is a necessary starting point; strict controls will assist in managing the flow of people (legitimate and otherwise) to the facility, together with reducing the number of physical entry and exit points to the minimum necessary. Alongside this, consider how such areas will be monitored and managed. This includes the extent to which security personnel will be deployed, the introduction of physical barriers, and what logs will be kept and for how long.

There will typically be a large number of restricted areas, buildings and rooms within a facility, where locks are utilised to prevent unauthorised access. Regardless of who may have them, robust processes are necessary to ensure that keys are returned and controlled with timely intervention protocols.

The implementation of electromechanical key systems may significantly improve essential control and operational efficiencies; these remove the risk of lost or stolen keys and security compromises while providing valuable user data for management and control. Central programming ensures efficient and speedy modification of access permissions. Further smart and high-security locks may be appropriate.

Line of sight

The deployment of cameras can add to security provisions and can have multiple benefits. Sophisticated systems monitoring the entry gate can serve not only to record access but also to capture the condition of the vehicle, container, chassis and cargo. All such records might prove invaluable evidence in the event of any dispute.

Cameras can also be linked to a terminal operating system. At the same time, using optical character recognition technology can drive the development of operational efficiencies, identifying and locating individual containers. Automatic number plate recognition cameras can identify expected site visitors, providing both security and efficiency, potentially controlling the release of vehicles and containers with a binary 'release/don't release' prerogative.

Visual analytics software can provide unrivalled insight, including managing the movement of visitors and restricting & controlling the areas of the facility that they are able to access. Additionally, if linked to the relevant authority and national databases, this could serve to identify bad actors and vehicles operating on false registration plates (often used to facilitate theft of cargo).

Thermal cameras are now being used for both security and fire detection. These may eliminate the need for continuous monitoring of cameras by alerting security personnel at the point of detection due to a fire or a trespasser.

CCTV cameras and software can also provide a deterrent to bad actors. However, take care to ensure that the procured system is fit for purpose, well-maintained and that operators are trained to use the equipment proficiently. And don't forget simple

housekeeping – overgrown foliage or litter can trigger unwelcome false alarms!

Eye in the sky

The supporting use of drones not only helps pinpoint an area of suspicion but also can provide and record additional data, such as thermal imagery and geo-location, which can deliver valuable insights for any ongoing incident or subsequent investigations.

Tethered drones are, in particular, a useful refinement allowing a permanent land-based power supply in the form of a fixed cable attachment. This technique removes the limitations of the flight time due to the capacity of the batteries and avoids battery changeover interruptions. Tethering allows the drone to operate for a much longer duration; it lends itself to use in more prolonged surveillance operations where a high viewpoint from the drone can be used to maximum effect while utilising the camera's zoom and thermal imaging functions. The collateral limitation is reduced freedom of movement around a facility.

Drones can be further adapted. Thermal imaging may identify and track heat sources over a wide area and in poor lighting conditions, allowing this information to be relayed to the team on the ground, thus supplying them with intelligence that would not be otherwise available.

The object tracking function – available for use with a regular image camera as much as with thermal imaging – allows the drone operator to fix onto an object and then let the drone camera track it. This enables the drone operator to relay/record the data without losing sight of the object being tracked. In each case, it's possible to relay the thermal image/camera data directly to the ground team so that they can see exactly what is being seen by the drone and its operator, who may be some distance from what is being observed. These capabilities can support the detection of intruders (including clandestine migrants) as much as give early warning of developing fire risks in cargo or assets.

Interfaces and insider risk

Some facilities might fall under the jurisdiction of the port police; regardless, working closely with local law enforcement will be vitally important. While operation-specific security measures should consistently be implemented, interacting with port police or other local law enforcement agencies will be beneficial in 'layering' protections.

Technologies are likely to overcome the human-moral hazard. This can be further enhanced, for example, with forensic coding security solutions: gels, sprays and liquids can be an effective deterrent, remaining on clothing and skin for prolonged periods, and thus increasing the risk of apprehension (this may be during questioning in relation to unconnected crimes since those involved in criminal activity in and around ports will typically be entangled in other crime, too).

Insider risk is prevalent within TT's claims experience; information is the lifeblood of criminal activity and can be sourced from within an operation. This may be access codes, the location of a particular container or details of on-site security provisions. Information security is, therefore, critical. Carry out a risk assessment of the information that your operation collects, stores and shares. Recognise the value of that information in the wrong hands and consider thoroughly who has access and why, balancing access restrictions with operational efficiency. Prevent workstation sharing or sharing of passwords. The terminal operating system is pivotal in the management of a container terminal. Protecting this key infrastructure is critical to maintaining operational integrity and avoiding business disruption.

Advanced technologies require skill & awareness advancement

The use of automation and innovative technologies – including artificial intelligence, big data, the Internet of Things (IoT) and blockchain – to improve port and terminal operational performance is becoming more commonplace.

Although the industry is often regarded as conservative and resistant to change, this image is fast-changing. However, together with the opportunity to improve efficiency come new risks in terms of cybersecurity, such as an increase in the potential access points to the valuable data that is being collected through IoT devices. These issues force increased focus and resources into the development of measures to secure the data and prevent unauthorised access.

Cybercriminals often exploit the 'people factor' through the use of common hacking tool kits readily available in the public domain. Consequently, an ongoing mandatory awareness programme should be implemented for the workforce to explain the risk of cybersecurity events and set up preventive measures. It is vital to establish an appropriate cybersecurity incident response team along with an assigned contact point.

Further to this, it should be recognised that many elements of operations are likely to be outsourced to third-party vendors; it remains the responsibility of the company to ensure sufficient due diligence has been taken to avoid a cyberincident resulting from the action or inaction of third parties. For example, ensuring information security management standards, such as ISO 27001, are complied with by the third party can reduce the risk substantially. It is essential to develop an appropriate strategic approach and a formal cybersecurity incident response process to tackle cyberincidents effectively and consistently.

Closing the window

The sheer volume of cargo moving through ports and onto their final destinations is staggering – and only likely to grow with the predicted increase in global population. Unfortunately, this makes it a target for criminal exploitation through the trade in illicit commodities and theft of cargo, to name a few.

Therefore, the adoption of 'smart' technologies such as IoT and blockchain within ports can increase the 'visibility' of the cargo throughout the supply chain. This augmented oversight not only has the potential to improve efficiency, but it can also improve security through transparency of the entire process.

Increasing the visibility of the cargo flow by providing real-time information can reduce the opportunity time window for criminal activity. Likewise, the digital fingerprint that is left through the use of blockchain provides a smaller hiding place for criminals operating in the margins of our industry. ■

HIGH WAVES, HIGH CLAIMS

by Kunal Pathak, Team Leader, Claims, Siddharth Mahajan, Loss Prevention Manager Asia,
Are Solum, Team Leader, Dry Cargo Claims, and Helge A. Nordahl, Vice President, Analytics, Gard

In a comprehensive new study, we delve into the impact of weather on container stack collapses. Our findings show the impact of progressively increasing wave height, the quantified risk of high waves, and variance in weather exposure among different operators. Hopefully, the study sets the stage for a deeper dialogue within the industry about mitigating the impact of adverse weather on container safety.

As the world economy develops, the volume of containerised trade increases steadily. Last year, the global container shipping fleet grew by almost 4%, according to UNCTAD, and in Gard's P&I portfolio, the segment has increased by as much as 16% over the past five years. It currently makes up 18% of our insured vessels.

With more container shipping comes also a higher risk of casualties. Certain incidents, such as stack collapses or containers lost at sea, are closely monitored as they tend to be relatively more severe. Container losses also have the International Maritime Organization's attention, and they are working on making reporting of lost containers mandatory. Meanwhile, insurers and other key stakeholders are involved in detailed work, such as the Top Tier project, to investigate the causes of stack collapse and seek solutions.

Data analytics

To contribute to the industry understanding and help prevent losses, we have studied all cases of stack collapse where Gard was involved as a P&I insurer. These cases occurred between 2016 and 2021, and we have looked at the weather data to make sure we understand the factors contributing to these incidents. More specifically, we have combined Gard claims data with geographical and meteorological data from Windward, which includes estimated wave height and wind strength on an hourly basis. Several measures are common when it comes to waves. For this study, we have used the maximum wave height.

Our claims data includes a wide selection of cases, both when it comes to severity, vessel size, and geographical location. For each claim, we have collected meteorological data for the incident date as well as the six days leading up to the day of the incident. This allows us to analyse how the weather progressively worsened over the given period.

Impact of vessel's size

Weather needs to be seen in the context of the ship's design and size, of course, although we do see that container stack collapses happen across different-size segments. This just underscores the fact that several causative factors are usually involved in these incidents, as highlighted in our article *Why do container ship stacks collapse, and who is liable?*

Analysing incident numbers relative to number of vessels in our portfolio provides valuable insights on claims frequency across different size segments, which can range from feeders (less than 3,000 TEUs) to ultra-large container vessels (ULCVs) exceeding 15,000 TEUs where the stack heights can exceed ten-high on deck. Despite a higher number of incidents on smaller ships, there is a clear correlation between incident frequency (or likelihood) and vessel size, as depicted in Figure 1. The 6-year average claims frequency for stack collapses on feeder vessels is 1%, whereas for ULCVs, it rises to 9%.

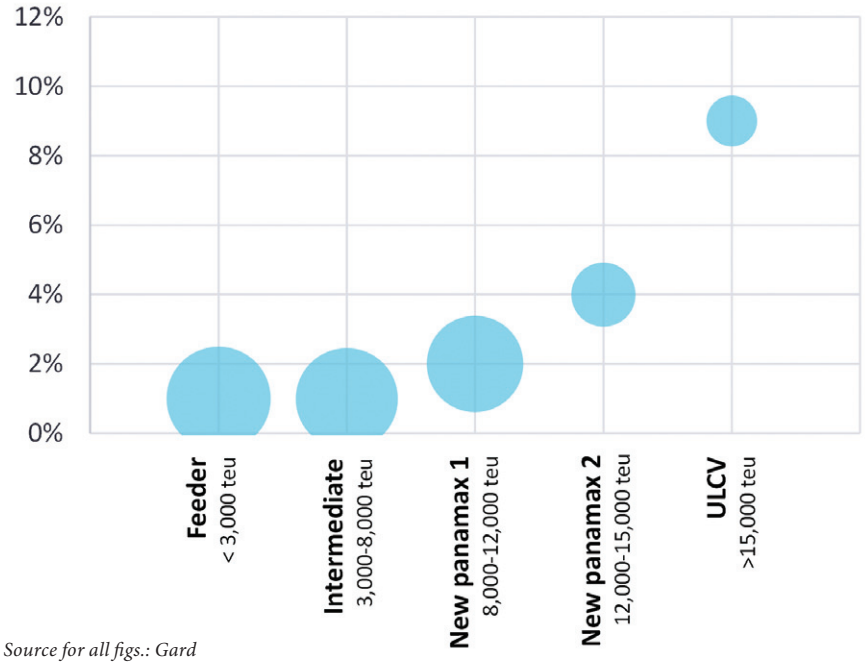
Impact of progressively increasing wave height

When looking at a 7-day period before the incident, we noticed that on Day 1, vessels are, on average, experiencing wave heights of 2.5 metres, which corresponds to a wind force of 5 on the Beaufort scale. The weather then progressively worsens, and this increase in wave height is more pronounced from Day 6 onwards – the average wave height peaks on Day 7 at 6.5 m, which corresponds to gale force winds. The duration for which the vessels were exposed to sea conditions with wave heights of 4 m and above (corresponding to near-gale force winds or stronger) was 72 hours.

We underline that these are the average wave heights of all vessels that had a stack collapse incident. If we look at each ship separately, many of them were exposed to these conditions for a much longer duration of time. During the 7-day period we examined (which is also shown in the graph below), the "incident zone" for the majority of the incidents was a 24-hour window on the last day.

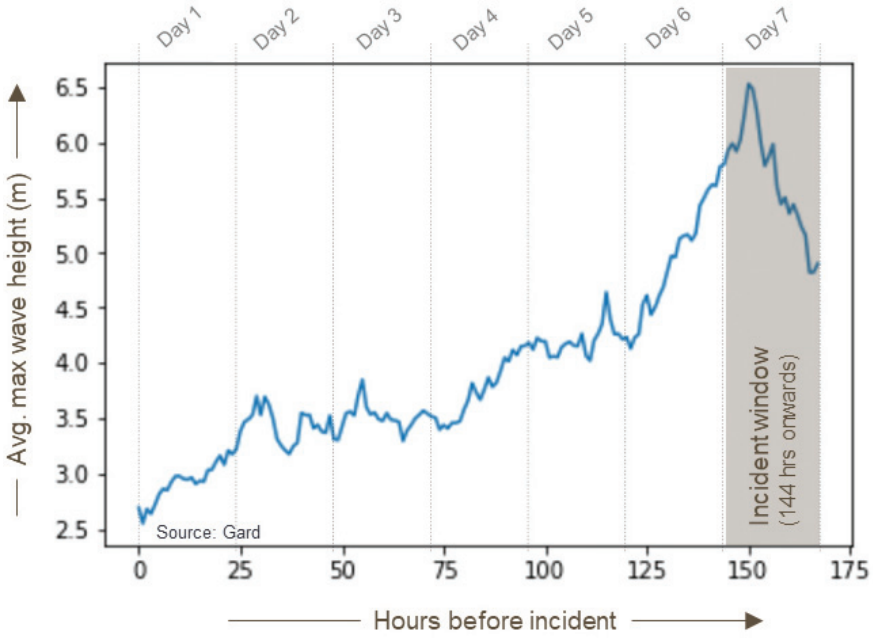
It was, therefore, evident that the vessels experienced average wave heights, which progressively increased by two and a half times during the 7-day period. Interestingly, the incidents did not always happen when the wave height was the highest but after the weather had started to subside. This might be partly due to the fact that the time of reporting the incident to Gard may not always coincide with the time of the incident itself.

Fig. 1. Count and frequency of stack collapse incidents by vessel segment



Source for all figs.: Gard

Fig. 2. Average maximum wave heights during the seven days leading up to the incident



Higher waves – higher risks

To further study the exposure to high waves, we looked at vessels that are exposed to a wave height of 7 m (corresponding to Bf 8 gale force winds) or above. An observation of interest was that while vessels involved in incidents spent only 5% of their time in wave heights exceeding 7 m during the incident year, half of all incidents occurred during such conditions. Analysing the maximum wave heights experienced by vessels on the day of the incident, as shown in Figure 3, reveals a similar pattern. Essentially, despite spending 95% of their time in calmer waters, the relatively small percentage spent in adverse conditions significantly amplifies the risk of incidents, potentially up to 20 times higher, as indicated by our study.

Another finding we had was that among the vessels that had a stack collapse incident, the share of ships exposed to such high waves increased by almost 12 times from day 1 to day 7. This suggests that these vessels may not have been able to avoid such heavy weather in spite of the advanced weather-routing tools available.

Examining the global container fleet, roughly 3.4% are exposed to such weather at any given time. Interestingly, among various size segments, the new Panamax 1 segment (8,000-12,000 TEUs) appears to have a higher exposure to wave heights of 7 m and above compared to any other size category. This trend is also evident for wave heights around 4 m.

Differing risk profiles

The variation in exposure to adverse weather is not only limited to different size segments in our container fleet. From our study for the period 2016-2022 for the global container fleet, we also see that some container operators or owners are more exposed to the risk of adverse weather than others.

In essence, this discrepancy likely stems from differences in operators' risk tolerance and the internally defined weather thresholds for the vessels. However, the consequences of decisions made in the chartering or the operator's desk are pretty evident in the safety of the ship and the cargo.

Reflections

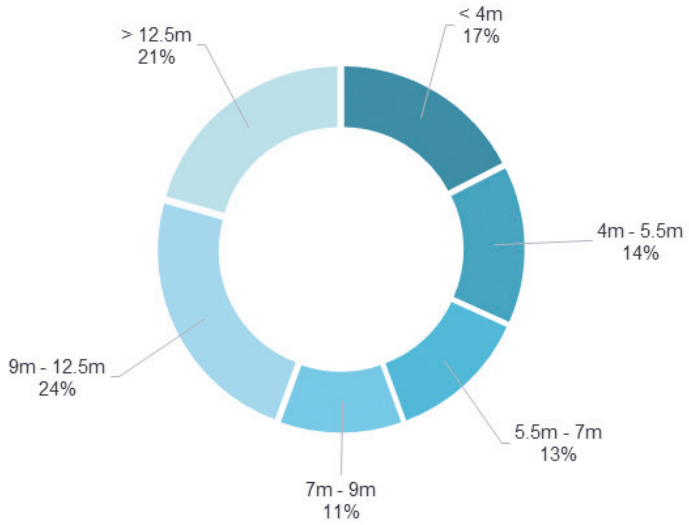
Exposure to progressively worsening weather poses a clear risk, and our studies highlight two crucial aspects in this regard. The first involves the duration of exposure, while the second concerns weather thresholds, such as maximum wave height for a vessel, influenced by factors like stability, stack height, and physical condition of the securing equipment. Based on our study findings, there are key questions to be considered by the various stakeholders working in the liner industry.

Conflicting priorities on weather thresholds

Does the understanding of the weather limiting factors, such as maximum wind and wave height for a voyage, vary among different stakeholders, and if so, why?

Conflicting priorities may arise between a commercial operator and a vessel's master regarding voyage routing. While a master might prefer a slightly

Fig. 3. Max wave height experienced on the day of the incident[1]



[1] *This chart shows the maximum wave height experienced by the vessels on the day of the incident, whereas the previous graph showed the average of the maximum wave heights to which the vessels were exposed over a 7-day span*

longer route with less exposure to adverse weather, a commercial operator might prioritise time and fuel savings, potentially pushing the limits. Additionally, we've noted that routing advice to a vessel could vary based on whether their principal is a charterer or owner.

Another variable to consider when determining weather thresholds is the vessel's stability, which may be different from the loading computer calculations, given the misdeclaration of weights and/or a mismatch in stowage location.

Suitable tools for complex rolling phenomena

Do seafarers have access to suitable digital/automated tools for evaluating the risk of intricate phenomena like resonant, synchronous, and parametric rolling?

The term "adverse weather" is subjective to seafarers. Often, advice on mitigating the risk is either oversimplified (by recommending avoidance of adverse weather altogether) or overly complicated (by suggesting calculations for resonant, synchronous, and parametric roll risks based largely on estimates). While assessing the influence of weather on a vessel's motions may seem straightforward in theory, it is much more challenging for seafarers in practice due to numerous unknowns and estimations.

Slackening of lashings in heavy weather

Is there indeed a progressive deterioration of the lashing efficacy that leads to failure beyond a specific period?

The constant motion of a vessel in heavy seas can exert loads on container stacks, leading to the potential loosening of lashings. The loosening process can start early in heavy weather conditions, especially if the ship is navigating through rough seas for an extended period.

In theory, routine lashing checks may seem like an appropriate preventive measure, but in practice, this could pose safety concerns, as the crew would then be exposed to adverse weather during lashing checks. This risk would be even greater aboard larger vessels where there are a lot more lashings to be checked.

Tighter weather routeing for vessels with deteriorated securing equipment

Should weather routing considerations be tightened for vessels with deteriorated container sockets and lashing eyes?

Experience shows that the condition of lashing and securing equipment degrades over time due to usage and inadequate maintenance. It is no surprise that stack collapse incident investigations often emphasise poorly maintained lashing and securing equipment as contributing factors. In fact, corroded sockets and lashing eyes rank among the top three findings in Gard's condition survey data for container ships.

Despite these issues, containers continue to be loaded in affected slots, and repairs are postponed until dry dock for commercial reasons. Our recommendation is, of course, that affected slots be taken out of service until repairs are carried out, but from a pure routing perspective, weather thresholds might need to be adjusted for such vessels. We understand that a few liner operators already have such procedures in place for both owned and chartered tonnage.

Impact of weather on cargo securing inside a container

To what extent can the securing of cargo inside containers endure movement caused by adverse weather?

Prolonged exposure of the vessel to rough weather could lead to deterioration of cargo securing within the container, potentially leading to cargo breaking loose and shifting within the container. This, in turn, adds additional forces to the container stack.

The ship's crew lacks visibility and control over this aspect. The solution involves engaging in dialogue with and educating shippers, along with implementing improved Know Your Customer (KYC) procedures.

Broadening KPIs for weather routeing

Should safe weather routing and avoidance of adverse weather be included as components of internal key performance indicators (KPIs)?

Modern digital tools make it much easier to assess a vessel's or fleet's exposure to weather over a specific time frame. This assessment not only helps a company determine if its vessels encountered weather conditions exceeding internally defined thresholds but also facilitates benchmarking against other vessels of similar size and on similar routes, whether under the same management/ownership or different.

Given that most liner operators already have dedicated teams focusing on vessel routing for efficiency and scheduling purposes, expanding their focus to include the aforementioned aspects could enhance safety.■

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a visit in 2024!

it's out!

preview

PRECISE POSITIONING WITH RADAR

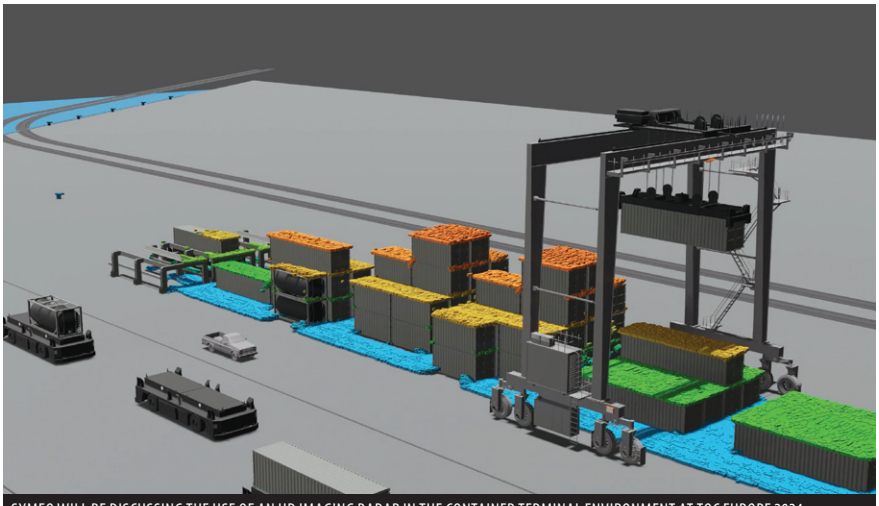
by Benjamin Wuttke, Head of Sales, Symeo

Symeo's industrial radar sensor technology has proven itself in ports and container terminals worldwide as a fail-safe, maintenance-free solution for determining positions, measuring distances and detecting movements. The great advantage of the patented LPR® (Local Positioning Radar) technology on which it is based is not only its accuracy, but also its robustness: radar sensors work absolutely reliably even in the most contaminated, dusty, sunny, foggy or rainy conditions and under vibration. Visitors to the TOC stand L46 can experience these benefits on a demonstrator. A sensor measures the distance to a moving reflector through boxes in which, for example, rain or a snowstorm are being simulated in real-time.

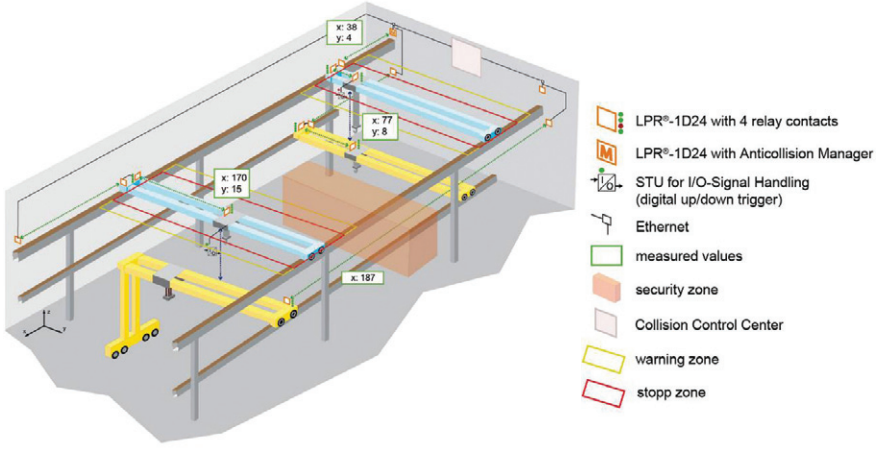
This time, the company is focusing on a technology of the future. Symeo is currently researching and developing an HD imaging radar. In the future, Symeo radar experts want to combine the reliability of radar sensors with the high resolution of laser scanners and replace them wherever dust and adverse weather conditions will impair optical sensors. Experts in port logistics and crane technology attending the trade fair will have the opportunity to find out about this new development in industrial radar technology at an early stage and discuss its potential for automation applications.

Symeo is presenting the Collision Control Center (CCC), a modular assistance and management software specifically designed to avoid collisions between cranes and physical objects. Three sensor systems will also be on show: LPR-1DHP-291 for precise real-time distance measurement up to 50 meters with a single sensor, up to 300 m with two sensors, and up to 500 m in combination with several sensors. Operation, parameterization and monitoring are carried out in the company's CCC via a web browser. There is also the LPR-1DHP-350, measuring just 90 x 90 x 35 mm, which is primarily used as a replacement for ultrasonic and laser sensors. Also on display is the LPR-1D24 for measuring distances of up to 1,000 m, which is used for collision avoidance and reliable positioning in seaports, container terminals, bulk goods warehouses, and in steel processing.

Visit us at TOC Europe –Symeo GmbH, Booth L46! ■



SYMEO WILL BE DISCUSSING THE USE OF AN HD IMAGING RADAR IN THE CONTAINER TERMINAL ENVIRONMENT AT TOC EUROPE 2024



WITH THE COLLISION CONTROL CENTER (CCC), SYMEO OFFERS MODULAR ASSISTANCE AND MANAGEMENT SOFTWARE SPECIFICALLY FOR COLLISION AVOIDANCE OF CRANES AND OBJECTS

HOW TO BORROW & LEND

by Mike Yarwood, Managing Director, Loss Prevention, TT Club

TT Club, as a leading international freight transport and cargo handling insurer, recognises equipment-sharing agreements as an efficient use of resources but flags potential liability issues if appropriate insurance cover is not in place. The first in our new advice document series, Risk Bytes, provides guidance on how to be on good terms with your neighbour. The following piece outlines the key considerations.

The benefits of good neighbour agreements are well recognised and utilised by cargo handling operators and others in the supply chain to successful effect. Sharing infrequently used equipment gives greater flexibility in operations and can cut costs significantly. These arrangements are, however, not always formally outlined in well-defined contracts.

Hello neighbour, can I borrow your st(u/a)ff?

So, what are good neighbour agreements? Why do they exist? And what are the risks of not formalising the arrangement with an exchange of contracts?

A good neighbour agreement describes a situation where operators with a close working relationship arrange to borrow or lend equipment, vehicles and staff for a certain period. They are beneficial to both the borrower and the lender. They are usually reciprocal arrangements, with both parties having something the other may need at one time or another.

For the borrower, the benefits can mean avoiding buying equipment that is only used infrequently; it also avoids hiring additional staff for short periods and results in potentially not insignificant cost savings. The lender gets greater use from its assets and receives additional revenues. At the same time, for all interested, it means working with an entity they know well and may create other reciprocal opportunities on an ongoing basis.

However, an arrangement of a casual nature, though often workable and agreeable to both parties, can lead to potential risks where liability and responsibility in the unfortunate event of an accident or breakdown may not be clear. The owners are financially exposed when the equipment or machine gets lost or damaged during the loan period. In addition, this might severely impact business operations, cancel out any benefit gained from the arrangement, and severely damage years of a good working relationship with the neighbour.

Clarity in writing

Our primary advice covers the provisions that should be made in a formalised written contract, clarifying where the risk and liability rest during the operation of any shared asset and providing the opportunity for thorough due diligence to be carried out before the agreement is signed.

When involved in a good neighbour arrangement, you must be aware that when your neighbour takes possession of your property – or the other way around – several legal relationships can arise under English law (the details of other nations' legislation may differ and should be checked). But the following liabilities should always be considered whatever the legal jurisdiction.

You may have a verbal contract between you, with expressed or implied terms of which you are not aware. You might have a duty of care to your neighbour to exercise reasonable care and skill. You may have created a 'bailment,' where you (the 'bailor') grant exclusive possession of your equipment to your neighbour (the 'bailee'). You might instead have a licence, where you (the 'licensor') grant non-exclusive possession of your equipment to your neighbour (the 'licensee'). Each of these relationships can give rise to different legal duties and obligations, shifting the legal burden of proof in cases of dispute.

PHOTO: CANVA

The ifs

Before entering a good neighbour arrangement, it would be wise to put your agreement in writing. Without it, there could be any number of issues. For example, under a bailment, there is, in effect, a temporary transfer of property rights from you to your neighbour. In other words, your neighbour is entitled to the exclusive use of your equipment during the bailment period. This means that if your operational needs suddenly change, you will not be entitled to get your equipment back until the bailment has come to an end.

If your neighbour damages your equipment, you may not recover sufficient compensation to repair or replace it in the absence of a specific contractual provision.

If your equipment is defective, and your neighbour's or someone else's property is damaged, or an individual is injured – even though it is not your fault – you could get caught up in legal proceedings and have to make contributions for the losses suffered by someone else.

If your equipment is not defective but is damaged or causes damage or injury while in your neighbour's possession – but with neither of you being at fault – there could be a dispute as to which of you is liable.

Your manufacturer's warranty could become void, either by giving your equipment to your neighbour or because your neighbour breached the warranty conditions by not being aware of them, resulting in loss or damage.

A written contract helps you define what your equipment is being used for, how long, and your respective rights, duties, obligations, liabilities and insurance needs. It would help if you also undertook due diligence checks prior to entering an agreement. Among others, you ought to be satisfied that your neighbour's employees have sufficient training to use your equipment; ensuring adequate training will mitigate the risk of damage to the equipment as well as reduce the chance of accidents involving it.

If you do not have adequate insurance coverage, or your insurer is unaware of the agreement, your loss might not be covered. This might severely impact your business operations and finances, once more potentially cancelling any benefit gained from the good neighbour agreement. While a formal written agreement defining the precise conditions of your loan may mitigate the risks, you must advise your insurer of such arrangements. In doing so, you are protecting your business by ensuring that any liabilities are covered, whether they arise under a written contract or not.

Of course, TT Club recommends checks on financial stability and whether sufficient and appropriate insurance cover is in place. But we also offer advice on adequate staff training and health and safety provisions. Moreover, our *Risk Bytes: Good Neighbour Agreements* includes a readily recognised case study of a typical asset-sharing operation.

At risk

In summary, as a lender in a good neighbour agreement, it is vital to conduct thorough due diligence to know who will be using your equipment and how it will be used, remembering that any equipment warranty may be affected. As a borrower, you must consider whether you can meet your contractual obligations if you damage the loaned equipment.

In either position, it is your responsibility to notify your insurer of any good neighbour agreements to lend or borrow equipment or staff. You must declare all equipment to your insurer to be covered under your policy, including new property acquired during an account year and equipment borrowed for temporary use. It is at risk of not being covered if it is not declared.■

FROM THEORY TO PRACTICE

by Stuart Nicoll, Director, Maritime Strategies International (MSI)

The prospects for hydrogen trade are developing rapidly but are still theoretical. Estimates prepared by bodies such as the International Energy Agency (IEA) and the Hydrogen Council (a body that seeks to promote the hydrogen economy) provide a wide range of potential outcomes. However, once the hydrogen economy moves past the theoretical stage, shipping demand will increase, and ammonia's role will be transformed.

Major challenges remain before significant trade can become a reality. Perhaps the most important are policy uncertainty and final investment. Increased capital costs combined with unclear regulatory decisions surrounding government subsidies have led to low developer confidence and widespread project delays. Nevertheless, progress is being made, most notably with Saudi Arabia's Public Investment Fund and ACWA, in partnership with Air Products, reaching the final investment decision (FID) in 2023 on the NEOM Helios Green Fuels Project ($8.5 billion investment of 3.9 gigawatts of capacity to produce 600 tonnes of green hydrogen per day).

National and regional energy plans are emerging. The EU has a stated aim to import 10 million tonnes per annum of hydrogen by 2030 for use as an alternative to natural gas and as a transportation fuel. Progress is being made towards meeting this target, as set out in the RePowerEU plan.

In March this year, Canada and Germany signed an agreement committing them to back transactions between Canadian hydrogen producers and German off-takers as a means of working towards commercial-scale trade of clean hydrogen fuel. As yet, details of the import mechanism are unclear, but it seems most probable that this will be in the form of ammonia. Meanwhile, in the US, the Inflation Reduction Act aims to stimulate the development of low-carbon energy sources.

The decarbonisation of the global economy and its implications for shipping are increasingly fundamental to MSI's long-term forecasts. As a result, we have developed a series of interlinked models looking at the evolution of hydrogen production, consumption, and trade. The models assess the potential for supply and demand in ten countries/regions. Each country/region is also evaluated for potential for exports and imports.

Hydrogen production

Energy analysts categorise methods for hydrogen production according to the associated carbon emissions using a veritable rainbow of colours. However, for MSI's purposes, we have simplified the analysis to cover green and blue (collectively clean). Blue represents production from coal or natural gas with carbon capture, while green is via water electrolysis using renewable electricity.

Indeed, the key to the production of green hydrogen lies in the development of renewable energy production, which globally increased by 54% in the decade to 2020 – and the pace of investment is set to accelerate. Significant development of renewables has been seen across the globe, most notably in China, Europe, and North & Latin America. Under our Base Case, this is sufficient to meet projected requirements for the hydrogen economy and other key sectors.

MSI's analysis extends to 2050, integrating our forecast for hydrogen demand with our Energy Model. Long-term forecasts are aligned to some extent with the IEA's Announced Pledges Scenario and forecasts from BP and Shell.

The output of the initial phase of our modelling is a forecast for exports and imports of hydrogen for each country/region. A forecast for pipeline and seaborne trade is also provided, based on proposals for Europe and assumptions on pipeline supply to China.

The next issue to be addressed is what form the seaborne trade in hydrogen will take. At present, there is a widespread assumption that, in the first instance, ammonia and methanol will be the 'hydrogen carriers' produced from clean hydrogen. In the longer term, the liquid hydrogen trade is assumed to become viable.

Project ≠ project

Short-term forecasts are based on our database of hydrogen projects. MSI has identified more than 1,000 of these for clean hydrogen production that are either operational, under construction, have taken FID, or are at the feasibility study stage. These generally include an indication of focus in several categories: domestic use/export, transportation as hydrogen/methanol/ammonia, and/or use for bunkering.

The large number of operational projects tells a story in itself. The operational supply of clean hydrogen accounts for just under 2% of the total announced

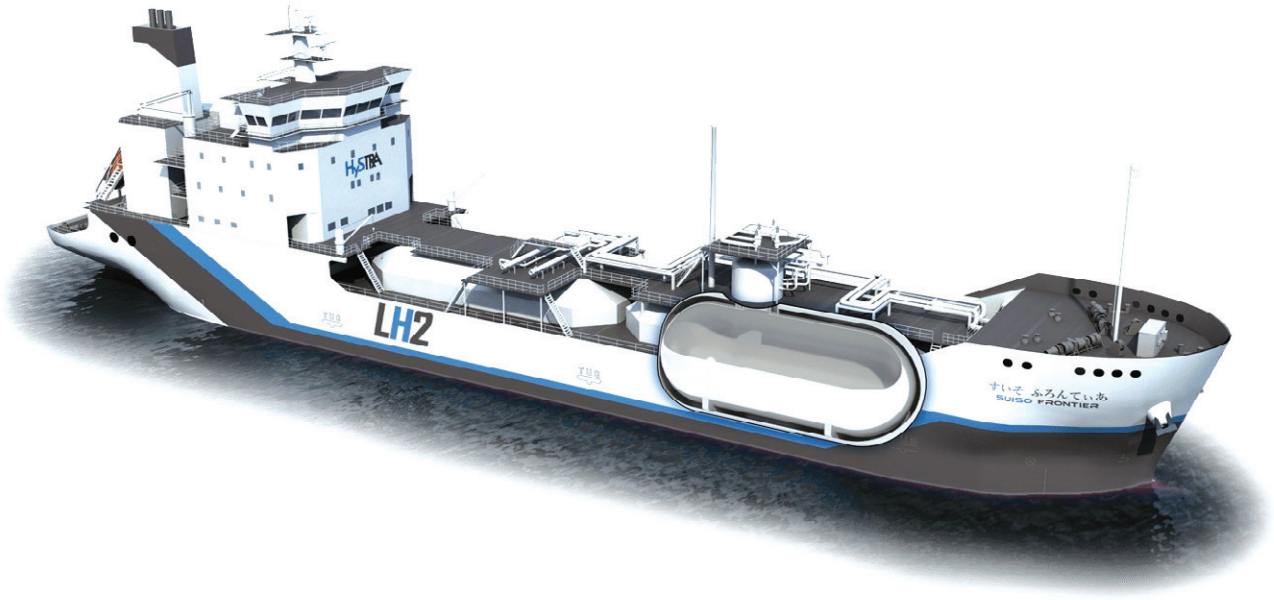


PHOTO: KAWASAKI HEAVY INDUSTRIES

supply. These facilities are small-scale and proof of concept, with an average capacity of around 1,200 tonnes/year. For those projects under construction, the average capacity rises to about 18,000t/y. The need to scale up is clear in the fact that for projects that have taken FID or are at the front-end engineering and design stage, the average rises to almost 70,000t/y.

The overwhelming majority of projects under consideration at present are in Europe and North America, with most of the output to be consumed locally. In the major export centres of Latin America, the Middle East, and Oceania, there are over 170 projects with a potential capacity of almost 14mt of hydrogen by 2030.

MSI's assessment of the current pipeline of projects suggests that the production of clean (blue/green) hydrogen could reach 18mt by 2030. To put this in context, it is worth mentioning a caveat that has been noted repeatedly by the World Hydrogen Council. They suggest that while growth in the number of projects is exponential, for projects taking FID, the graph is linear with a very low slope. The gap between proposed and actual needs to be bridged – and soon – if there is to be sufficient green hydrogen and derivative products available by this decade's end and beyond.

Marked market transformation

Despite high costs and safety issues, clean ammonia's role as a prospective marine bunker fuel, hydrogen carrier for use in power generation, and industry feedstock has solidified its place in the green transition, especially for high-volume uses. For example, plans for direct co-burning of ammonia in coal-powered electricity plants in Japan provide a clear opportunity for end-use without reconversion.

This signals a marked transformation for the industry, which has been focused on fertiliser production, to one driven by energy markets. Future volumes of clean ammonia are set to dwarf the existing grey trade. The nascent industry is anticipated to achieve clean exports of up to 30mt by 2030 and, in the best-case scenario, could reach 300mt by mid-century.

Production of clean methanol is also ramping up, driven by uptake agreements for methanol as a marine fuel, its use as a chemical feedstock, and its role in the hydrogen economy. Whilst sharing similar drivers, clean methanol trade is forecast to be significantly lower than that of ammonia, with 2030 seeing almost 15mt of product traded. By 2050, global clean methanol trade is expected to rise to 95mt – equivalent to half of the amount of clean ammonia trade.

Despite our model showing a relatively slow start for green methanol trade, incremental growth is expected year-on-year from 2026. We expect exports of green methanol to be around 8.0mt, equivalent to 23% of the projected grey methanol trade by 2030.

The requirement for methanol-capable chemical tankers will continuously and gradually expand. We expect 25 methanol carriers (of 50,000 deadweight) will be required to transport 15mt of trade by 2030; our modelling suggests a total of 215 methanol carriers of 50,000 dwt could be required by 2050 to ship the expected 95mt of clean methanol trade.

Ammonia trade is likely to be transformed over the next 25 years. By the middle of the century, clean ammonia could provide demand for up to 400 very-large gas carriers (VLGC), compared to the current fleet of 375 that is focused on carrying liquefied petroleum gas. In this context, it is striking that the current order book for ammonia-capable VLGCs is reported to be more than 50 ships. In contrast, though a requirement for just under 200 methanol carriers will be significant, it compares to an aggregate methanol-capable 35,000+ dwt fleet of 277 at the end of 2023. ■

How innovation drives efficiency gains by eliminating the hub vortex

THE HOLY BOSS CAP

by Dr Batuhan Aktas, CEO of EcoMarine Innovations, Futureproof Ship Design Group at the University of Strathclyde

One area of ship operations that has attracted much attention in recent years due to the possibilities it represents for emission reduction is that of cavitation. During ship operations, cavitation occurs because of vortices that build up and cause bubbles to collapse under the ship's propeller. The results of this process include increased noise, vibration and energy usage. The latter is of particular concern for vessels looking to streamline their energy profile. There is a hydrodynamic solution that delivers multiple benefits for shipowners facing increasingly tough regulatory requirements and rising operational costs.

Existing energy-saving designs for propeller hub caps or boss caps incorporate fins that act to improve vessel efficiency by reducing cavitation while ships are at sea. However, the finned design generates turbulence and is linked to cavitation as bubbles form underwater.

At EcoMarine Innovations, a pioneering start-up supported by the University of Strathclyde, we set ourselves the goal of addressing these issues while working on a project with a major European propeller manufacturer. During this collaboration, we learned that cavitation is a major cause of inefficient ship operations, accounting for 3-8% of lost propulsive efficiency.

Convinced that it must be possible to develop a better way of addressing this efficiency cost and related environmental impacts, we studied the design of boss caps commonly used on ships. In the course of this research, we began exploring the idea of designing a boss cap that utilises holes instead of any structure that can cause turbulence or operational risk. The result is the Holy Boss Cap (HBC).

Testing the technology

The development of the HBC demonstrates the importance of research support of the kind we have at Strathclyde University. The product, which was launched in February 2024, eliminates propeller hub vortex cavitation, the main source of rudder erosion, and reduces associated propeller efficiency losses. However, an early version of the innovative 'holy' design failed to gain traction as it was not hydrodynamically efficient, as the holes reduced the efficiency of the propeller.

The revised HBC design, which we implemented following extensive studies in partnership with the University, addressed these problems with carefully placed and angled holes bored into a conically shaped hub. The holes channelled into the hub affect the high pressure in the hub vortex by redirecting the flow downstream. The resulting low-pressure swirl flows in the opposite direction to conventional hubs behind the propeller blades, reducing propulsive drag, fuel consumption and maintenance costs.

To assess the effectiveness of the new design, we carried out computational fluid dynamic (CFD) tests on a typical twin-screw vessel with V-brackets and a 90-metre coastal general cargo ship. Using local workstations running parametric optimisation software combined with CFD software, we studied the effects of variables such as chamber volume and profile, number of holes, and angle of the holes.

When we compared the HBC with more advanced energy-efficient boss caps currently in operation, we found it to be at least 3% more efficient. Overall, compared to standard propeller boss caps, the HBC improved propeller efficiency by 3.1% and thrust by 1.1% while reducing torque by 2%, rudder cavitation by 10%, and propeller-induced noise by 1-3 decibels. We expect the HBC to be capable of delivering increases in propulsion efficiency of up to 5% vs conventional propeller boss caps. These potential savings were further confirmed by a reputable European cavitation tunnel testing facility, which found savings of more than 2.1% despite challenging scale effects.

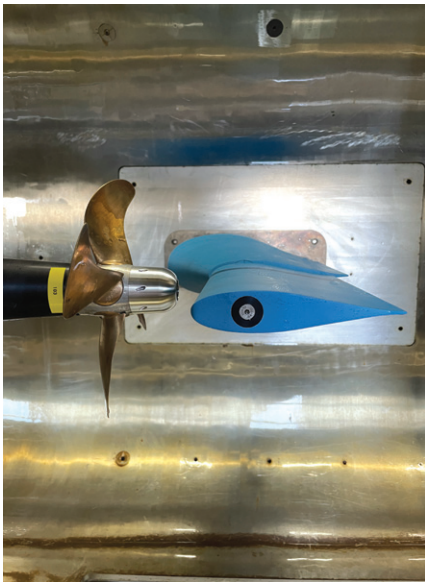
PHOTOS: ECOMARINE INNOVATIONS

Given the pressing emission-reduction challenges that the shipping sector faces, we believe it is not enough to develop a solution without ensuring that it can be scaled in a meaningful way. Having successfully completed validation tests at a hydrodynamic research centre in Sweden, the HBC is undergoing ship model basin trials to verify the efficiency gains on larger commercial and naval vessels. Meanwhile, the patent for the HBC is pending, with the support of the University of Strathclyde in the patent application process.

A simpler solution

It has become clear to us while developing the HBC that traditional methods of addressing ships' energy wastage have failed to keep pace with the industry's needs – or to consider the wider impacts of underwater noise and vibration. Zero propeller hub vortex cavitation can help towards environmental-social-governance, Energy Efficiency Existing Ship Index and Carbon Intensity Indicator goals, improve efficiency and reduce the costs associated with cavitation-induced rudder erosion. Driven by research, the HBC is meeting this need in the market and is contributing to more sustainable ship operations.

We are delighted that CFD trials have validated the HBC concept. Underpinning our efforts in bringing this product to market is the drive to find the simplest way to address what is actually a very simple problem. We have achieved this by several metrics: installation of the HBC takes just five to six hours, and the product can easily be retrofitted or installed on new vessels. Once fitted, the product can be maintained during routine dry-docking visits. In addition, the HBC offers reduced CAPEX compared to existing devices: thanks to the ease of casting and the lower amount of material required, it costs significantly less to manufacture than current conventional propeller hubs.



The business case for shipowners is compelling. Taking the example of a 250-metre vessel that consumes about 35 tonnes of fuel per day, operating for approximately 240 days a year, and assuming a 3% saving, the return on investment is around five months. We have already received significant interest from shipowners and propeller manufacturers and are engaging with potential partners to take the concept to market. ■

EcoMarine Innovations
PROPELLING A GREENER FUTURE

EcoMarine Innovations is a pioneering research group in the Department of Naval Architecture, Ocean and Marine Engineering at the University of Strathclyde, dedicated to developing cutting-edge technologies for the global maritime industry. Sail to **ecomarineinnovations.com** to learn more.

Results of a global survey on the current state
of automation in container terminals & the trends shaping its future

THE WAY TO GO (IN SPITE OF A FEW ROADBLOCKS)

by Peter Szelei, Senior Director of Business Development, FERNRIDE

Over the past decade, technology innovations have fueled widespread digital transformation across global industries such as healthcare, telecommunication, and manufacturing. Maritime transportation, however, despite handling over 80% of international trade, has been slow to adopt new solutions. Yet, disruptive global events and persistent challenges, such as skilled labor shortages, among others, have exposed the increasing fragility of the worldwide supply chain. These pressures are driving industry professionals to evaluate and introduce new technologies to increase efficiency, worker safety, and environmental sustainability.

In its recent survey, FERNRIDE asked container terminal professionals from across Europe, the Middle East, Africa, Asia-Pacific, and the Americas about the present levels of automation in their terminals and the technology trends they plan to follow. The majority (67%) ranked the level of automation in their terminals as 'low to moderate.' Still, the overall sentiment was clearly toward increasing implementation.

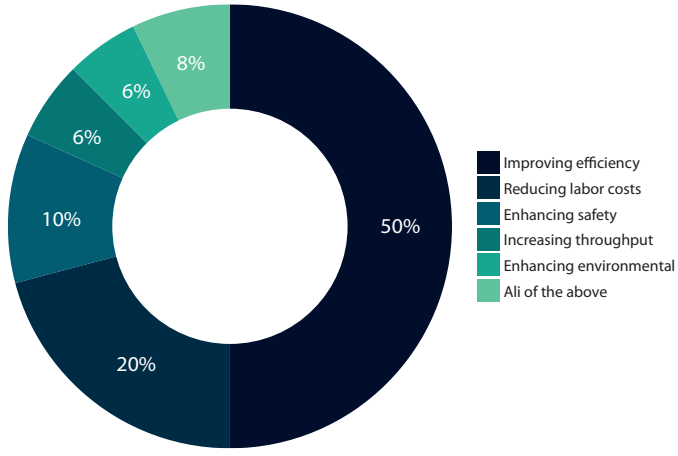
This article summarizes the findings from the survey to paint a clear picture of the current state of automation in container terminals and examines the barriers to implementation. Finally, it explores the emerging trends most likely to influence decision-making and technology implementation in container terminals in the future.

Primary goals: What do container terminal professionals expect to gain from automation?

It is not surprising that efficiency improvements ranked the highest (Fig. 1), as small profit margins and the lack of skilled labor are global phenomena. While improving efficiency is the number one driver for automation across the board, for survey respondents on the executive level, this is followed by their ambition to improve safety.

Labor cost reduction is ranked second highest (20%). This desire is likely a by-product of ongoing pressure to increase efficiency. Our survey showed that it is felt most strongly by those in operational roles, who must navigate external pressures, rising costs, and labor shortages on a daily basis.

Fig. 1. Container terminal professionals' primary goals for implementing automation

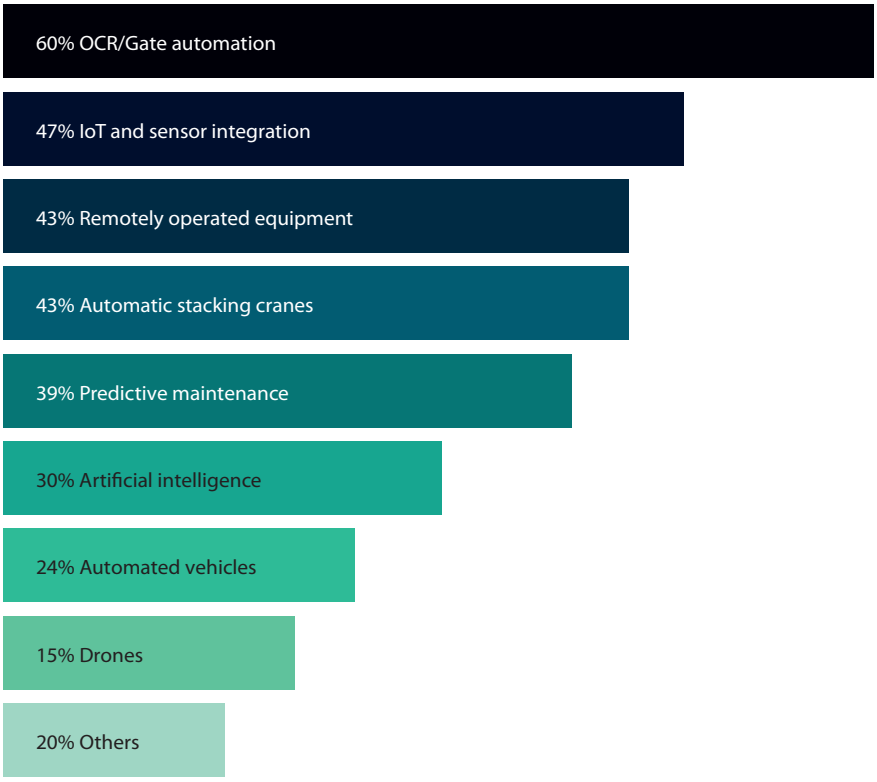


Status quo: What automation solutions have container terminals already implemented – or are they planning to implement?

Optical character recognition (OCR) for gate automation ranks highest (Fig. 2) among the solutions that container terminal professionals are already using or have planned to implement. This is unsurprising as OCR is a mature technology that has already been proven across industries. The prevalence of OCR is an excellent example of a proven automation technology accelerating the primary goal of increasing efficiency while delivering a return on investment (ROI) relatively quickly by reducing congestion and turnaround times in terminals. "[Going from] a manual environment in the port where almost everything was paperwork, [gate automation] has significantly improved our efficiency and truck turnaround time. It's the way to go in terms of efficiency, safety, and effective terminal operation," shared one of the respondents.

Survey responses also showed that the implementation of newer technologies – such as the Internet of Things (IoT), remote-controlled & automated equipment, and predictive maintenance – is increasing in maritime terminals. Advancements in these technologies are driving the introduction of robust and reliable solutions (such as remotely operated and autonomous terminal tractors and cranes).

Fig. 2. Automation solutions that maritime terminal professionals have implemented or planned to implement



Challenges and barriers: What slows the implementation of automation solutions?

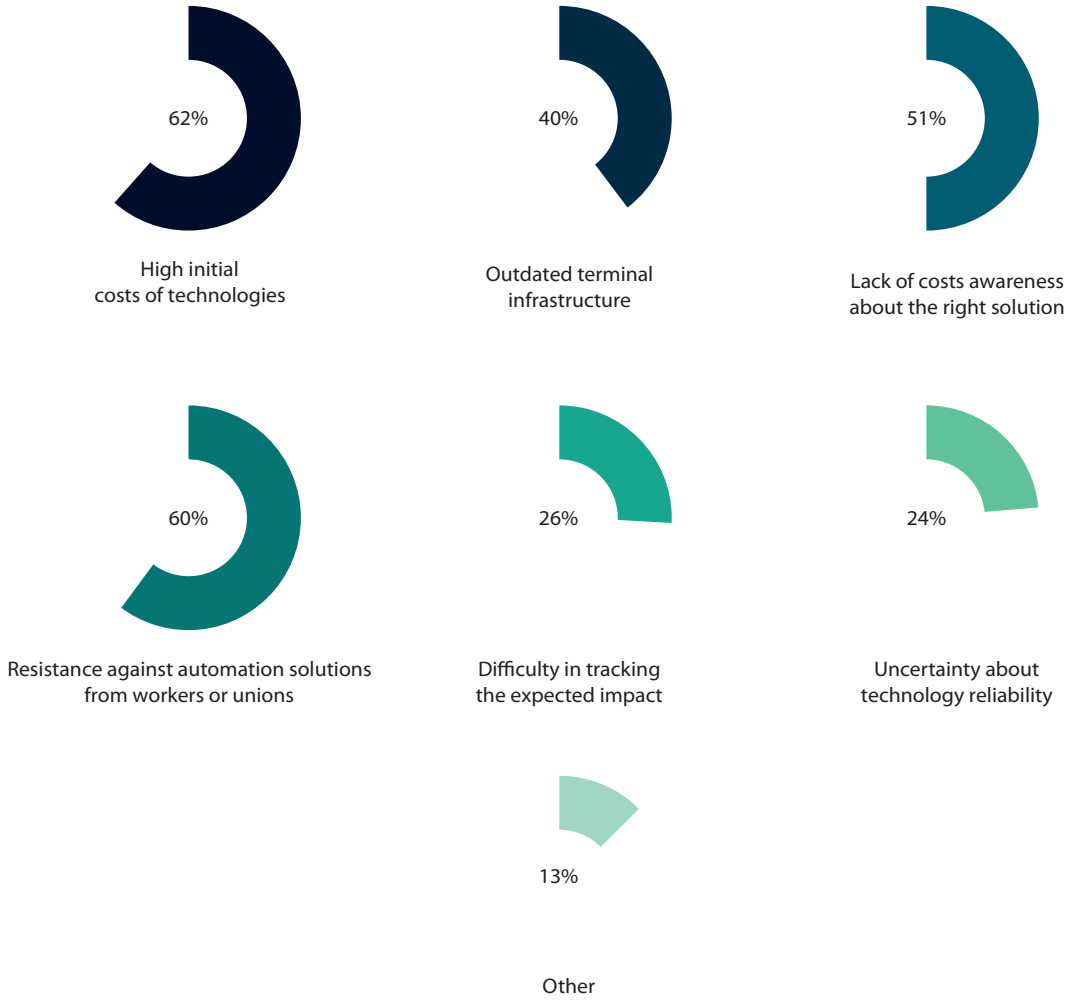
Some 62% of respondents cited the high initial cost of technologies as the main barrier to implementing automation solutions (Fig. 3). Executive-level respondents ranked resistance from the workforce as their second highest concern, along with a lack of skilled workers versed in new technologies. "In as much as people are willing to embrace automation in terminals, they are also concerned about the job security of workers," one respondent said.

Those pushing for more automation also point to a lack of awareness about the right solutions and say that they have difficulty engaging stakeholders due to uncertainty about the reliability of new technology and its expected impact. Survey respondents report that decision-makers prefer to prioritize small gains achievable with familiar solutions over the higher risk-reward ratio of new and transformative technologies. "Although managers say they believe that automation is necessary, they don't really realize what they can achieve," one of the surveyees told us.

Operations managers are the most concerned with how automation integrates with existing systems (60%) and any potential negative impact it might have on efficiency. Autonomous terminal tractors, for instance, must be able to navigate novel scenarios (like external truck drivers who don't necessarily adhere to speed limits or follow designated routes, resulting in unpredictable behavior). "The complexities of mixing our manual operations with automation is one of our key hurdles. For example, we will have autonomous trucks utilizing the same roadways as our manual vehicles," commented one respondent.

Respondents in automation-related roles emphasized a need to increase awareness of existing automation solutions, fearing that terminals that fail to adopt these innovations will struggle to compete with more technologically advanced facilities.

Fig. 3. Barriers and challenges to the adoption of automation



Environmental sustainability: How can automation help container terminals to become greener?

The efficiency gains possible with autonomous technology also help terminals to become more sustainable by reducing fuel consumption and increasing productivity.

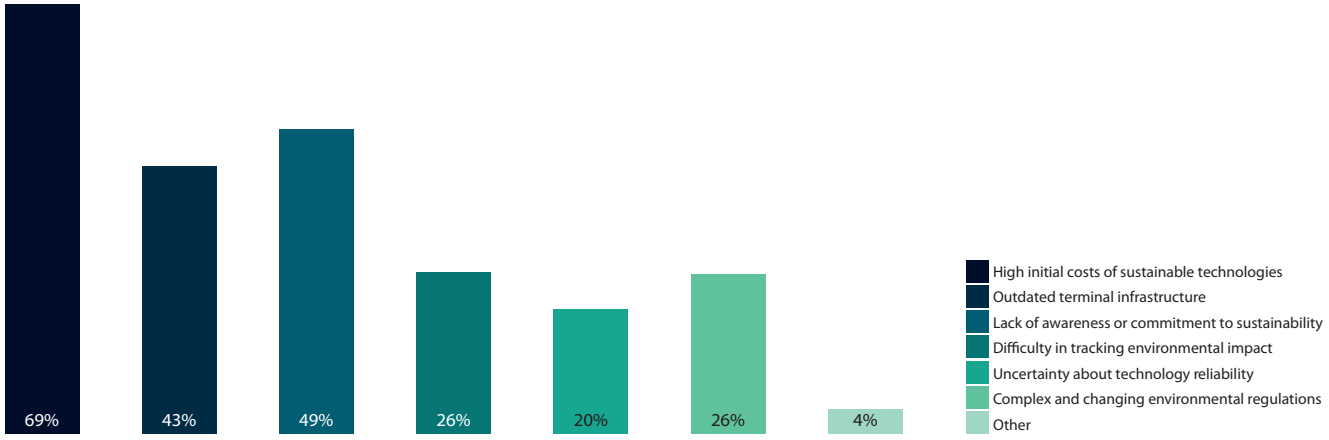
Autonomous terminal tractors, among other things, can run more efficiently than manually driven tug masters, leading to reduced emissions. Vehicles equipped with human-assisted autonomy can increase the productivity of the existing workforce by handling the majority of driving tasks autonomously. This allows remote human operators to oversee multiple vehicles and only support autonomy remotely when needed.

Pressure is increasing across the logistics industry, including container terminals, to adopt more sustainable practices. In line with the implementation barriers for automated solutions, industry professionals rank the high initial costs of technologies as even more prohibitive when it comes to adopting sustainable practices (Fig. 4).

Survey respondents said that container terminals lack the budget to replace outdated technology and infrastructure. Those pushing for more environmentally friendly measures also described the difficulties they face in convincing stakeholders without a demonstrable ROI: "I strongly believe in improving the sustainability of port operations and that terminal automation helps in advancing sustainable practices. But I always get the same response [from stakeholders]: What's the ROI?" Another said: "ROI is a big challenge for any new technology implementation; it is difficult to capture the impact with numbers."

Less than 6% of respondents said that enhancing environmental sustainability was their primary goal for implementing automation, and all of these worked in operations or automation-related roles. However, most of the workforce agrees that an increased awareness of and commitment to sustainability is needed to drive the adoption of environmentally friendly practices.

Fig. 4. Barriers and challenges to the adoption of sustainable practices



Key takeaways & outlook

Beyond assessing the current state of automation in container terminals, the survey results also indicate which trends we can expect to shape the future of automation in the industry.

Efficiency improvement and labor cost reduction are the main drivers for automation overall, but decision-makers will push to enhance safety, too. The general ambition for efficiency improvement and cost reduction reflects the persistent budgetary and labor challenges faced by container terminal professionals, particularly those in operations and IT. In contrast, executive-level respondents rated 'enhancing safety' as their second most important goal. Skilled labor shortages and cost restrictions will increase pressures to reduce risk in the workplace as executives push to attract new talent as well as retain existing workers.

Mature technologies with proven efficiency benefits are fast becoming the norm: 98% of survey respondents have already implemented (or planned to do so) technologies such as OCR for gate automation (60%), IoT and sensor integration (47%), and remotely operated equipment & automated stacking cranes (both 43%). We can expect these proven solutions to become the norm due to their predictable efficiency improvements. At the same time, advancements in newer technologies will also drive the implementation of more robust and reliable solutions (like remotely operated and autonomous terminal tractors).

Workforce acceptance and adoption will depend on the investment in training alongside new technologies. After the cost of tech, executive-level respondents are most concerned about the workforce resisting automation and lacking the skills to work with innovative technologies. Providing quality training will be instrumental to overcoming these challenges by upskilling the current workforce and attracting new talent to the maritime transportation industry.

Container terminals will prioritize automation solutions that can be integrated into live operations. With efficiency improvements and cost savings set to remain the primary goals for implementing automation (particularly amongst operations, IT, and terminal development personnel), we can expect solutions that can be integrated into live operations without disruption and deliver near-term ROI to be most successful.

Autonomous solutions will also pave the way to greener practices. The efficiency gains will support the adoption of more environmentally sustainable practices. Pressure on providers to offer more data visibility will increase as stakeholders scrutinize the reliability and environmental impact of new technologies. The rate of change will also depend on how well policymakers communicate new requirements.

Can you afford *not* to automate?

Forward-thinking container terminal professionals are already seeing the efficiency, safety, and sustainability benefits of early automation and remotely operated solutions. Now seeking to increase their awareness about the right solutions in an industry that can ill afford even the smallest setbacks, decision-makers must strike a balance between achieving efficiency gains and reducing labor costs while ensuring a smooth transition for workers and operations. Investment in training will be central not only to filling skill gaps and ensuring acceptance of new ways of working but also to attracting the next generation of talent who bring along an increased awareness and knowledge of the best solutions for the future. ■

FORGE AHEAD

by Martin Isik, CCO, FERNRIDE

Terminal operators, positioned at the critical junctions of international trade, play a pivotal role in facilitating global commerce. They work behind the scenes to ensure smooth and efficient movement of goods across continents. As the scale and complexity of global trade continue to escalate, operators are tasked with a demanding challenge: to increase efficiency, reduce downtime and ensure safety, all while maintaining robust and reliable operations.

This case study article explores how HHLA tackled this challenge head-on by embracing innovation and technology, working with FERNRIDE, a company offering automation solutions for yard trucking. Therefore, FERNRIDE and HHLA TK Estonia, a subsidiary of HHLA that operates a container terminal in the Port of Tallinn's Muuga Harbour, started a project to validate and integrate the solution of FERNRIDE at the facility.

The opportunity

As global trade expands and evolves, container terminal operators must adapt and innovate. As one of Europe's largest operators, HHLA is no stranger to such demands. With vessel size increases, freight rate fluctuations, and ever-evolving customer expectations, the company has consistently demonstrated resilience in facing these challenges, focusing on maintaining efficiency, safety, and customer satisfaction.

One of the most pressing challenges HHLA had to tackle was the ever-increasing size of container carriers serving global trade. Over the past decade, the average size of these vessels has more than doubled, with mega-ships capable of carrying 20,000 TEUs becoming increasingly common. Such colossal vessels profoundly impact terminal operations because un-and loading them requires significantly more time than their smaller counterparts.

This increased berth time could lead to a domino effect on the entire operation, causing delays and congestion that ripple through the terminal and disrupt the carefully orchestrated flow of goods. The congestion doesn't only mean a few hours of setback: a ship may miss its tidal window in some ports, forcing it to wait for additional 12 hours to leave the harbour.

Balancing these escalating demands with the need to maintain safety standards and profitability is a delicate act. Terminal operators are expected to be flexible, agile, and efficient. Some see it as an opportunity to give transformative innovation a play.

The leap

HHLA strategically decided to develop an automated mixed horizontal transport system to increase efficiency and throughput. This forward-thinking approach brought them together with us, a technology company at the forefront of human-assisted autonomous trucking solutions. FERNRIDE's automation technology will enable a single remote operator to manage up to four trucks concurrently. This is a tangible improvement from the traditional 1:1 driver-truck ratio, easing the trucker shortage issue prevalent in the logistics industry.

To validate the solution in the area of a container terminal, FERNRIDE and HHLA TK Estonia, the country's largest 'box handler,' decided to start a site project in Tallinn. As a digital-oriented terminal, HHLA TK Estonia is open to testing innovative solutions. The decision to incorporate electric, autonomous trucking into their operations was a leap towards a new era of terminal operations.

The pilot involved fitting a terminal tractor with sensors and cameras to be remote-controlled via mobile networks. Teleoperators at a computer workstation resembling a vehicle cockpit took remote control of the machinery, receiving and sending targeted commands online by controlling the gas pedal, brakes, steering wheel, and joystick.

The pilot started in early 2023 to determine the technology's operational reliability in automated container handling and to validate the technology's viability for future business opportunities. FERNRIDE's solutions were implemented seamlessly into existing processes, ensuring no interruptions or incidents occurred during the transition. This smooth integration was critical in maintaining uptime and delivering consistent customer service throughout the implementation phase.

Safety remained a non-negotiable priority for HHLA TK Estonia despite the drive for increased efficiency. FERNRIDE's technology helps in reducing the risks of on-site accidents. In the operations we managed, the accident and injury rates were remarkably maintained at 0%. This achievement underscored the impact autonomous technology could have on safety, redefining what is achievable in the industry.

Half a year later, the project partners ticked off the first phase, agreeing to proceed to the next one. With the start of the second phase, autonomous driving will be integrated into operational processes. For this purpose, an additional automated yard truck will be deployed at the terminal for container transport. The goal is to achieve a degree of autonomy of at least 80-90%.

A defining testament to FERNRIDE's success at HHLA TK Estonia was the perfect net promoter score of 10/10 awarded by the port. It is proof that FERNRIDE not only met but exceeded the goals of

PHOTOS: FERNRIDE

FERNRIDE in the project with HHLA TK Estonia. Riia Sillave, CEO of HHLA TK Estonia, said, "The joint project with FERNRIDE enabled us to test the system directly in HHLA TK Estonia's operations. The implementation has proven itself in daily terminal operations so that the proof of concept could already be achieved at an early stage. We really enjoy working together with the FERNRIDE team, which always shows a high level of competence and professionalism. We will now continue the good cooperation with FERNRIDE and work out together how autonomous driving can work in the future. In doing so, we are pursuing the goal of making workflows at our international terminals future-oriented and sustainable."

The new benchmark

The successful project of HHLA TK Estonia and FERNRIDE is more than just a success story. It is an inspiring tale of how embracing innovation and technology can redefine the boundaries of an industry.

Adopting FERNRIDE's technology signals a significant shift in the terminal operations landscape. HHLA TK Estonia has paved the way for others in the industry by demonstrating the immense potential and benefits of autonomous trucking.

The journey of HHLA TK Estonia is a telling example of the power of innovation in addressing the modern challenges of terminal operations. It underscores the transformative potential of technology and the value of embracing change in a dynamic industry landscape. In the face of growing global trade and the escalating demands of terminal operations, HHLA has demonstrated that the solution isn't merely to increase effort but to optimise work strategies. By utilising autonomous technology, they have contributed to industry transformation and established a new benchmark for terminal operators across the globe.

This case study conveys the forward-thinking approach and determined spirit of HHLA and its subsidiary HHLA TK Estonia. As they navigate their way in the terminal operations landscape, one aspect is evident: they are not just keeping up with the industry's pace but forging ahead. ■

FERNRIDE

FERNRIDE is pioneering the use of autonomous, electric trucking within logistics centers, production facilities, and intermodal & maritime terminals, enabling its customers to immediately and significantly improve productivity, sustainability, and worker safety. Employing a human-assisted autonomy approach that allows teleoperators to control trucks remotely, FERNRIDE's technology has been seamlessly integrated into logistics operations in ports and terminals run by industry titans such as Volkswagen, HHLA, and DB Schenker. Go to **fernride.com** to discover more.

A surge in lithium demand raises stability concerns over transporting its minerals

ROCK-SOLID SHIPPING

by John Southam, Loss Prevention Senior Executive, NorthStandard (Greece),
and Lee Stenhouse, Managing Director, Roxburgh

Spodumene, a lithium aluminium silicate, is the world's most abundant commercially viable lithium mineral. The rapid global increase in lithium demand due to the advent of the electric vehicle battery industry has led to the mineral sources of lithium being increasingly developed and exploited, with spodumene being the most important. This has, in turn, led to an increase in shipments of spodumene (alternative names declared by shippers include lithium mineral concentrate, lithium alumina silicate, spodumene concentrate sc6.0, and alpha spodumene), a cargo which possess shifting and/or liquefaction risks.

The International Maritime Solid Bulk Cargoes (IMSBC) Code includes a schedule for spodumene (upgraded), describing it as an odourless and tasteless off-white-to-beige sand containing a mixture of naturally occurring silicates and quartz. It is categorised as Group A cargo, which may liquefy if shipped at a moisture content over its transportable limit. But spodumene can also come in other shapes and sizes, involving their own potential shipping hazards.

Coarse trade

Significant spodumene deposits exist in Australia (which currently has the highest annual production), South America, and Canada. There is also a growing African export sector (Zimbabwe, Namibia, Democratic Republic of Congo, and Mali), which is anticipated to be increasingly important due to its large reserves. Currently, the destination of spodumene concentrates is almost exclusively to China, chiefly discharging in ports of the Sichuan and Jiangsu provinces.

The source rock (spodumene pegmatite) is typically upgraded to a spodumene concentrate for shipping purposes. But it can also be carried in its natural coarse state, which can consist of large cobbles or even boulders, sometimes in palletised form, and is similar in appearance to an aggregate material.

The large particle size and relatively low friction mean that, if improperly loaded in the ship's hold, there is a risk that the cargo as a whole (or individual rocks) could shift, creating stability issues, or causing damage to the vessel or stress to the ship's structure.

Coarse material shipments have, up until recently, been considered uneconomic; as such, there is no individual schedule for them in the 2022 edition of the IMSBC Code. However, the increase in lithium prices has made coarse product shipments a more viable economic option, especially from remote mining operations or ones trying to develop early revenue streams before their concentrate processing facilities come online.

Fines and concentrates

In some regions, especially in Southern African countries such as Namibia and Zimbabwe, there is a focus on controlling natural resources. They aim to keep a firm hand on the export of raw materials by promoting value-added local concentrate processing. In some cases, full or partial bans have been put on the export of unprocessed (coarse) spodumene pegmatite. It is anticipated by the mining and material experts from Roxburgh that a pragmatic approach will be adopted, and there will be a mix of ore and concentrates shipped out of these regions as the industry demand increases.

It is expected that the spodumene (upgraded) concentrate processing facilities currently under construction near mines and quarries will soon become operational. This process will involve spodumene pegmatites (raw coarse state) undergoing initial concentration via crushing and grinding to a fine particle size before the valuable minerals are separated (and a waste product is produced). The upgraded lithium concentrate can then be further processed to produce sand containing naturally occurring quartz and silicates – as well as valuable spodumene.

PHOTO: NORTHSTANDARD/ROXBURGH

Carriage risks

As with other mineral concentrates, the potential risk of material failure during shipping, such as liquefaction, dynamic separation or cargo shift, will be controlled by the cargo's particle size distribution, mineralogy, and moisture content. Therefore, before commencing loading, the shipper must provide the ship's master with accurate information on the specific properties of the cargo to allow for safe stowage and shipment.

The shipper should also provide evidence that a proper technical assessment for the potential Group A properties of the cargo has been undertaken. Moreover, the subsequent procedures for sampling, testing, and moisture management of the shipment are to be reviewed and approved by the competent authority at the port of loading.

In some developing regions exporting this cargo, there are concerns that procedures for sampling and testing may not have had proper consideration or oversight. Shippers are recommended to ensure they are provided with the relevant documentation well in advance of loading to allow for an appropriate review. ■

KNOW THE DIFFERENCES TO MAKE A DIFFERENCE

by Kostas Gkonis, Secretary General, and Emmanuel Vergetis, Regional Representative Greece, INTERCARGO

Over the last few years, we have seen a (rather rough) perfect storm of events. Following the turbulent pandemic time, our industry now finds itself dealing with the situation in Ukraine and recent attacks on ships in the Red Sea, the legacy of COVID and, of course, the incorporation of the International Maritime Organization's (IMO) greenhouse gas (GHG) reduction targets into everyday operations.

The shipping industry has made significant progress in reducing its carbon footprint during the past decade and is striving to achieve IMO's ambitious goals, which may soon start aiming for zero-emission shipping by mid-century. As the industry works towards achieving the unanimously agreed upon IMO 2050 targets, dry bulk shipowners are keen to play their part in meeting the ambitious decarbonisation objectives, and 2024 will surely bring more opportunities to share knowledge and work together to protect the marine environment.

In need of a systemic approach

INTERCARGO firmly believes in safe decarbonisation and that environmental excellence requires collaboration. If we are to witness a future with zero-emission shipping, responsibility cannot be placed entirely on the shoulders of shipowners. It must be remembered that the commercial development of (effective and safe) green solutions is within the control of a spectrum of stakeholders. Such a target requires a drastic and urgent acceleration in the commercial development of the needed technologies, fuels, propulsion systems, and related infrastructure.

It is fundamental for governments, legislative parties, and all stakeholders to understand that the decarbonisation of shipping is a whole system challenge and affects not only the vessel but also its wider operating environment. Most investments are therefore needed for land-based infrastructure and low- and zero-carbon fuel production.

It is worth highlighting that dry bulk carriers' GHG emissions are amongst the lowest per tonne-mile of cargo carried, and bulk carrier vessels represent one of the most economical and, thereby, environmentally friendly transport modes on Earth. Based on the Fourth IMO GHG Study 2020, the most significant carbon intensity reduction was achieved by bulk carriers, where the overall EEOI and AER (both operational GHG emission metrics) in 2018 were around 38% and 31% lower compared to 2008. Bulkers represent 43% of total capacity but are responsible for only 35% of all shipping emissions.

Models of trade

Shipping is primarily divided into the liner or tramp model, the latter characterised by vessels sailing in irregular trade patterns calling various ports worldwide. Over 65% of the around 13,000 bulk carrier fleet are engaged in this tramp trade.

Vessels of the liner model, typically container ships, often carry time-sensitive and refrigerated cargoes. Thus, these need to sail faster due to time pressure, whereas tramping vessels are not as time-constrained, with the cost per tonne being a more critical factor. Tramping shipowners tend to be asset managers, with the charterer responsible for the cargo carried, the vessel's speed, and ports of call. In contrast, for container carriers, the owners have operational control.

For regulations to be equitable and effective, knowledge of all shipping sectors and models is necessary. To successfully deal with the massive task of decarbonising a world fleet comprising thousands of vessels of different sizes and shapes, regulators must understand the particulars of the two main maritime economic models. Furthermore, the tramp shipping model does not easily allow for operational optimisation, which would lead to further reductions in GHG intensity.

On top of the challenges above, due to irregular trade patterns, we also need to add the substantial capital expenditures of energy-saving devices, highlighting that their cost (e.g., of wind-assisted propulsion) is much higher proportionately for the bulker fleet vs other sectors. This situation may negatively extend the return on investment horizon and make the business case less attractive. There are also novel technologies (at least for the shipping sector), such as onboard carbon capture, the true sustainability of which remains to be thoroughly validated.

Ports, fuels, ship design, and people

While the majority of bulk carrier owners eagerly await new fuels – as long as these are safe, promptly available, and permit a sustainable business model – shipping will be competing with other industries that are also trying to decarbonise (such as aviation, which aspires to become net zero carbon by 2050).

The GHG reduction potential of e-fuels, produced using green hydrogen and CO_2 (i.e., e-hydrogen, e-methane and e-ammonia, or liquids like e-methanol or e-diesel), depend entirely on abundant renewable electricity. This prerequisite is questioned since the supply of green power is forecasted to remain in high demand. It is essential to look at any potential future marine fuel from a lifecycle GHG intensity perspective to provide clear & navigable 'readability' of the new fuel roadmap. There is too much confusion regarding the 'green credentials' of (bio)LNG, blue fuels, and so on, whilst stakeholders (the

PHOTO: PORT OF KEMI

World Bank, EU, etc.) still debate if LNG is a suitable transition fuel.

There has been much discussion regarding the Green Corridors concept, too. While it might benefit some types of vessels (mostly those serving fixed routes), it may not be suitable for most bulkers that are tramp trading. Instead, dry bulk shipping needs green ports above all else.

The most robust path for zero-carbon fuels is through dual-fuel engines and systems to ensure flexibility in bunker selection, but the multi-fuel pathway for bulk tramp shipping is much more challenging than for other segments. Alternative drop-in fuels would be in high demand and probably unavailable globally in sufficient quantities and locations. Furthermore, the dry bulk shipping sector does not enjoy national subsidies and has little political influence, let alone leverage over fuel suppliers.

Shipyards and marine designers must also play their part and develop ship concepts that integrate technology that can be practically and safely implemented on board. Yet, there are also inherited constraints with certain types of dry bulkers. For instance, smaller geared vessels present the designer with a cargo section forward of the engine room bulkhead where deck tanks for alternative fuels cannot be located. In addition, the deck cranes leave little room for the increased storage volumes required by alternative, low- or zero-carbon fuels.

Last but certainly not least is the human element. The shortage of skilled seafarers will continue to be one of the biggest challenges for most dry bulk owners and operators. Crew competence for most pure bulker operators (i.e., not operating LNG/tankers, etc., and thus their crews not having adequate experience with alternative fuels yet) may prove to be one of the most significant threats in the decarbonisation journey, particularly as alternative fuels (some of them toxic by nature) are becoming more complex to handle on board.

Spinning the Ariadne's thread

In common with other shipping industry sectors, our members face a confusing conundrum of MARPOL amendments, circulars, resolutions and guidelines as they work to turn the green ambition into reality. We at INTERCARGO work hard to guide our members through this maze, as no one can navigate it alone. Partnership has, is, and will continue to be critical.

Against this backdrop, INTERCARGO continues to address the key issues the dry bulk industry has always faced. Our Association's working groups deal with the safety, environmental, and regulatory aspects, as well as security and broader challenges that INTERCARGO, as a collective body representing the sector, takes the lead on.

Through INTERCARGO's presence on the IMO scene, we are able to influence industry-wide decisions and impacts on our sector. As an Association closely working with its members, INTERCARGO understands how IMO instruments affect the operations of our vessels and crew and their unique trading patterns – the implications of which are, unfortunately, not always fully understood outside the dry bulk industry.

During their regular meetings, INTERCARGO's Committees explore the impact of new legislation and technologies on vessel operations to further projects on safety and environmental issues, likewise to share successful solutions. With some 3,300 ships of 325 million deadweight, our more than 250 INTERCARGO members now represent about one-third of the global dry bulk fleet tonnage, thus strengthening the Association's global influence. The enlargement and vigour of our organisation allow members to benefit even more by coming together and sharing their experiences.

Having a strong voice enables INTERCARGO's membership to build on solid foundations as we face and together address the challenges detailed above (and many more). ■

INTERCARGO
International Association of Dry Cargo Shipowners

The International Association of Dry Cargo Shipowners (INTERCARGO) is representing the interests of quality dry cargo shipowners. The Association provides the forum where dry bulk shipowners, managers and operators are informed about, discuss and share concerns on key topics and regulatory challenges, especially in relation to safety, the environment and operational excellence. Go to **intercargo.org** to learn more.

THE ENERGY TRANSITION'S NEW DUCK IN THE POND

by Alexa Ivy

When asked to name a renewable offshore energy source, most people would probably say "wind." That's a perfectly logical answer because, after all, the offshore wind energy industry is well-established. The first farm was up and running back in 1991, and around 20 countries have to date started harvesting power this way. When asked to name a second renewable source, a smaller number of people would say "tidal," referring to the energy gleaned from areas of strong tidal currents. Even fewer people would give "solar" as their answer. This is not surprising because offshore solar power generation as an energy sector is still in its infancy. But that doesn't make it any less important or attractive. It is here – and it's growing fast!

With this in mind, looking to discover more about the challenges and opportunities of developing and deploying offshore solar energy, we take a look at the 2020-founded SolarDuck, a Dutch-Norwegian cleantech company with big ambitions for the energy transition, putting its Offshore Floating Solar (OFS) systems forward as a realistic alternative to fossil fuels as well as a 'booster extension' to offshore wind energy farms.

SolarDuck's mission focuses on accelerating the energy transition. "Our aim is to develop offshore floating solar energy to a point where, from 2030 onwards, we are deploying in excess of 1.0GW per year," says CEO and Co-founder Koen Burgers. "To achieve this, we are currently involved with numerous international demonstration projects – in Japan, Malaysia, and the Netherlands."

Solutions to challenges

The design and technology behind OFS systems are based on various factors; sea conditions, environmental impact, reduction of maintenance, safety, and scalability all play a huge role. While it must be noted that SolarDuck is not the only OFS company in the market, its solutions to each of these factors give a broad impression of the challenges and solutions of OFS projects.

To cope with the exposed weather conditions found in offshore waters, SolarDuck has designed its floating systems as triangular or hexagonal platforms topped with solar panels. The geometric shape provides a cost-effective and structurally flexible yet stable construction. For mooring solutions, the innovator looked to the design of floating oil rigs and floating offshore wind turbines for lessons learned.

In terms of the environmental impact of floating solar platforms, it is crucial to reduce this to a minimum. In practice, this equates to minimising the reduction of air and light flow below the solar panels. It is for this reason that SolarDuck's systems are raised to a distance of three to ten meters above the water surface depending on wave height, allowing free flow of air. Open grating around and between panels enables the transmission of sunlight below the platform.

With an eye on reducing lifecycle maintenance costs associated with marine fouling and salt deposition, SolarDuck's floaters have a small surface area to minimise marine growth, and the solar panels have a self-cleaning 10° tilt to prevent the build-up of salt. The entire construction is fabricated from offshore-grade aluminium, which is said to be able to last 30+ years in the corrosive offshore environment.

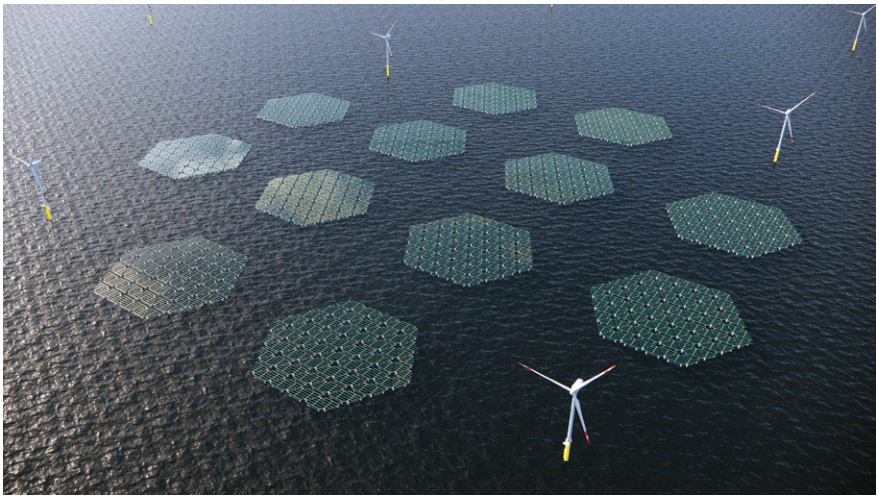
Safe access (e.g., by maintenance personnel) is provided by offshore-standard grated walkways. What's more, the seakeeping behaviour of the entire structure is such that only low levels of movement and acceleration are experienced by people working 'on board.'

The final aspect to take into account is scalability or, more to the point, cost-effective scalability. To make this form of energy generation as accessible as possible, SolarDuck has set up its company processes and supply chain to make sure that costs are kept to a minimum throughout all stages of production, installation, and operations. This includes solutions such as containerised logistics and commercial off-the-shelf components, straightforward assembly, and installation requiring small & inexpensive workboats.

New (solar-hybrid) lands

As the world faces the numerous challenges of climate change, one of the biggest questions is: when will OFS make its mark? Burgers highlights the scarcity of land as the driving force behind the anticipated growth of OFS. "Of course, onshore solar will remain a vital component of our future energy mix, but the fact is that space on land is getting more and more limited. We are going to have to move solar power offshore to meet our future energy requirements. To this end, perhaps the biggest advantage of offshore floating solar applications is the availability of space, something that is in very short supply throughout the coastal metropolises around the world."

The potential for OFS power generation can be illustrated with two of SolarDuck's current projects: Merganser and Hollandse Kust West (HKW). The former is an industry collaboration between SolarDuck and several Dutch research institutes. The aim is to develop, test, and validate solar energy platforms that are capable of functioning reliably in the toughest North Sea weather conditions



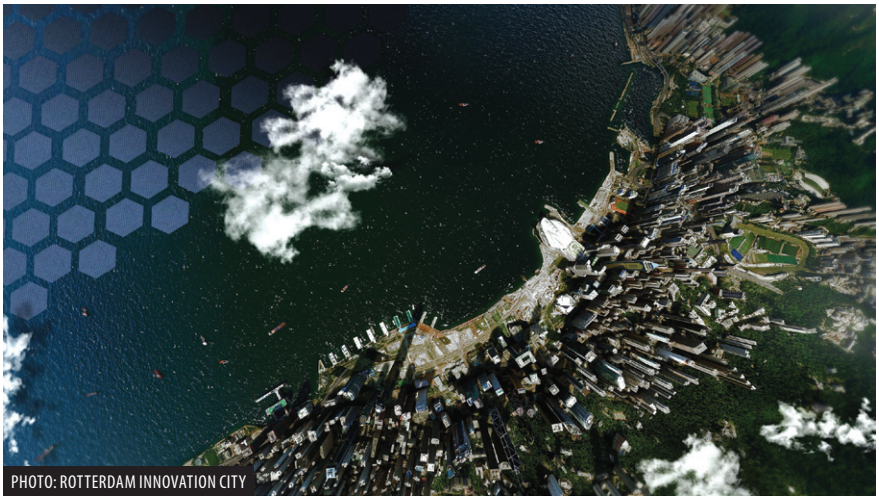


PHOTO: ROTTERDAM INNOVATION CITY

KOEN BURGERS; PHOTOS: SOLARDUCK

(including hurricane-speed winds and 14-metre-waves). The latter has been, in turn, heralded as the world's largest hybrid offshore floating solar farm.

Both are close to Burgers' heart. "Merganser was one of our first projects, consisting of six interconnected triangular floating platforms, each measuring 42 meters side-length. The key point is that OFS is an easily scalable technology; Merganser will start its life generating 5.0MW of renewable energy at sea, but we see this idea getting upgraded to gigawatt scale."

"And then we have HKW," he continues, "our flagship project. But more importantly, it's a groundbreaker for the whole OFS industry because it is a hybrid project." What Burgers means by that is that floating solar panels will be installed in between offshore wind turbines. He explains, "Wind turbines are positioned a considerable distance apart from each other. As such, there is a lot of space within an offshore wind farm that we can use to install an offshore floating solar park. Looking at the number of offshore wind turbines currently active in the North Sea, hybrid projects where wind and solar complement each other will really make optimum use of both space and infrastructure. This will yield significant benefits in terms of stability of energy supply."

Hotspots

Another key question to ask is: where will OFS make its mark the most? The answer to this can be found by looking at the Earth's latitude. Just as there are windy areas of latitude (and it's no coincidence that the world's offshore wind energy farms are located in these zones), there are also sunny areas of latitude, forming the so-called 'sunbelt,' which lies in tropical countries with latitudes of within 40° of the equator.

"These are 'hotspots' for solar power energy generation," notes Burgers. "Crucially for OFS, these areas are characterised by their low average wind speeds – this will make installation and operations much less challenging. Furthermore, these 'sunbelt' countries often experience land scarcity. It is for this reason that we see great opportunities in urban conglomerations in Asia: Japan, Singapore, and South Korea, for instance, as well as the island nations of the Caribbean. In fact, we have already signed agreements with partners in Malaysia to undertake a feasibility study and in Japan to build a demonstration project – both signifying 'OFS firsts' for both countries."

Burgers is excited about how SolarDuck is stretching its wings beyond its European roots. More than that, however, he is keen to show the world the benefits of OFS. "Due to rising populations, the need for urban development and agricultural land will only increase in the coming decades. With energy demands increasing, Offshore Floating Solar offers real promise for the decarbonisation of our energy supply." ■

TURN UP THE VOLUME!

by Fitzwilliam Scott

On the understanding that 'green' methanol will run vessels almost emission-free one day, commercial shipping is increasingly looking favourably on a fuel type which – in its current form – is widely used in other industries. As such, technical inquiries poured in after SRC Group secured Approval in Principle (AiP) for a concept that "reinvented methanol fuel storage" on board ships. Delivering the answers has seen technical talk quickly converting into project discussions.

Methanol, currently derived principally from natural gas, is available, relatively easy to handle, and predictable. Lower-carbon today and potentially zero-carbon tomorrow, methanol, therefore, offers a practical alternative to heavy fuel oil (HFO) and a pathway towards ticking off the International Maritime Organization and EU's decarbonisation targets.

As of September 2023, methanol had been specified for 216 newbuilds, according to figures from DNV. Clarksons recently estimated that 1,200 ships could be running on methanol by as early as 2030. That is, indeed, much methanol that needs to be stored somewhere.

How to free capacity – safely

Methanol's other "outstanding" characteristic is its space inefficiency: tonne-for-tonne takes 2.4 times more to generate the equivalent energy as HFO.

Conventionally, tanks storing low flashpoint fuels on board ship feature cofferdams of at least 600 millimetres (mm) across to separate internal and external walls. Included as a safety precaution, the gap nevertheless restricts capacity.

Imaginative design can help find unused spaces for extra storage aboard a newbuilding, but opportunities are more limited on existing vessels. Where retrofitting a dual-fuel engine to run on methanol is feasible, the fuel storage issue may restrict a ship to short voyages or demand more frequent bunkering – both of which undermine the return on investment.

Understandably, huge interest greeted Lloyd's Register (LR) AiP for SRC Group's 'Methanol Superstorage' in October 2023. According to the designer from Estonia, the retrofitted tank storage solution increases volume by as much as 85% and can be installed with minimal impact on the general arrangement.

New use of "old" tech

The Methanol Superstorage dispenses with the cofferdam altogether and instead installs tank walls formed by the sandwich panel system (SPS) technology. This solution sees a continuous polymer core injected between two steel surfaces.

Approved for permanent repairs by all major members of the International Association of Classification Societies, SPS has been used in maritime and offshore applications for over two decades, including for corrosion repairs in ship structures. The secured class approvals have involved laboratory testing of the polymer core material for chemical resistance, among others, for methanol. SRC, as an engineering, procurement, construction and installation service provider, has experience with complex refits across 5,000+ projects worldwide, including an extensive understanding of the patent-protected SPS technology process.

For the Methanol Superstorage fuel tank, a 25-mm-thick steel-polymer-steel barrier provides protection against fire or leakage that is equivalent to a conventional tank, according to SRC. The injected polymer also creates oxygen-free conditions behind the steel plates to prevent corrosion. The sandwich panel system can be used in place

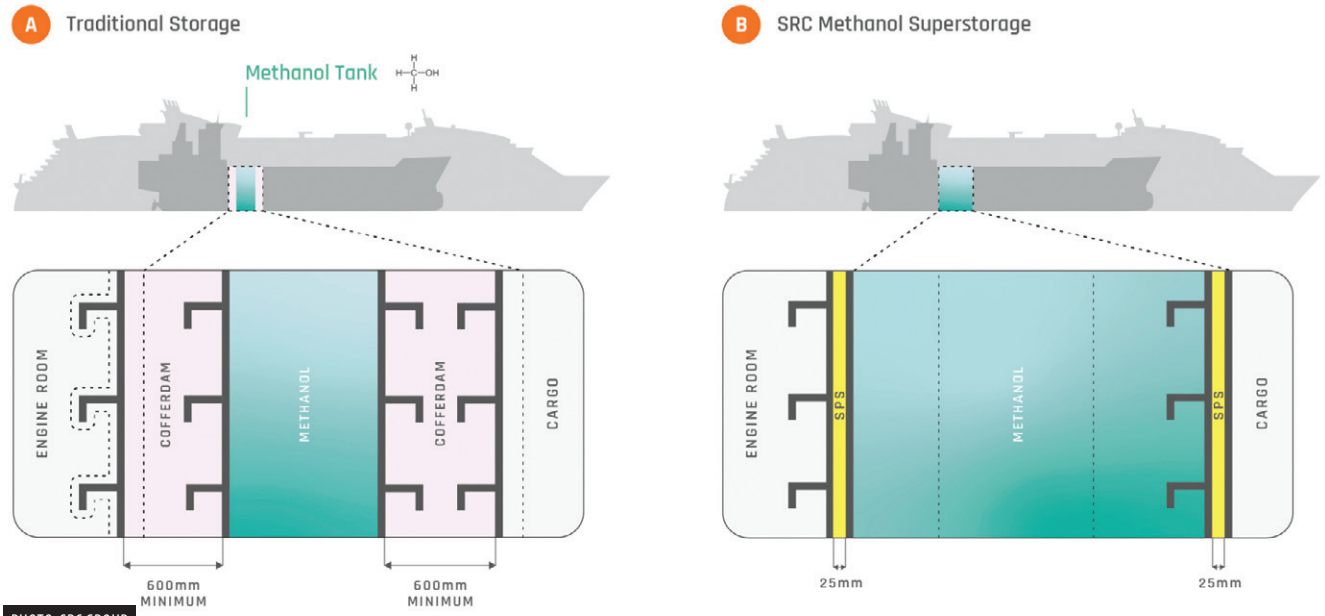


PHOTO: SRC GROUP

of cofferdams on all tank boundaries (incl. those facing shell plating).

"We always knew how significant Methanol Superstorage would be because existing ships need to play a full role in energy transition if GHG emission targets are going to be met and storage capacity is a key challenge," says Hannes Lilp, SRC Group's CEO. He furthers, "We are already in detailed discussions with a well-known ferry line, while we've been approached by cargo ship operators, offshore support vessel owners, tug companies, shipyards in Europe and Asia, and by the marine engine suppliers. One area that has surprised us has been the high level of interest from the super yacht sector." Less surprising has been the flow of inquiries from cruise ship owners, many of whom have already studied the feasibility of retrofitting ships for using methanol as a marine fuel.

"These are new and confidential discussions, but what I can say is that live projects are under review to accommodate consideration of Methanol Superstorage, while one project that looked dead is being revived," comments Lilp. The in-flow of technical questions from all corners of the maritime industry has been "almost overwhelming," he adds.

No showstoppers

Securing AiP provides a technology developer with a statement from class confirming there are no significant obstacles to future certification or classification. As explained by LR, it allows an innovator to "gain early confidence that your technology has the potential to satisfy regulatory requirements." It also means that "stakeholders will have confidence in their investment."

Discussions covering approvals from other classification societies are ongoing, shares Lilp, although he acknowledges that the journey length from AiP to full class approval is substantive. In an area where fuel storage regulations are evolving, additional scrutiny can be expected. "Due to the regulatory status of low flash point fuels, all methanol fuelled ships need to go through a Risk Based Certification process that includes full risk assessment for the whole methanol fuel system from bunkering station to the engines," comments Alex Vainokivi, Innovation Manager, SRC Group. "AiP is part of the risk assessment. Any final approval for a methanol fuelled ship comes from the Flag State Administration," he adds.

Nevertheless, key SPS technology characteristics are not in dispute. "For example, under fire testing, and when the core thickness for SPS structure is more than 25 mm, it has satisfied the fire safety objectives and the functional requirements of SOLAS A-60 regulations without the need to install thermal insulation," underscored Vainokivi. He continues, "We will establish whether inerting and venting are needed on a case-by-case basis – and the same for fire and leakage detection – but the requirements relating to cofferdams can be dispensed with. From that perspective, the solution provides equivalent 'triple barrier protection' to prescriptive requirements for cofferdams adjacent to all space categories – including accommodation."

Happy to answer

Lilp says the most frequently asked question SRC has been fielding concerns whether Methanol Superstorage is as appropriate for newbuildings as it is for retrofits. "The answer is an emphatic yes: fuel storage tanks can be constructed using the SPS sandwich panel system in lieu of cofferdams on both new build and refit projects," he explains.

"Actually, we seek to open more direct channels of communication for questions from major shipbuilders and designers worldwide because of requests from our commercial ship-owning clients. As before, we are only too happy to answer," Lilp sums up. ■

Can a single maritime artificial intelligence (AI) research project cut 1% of total global emissions?

WELL, DUH!

by Alexa Ivy

Be ready to pick your jaw up off the floor as NAVTOR's Chief Sustainability Officer Bjørn Åge Hjøllo explains how the Green AI for Sustainable Shipping (GASS) initiative promises to transform the ability of shipowners and operators to slash fuel consumption, emissions, and operational expenses (OPEX), ushering in a smarter, greener, and more connected maritime future. Sorry, what did you just say? Hjøllo smiles in recognition of the apparent disbelief. He tries again: "I said that this project has the potential to cut 1% of all global emissions." Do you mean 1% of all shipping *emissions? "No, 1% of total* global *emissions… For everything!" Sorry. What?!*

This may be the first, but it won't be the last time Hjøllo is met by someone who needs to reboot their brain while struggling to come to terms with the ambition of the Norwegian government-backed GASS research project.

Led by NAVTOR, the initiative is a partnership with Grieg Star, Maritime CleanTech, Scandinavian Reach Technologies (ScanReach), Simula Research Laboratory, SinOceanic Shipping, and Sustainable Energy/SIVA, with support from the Norwegian Research Council, Innovation Norway, and SIVA.

Over the next three years, it aims to champion what Hjøllo calls a "data-driven approach to decarbonization," enabling shipping companies to identify, analyze, and address inefficient energy use on any vessel, in any location, in any weather conditions, in real-time.

Powered by machine learning algorithms, digital twin technology, and a constant stream of high-quality data, the result will be, says Hjøllo, "a simple, powerful decision-making tool that allows users to maintain competitiveness, achieve regulatory compliance and, in short, unlock more sustainable shipping."

Although he makes it sound 'easy,' there's much hard work that needs to be done first. And this is where the partnership model comes in.

Teamwork makes the dream work

As in any ambitious team, each GASS player has clearly defined roles. NAVTOR is the world's leading supplier of maritime technology for e-navigation and performance solutions, with products and daily services on over 18,000 vessels in the world's fleet. With expertise derived from building and continually developing an integrated digital 'ecosystem' connecting ships, fleets, and entire organizations, it is well placed to design, integrate, and eventually bring this type of innovation to market.

Grieg Star, SinOceanic Shipping, and Sustainable Energy/SIVA provide both invaluable domain expertise and the crucial test vessels required to build, run, and constantly refine the solution for real-world operations.

Meanwhile, ScanReach offers a unique wireless Internet of Things platform that connects sensors, equipment, and systems across complex steel vessel environments to harvest the data needed for GASS' high-power processing engines.

Simula's role sees the team leveraging their renowned developer experience to create the machine learning and digital twin back-end to empower the front-end benefits.

Finally, Maritime CleanTech is on hand to disseminate information and encourage interaction with another potential 150 partners through its future-focused industry cluster.

So, that's the Big picture, but we have to zoom in to see how this will work in reality. Hjøllo is happy to 'go granular.'

Richer data = cheaper operations

"At present, there are no systematic data-driven solutions for improving energy efficiency onboard, and GASS aims to address that," he says. "We want to capture granular information from a very wide range of high-frequency data that basically allows us to predict what a vessel's fuel consumption should be, regardless of ship type, location, weather, and so on. That means integrating precision data from vessel operations and exact operating environments – combining metocean condition and forecast data, automatic identification system data, and a whole range of reporting & performance data gathered in real-time, all the time, from sensors. That can span anything ranging from propeller information to engine revolutions per minute, navigational data, speed, and the like."

Once they have this building material, Hjøllo explains, it can be used to craft a digital twin of any vessel that, regardless of operational parameters, can be used to demonstrate optimal fuel consumption. If the 'real world' ship is failing to live up to its virtual sibling's performance, then the data can be instantly analyzed to find out why. "Maybe there's an issue with the trim of the vessel, or a problem with fouling, or perhaps the auxiliary engine has been used in a congested area, so it's still running when there's no need," he says.

"With much richer, real-time data than ever before," Hjøllo furthers, "we can unlock up-to-the-minute awareness and performance analytics that enable dynamic voyage optimization – as opposed to today's 'static' standard – and allow onshore teams and onboard crews to address issues/deviations from plans as they actually happen. That's an incredibly powerful advantage to have, especially in the new regulatory reality of Carbon Intensity Indicator ratings and the EU Emissions Trading System, for example, and the associated costs and investments associated with compliance." In other words, he says, "This could be huge!"

PHOTO: NAVTOR

Once extensive testing and validation have been completed, the AI module will be integrated into NAVTOR's existing joined-op portfolio. Although it's early days, Hjøllo suggests that this would be on both NavStation (the company's onboard digital chart table/planning system) and NavFleet (a shore-based management, monitoring, and optimization solution), allowing both vessel and office teams to make the most of up-to-the-minute insights and enhance decision making.

"We've always been focused on developing innovations that simplify life at sea for our customers," Hjøllo states. "This is the epitome of that: gathering and utilizing vast amounts of complex data to deliver straightforward, actionable, and powerful recommendations. It's an advisory functionality that we're constantly building, helping deliver added value for anyone that's looking to gain advantage."

As his job title suggests, the key advantages Hjøllo is setting his sights on revolve around sustainability, which, as he rightly points out, goes hand in hand with commercial benefits. "If we can dynamically optimize voyages and energy consumption, we can also, by extension, dynamically optimize costs," he says, "helping owners around the world cut down on their greatest OPEX outgoing."

"But, as you might expect, it's the impact on emissions that should create the greatest excitement," Hjøllo notes. That brings us back to the 1% figure. How is that even possible?

No roadblocks

Hjøllo admits that the number is both a best- and worst-case forecasted scenario. Here's how the GASS partners arrived at it: today, worldwide shipping accounts for nearly 3% of greenhouse gas (GHG) emissions. However, widely reported research suggests that it could reach as much as 17% (you read that right!) by mid-century as global trade expands while other industries cut their emissions faster than maritime. GASS expects that a machine learning application that dynamically optimizes vessel energy use should be able to reduce consumption, and therefore GHG emissions, by 20%.

So, when the 30%+ of vessels in the world fleet that use NAVTOR products have their breakthrough AI technology powered up, that translates to over a 5% cut in all of the shipping emissions and, assuming the 17% figure, a 1% cut in total global footprint.

Hjøllo can't suppress a smile but is cautious enough not to get carried away. "I think the important thing is there's nothing to suggest we can't do this – we, and our partners, have the track record, technology, and domain expertise to succeed here. The 1% figure obviously depends on a lot of variables that are beyond our control, but the 20% reduction per vessel doesn't. That is a very realistic target."

He concludes: "If we can play a part in reducing energy use and emissions by one-fifth on every vessel we serve – regardless of type, age, location, weather, whatever! – imagine how powerful that could be. Imagine the difference environmentally, from a regulatory perspective and commercially. In an industry and a world where every marginal gain is a major win, this is… Well…"

He shrugs his shoulders, temporarily lost for words. Even Hjøllo, it appears, needs to reboot sometimes. ■

WHAT HAPPENS NOW

by Mike Garratt, Managing Director, and Antonella Teodoro, Senior Transport Consultant, MDS Transmodal

Someone falling into a deep coma four years ago in December 2019 and re-awakening today might be forgiven for believing that little had changed in the world of deep-sea containers. Container Trade Statistics reported a 4.7% growth in global loaded TEU. The Shanghai Containerized Freight Index was marginally higher. Maersk's Q3 EBITDA was still around 14% of turnover. Mean ship size was up by 11%. How misleading those initial observations would have been!

Over those intervening four years, which incorporated a global pandemic, an initial fall off in traffic had been followed by demand exceeding supply to such an extent that the mean freight revenues had nearly trebled by Q3 2022. Consequently, the lines made enormous profits that were (in part) used to extend vertical integration into port terminals and increasingly into door-to-door logistics.

However, having won their case four years before, the lines had just lost the argument to retain the anti-trust legislation provided by the Consortium Block Exemption Regulation (CEBR). The UK Competition and Markets Authority has similarly decided that the country will not establish its own CEBR. And there's the signed & sealed inclusion of much of the shipping industry in the European Union Emissions Trading System (EU ETS), effectively raising energy costs to the lines by 40% for ships sailing between EU ports (but not if sailing between other ports – an invitation to develop ingenious routing if ever there was!).

The age-old supply-demand (different tune) dance

In so far as demand is concerned, the trade statistics which feed our World Cargo Database suggest that while the European market has been depressed in 2023, the global pattern of 3% per annum growth is re-establishing itself; exports from the Far East are now growing, including to Europe. We estimate that at its peak, the very high freight rates that drove as much as 7% of cargo normally containerised to alternative maritime, air, or overland modes – but this level of diversion has now been halved.

Figure 1 indexes the changes in scheduled deployed capacity, fleet capacity, demand, and mean revenue per TEU over the last few years (with Q1 2019 as the baseline). A supply shortage in late 2020 accelerated rates that peaked over a year later when fleet capacity was already creating a capacity surplus. Demand fell back, and only now is returning to the levels of three years ago.

The impact of the coronavirus pandemic and the management of fleet capacity led to the curious feature of utilisation levels (demand/supply) falling as the number of ports the lines called at relative to 'scheduled expectations' also fell, a significant slump in service quality that is only recovering in the second half of 2023. Our forecasts for all deep-sea containerised trades over the next five years reflect the gradual pick-up in demand being experienced as 2023 comes to an end (most marked on the Pacific).

However, this level of growth appears unlikely to match the additional capacity that has recently and is currently being built. The lines offered less deployed capacity during COVID-19, which drove rates up. Ironically, as ship queues and capacity challenges in the ports have been resolved, the lines have more ships on order than demand may justify over the next three years.

Table 1 describes our current estimates for fleet supply (including newbuilds and scrappage) and the capacity required to address a yearly 3% growth in demand (assuming ships continue to operate at current speeds in existing strings). If the way vessels are deployed remains the same, then we estimate excess fleet capacity to be around 4.5% in 2026 (1.4m/30.8m TEU of fleet capacity) compared with today.

In practice, the lines will be able to absorb some surplus fleet capacity through further speed reductions to re-optimise given the impact of the EU ETS, increasing the proportion of the fleet deployed on 'multi-regional' services (e.g., Europe-Gulf-Far East), more lines operating services independently, and through adding ports to rotations to reduce feeder costs (and potentially game-play the EU ETS to minimise nautical miles between ports in the European Economic Area). Scrappage may also accelerate.

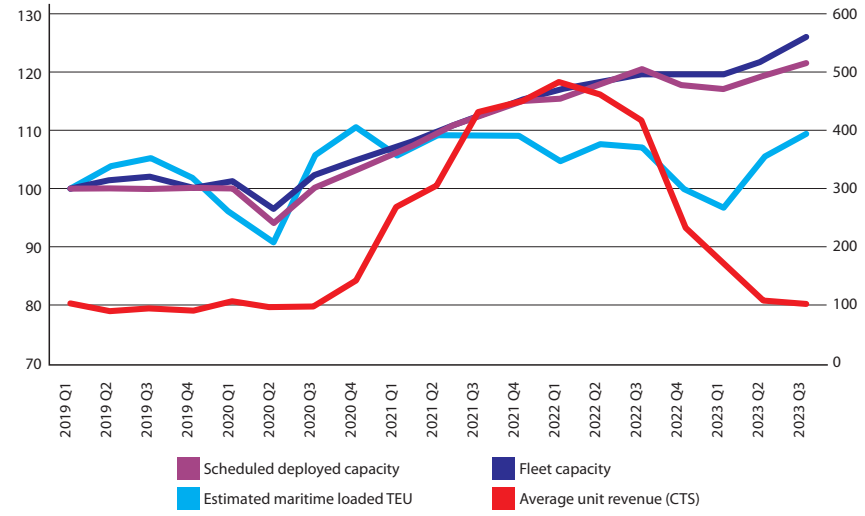
An important question is the overall impact that the end of CEBR will have. MDS Transmodal's role in this debate was to provide the European Commission (COM) with statistical analyses on fleet deployment and market shares.

Crackdown?

The lines lost the argument to retain CEBR because COM decided that providing the liner business with anti-trust privileges that exceeded those available to other sectors did not pass the five tests (of effectiveness, efficiency, relevance, coherence, and EU-added value) it set and, crucially, did not protect shippers (i.e., consumers) when a crisis occurred.

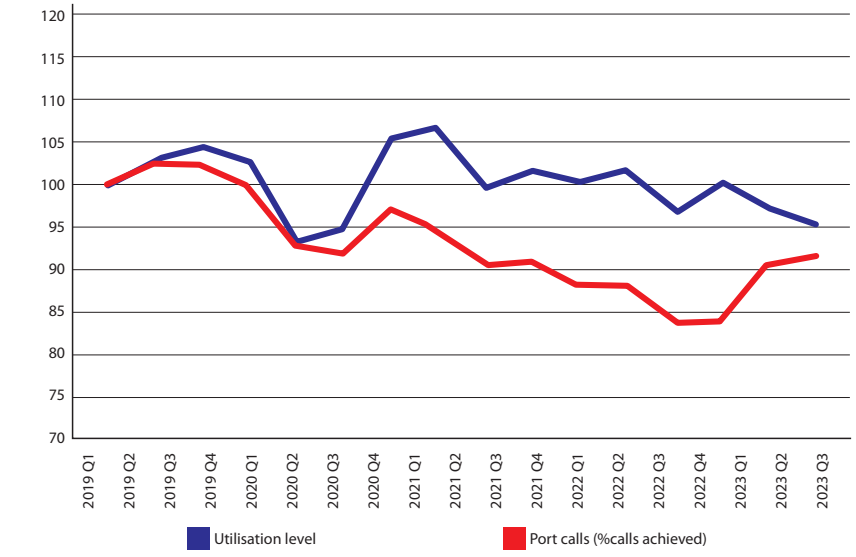
While a number of European trade associations collaborated to also argue against CBER because of the high levels of vertical integration taking place, the most dramatic statement against the lines probably came from another

Fig. 1. Scheduled deployed capacity, fleet capacity, estimated maritime loaded TEU & unit revenue for deep-sea routes



Source for all figs. and Tab. 1: MDS Transmodal

Fig. 2. Utilisation vs port calls – global



jurisdiction. President Biden's March 2022 State of the Union speech included this passage: "See what's happening with ocean carriers moving goods in and out of America. During the pandemic, about half a dozen or less foreign-owned companies raised prices by as much as 1,000 % and made record profits. Tonight, I'm announcing a crackdown on those companies overcharging American businesses and consumers." So, will this legal change make a difference?

The degree to which the World Shipping Council campaigned to retain CEBR suggests that it will make a difference. Then again, it may be that the major lines were already adapting to a decision they had anticipated. The 2M Alliance will complete its break-up in 2025. The very largest carriers are likely to operate their global networks on a stand-alone basis or with support from the smaller players; there may even be a further consolidation because the nine leading lines cannot each sustain global networks alone. While for smaller markets, lines may be able to make a case that market shares above 20% are in the wider interest, this will not be the instance for the larger markets.

The impact may extend beyond the lines themselves. Page 32 of the COM staff working paper discussed the relationship between CEBR and the container terminals that the leading lines also control, implying that CEBR also protected the relationship between lines and these terminals, and its end could raise questions about the rights of equal-term access. Such uncertainties may be compounded where different regulators (on a trade route) have differing rules; some (e.g., Singapore) allow up to a 50% market share for a given consortium.

To raise awareness and to question

Rather than make a firm prediction, we put forward three potential outcomes. Firstly, one that does not favour the lines and to which an excess supply weakens their position. The uncertainty that may apply to the relationship between terminals and lines post-ending of CEBR may play to the advantage of the non-liner major stevedores, who did not have the leverage to make super profits during COVID. These stevedores seek to develop a closer relationship with shippers, which will improve their ability to provide value-added services and onward transport services (directly or by sub-contract). This is already happening; stevedores own companies feedering containers (DP World – Unifeeder, Peel Ports – BG Freight Line, Abu Dhabi ports – Safeen Feeders, etc.), and ports contract for space with railroad operators. At the same time, port-centric distribution hubs secure cargo to an individual port. The lines themselves come under increasing pressure to offer the most cost-efficient services, leading to further consolidation of liner services. Non-vessel operating common carriers expand their port-centric distribution centres and, likewise, their capacity purchasing from the lines.

Quite clearly, this may not be attractive to some of the shipping lines. The ability to make profits by charging an economic rent to pass through a port will pass to the ports themselves. The step taken at Jebel Ali is worth noting, where DP World announced that cargo owners, not the lines, will pay terminal handling charges.

The second scenario favours the lines. If market shares do not exceed 20%, an individual shipping line will continue to vertically integrate (including with terminals, inland transport services, and door-to-door logistics). In an environment where scale economies are crucial, any share less than 20% could, therefore, be uncompetitive, and a very small number of look-alike global vertically integrated operators emerge. Ports whose terminals

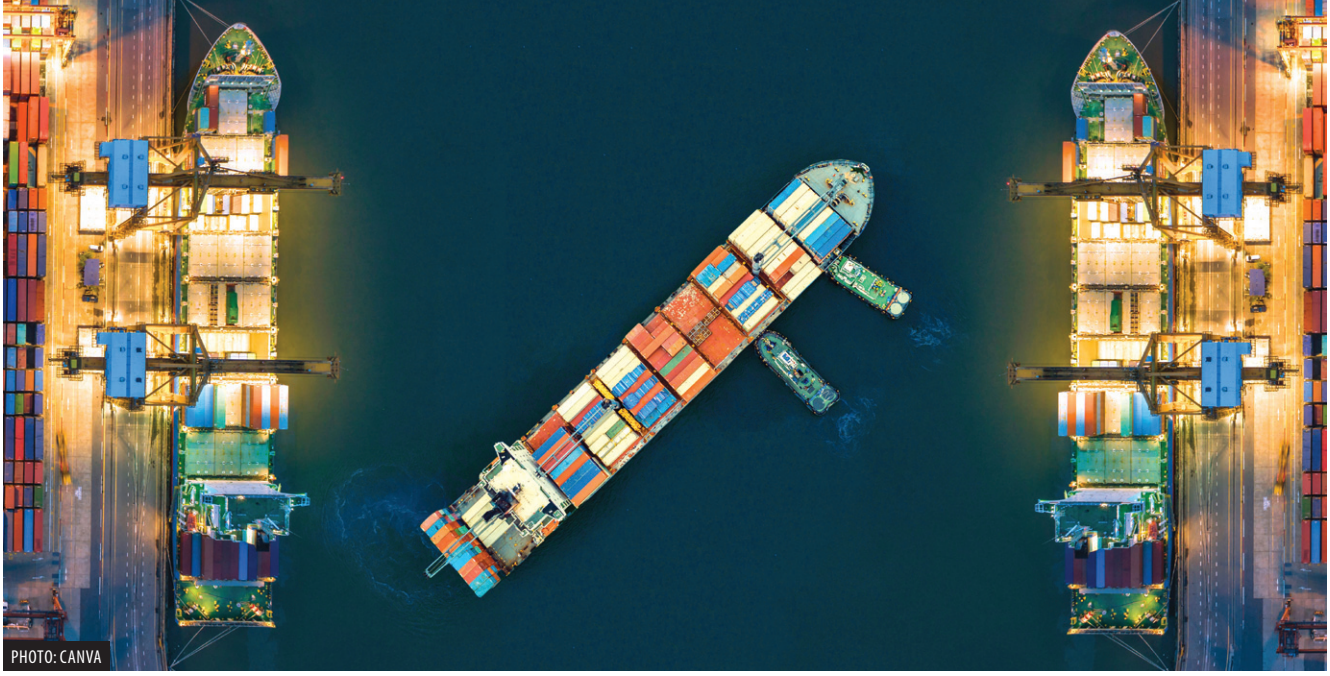
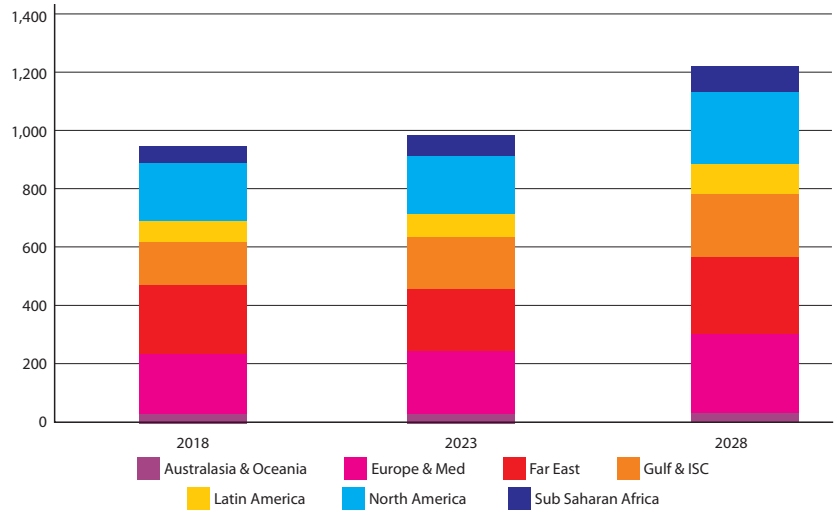


PHOTO: CANVA

Fig. 3. Deep-sea containerised trade in 2018, 2023, and 2028 (million unit-tonnes)



Tab. 1. Fleet capacity, newbuilds, and assumed scrappage in TEU (fully cellular) in 2018, 2023-2026

Year	Scrappage (=> 25 years)	Newbuilds	Capacity - scrappage + newbuilds	3% growth in demand	Capacity difference
2018			21,900,616		
2023[1]			26,938,222		
2024	1,077,367	3,012,345	28,873,200	27,746,369	1,126,831
2025	341,417	1,597,740	30,129,523	28,578,760	1,550,763
2026	469,690	1,150,446	30,810,279	29,436,123	1,374,156

[1] *Existing fleet as of Q4 2023 and outstanding newbuilds due for delivery in 2023*

are not included in such networks may find it challenging to remain in the market. Individual lines (and two of the existing ones already reach this scale) are supported by a range of sub-contractors (feeders, third-party logistics, etc.) who are effectively rate takers; the advantage will lie with the lines. The relatively broad definitions of markets may be such that within these, sub-markets remain oligopolistic.

Outcomes may not be so extreme, and much may depend upon the legal interpretation of the new regulatory environment. The World Shipping Council may have a point that change will generate legal uncertainty (but that's in the nature of change).

Thirdly, a possible course of events in which nation-states and regulators take a more proactive approach. Given the problems shippers faced during the pandemic, the decision to terminate CEBR despite the position that the lines have taken, and the vast challenges faced to decarbonise the industry, global bodies may choose to examine whether the current industry structure serves the public interest to promote trade. Such an examination may consider that regular and reliable liner shipping services should be seen as a global trading utility, providing a minimum level of connectivity, frequency and reliability (including to emerging economies). In these circumstances, it could be that lines will find themselves being obliged to offer minimum levels of service to individual nation-states to be authorised to operate at ports in their countries.

We do not suggest which, if any, of these 'travel directions' might be followed. However, one of the effects of the industry's reaction to the pandemic has been to raise awareness of the vulnerability of world trade to investment and operational decision-making by a relatively small number of companies and to question the level of resilience the industry offers. ■

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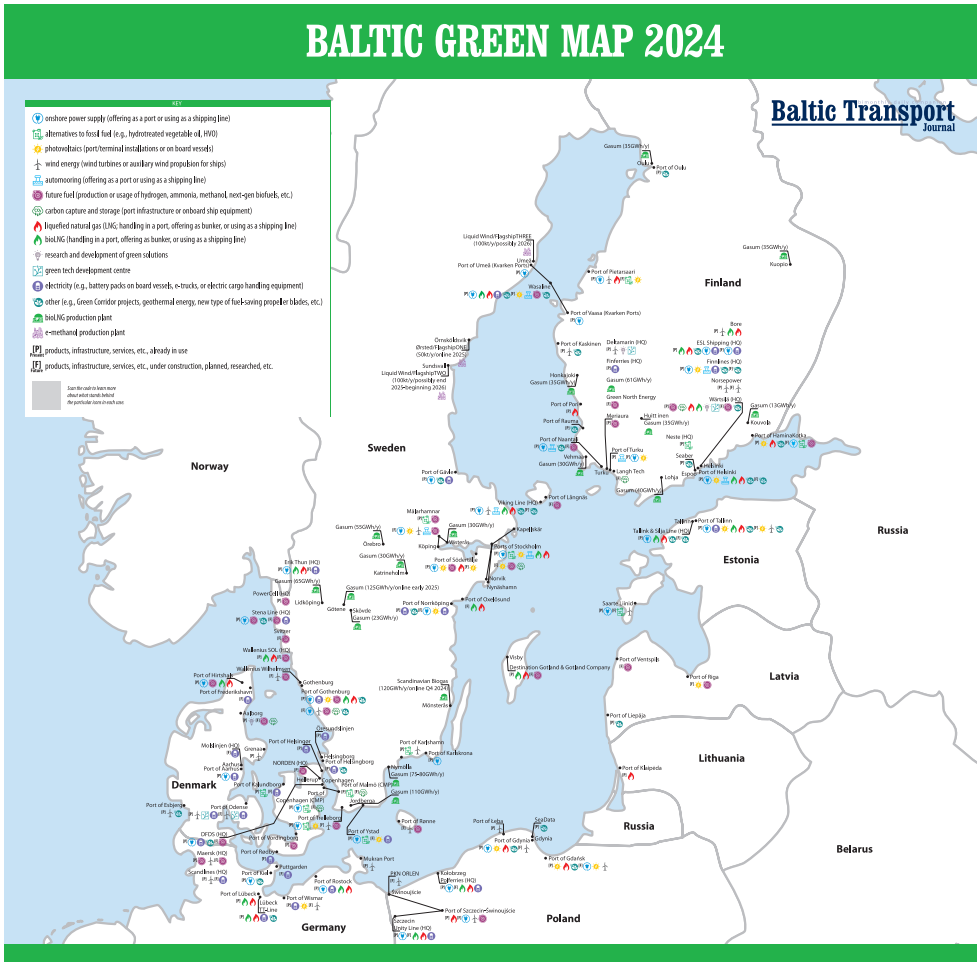


NAVIGATING NEW WATERS

by Dr. Jörg Herbers, CEO, and Dr.-Ing. habil. Eva Savelsberg, SVP Terminal and Distribution Center Logistics, INFORM

In the rapidly evolving world of terminal operations, the integration of artificial intelligence (AI) is not just a futuristic concept but a present reality. AI's transformative impact on the maritime sector is profound, reshaping the traditional paradigms of operations and setting new efficiency and innovation standards. However, this powerful technology also raises ethical questions to which INFORM has found its own answers.

At INFORM, we're actively engaged in the evolving use of AI and optimization in maritime terminals. Our suite of solutions demonstrates our commitment to using AI to enhance teamwork and operational efficiency. Still, at the same time – in this era of rapid AI advancements – we see ethical considerations as paramount as well.

In this article, we'll dive deep into the current and future implications of AI in terminal operations. We'll also explore the latest trends, real-world applications, and – crucially – the vital role of ethical AI in shaping a sustainable and efficient future for the maritime industry.

As we step into 2024, we believe that next year and beyond, we will see several cross-industry developments and technological advances that can potentially change our lives. For one, we see a trend towards more natural user experiences in AI interactions, stepping away from traditional screen-centric interfaces. This shift aims for AI's seamless integration into daily operations, making complex software more accessible and intuitive.

AI is becoming a core element across industries. We anticipate generative AI to emerge as a vital co-pilot in various platforms, enhancing functionality and user interaction. The future will be collaborative and assistive, integrating AI into mainstream products and optimizing processes. Of course, AI also continues to be a pivotal force in shaping maritime terminal operations.

From facilitation to empowerment

This revolution dates back to the early 1990s with the emergence of terminal operating systems (TOS), the initial step towards digitizing terminal operations, focusing on process adherence, communication, and coordination.

But as the industry evolved, so did the need for more advanced tools. The real game-changer has been the integration of an advanced intelligence layer behind the TOS, leveraging algorithmic-based decision-making. This leap from mere facilitation to empowerment is where the true essence of AI's role in terminal operations lies. As an add-on to existing investments in IT and software infrastructure (including a TOS), AI-based optimization modules support and/or automate decision-making within a terminal to assist in reaching operational goals and excelling at moving containers profitably.

AI applications are, to give a few examples of proven use cases, enhancing storage efficiency by optimizing container yard space utilization. This reduces the need for moving items repeatedly, ensuring peak performance in storage management. By minimizing travel and equipment interference and maximizing movement strategies like double-cycling, AI is significantly improving the productivity of crane operations in various modes of operation. It is also used to maximize the efficiency of all types of horizontal transport equipment, as AI-based decision-making reduces travel distances and lowers maintenance costs.

There are also examples of artificial decision intelligence in rail applications, such as when AI tools are employed to plan outbound trainloads efficiently. These enhance slot utilization and align closely with business objectives, demonstrating AI's proficiency in complex logistical planning. Naturally, optimized scheduling can also help augment the productivity of rail cranes and yard vehicles. It offers real-time optimization, adapting dynamically to operational changes.

Additionally, machine learning is being leveraged to improve data accuracy for decision-making processes, among others, for predicting container dwell times (i.e., the period the container is expected to be stored in the yard) and completion times for container handling tasks. This use of machine learning exemplifies how AI can boost the precision and efficiency of operations in terminal environments.

As early as 2018, INFORM was conducting a machine learning assessment, which would later result in the implementation of a machine learning solution in 2020 at HHLA Container Terminal Burchardkai in the Port of Hamburg. This use case aimed to reduce container rehandling for import boxes at terminals. INFORM's AI solution predicts the dwell time and the outbound mode of transport (e.g., rail, truck, vessel) – both of which are crucial criteria for selecting an optimized container storage location within the yard that avoids unnecessary rehandles.

Guide to responsible AI

Unfortunately, as AI's capabilities advance, so does its potential for misuse, calling for heightened vigilance and a robust ethical framework to govern its applications. The proliferation of generative AI tools has, for example, inadvertently fueled a surge in phishing attacks, as evidenced by the dramatic rise in incidents following the availability of ChatGPT.

Recent news about unauthorized deepfakes of well-known people in advertising also illustrates the growing ethical concerns surrounding malicious AI utilization. Developments such as the recently passed EU AI Act, US President

PHOTO: CANVA

Biden's Executive Order on AI, and the G7's Hiroshima Process demonstrate the imminent implementation of regulatory frameworks.

We believe these developments can be seen as positive if taken responsibly. Moreover, we assume responsible AI conduct is a precondition for adopting AI for successful use cases. Driven by our deep-rooted values and our over 50-year legacy in optimizing business processes through advanced technology like AI, we want to maximize AI's potential while minimizing its risks.

We would therefore like to propose an approach for the responsible design, development, and application of AI systems that we, as solution providers, have already imposed on ourselves with our **Responsible AI Guidelines** published in September 2023. These set forth best practices, standards, and protocols, reflecting a comprehensive approach to AI that prioritizes societal needs and individual rights.

Beneficial AI: INFORM's approach to AI prioritizes societal and user benefits, actively mitigating risks such as bias and misinformation. This principle ensures that AI systems enrich operations while avoiding negative impacts.

Human-centric AI: AI is designed to support human decision-making, not replace it. A human-centric approach emphasizes AI's role as an enhancer of human capabilities, upholding human responsibility and judgement in critical operations.

Aligned AI: AI solutions must be aligned with human and business values. We must strive for AI systems that are clear and comprehensible, providing a solid foundation for trustworthy operations.

Privacy-preserving AI: adhering to the standards of the European Union's General Data Protection Regulation and achieving ISO 27001 certifications, we prioritize data privacy and security. AI solutions must be designed to protect sensitive information, ensuring top-tier security.

Reliable AI: consistency, quality, and transparency are the hallmarks of trustworthy AI applications, especially in vital sectors.

Safe AI: safety is a critical aspect of AI algorithms. The development process must involve rigorous testing and validation to ensure that AI systems are secure and free from potential threats.

Shifting the paradigm – ethically

Integrating AI in terminal operations is not just a technological advancement but a paradigm shift that redefines efficiency, innovation, and ethical responsibility in the maritime industry. As we look to the future, the industry must continue prioritizing ethical considerations, ensuring that AI remains a force for good, driving progress while safeguarding values and principles. ■

INFORM INFORM develops software to optimize business processes using artificial intelligence (AI) and advanced mathematics of operations research. The company, founded in 1969 and headquartered in Aachen, promotes sustainable value creation in various industries through optimized decision-making. Its solutions are tailored to specific industry requirements and help over 1,000 customers worldwide operate more resiliently and sustainably with greater success. INFORM's systems serve a range of industries, including aviation, automotive, financial institutions, logistics, manufacturing, transportation, telecommunications, and wholesale. The company is committed to ethical AI practices, sustainable customer relations and is increasingly focusing on cloud-based solutions. Visit **inform-software.com** to learn more.

IN SAFE HANDS

by Jérôme Lacroix, European Sales Manager, TeSuCon

In the bustling world of global trade, terminal cranes serve as the unsung heroes, ensuring the smooth flow of goods. However, with great heights and complex structures come significant safety challenges. Enter the Evacuator®, an escape descent system that is about to change the standards in wind energy likewise is poised to transform the safety landscape of terminal cranes globally.

The Evacuator® is not just an escape system; it's a paradigm of simplicity, panic-proof design, and fire-resistant technology. In a nutshell, an operator can initiate a safe descent in a mere ten seconds, ensuring a swift evacuation during emergencies. Its intuitive 'click-and-go' mechanism means that escaping is as simple as it gets, even in the most stressful situations. This panic-proof feature is invaluable, especially in high-pressure scenarios where quick decisions can make a life-saving difference. Moreover, the solution's fireproof construction (up to 1,200°C; the steel cables cannot burn or melt and can't get entangled) adds a layer of safety, ensuring that operators can evacuate even in the face of a severe fire emergency, a scenario where traditional escape methods often fail (as fire can, and sadly often does block the escape route).

Prepared for emergencies – always

More and more wind farms are opting for this new escape upgrade. Wind turbines are places where technicians routinely work at staggering heights and in areas that may quickly become a life-threatening hazard should, e.g., a fire break out. Its success in this demanding industry is a testament to its reliability and efficiency. Now, this proven technology is making its way into terminal cranes, notably ship-to-shore gantries, promising a safer working environment for operators in terminals across the globe.

One of the most significant advantages of the Evacuator® is its easy integration into existing structures. Its adaptable design allows it to be pre-installed in terminal cranes during the manufacturing process or retrofitted into older models. This seamless installation process ensures that terminal crane operators are always prepared for emergencies – without the hassle of complicated retrofitting procedures.

How it works

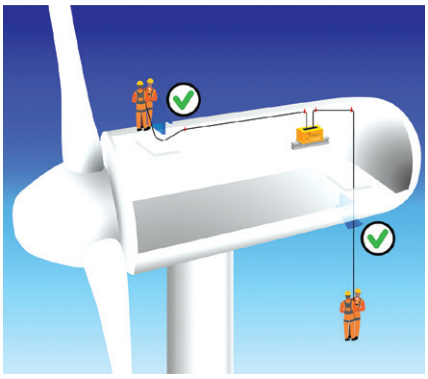
Imagine a scenario where terminal crane operators find themselves in a critical situation – a fire, a structural failure, a cardiac arrest, or any other emergency that necessitates immediate evacuation.

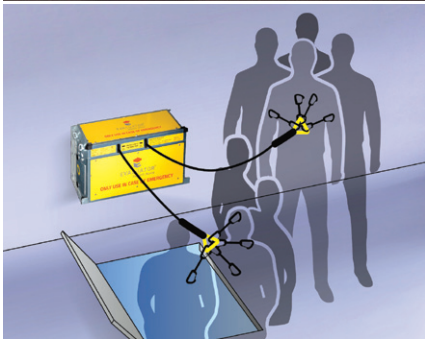
With the solution pre-installed, the operator only needs to reach the escape system, put a (simple) harness on, attach the hook to that harness – all within ten seconds – and then descend to safety, with the descent itself being automatic.

Independent of the weight carried by the steel cable, the no-electricity-required Evacuator® goes at ±1m/s (ensuring safe descent at all wind speeds and in extreme wet conditions or heavy rainfall) and automatically stops when reaching the ground level or a secure platform. In moments of crisis, these seconds saved can be the difference between life and death (in case of acute health problems/cardiac arrest, a person can safely get on the ground within the '6 Golden Minutes' thanks to the Evacuator®).

The solution comes in different variants: the one cable-reel model offers 300 m of descent height and a maximum descent load capacity of 282kg (up to four persons); the two cable-reel version offers 140/165/200m and a max load capacity of 564kg for eight people; the four cable-reel variation offers 50m per cable and a max load capacity of 564kg for 16 persons. There are also different installation configurations: in- and outdoor, with the reels coming from the front or top. All Evacuators® come

PHOTOS: TESUCON





with a lifespan of at least 30 years (subject to the statutory annual safety inspection; the system can be inspected and tested in about 15 minutes).

The solution is certified by the German institute DEKRA (EN341, in compliance with ANSI Z359/CSA Z259), and the system brings adherence to the UK Offshore Safety Directive Regulator/HSE-Offshore Emergency Response Inspection Guide. The Evacuator® also complies with the Official European Safety Standard for Wind Turbines EN50308, §4.2.2: "The descent device has to be fireproof enough to allow escape from the nacelle to the ground in the event of fire, it shall be suitable for the numbers of persons to be evacuated."

The system does not require any special training, but naturally, such models are available for educational purposes and multiple descent experiences.

Peace of mind

When a fire breaks out, people often feel scared and confused. They may not be able to act rationally or follow complex instructions. Our solution is, therefore, more than just an escape system: it's a lifeline, a beacon of safety in the heart of bustling terminals. Its integration into terminal cranes signifies a paradigm shift in the industry's approach to worker safety. With the Evacuator® in place, terminal crane operators can focus on their tasks with peace of mind, knowing that in the face of any emergency, their escape is just a click away, ensuring a safer and more secure future for everyone involved in the global trade ecosystem. ■

TeSuCon
Technical Support & Consultancy

The Dutch Barneveld-based TeSuCon is an official installation and sales partner of the Evacuator®, a new generation of evacuation systems that provides the perfect escape and descent solution for people in emergency situations. The solution is designed for use on wind turbines, offshore substations, harbour cranes, and all other high rise structures. Check **tesucon.nl** for more information.

KEEPING A WEATHER EYE

by Fitzwilliam Scott

In the fast-paced and high-stakes world of ports and terminal operations, Tinamu is pioneering the realm of robotics and artificial intelligence (AI)-powered stockpile volumetric measurements. A spin-off from the Swiss Federal Institute of Technology in Zürich (ETH Zürich), the company has introduced a groundbreaking automation workflow that is changing how industries monitor stockpile inventory.

Traditionally, stockpile volume measurement has been a painstaking and error-prone manual task that has struggled to keep up with the fast-paced dynamics of the industry. The intricate process of handling cargo in ports and terminals necessitates numerous stages, from sampling and preparation to weighing and final verification — all susceptible to inaccuracies and inefficiencies.

Keeping accurate and up-to-date inventory records is a daily challenge. Weighbridges, conveyor scales, draught surveys, and the rest of the existing solutions have limitations and rarely deal effectively with the dynamics of ports, terminals, and warehouse operations.

Inspections cannot be done multiple times a week, the same holds for regular human-piloted drone missions, as both have a high incurred cost and long turnarounds to provide results. This means recency and confidence about the inventory are low, leading to logistical and operational inefficiencies. Plus, the lack of visibility leaves room for fraud.

Up from days down to hours

Tinamu's solution meant to change the game is an AI-powered autonomous drone system that captures high-resolution images of stockpiles, analyses the data, and delivers precise volumetric measurements to the user within a few hours.

Recently selected as one of the TOP 100 Swiss Startups of 2023 (runner-up in the Robotics category), the company's technology combines autonomous indoor drone navigation, cloud-based and AI-driven data processing, and a user-friendly platform to deliver periodic volume measurements of stockpiles with second to none precision.

As the drones gather data, the information is uploaded to the cloud, processed with AI, and then returned to the user via a web interface, visualised in easily digestible dashboards. These interfaces enable tracking of changes in material distribution, analysis of inventory trends over time, and provision of detailed inventory data for each stockpile surveyed, enhancing monitoring and logistics planning and maximising warehouse utilisation. Additionally, the technology enables early identification and resolution of discrepancies.

This innovation expands the limitations of traditional bulk inventory technology, like weighbridges and conveyor belts, and resolves issues associated with fixed sensors, including fine dust and blind spots.

Where traditional methods take days, Tinamu's system reduces this to hours. The platform ensures that from the moment the drones take flight, the collected data is swiftly processed and delivered to the client, maximising efficiency and reducing waiting time.

What the company has to offer stands out from other modern solutions due to its minimal capital expenditure during installation. Unlike alternative technologies such as laser imaging, detection and ranging, which necessitate the procurement and installation of numerous sensors and cables, Tinamu's system is devoid of any cumbersome physical installation processes. This efficiency elevates its appeal to operators who want to apply a solution quickly, cost-effectively, and at scale.

"I can't imagine our operations without it"

Customers have found that the ease of use, fast data turnaround, and increased accuracy of Tinamu's automated processes improve 24/7 visibility for end-to-end automatic monitoring and control over warehouse inventories. As a result, companies dealing with dry bulk cargo can leverage the solution to streamline their inventory management, enhance logistics planning, and increase operational efficiency.

KIBAG, one of Switzerland's largest building material leaders, is a case in point (case video). The company recycles a million tonnes of material each year to be transformed into gravel for construction. Consequently, it's highly dependent on reliable stock levels and needs to constantly monitor how much free space is available for storage; likewise, inventory for sale.

But like many in the industry, KIBAG was estimating these stockpile volumes visually, with reporting done manually in Excel. This procedure was both time-consuming and inaccurate, leading to planning and coordination issues that made the system totally unreliable.

Incorporating Tinamu's solutions into their operations led to a radical improvement in stockpile measurements and a significant boost in operational efficiency. Put simply, the technology inserted trust back into the system. "We push a button, the drone automatically flies indoors, outdoors, and we get real-time stock data," says Urs Ficher, Site Manager at KIBAG. "Now that we use Tinamu's solution, I can't imagine our operations without it," he underscores.

Other prominent clients include global inspection companies, an international producer of minerals, and a recently signed deal with Axpo Tegra, Switzerland's largest wood-fired power plant.

Tinamu also just signed in new clients and a pilot project with one of the

PHOTOS: TINAMU

world's largest metal companies. As metals continue to be a vital resource for electrification efforts worldwide, the speed and accuracy of Tinamu's system offer companies that ship and warehouse these materials a competitive advantage that can be deployed without a lengthy installation process.

Not only does the company's technology deliver efficiency and accuracy, but it also contributes to a more sustainable world. By automating the process, human error, waste, and carbon emissions are significantly reduced, leading to better utilisation of resources and safer inspection methods.

Unlocking new possibilities

On 11 May 2023, Tinamu announced a technological partnership with the European drone manufacturer Parrot. This synergistic co-op provides a software layer to transform Parrot's hardware into autonomous, self-navigating drones capable of operating in challenging indoor environments, further amplifying the scope and impact of Tinamu's solutions.

Seamlessly integrated into Tinamu's indoor monitoring system, the Parrot ANAFI Ai's robust features (such as 4G connectivity, reliable indoor mission execution, and obstacle avoidance) fit perfectly with Tinamu's needs. The partnership unlocks new possibilities for service delivery thanks to the ability to upload custom autonomous missions. Tinamu's proficiency in indoor autonomous flight sets it apart from competitors, and the company's automation workflow now enables Parrot drones to provide reliable and precise measurements at the push of a button without the need for a pilot.

Tinamu's innovative approach provides substantial relief for industries frequently constrained by personnel shortages. Beyond the advantages of accuracy, reliability, and error elimination, this highly advanced solution frees up inventory managers to allocate more time to qualitative and strategic activities, thereby enriching the overall operational ecosystem.

The company anticipates improvement in service delivery, enhancing safety, speed, and accuracy, which will substantially improve customer experience. Parrot also echoes these sentiments, marking automation as the future for scaling professional drone usage.

Pushing the boundaries

With an operational footprint in several European countries, including Switzerland, Belgium and France, Tinamu is rapidly expanding its reach. The company continually enhances its platform, keeping it ready for technological advancements and adapting to the industry's changing needs. And its solution works for all types of dry bulk, including minerals, metals, grains, fertilisers, and aggregates.

Tinamu's vision is to use autonomous drones as flexible sensors, capturing and automatically processing information in the field. Based on its existing volume measurement solution and platform, the company foresees the addition of new sensors and monitoring capabilities. By creating a new way to do periodic stockpile monitoring, Tinamu is pushing the boundaries of the supply chain for the better. ■

TINAMU Tinamu, an ETH Zürich's spin-off, develops a turnkey solution for drone-based inspection automation that consists of a dashboard that visualises relevant information, analytics software running on a secured cloud, and the drone system connected to a communication network. Real-time insights are directly delivered to the asset owners. Fly to **tinamu.com** to discover more.

MEASURING WHAT MATTERS

by Chad Van Derrick, VP, Software Product Management, Tideworks Technology

Terminals are continually pressured to increase the efficiency of how goods are moved. As such, operators must be able to obtain and leverage insight from data quickly to make decisions that impact their business and customers. But how can this be done when terminals often lack the infrastructure and resources necessary to sort through terabytes of data, the majority of which could change several times within a day? The secret lies in creating a well-formed data strategy that can inform decision-making and ensure smooth operations across ports and the broader supply chain.

The big buzzword that comes across most frequently when I speak with customers is "optimization." "We want to optimize." "Your software should optimize our operations for us." "We want to be fully optimized within the next five years."

But what does this actually mean? What stands behind "to optimize your terminal's operations?" Because each facility operates differently, and because they are unique snowflakes per se, their definition of optimization and data strategies need to be unique.

A data strategy is a framework that a terminal develops to effectively manage, use, and leverage its data assets to achieve business objectives. Some of these are tactical, like keeping gate turn times below a certain threshold, while others are strategic, such as minimizing unproductive moves to maximize margin. A good data strategy outlines business goals and offers a comprehensive roadmap for how a terminal should use and share its data across the organization and with customers and vendors.

As I write this, a copy of John Doerr's *Measure What Matters* is staring at me from my bookcase. In this seminal tome, he introduces the concept of Objectives and Key Results (OKRs) for setting clear and measurable objectives across the organization, providing alignment, transparency, accountability, adaptability, and perhaps most importantly, focus. A good data strategy starts here, identifying what matters, why it matters, and with what frequency decisions on that data need to be made.

The right data, at the right time, in the right place

Terminals are swimming in transactional data. This type of data records specific interactions or events, such as a gate-in, a container's location, or equipment move instructions. This information matters in the moment and can be used to guide hour-to-hour, day-to-day operations.

Compare this to master data, core information about vessels, berths, equipment, terminal layout, customers, employees, and container data like the number, owner, type, and status. Master data is pretty stable; it doesn't change frequently, compared to transactional data like a container's location, which could change daily.

There are other data types, but let's keep it simple and start there. So, the big question is whether these types of data are suitable for analytics. The assumption I see many terminals make is "yes." And with that, they start building data warehouses to gather all of the information that the terminal produces, hoping it will eventually lead to some insights.

It is a fair assumption, and companies in other industries started with this same assumption many years ago. Still, they quickly learned it was a costly, time-consuming affair that produced minimal results. Why? It ignored Doerr's advice: measure what matters.

Analytical data is structured specifically for analysis and reporting. Analytical data is what belongs in a data warehouse, and through its specific data lineage, it is the data used to compute it. Doesn't this mean all data? Absolutely not! It's only the data that matters to that specific terminal – that the terminal is using to make decisions.

The best data initiatives start simple, are time-boxed, and are tied to a specific, measurable business outcome. Resist the temptation to boil the ocean; start small and get results – fast. In this way, a terminal optimizes its operations, one OKR at a time.

The value of real-time data – and a warning about AI

A data strategy often relies on real-time data to provide accurate and timely information on events happening throughout a terminal. Real-time data becomes available as events unfold with a few seconds of minimal delay. It is a valuable measure in a data strategy because it gives insight into recent and present events and helps organizations anticipate future moves.

And there's the gazillion-dollar data strategy word: anticipate. So, let's talk about Artificial Intelligence, or AI, those two enchanting letters representing the magical black box for quick and easy optimization. Where does AI fit into a terminal's data strategy?

While AI can certainly uncover hidden insights in large data sets and

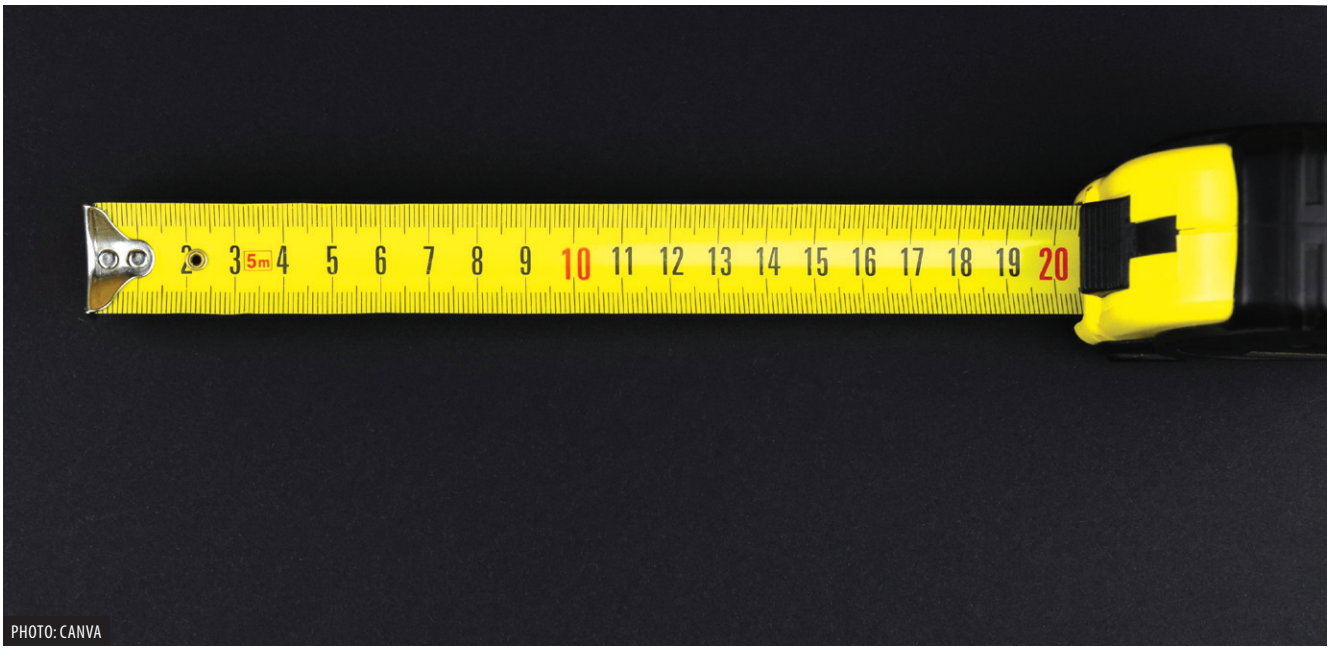


PHOTO: CANVA

apply predictive analytics and machine learning models to forecast trends and outcomes, it should be considered a piece of your strategy but in no way a substitution for it. A magic bullet is just that, magic, and without the work to identify OKRs, your various types of data and its lineage, and then applying the people, processes, and systems to govern that data, ensuring its quality and integrity, your AI initiative is sure to fail.

We have all heard the adage 'garbage in, garbage out,' and so without an effective data strategy already in place, how could you possibly trust in the results of AI? For any strategy to succeed, there must be rules and processes: cue data governance, one of the critical steps in defining your data strategy.

Creating a data strategy

Terminals can begin by following six key steps to optimize their data assets and implement a data strategy effectively.

First, organizations must have a firm understanding of their business objectives and ensure that their data strategy aligns with these goals. This alignment makes sure the organizations directly tie their data strategy in a way that aligns with how their business runs and how they interact with customers, partners, and the broader supply chain.

Second, connecting with technology providers and key decision-makers is important to understand existing philosophies. Including them in the data strategy will make sense because it will likely benefit and optimize how their solutions serve the business and its customers.

The next step involves assessing the organization's current state of the data itself and data management. This assessment entails identifying any organizational issues, such as data inconsistencies or duplications. A thorough evaluation of existing data use and management will help uncover potential challenges that might obstruct data utilization. These challenges include data silos, where valuable information is not easily shared or accessible across the organization, hindering collaboration and decision-making, and workflow challenges, where there are difficulties when designing, implementing, or optimizing the processes and steps involved in handling, transforming, and analyzing data.

Fourth, following the data assessment, organizations must create and implement data governance practices that will be utilized throughout the organization's data strategy. A data governance framework will ensure that all data is secure, compliant, and high-quality.

Fifth, the terminal's data strategy is taking shape at this point. Now, the terminal can create an implementation roadmap, defining how and when it will enhance its business strategy with data and equip its various teams with a tactical approach to managing current and future data streams and avoiding common challenges in data management.

The last step in implementing a data strategy is the assignment of ownership for each aspect of the data. This step entails designating individuals responsible for various stages of the data process, ensuring accountability, effective management and consistency throughout the data lifecycle.

Empowered

A well-structured data strategy, rooted in real-time data and clearly defined practices, empowers terminals to make informed, timely and secure decisions. A data strategy can help terminal operators use existing technology resources to address congestion and capacity changes where access to timely and standardized data is essential. With a cohesive data strategy, companies can harness the power of data to meet short- and long-term goals and adapt to evolving industry dynamics. ■

How to help the transport industry make green corridors a reality

PLANTING A SEED

by Panos Koutsourakis, VP, Global Sustainability, ABS

Maritime decarbonization is a complex challenge with multiple pathways at various technological and operational readiness levels. Because of the industry's regional aspects and varied trading routes, the shipping value chain has a unique opportunity to serve as a test bed for implementing infrastructure, developing and applying novel technologies and adopting alternative fuels.

Establishing green shipping corridors allows us to test, calibrate and assess risk in a regionalized or specific industrial ecosystem which can be further scaled to other regions or sectors. Optimization and simulation tools are expected to play an expanding role in helping stakeholders from across the green shipping corridor value chain in their decision-making process. This advanced modeling capability provides a detailed simulation of the complex nexus of stakeholders involved in corridor development, providing the data required to support policy and investment decisions.

To back up the development and implementation of green shipping corridors, ABS has launched a pioneering new Green Shipping Corridors Simulation service designed to assist international design and development of clean energy initiatives, together with an accompanying publication, *An Approach to Green Shipping Corridor Modelling and Optimization*, to provide practical support.

Aligning the disaggregated industries

A green shipping corridor represents a system of systems interacting with each other in unique ways, and modeling them using optimization methodology provides a framework for problem-solving and collaboration.

As a concept, green shipping corridors are likened to special economic zones at sea, where various value chain stakeholders can come together and deploy new technologies and business models that interact at full scale. The biggest advantage of such an initiative is to help diverse and disaggregated industries align and diversify their collective risks.

Any envisioned green shipping corridor will require close collaboration between stakeholders such as shipowners, fuel providers and ports. In addition, green shipping corridors will need an enabling environment where each value chain member can share risk at a smaller scale before upping the ante.

The ABS insight publication aims to communicate the need for optimization models in resource planning and techno-economic analysis for such a complex system of systems as the green shipping corridor. The publication also provides a step-by-step logical methodology to achieve the same, considering multiple variables and constraints. The input data in the developed models are approximations from publicly available sources. The scope of this insight is to look at the results from mostly two specific points of view: the port and the shipowner, who are at the center of this value chain and have the greatest impact on emissions.

Every green shipping corridor should be considered unique, as the geographical locations, behavior of the stakeholders, fuel availability, economy, and trade patterns will be different in each case. For example, a corridor may have commercial ships and port operations that utilize alternative fuels derived from renewable energy with or without energy efficiency technologies. Simulating and optimizing all those operational aspects is vital to accelerating decarbonization across the various stakeholders.

Finding common ground

The development of a green shipping corridor begins by establishing a core group of stakeholders who will drive the development and implementation of it, often with one organization or a third party acting as a facilitator to guide the process. A working group develops a vision/charter and performs an initial analysis (often called a pre-feasibility or feasibility study) to help set end-state and intermediate goals.

Based on this analysis, the working group develops phased plans to achieve reduction targets and then advocates for action by the stakeholders to implement those actions. Key decisions that focus on the critical building blocks of green shipping corridors are viable fuel pathways, policy & regulation, customer demand, and cross-value chain collaboration.

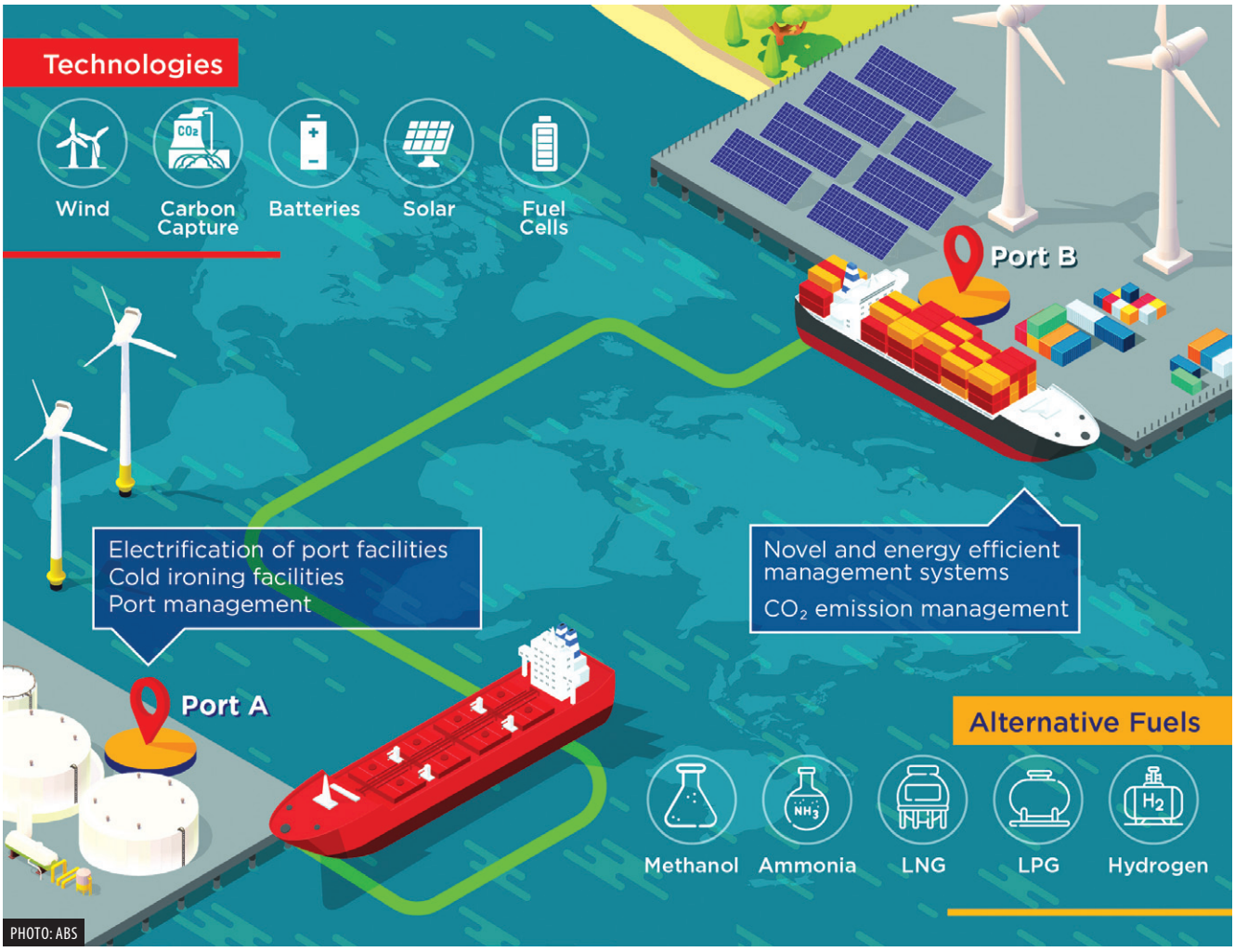
The working group monitors implementation progress and attainment of goals while continually reassessing options and strategies amid changing regulations/policies, technology availability, funding sources and operation incentives, etc. This is an iterative process informed by key analysis insights along the way.

Because of the number and variety of stakeholders involved in green shipping corridors, government agencies are sometimes expected to play a pivotal role in integrating individual stakeholder interests while testing and establishing policies.

Optimization and simulation models can help in resource planning and techno-economic analysis of the selected corridor while considering any permutation and combination of alternative fuels and technologies. In this way, such tools provide the ability to bring all stakeholders, industry, non-governmental organizations, and government together to enable the exploration of the most optimal path forward for establishing and operating a green shipping corridor.

Real-world examples demonstrate how a green shipping corridor initiative can be viewed as a resource planning and optimization problem that considers the diverse requirements of each stakeholder. For example, the shipowner's requirements and decision-making criteria will differ fundamentally from a port's, but each decision is inextricably linked.

Hence, the model acts as the basis for common ground among the consortium members and helps them in their pre-feasibility and feasibility assessment. Such analysis will likely become a foundational requirement for any green shipping corridor as the concept matures. As more green shipping corridors take off, the methodology will evolve. As the data becomes easily available, there could be



very creative use cases for these optimization and simulation tools.

Simulation in practice

Shipowners and port authorities can use the green shipping corridor optimization and simulation capabilities developed by ABS to optimize their decarbonization strategy with quantitative evidence and trackable projections.

The simulation outputs cover fleet fuel shares, newbuilding vessel shares, annualized port investments, fuel demand prediction in specific ports, fuel storage requirements at particular ports, and year-over-year fuel procurement for port bunkering stations. Major KPIs of fleet fuel options, their shares, and the corresponding costs should be investigated to help green shipping corridor decision-makers develop a decarbonization strategy.

Both tank-to-wake and well-to-wake fuel lifecycle emissions of marine fuels should be considered with decarbonization goals set appropriately. The fuel mix shares have shown clear trends in all the scenarios developed to date: low-carbon fuel options will gradually substitute the current dominant bunker, very-low sulfur fuel oil, and a more ambitious strategy will tremendously accelerate the speed of fuel oil phase-out. Green ammonia has been projected to be a strong candidate for tank-to-wake cases, and bio-methanol would be the most cost-effective fuel option for well-to-wake emissions in 2050.

Stakeholders should also consider the average total cost of ownership for the selected green shipping corridors fleet, considering operating expenditure, annualized building cost, fuel tank cost and carbon pricing. The OPEX and annualized building cost are the primary indicators used to determine the average.

The optimization outputs provide insights on fuel procurement shares for decision-makers within port authorities. The fuel sources and associated infrastructure readiness levels are essential to reach the maximum return on investment as well as meet the long-term maritime decarbonization goals.

De-risking the process

Optimization and simulation are potent capabilities that can help the various stakeholders in a green corridor project understand the variables in their systems with as much detail as possible to make the most prudent decisions from their point of view.

One of the most significant advantages of this optimization tool is that it can help each stakeholder understand their maximum risk profile and the impact of their decisions on the entire corridor.

When shared among the consortia members, the optimization model results will provide a common ground for de-risking and sharing the costs, which will be one of the most important outcomes of a collaborative initiative of this size. ■

Using 3D models is a ship designing game-changer – but what does it mean in practice?

GOODBYE, ANALOGUE!

by Joonas Määttänen, Project Engineer, Concept Design and Project Services, Deltamarin

The use of 3D 'digital twins' for class approval represents a milestone in the ongoing focus on applying digitalisation to increase productivity and shorten the calendar time for ship design. Designing ships in a 3D digital environment is not in itself new. We already use advanced CAD software in our everyday work, and these applications get better with every new release. However, we can't yet use the 3D models themselves for the classification approval process, where the relevant class society could review and comment on the design directly from the models.

The traditional approval process – and this applies across the board – still requires us to supply the relevant class society with a vast amount of 2D structural drawings for every ship project. These we have to extract from the 3D models we have created, which is hugely time-consuming.

The effort that goes into them only increases as they get more intricate. For example, we recently built a detailed 3D model for the initial basic structural design of a regular-size ro-pax vessel. From this, we had to extract up to 50 separate sets of drawings, each consisting of up to 1,000 individual drawing sheets. That is quite a mountain of material!

On average, around one-third of the basic design process on each project is spent on creating, modifying, and updating such drawings, even though we do pretty much all of the actual design work in 3D. However, this is about to radically change as class societies increasingly work directly from 3D models. Our ultimate goal is to create easily maintainable 3D models covering the basic design of entire ships – essentially a digital twin for class approval.

No room for interpretation

We estimate that cutting out the laborious phase of generating and constantly updating 2D drawings will save up to 30% of the person-hours required for the basic design process, enabling faster ship deliveries. The class approval process, which is critical in terms of the ship's overall delivery schedule, could, in turn, be completed around three months faster as the class surveyors can respond much quicker to the designer's needs. Overall project lead time can be significantly reduced and productivity increased, as the 3D model can be shared directly with all project stakeholders, including the shipowner, shipyard, and equipment suppliers.

One crucial benefit of using a 3D model vs 2D drawings is that there is no room for 'interpretation' as everything is visible. The model's automatic tools can highlight changes and show previous revisions, making it easy to track alterations and revert to an earlier version if necessary. In addition, production can continue directly from the final approved model, making handover to the shipyard easy, efficient, and free of mistakes.

Always up-to-date

The interactive model also has life-cycle benefits that drawings cannot provide. The problem with the latter is that they quickly become obsolete and unusable as the ship's structure changes, and not all drawings may even be available or accessible at a later date (some serve only one purpose, after which they are no longer needed).

PHOTO: DELTAMARIN

In contrast, the digital twin would always be up-to-date as new changes can be done directly in the model. It would hold all important data in one place that everyone can access. Hence the benefits of the model accumulate over the ship's entire life cycle – from initial classification to later modifications or conversions/retrofits, with, for example, new propulsion systems (including wind power). The production model can simply be handed over to the project-responsible designer and/or shipyard.

As Ole Christian Astrup, Senior Principal Specialist at DNV, confirms, using 3D models "opens up for new possibilities in asset data management, which I strongly believe will drive the safety and reliability of ship design and operation. A good example would be a more efficient process for verifying rule compliance. The OCX format will help designers control and optimise their designs while enabling class societies to confirm rules compliance directly from the 3D model."

Breaking down the barriers

We are taking a leading role in this design evolution, having recently completed a section of the steel design work for an ammonia-ready Aurora Class vessel for Höegh Autoliners both in 2D and 3D, with the latter model conforming to the new Open Class 3D Exchange Format (OCX) standard. The model was approved by DNV, which to our knowledge, is a first.

The OCX is a standardised file format and a key enabler to replace 2D documentation requirements. The standard is owned and managed by the OCX Consortium, established in 2021, which unites all the major class societies and CAD software vendors, as well as shipyards and design houses.

The core objective is to break down barriers between different design platforms to enable the exchange of geometry and metadata between them. This will ensure that trace information is exported from the designer's application to class in a managed process that is reliable and fully transparent.

Not far off

As software development takes time, there is a bottleneck in rolling out the OCX format, not on the part of ship designers or class societies, but as 3D software suppliers work to implement it as fast as they can. They are not far off!

As to the future, we are also exploring further digital developments, including using artificial intelligence to compile a database of ships that naval architects can access to study previous designs and sort them based on specific characteristics. This kind of reference set would eventually include 3D models, saving even more time. Onwards and upwards! ■

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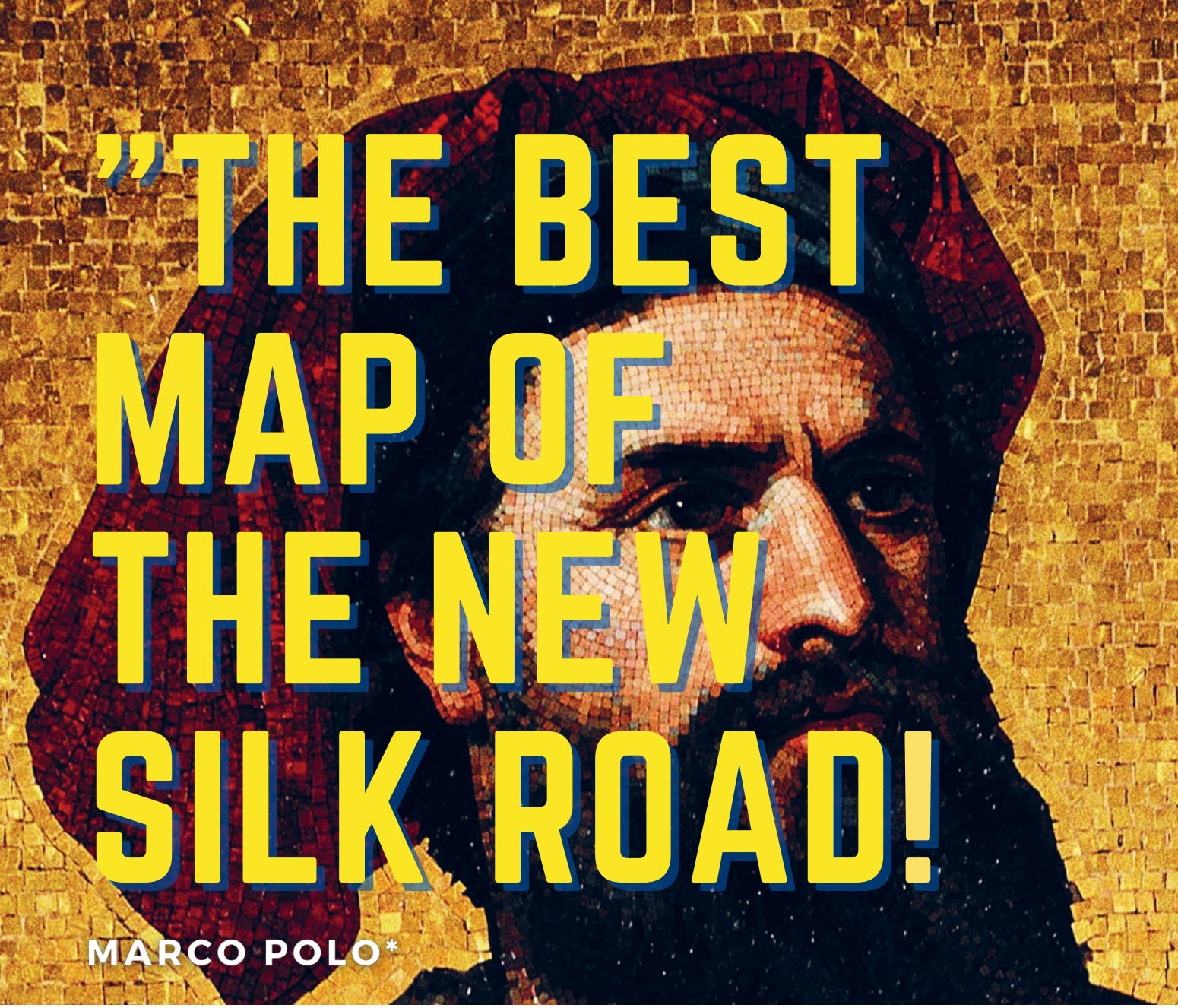
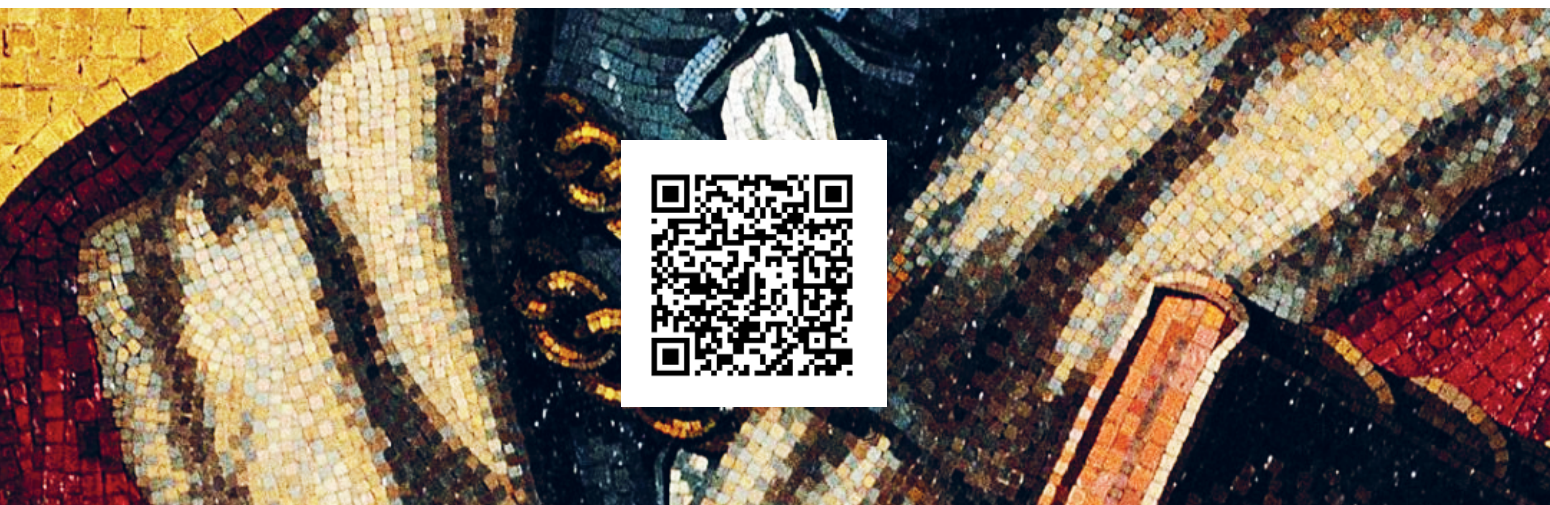


*** NOT A REAL QUOTE (BUT WOULD BE IF MARCO POLO WAS HERE WITH US – SCAN THE QR CODE AND CHECK FOR YOURSELF!)**



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