Harbours review

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.

Welcome to the Port of HaminaKotka!

Short Stories

Liebherr's new LHM series – presented

The latest product line features a new crane control system (Master V), advanced sensor integration, and digital information transmission.

The position of the outrigger system is now monitored by sensors, forming part of the internal data processing. Using a new outrigger base in the field only requires a software update by Liebherr.

Digital IP cameras are used for better monitoring of the crane interior and the external crane environment.

An independent power circuit supplies the new control, meaning the machinery can be continuously monitored by cameras and protected without activating the crane ignition.

The new series also features the Liebherr Pactronic 2.0 hybrid hydraulic drive system. An accumulator serves as energy storage and provides support when needed by supplying additional, temporarily stored power.

Pactronic 2.0 offers two operating modes: Boost and Green. The former acts as a power amplifier, increasing lifting speeds. Liebherr says the new LHM with Pactronic 2.0 achieves the same performance parameters as a comparable device with two main units.

The Green mode has been designed to save fuel or power consumption and reduce CO_2 emissions. During the lifting process, Pactronic 2.0 supports the main unit to such an extent that less power is required by the main drive, despite the lifting speeds remaining the same.

By setting the individual lifting height, the power output of Pactronic 2.0 is adjusted accordingly. The additional energy is distributed over the entire lifting process. The new Pactronic reacts to changes in the outside temperature and the accompanying change in pressure in the reservoir.

The cabin of the new LHM has also been redesigned to provide increased comfort, precision, and safety.

"With its new mobile harbour crane, Liebherr presents groundbreaking technical developments and updates that make the LHM product series fit for the future. […] Overall, the crane will become much more digital, networked, and smarter," the company wrote in a press release.

Photo: Liebherr

Auramarine goes methanol

The Finnish developer of fuel supply systems has presented its Methanol Fuel Supply Unit (MFSU) to meet the demand for methanol as a future marine fuel.

The solution is suitable for both two- and four-stroke engines and can be adapted to suit the conversion of existing engines to dual-fuel methanol operation.

The MFSU can be installed on newbuilds and retrofits.

The company says its system can ensure the safe delivery of methanol from the service tank to the master fuel valve, regulating the flow, pressure and temperature of the methanol to meet the engine's specific requirements.

The system actively maintains the supply pressure within the specified tolerances during load changes and filters the fuel to prevent any impurities from entering the engine.

The unit can be split into parts for transport and installation (in a container or below deck - as one unit or in several parts).

The company expects to deliver the first system in 2023.

"Ship owners want to invest in green fuels, but the challenge lies in finding the right solution and inspiring confidence to drive uptake. At Auramarine, we provide an expert technical review of a vessel or fleet's fuel supply systems and determine the best possible adaptation of existing equipment to effectively and safely handle methanol and other future fuels such as biofuel and ammonia," Auramarine's CEO John Bergman said.

He added, "Auramarine is committed to supporting the shipping industry's roadmap to decarbonisation. With future fuel uncertainty leading to some ship owners stalling newbuild orders, we need to scrutinise every aspect of the supply process and analyse the supporting fuel supply infrastructure to ensure ship owners are empowered to make the right decision."

Finnlines' new Eco class – delivered

The 238 by 34 m 1A Super ice-class vessels will serve the company's Biscay Line, connecting the ports of Paldiski, Kotka, Helsinki, Antwerp, Tilbury, Zeebrugge, and Bilbao.

The first newbuild, Finneco I, was delivered on 28 April 2022, while Finneco II - on 30 May 2022.

All three ro-ros feature emission reduction solutions, such as air lubrication, battery packs, solar panels, waste heat recovery, and scrubbers. They also have a ballast water treatment system installed.

Together with two Superstar class ferries, the new freighters form Finnlines' €500m newbuilding programme.

"Through our ambitious investment, we can bring to our customers, not only the economies of scale and increased frequency, but a green and well scheduled infrastructure in the Baltic Sea, the North Sea and the Bay of Biscay. The Finneco trio will give added value to Finnlines and its customers when they start to operate on their routes," Emanuele Grimaldi, Chairman of the Finnlines' Board, commented.

Photo: Finnlines

APM Terminals Aarhus' new straddle carriers

The six new machines manufactured by Kalmar have increased the container terminal's straddle fleet to 36 units.

"We have seen continuous volume growth over the past years at our terminal and we want to continue to be ready to meet future customer demands," Helle Almind, Commercial Manager at APM Terminals Aarhus, said.

She added, "Our investment programme goes beyond just equipment upgrade, as we have also invested in our operating model, people development and improving our IT-backbone."

HHLA TK Estonia's new STSes – online

The gantries, named *Alfa* and *Bravo*, were officially christened on 31 May 2022 and will make it possible for the Estonian sea container terminal to serve up to 14,000 TEU-big ships.

The ship-to-shore (STS) cranes, 73 m tall with a lifting height of 50 m and a carrying capacity of 70t, can handle up to 21 container rows.

"The new, larger gantry cranes will help HHLA TK to utilize its full potential for the handling of existing and future freight streams. We have invested over five million euros to be able to service vessels accommodating four times more containers than the ships able to dock in Muuga at the moment [3,500 TEUs]. In the future, calls in Muuga will be more attractive and efficient for global shipping companies. Thanks to the growth in handling capacity, Estonia's opportunities as a multimodal logistics hub in Northern Europe will increase considerably," Angela Titzrath, HHLA Group's CEO, commented.

Alfa and *Bravo* were previously taking care of container traffic at HHLA's Container Terminal Burchardkai in the Port of Hamburg.

Photo: HHLA

Awake.AI-Intel port digitalisation co-op

The Finnish and the Californian tech companies have joined forces to mesh edge, Artificial Intelligence (AI), and 5G technologies to make port operations more efficient.

The solution uses machine-learning models to detect yard objects via sensors installed in the port area, automatically providing real-time awareness of utilisation rates and cargo flows.

"Potential benefits from using the platform include but are not limited to a better use of existing capacity, reduced port area emissions, accurate real-time prediction of arrivals and departures, optimised port calls driven by AI and computer-vision insights, real-time information sharing, and time and cost savings," Awake.AI said in a press release.

Karno Tenovuo, the company's CEO, added, "For example, Lidar sensor data, often combined with other sources of data, can be used to optimise the arrival and departure of landside traffic. Sensors can detect congestion, enabling re-routing port gate and inner area traffic."

"Smart Port as a Service and our cooperation with Awake. AI have great potential to revolutionise trade and to make it more sustainable. We can help transportation providers turn data into insights to achieve fast, efficient and informed use of transportation resources," Maurits Tichelman, Intel Vice President of Sales and Marketing, also underlined.
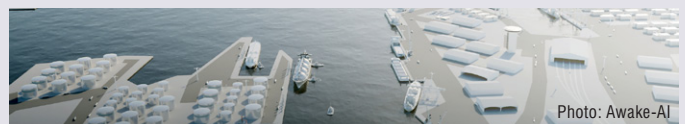

Photo: Awake-AI

Poland's new ferries to feature MacGregor's equipment

The subsidiary of the Finnish Cargotec will design, manufacture, transport, and assist in the installation of the bow and stern equipment together with internal ramps and doors.

"The bow ramp folding frame solution and mooring rope self tension system increase efficiency by enabling loading at two levels and reduce the turnaround time in port," MacGregor said in a press release.

The three dual-fuel, hybrid ferries are being built by the Polish Remontowa Shiprepair Yard, slated for delivery in 2025, 2026, and 2027.

Each 195 m long ro-pax will offer room for 400 passengers and 4,100 lane metres for trucks & trailers.

The vessels, flying Polferries and Unity Line's liveries, will connect Świnoujście with Ystad and Trelleborg.

"Remontowa is known for its professionalism, high quality and long-term environmental efforts, and we are delighted that our know-how and long experience has led the customer to choose us to deliver this comprehensive set of ro-ro equipment for these three ro-pax vessels," Magnus Sjöberg, SVP, Merchant Solutions Division, MacGregor, highlighted.

He also said, "I am also satisfied to see that we are able to support our customer's focus on sustainability, as in this case, reducing the fuel consumption by enabling shorter turnaround time in the ports."

Photo: Polsteam

More Konecranes to serve containers in Koper

The Slovenian Port of Koper has ordered three electric, low-noise rubber-tyred gantry (RTG) cranes from the Finnish manufacturer, set for delivery in February 2023.

The RTGs will be equipped with cable reel systems and an auto plug-in feature, feeding regenerative power to the local grid.

The machinery will also have energy-efficient LED lights and a selection of the company's smart features: DGPS Auto-Steering, Auto-TOS Reporting, Auto-Positioning, and Truck Lift and Stack Collision Prevention.

The new equipment will up Koper's Konecranes RTG fleet to 30 units.

"Koper is a forward-looking container terminal operator with ambitious environmental goals, a quality that is strongly supported by our ecolifting approach," Adel Issa, Sales Manager EMEA, Konecranes, Port Solutions, said.

Edvin Boškin, the Port of Koper's Technical Manager, added, "It speaks volumes that our Investment Supplier of the Year award has been given to Konecranes a couple of times. We look forward to receiving our new RTGs and making them work for our customers. We will continue striving to be one of the leading port operators and logistics providers for Central and Eastern Europe."

Photo: Port of Koper

Autonomous, all-electric coastal feeder – in the making

DB Schenker, Ekornes, Naval Dynamics, Kongsberg Maritime, and Massterly have partnered to develop a next-gen waterborne transport solution for the Ikornnes-Ålesund route in Norway.

Following the prestudy agreement, the parties will work on deploying a 49.9 by 9.6 m, 18 FEUs capacity container carrier on the 23 nautical mile-long stretch that handles Ekornes' cargo flows.

Based on the Naval Dynamics' NDS AutoBarge 250 concept developed in partnership with Kongsberg and Massterly, the vessel will run un-crewed but supervised by Massterly's Remote Operation Center (ROC) staffed with certified navigators and naval engineers.

The project partners will now seek approval from the Norwegian Maritime Authority. They also hope to secure support from the country's government for the feeder's sustainability and technology aspects.

"We are continuously working towards our goal of becoming the leading global sustainable manufacturer of premium furniture. With this landmark project, we will meet our sustainability targets by using the most innovative technology available. Using the autonomous electric container feeder for direct pick-ups of our Stressless products from our own quay at Ikornnes means that our total carbon footprint will be reduced significantly. We will also gain better control over, and a greater flexibility of, our own logistics," Roger Lunde, Ekornes' CEO, commented.

Geir Håøy, CEO of Kongsberg, added, "We are beginning to see a general shift away from the road transportation of goods, with its considerable carbon footprint, and towards clean, energy-efficient, short-sea freight transportation."

Tom Eystø, Managing Director, Massterly, also said, "We find it significant that one of the world's largest logistics providers, DB Schenker, is seeing the benefits of un-crewed, zero-emission shipping and we hope this project will inspire a larger volume of similar vessels."

Photo: Ekornes

Antwerp and Zeebrugge – now officially the Port of Antwerp-Bruges

At the extraordinary general meeting on 22 April 2022, the two cities signed the shareholders' agreement of the unified port company.

The combined entity has an overall cargo throughput of 289mt/year (2021 data), including 159mt of containerised freight (some 14.2m TEUs), 82.4mt of liquid bulk, 19.2mt of wheeled (ro-ro) cargo, 15.1mt of dry bulk, and 13.2m of break-bulk.

The ports' 2021 passenger traffic amounted to 114k travellers.

"The unified port is not only the economic engine of Flanders, but together, the ports of Antwerp and Zeebrugge will also form the largest export port, largest throughput port for vehicles, and the leading chemical hub in Europe! At the same time, the Port of Antwerp-Bruges has major ambitions to become the energy gateway to Europe as a 'green port.' In short, Flemish economic history is being written here today," Annick De Ridder, Vice-Mayor of the City of Antwerp and President of the board of directors of Port of Antwerp-Bruges, commented.

Dirk De fauw, added, "As Mayor of the City of Bruges and Vice-President of the Port of Antwerp-Bruges, I am convinced that this merger will lead to sustainable growth in economic activity and jobs in both sites, and boost Flanders' international reputation around the world. Together, we are stronger."

The two will now work on multiple projects, such as increasing container handling capacity, capturing, storing and reusing CO_2, and receiving hydrogen and its derivatives.

The merger was announced in February last year.

Photo: Port of Antwerp

Emission monitoring campaign underway in the Baltic

The European Maritime Safety Agency (EMSA) and Germany's Federal Maritime and Hydrographic Agency will be using a remotely-controlled drone to measure the sulphur content in the ships' exhaust plumes.

The aircraft will take off from the German Armed Forces' Staberhuk site on the east coast of Fehmarn and fly over selected vessels operating in the Fehmarn Belt and the Kadetrinne/Kadetrenden.

The measurements will be made available in real-time to responsible authorities in all European ports via THETIS-EU (an EMSA-operated port state control information system) to select ships for inspection at their next port of call, including taking fuel samples. The examinations will verify a vessel's compliance with the 0.10% cap of the Sulphur Emission Control Area.

In addition, the drone will take multispectral aerial imagery for hydrographic surveying.

The campaign will last three months, starting from April-end 2022.

The Norwegian company Nordic Unmanned will carry out the drone flights on behalf of EMSA.

The Danish Explicit ApS has supplied the sensor technology and analysis capabilities for emission measurements.

Photo: Nordic Unmanned

AA Logistik's first e-truck

The Swedish freight haulier has received its first electric truck from Scania to operate it 10k km/year with an 89% lower carbon footprint than a traditional lorry.

The e-truck will be deployed around Finnslätten, where AA Logistik will have its brand-new 32k m2, photovoltaics-furnished warehouse ready in 2024. AA Logistik will electrify its entire fleet of 15 heavy-duty trucks by 2030.

Finnslätten has already an ABB charging station installed by Mälarenergi that can both provide overnight and daily fast recharge to the new e-truck.

"We have a complete charging infrastructure that fits AA Logistik's operations. It makes it possible for the company to change the fleet without loosing their core business from sight," Niklas Gunnar, CEO, Mälarenergi, highlighted.

Photo: AA Logistik

Danish Shipping & Logistics Company DFDS selects Kuenz in Ghent, Belgium to deliver Intermodal Crane

Kuenz has been selected by DFDS Belgium to deliver one brand new RMG crane for its intermodal terminal in Ghent, Belgium.

Being one of the main intermodal terminals in Ghent, DFDS Belgium can handle all kinds of cargo and is increasing its capacity by implementing a rail mounted gantry crane.

The new Kuenz intermodal RMG crane is aimed at improving the terminal's efficiency and productivity at lower costs while improving safety via an efficient camera system.

The crane will feature a non-spanned double girder, a rail span of 23 m, one single cantilever of 8, 25 m and will be equipped with a piggyback spreader. It will be able to stack 1 over 3 (10'6) containers.

TOC Europe Survey

Photos: TOC Europe

Philipp Helberg
*Senior Marketing Manager
– Maritime Cranes
Liebherr-MCCtec Rostock GmbH*

■ **How did you like this year's edition of TOC Europe?**

It was fantastic to participate in a fair again physically. You meet colleagues from the field offices again and, above all, see customers and partners face to face again. There was a certain euphoria throughout the show, I think. And it was precisely this mood that accompanied all conversations, be it with customers, consultants, suppliers or editors of maritime trade magazines.

■ **What new solution/product have you presented to your customers?**

Our highlight was the new Liebherr Mobile Harbour Crane, which was officially launched one week before TOC Europe.

We used the fair to explain the advantages of the new LHM to our customers and the public. The reactions were positive throughout. Everyone is excited about the wealth of technical innovations in the crane, not to mention the fresh new look of the machine, which is in tune with the times.

The new LHM is more digital, more automated and has a new look. A new crane control system, state-of-the-art sensor technology and digital information transmission enable future assistance and partial automation systems. In addition, the Liebherr hybrid system Pactronic and the driver's cab have been improved in line with customer needs.

Another highlight and, at the same time, a real crowd-puller was the new Liebherr simulator LiSIM.

We organised a challenge. The person who unloaded a container from a ship on the LISIM received a detailed model of the Liebherr LHM 550 mobile harbour crane.

Visitors were able to experience the benefits of our new simulator.

The new LiSIM simulator enables an unprecedented simulation of crane operation. Thanks to the complete integration of the original crane control hardware via a CAN BUS client, all sensors on the real machine can be integrated and simulated. This level of integration is unique in the market and provides a training experience that closely resembles reality. By using the high-quality physics simulation "Algoryx" and a graphical display in 4K resolution, a very realistic behaviour can be imitated. The use of VR glasses enables complete immersion in the virtual port environment and creates a detailed representation of the crane driver's cabin in three-dimensional space.

■ **How, from your perspective, does the current situation on the market look?**

The general mood is quite euphoric, as already described. In the maritime sector, good sales are being made due to the enormous increase in freight rates. The entire industry is benefiting from this. It remains to be seen how sustainable the current willingness to invest is. Another uncertain factor is, of course, the problems within the supply chain that affect everyone.

Basically, however, we are very optimistic about the future.

Tanja Altjohann
Marketing Specialist
SANY Europe GmbH

■ **How did you like this year's edition of TOC Europe?**

As SANY Europe, we enjoyed TOC Europe 2022 very much. There was a steady stream of visitors, and the organisation on the part of AHOY was very good.

■ **What new solution/product have you presented to your customers?**

We presented the entire product range of SANY Europe's mobile harbour machinery. This includes our wide range of reach stackers, STS, RTG, RMG, Empty Container Handler, Heavy Duty Forklift Truck and Material Handler.

■ **How, from your perspective, does the current situation on the market look?**

The order situation is currently very good at SANY Europe. The ongoing situation regarding Covid-19 is affecting the delivery of machines, but this affects the whole market.

Patrik Starck
Sales Director
MANTSINEN

■ **How did you like this year's edition of TOC Europe?**

It was mixed feelings, Tuesday and Thursday were slow, but Wednesday made up most for most of the deadtime the other days.

■ **What new solution/product have you presented to your customers?**

MANTSINEN DUALPOWER is the first-ever dual power concept in material handlers. It combines the best features of both electric motors and diesel engines.

■ **How from your perspective does the current situation on the market look?**

Activity in the market is good, but the current inflation climate causes some customers to delay their orders in the hope of improved pricing if costs start declining at some point.

Photo: Liebherr

Harry Nguyen
Director and Founder of Realtime Business Solutions Pty. Ltd.

■ **How did you like this year's edition of TOC Europe?**

At this year's TOC Europe, it was nice to see everyone back at the physical conferences and see familiar faces again, as it has been two years without an in-person TOC event. The conference was a most convenient way to interact and showcase all our current and new solutions to customers, as nothing beats a live demo. The RBS Team is looking forward to the next TOC Europe, and we hope to see more familiar faces in the upcoming TOC Asia in Singapore this November.

■ **What new solution/product have you presented to your customers?**

TOPS Expert Enterprise and Cloud are our latest solutions on offer and have gotten even better with new and improved AI features such as The Digital Twin 3D Application; Intelligent Equipment tracking system; improved GUI, and enhanced yard management features. TOPS Expert is an advanced TOS that offers a unique real-time control and planning application known for improving performance, its cutting-edge technology, and its reliability within the Container Handling Industry. These new product features were on display at TOC Europe this year at our booth, and we are excited to start offering these to our customers.

The new features included:
– Digital Twin 3D application which has real coordinates data of any CHE and any container in the yard, functions to calculate actual distances for every move and equipment utilization within the system to bring TOPX Expert to the next level.
– iTrack (Intelligent Tracking) is used for Equipment control and CHE Strategy - to minimize the unladen move of trailers, distribute traffic and avoid congestion in terminals.
– Enhanced yard management features in the latest TOPX Expert. There are improved Hazardous segregation rules, more validation for manual planning, and enhanced WI distribution to improve operation and truck delivery.
– Automation on the cloud! - with the latest TOPS Expert Cloud system being able to manage and control automatic container handling equipment (CHE). There are also new intelligent features to automate processes.

■ **How, from your perspective, does the current situation on the market look?**

At RBS, we believe that the market is constantly hungry for new innovative ideas and new technology to face arising challenges in ports and terminals. Therefore, we are constantly researching and developing the best possible products for our customers with this in mind. We have seen real-life applications of machine learning in terminal planning and decision-making, as well as automation operating on a cloud TOS.

Matthew Wittemeier
Director Marketing and Sales
at INFORM's Terminal & Distribution
Center Logistics Division

TOC Europe 2022 was the first major gathering for the maritime industry in three years, and it didn't disappoint. It brought together vendors, terminal operators, and other industry stakeholders in a good mix of education, entertainment, and networking. As always, automation and digitalization proved to be central educational themes on the Tech TOC stage. INFORM was able to highlight our industry-leading AI-based software rail automation solutions as well as our yard and vehicle optimization solutions to an industry that is actively pursuing these precise topics. While I do not hold a crystal ball, my perspective on the industry is that it will continue to look at more dynamic solutions to traditional challenges. As opposed to investing heavily in cement and steel, I believe the trend to look at improving asset utilization and strengthening ROI from existing assets is a trend that will continue well into the future.

David Moosbrugger
Chief Technology Officer
Künz GmbH

■ **How did you like this year's edition of TOC Europe?**

As a long-standing exhibitor at TOC Europe, we had high expectations, especially from the feedback we got from customers before the TOC. We met a lot of customers this year at the TOC, and it was how it was before the TOC. The event was well organized, as usual. We are looking forward to next year.

■ **What new solution/product have you presented to your customers?**

Our slogan for this year was INNOVATIVE SOLUTIONS for a SUSTAINABLE FUTURE. All our products are based on sustainability, for example. All our port products are fully electrified, even the Automatic RTG's. We have just delivered RTGs to the US, which include a battery system that can be used to run the crane even without an additional power source. We have also presented our Intermodal Automation Concept, which also includes Remote Operated Cranes for Piggy Back Handling. For the US Intermodal Market, Kuenz developed a new RTG called the Charger, which was explicitly developed for the so-called STRIPPING MODE in Intermodal Terminals, small, fast and sustainable.

■ **How, from your perspective, does the current situation on the market look?**

We have a positively full order book, and the current market outlook is also very positive. Of course, there are challenges to handle, like supply chain issues, etc., but with our strong Kuenz Team, we will manage it.

Björn Zeppenfeld
EMEA Business developer
Adveez

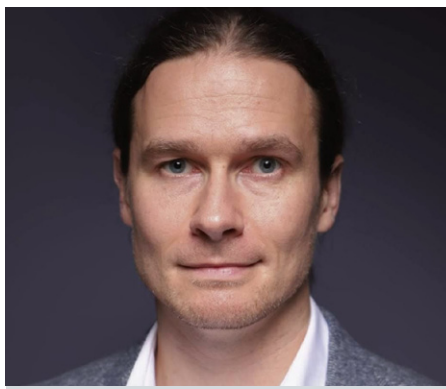■ **How did you like this year's edition of TOC Europe?**

It was a great first TOC show for us, with a lot of qualified leads and very interesting solutions. We came to have a first sense of the sector and meet potential prospects as well as manufacturers, and we were happy to meet both during the networking events, particularly. The conferences were insightful on the sector and great use cases to share. The first day was busier than the next two days, but it was important to get to meet other exhibitors through the show period. Throughout the many conversations we had, it became obvious that many chat partners, vendors as well as potential buyers and consultants share the common believe that the maritime sector is "behind" technological innovation, underpinning our impression that we have come to the maritime market with our products at the right time.

■ **What new solution/product have you presented to your customers?**

ADVEEZ presented the new FAMA device, which captures data in real-time from motorized assets and ensures safety in the yard with geofencing and automatic speed reduction. Also, the OSHA checklist and the driving score for GSE were quite popular among our new leads.

■ **How, from your perspective, does the current situation on the market look?**

For the moment, the market looks quite confident on the digitization of the operations and its capability to get sustainable solutions for a better future. The market is willing to invest and shows significant interest in innovations like ADVEEZ products.

Jussi Poikonen
VP of AI and Analytics
Awake.AI

■ **How did you like this year's edition of TOC Europe?**

There was on display an interesting mix of traditional hardware offerings, emerging technologies, and digital services. As speakers and exhibitors, we found the event very useful as there were plenty of opportunities to discuss our offerings with potential customers.

■ **What new solution/product have you presented to your customers?**

We presented solutions for AI-supported port call planning and optimization and custom data analytics services providing increased predictability in the maritime supply chain.

■ **How from your perspective does the current situation on the market look?**

There is a strong ongoing trend in the industry towards the digitalization of port and shipping ecosystems, and AI solutions are playing an increasing role in this development. We are seeing a lot of new opportunities as organizations start to modernize their planning methods and consider how they can get the most value out of their existing data sources.

John Lund
Sales and Marketing Director (Global)
Visy Oy

■ **How did you like this year's edition of TOC Europe?**

It was great to reconnect with the industry at TOC. The Visy team was engaged with customers, partners and friends for the entire week. After two and a half years of virtual conferences, it was obvious that the industry was longing for a live event with a human touch. TOC Europe was what we needed.

■ **What new solution/product have you presented to your customers?**

This year we presented the Visy Automatic Damage Detection System (ADDS) – the world's first automated vision technology damage detection system for container terminal operations. The feedback on ADDS was extremely positive. With only a software upgrade, a Visy OCR portal becomes a means to analyze, digitize and share container damage. The industry is familiar with the OCR portal. Trucks and cargo at terminals of all sizes drive through OCR portals in which cameras take high-resolution images of the assets to collect and share information such as the license plate number, container ID, ISO code, seal presence, door direction, hazardous goods labels, trailer ID and the like. Now, the same portal infrastructure can be equipped with a software upgrade to inform the operator, or in some cases 3rd parties, if the container is damaged, where is the damage and even the type of damage. Damaged cargo costs the industry billions of dollars per year in insurance claims, health, safety and security issues, ruined cargo, erosion of goodwill and partnerships, and inefficiency. Automating the detection process will make the industry safer plus help operators save time and money on every transaction while also giving them a tool to provide better service to their customers.
Visy ADDS: https://youtu.be/LMM_-QAQ-gw

■ **How, from your perspective, does the current situation on the market look?**

The Visy order book is very strong. June 2022 will be a record month for us. There is a lot of enthusiasm in the industry for innovation. Like I mentioned, Visy Automatic Damage Detection System (ADDS) has gained a lot of traction. Additionally, Visy TopView (spreader OCR application: V**isy_TopView_Spreader OCR.pdf**) is hot. We have several systems on delivery right now and more in the pipeline. The concept behind TopView is simple: transform the spreader into a smart device to boost operational efficiency. The spreader is the common denominator in container terminal operations. By adding a few cameras to a spreader, it becomes a smart device that will recognize the box ID and link it to the CHE to enhance automation, take a damage detection image of the roof, and automatically perform twin-20 detection. TopView exhibits the Visy philosophy of saving our customers time and money on every transaction.

Maarten Impens
CEO
Gantrex

■ How did you like this year's edition of TOC Europe?

It was a pleasure to be back at TOC after the two years break and to see all our customers in person again at the show. Gantrex has developed and launched new products and services over the last two years that people could finally see and touch at TOC Europe 2022. So overall, it was a very good event for Gantrex.

■ What new solution/product have you presented to your customers?

This year has been the perfect opportunity to display our new patented Gantrex HingeGuard™ Short Rail, developed by our in-house R&D department and launched in March 2020. In addition, we expanded our Technical Services range into Gantrex Port Crane Solutions and presented the innovative products and services that we provide with that portfolio.

■ How from your perspective does the current situation on the market look?

Overall, we are still quite optimistic. The Ports and Intermodal industry is, according to us, a key player in international trade and will remain a very important business area. Although, we remain cautious with forecasts given some of the uncertainties in today's business environment. As a strong and trusted brand, Gantrex has been delivering innovative solutions for over 50 years now, so our more than 3,000 loyal customers can be sure we'll continue to stay on track with them.

Stephan Piworus
Global VP Sales Marine & Ports
Identec Solutions

■ How did you like this year's edition of TOC Europe?

It was a great show. And not just because of the fact that we won the Golf Tournament It was very obvious that everybody was very happy to meet people in person again, get an update about the latest market trends, and find out about possibilities to automate operations. There is no digital alternative to such an event.

■ What new solution/product have you presented to your customers?

We presented Reefer Runner (a Reefer Monitoring and Management solution) and Terminal Tracker (a PDS solution to automate your operations and manage your CHE fleet).

■ How from your perspective does the current situation on the market look?

The trend of automation in the container terminal industry was very obvious. Our current customers, as well as potential customers, do have clear plans to drive automation significantly forward.

Maarten Impens
Market Manager
Phoenix Lighting

■ **How did you like this year's edition of TOC Europe?**

The 2022 edition of TOC Europe was great for Phoenix Lighting as we were able to connect with most of our end-users and OEM customers in our booth. After the cancelled tradeshow in 2020 and the 2021 tradeshow, which took place but with a very limited number of exhibitors and customers, this 2022 edition was basically back to the normal we had prior to Covid-19 at the 2019 show.

■ **What new solution/product have you presented to your customers?**

At TOC Europe, Phoenix Lighting presented two new products to the customers. The Phoenix ModCom 3 has a revolutionary feature where the customer can make the color temperature tuning and also dim the lights directly from the operator´s cabin. With this option, each crane operator can decide the intensity and color temperature that best fits their needs and guarantee them a more comfortable operation.

Phoenix has also introduced to the market the Phoenix Master Series with the No-Glare driving optic. These fixtures can be installed as front lights on various lifting equipment like Reach-stackers, Forklifts and Empty Container handlers. With this innovative optic developed by Phoenix Lighting, the drivers do not get momentarily blinded while other equipment is passing by. Nowadays, as a solution, the OEMs and end-users still use two lights with one facing up and the other facing down, but with the new Phoenix Master Series with No-Glare optic, they can use just one fixture facing forward.

■ **How, from your perspective, does the current situation on the market look?**

2020 was an extremely challenging year for all business and companies around the world due to Covid-19, and for sure, the Ports business were also affected. Most of the Port Terminals suffered from a decrease in their TEU´s or cargo movements, so some of the projects expected for 2020 just happened in 2021. 2021 was already a strong year for Phoenix, and in 2022, we are seeing an increase in investments in lighting upgrades and new crane purchases. The ports are looking to keep operations running 24/7, and the Phoenix LED lights are fundamental for that.

Mike Yarwood
Managing Director, Loss Prevention
TT Club

One of TT Club's primary missions is to encourage innovation to achieve greater safety in the supply chain. Together with ICHCA International, we demonstrated this with an innovation of our own, launching the inaugural Safety Village at this year's TOC Europe conference and exhibition in Rotterdam. The first of its type, the exhibition space was dedicated to discovering the industry's greatest safety concerns whilst promoting innovators looking to find the solutions.

The success of the TT Club Innovation in Safety Award programme, operated by ICHCA, has proved that there have been numerous ground-breaking innovations with multiple applications aimed at reducing these safety risks. Some of these were presented at the Safety Village, including by companies such as Traxens, LASE, Yardeye, KALP and Arck sensors.

For these forums to take place, the Safety Village featured a meeting area and presentation facilities, which allowed companies to showcase their innovative safety devices, processes and products – all aimed at championing safety in the supply chain and developing new solutions to managing risks. Planning for the Safety Village at TOC Europe in 2023 is already underway.

ICHCA, the representative body for cargo handling operators across the globe, has run TT Club's Innovation in Safety Award since its inception and shares in its passion for encouraging innovation and learning across the industry. Submissions to the Award programme have ranged in focus from bulk cargo handling to securing containers and their cargoes; from safety reporting and education to the correct handling of dangerous materials; from environmental monitoring to fire detection and suppression.

A Safety Awards Digest has been produced to share the knowledge, bringing together details of the wide variety of products and procedures that achieved a demonstrable improvement in cargo handling and transport safety. **A copy of the Digest in PDF form is available for download.**
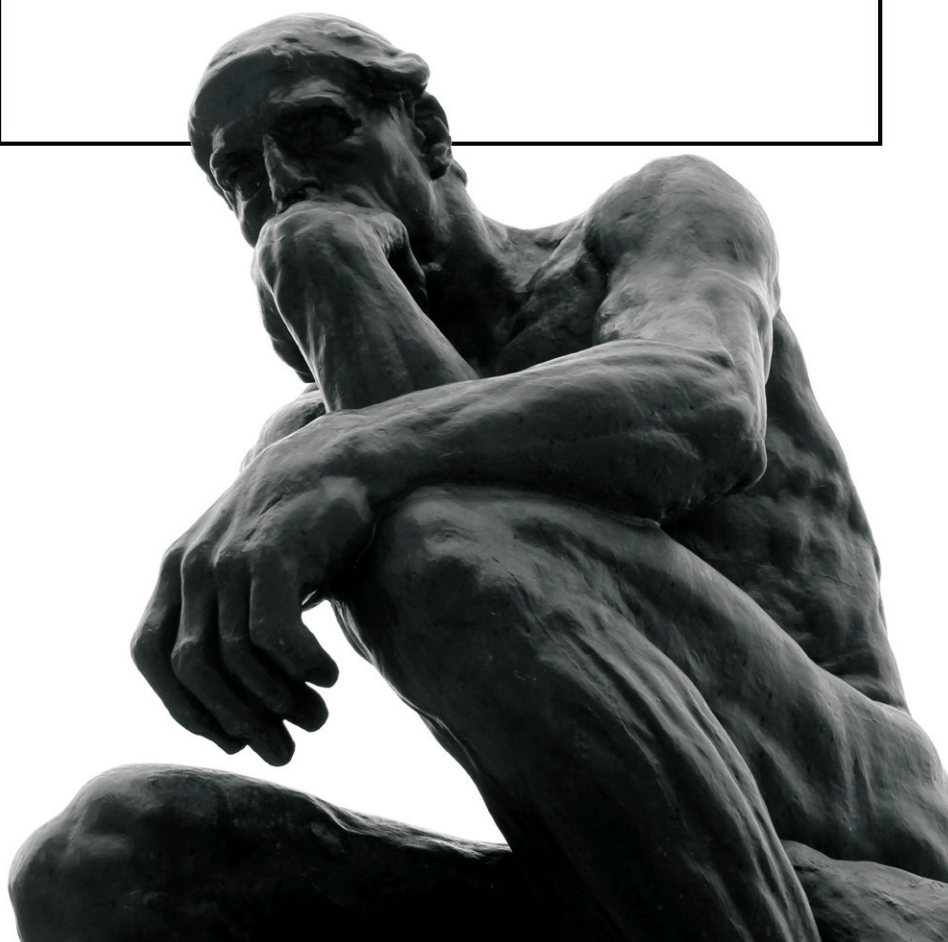
This year's Awards will open for entries soon, with the winners announced early in 2023. Details will be available at **www.ichca.com.**

Baltic Transport
Journal

bimonthly-daily companion

Thinking of
transport & logistics?

Photos: Visy Oy

First of its kind

by **John Lund**, *Sales and Marketing Director (Global), Visy Oy*

Aspects of science fiction films from the 1980s and 90s are becoming a reality in the modern container terminal. Some 20 years ago, vision technology in terminal operations was limited to optical character recognition (OCR) for container code recognition (CCR) and license plate recognition (LPR; also referred to as automatic number plate recognition, ANPR, depending on your geography). The game-changer in vision technology occurred in 2013 with the advent of dynamic neural networks (DNN). Long story short, using a DNN provides a faster, more efficient, and more accurate way to extract data from images using deep learning techniques. The benefit for the industry is that virtually everything that you photograph can be automatically digitised and therefore used as a basis for process automation. The latest application for container terminals, and those interested in a container's condition, comes in the form of Visy's Automatic Damage Detection System (ADDS), the first system of its kind.

VISY

Visy provides process automation ecosystems to manage the flow of traffic, cargo and personnel in transportation hubs and logistics centers. Every asset that goes in or out of a facility, whether by road, rail or quay, can be managed by Visy technology. Using vision technology and other data collection tools, Visy ecosystems manage more than 5,000,000 automation tasks per day in over 25 countries. Visit **www. visy.fi** to learn more.

it is safe to say that the issues surrounding damaged containers cost the industry billions of dollars per year. Broken boxes lead to spoiled cargo, and containers with severe structural damage present safety problems. Indeed, a container full of waterlogged iPhones, or one with warped corner posts that causes a stack to collapse, will evoke a ripple effect of insurance claims, angry customers, delays, and safety concerns. As a result, many container terminals have created processes to manage damaged cargo. However, until recently, those processes have been manual and therefore labour-intensive, slow, error-prone, and unpredictable despite management's best efforts. Today, damage inspection is automated through ADDS. This process automation improves the terminal's key performance indicators

(KPIs), including truck turnaround times, lifts per hour, and profitability.

Container terminals use OCR camera systems to identify assets entering or exiting the facility via road, rail, or quay to improve KPIs. The common industry terms for these solutions are gate operating system (GOS) with OCR for trucks, train GOS for rail operations, and crane OCR for quayside movements. These deployments all utilise vision technology to collect event data (box ID, seal presence, door direction, hazardous goods labels, etc.) and share it with third-party systems such as the terminal operating system (TOS).

The same camera systems can now be upgraded to include the ADDS feature through a simple software add-on. For example, as a truck drives through an OCR pre-gate portal and images
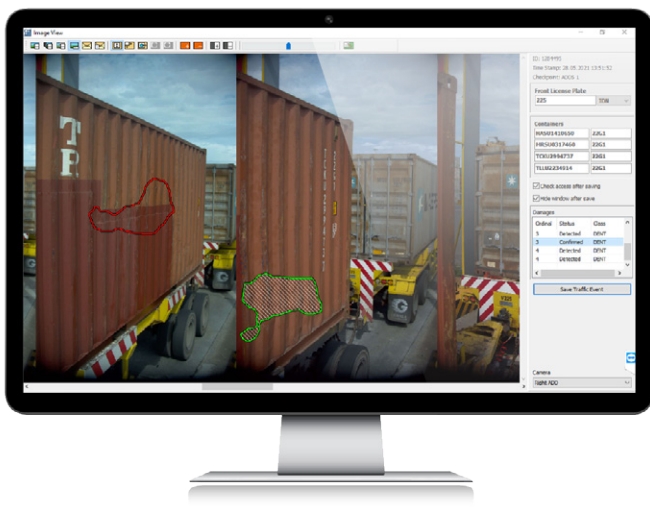
are taken to identify the box number, the same camera system now tells the operator if the box is damaged, shows where the impairment is and specifies the damage type. Afterwards, it is up to each operator how they want to use this new, digitised data.

Quayside operations

As boxes enter the terminal via ship-to-shore gantries, images are taken of all visible sides by the crane OCR system. Cameras are typically located in the spreader and on the crane's frame. As the spreader grabs the box(es), Visy's TopView application (i.e., spreader OCR system) captures images of the roof and uses those images for CCR, twin-20' detection, and ADDS. The operator receives confirmation of the box IDs even before offloading, thus preventing wrong moves. As the containers move into the exchange area, the frame cameras capture images of each box's long and short sides. These images are also used for automatic data processing, not least the box ID, ISO code, door direction, hazardous goods labels, tare weight, seal presence, and damage detection. Before the cargo touches the ground, the operator knows everything about it, including its condition. The information is digitised and shared with the TOS, meaning that exceptions, such as the lack of seal or extreme damage, are promptly managed. Perhaps the operator changes a work order so that a box goes to the maintenance & repair (M&R) centre and then updates the shipping line. With digitised data, previously inconceivable levels of automation become the standard.

The same data are used during loading operations. When a box is picked from the quay, all relevant information is captured, including its state. In this case, the terminal automatically collects and shares the standard OCR features, such as the box ID, but also confirms that the box is fit for sea travel. An equipment interchange receipt (EIR) can be automatically created and shared with the shipping line using the digitised data codes. Additionally, the terminal verifies that the box was in the same condition when it entered the terminal, refuting potential damage claims.

Truck gates

Before trucks and cargo arrive at the main gate, they typically drive through an OCR pre-gate portal. Depending on the operation, the portal is equipped with lights and cameras to capture high-resolution images for the OCR processes. The data extracted from the images will be similar to that utilised in quayside operations, save for apparent differences like truck license plates instead of terminal tractor ID, etc. Again, using a single set of images from the OCR portal, ADDS will find damage on the cargo, digitise the result, and create an exception handling event if required. Because the damage condition is digitalised, the work order can be automatically changed, and the container can be rerouted to the M&R centre if warranted by its state.

Much like the in-gate process, the out-gate process can be automated with ADDS. As the truck drives through the out-gate OCR portal, hi-res images are taken before reaching the main gate area, and all relevant data are acquired. The cargo is matched with the truck and work order, and the damage condition is determined. If the cargo is unfit for road travel, or some other discrepancy exists, the truck will be prohibited from leaving the terminal as an exception handling event. If there are no discrepancies, the truck will go, and the terminal has evidence that the assets were in acceptable condition when exiting the facility.

Rail operations

Like the truck pre-gate portals, rail tracks can be equipped with train GOS OCR portals to collect and share data in a variety of train operations. The train OCR portals work with double-stacked, dual-track, and bi-directional operations as the site requires. As the train travels through the portal, cameras capture hi-res images of the wagons and cargo to extract and share relevant data such as the box and wagon IDs and the composition.

The data are shared with the TOS and compared to the expected composition. Exception handling events are created in the system for box/wagon discrepancies and damaged cargo alike. If a box is damaged upon arrival, the information can be automatically shared with a third-party system before the terminal even offloads it. Similarly, as the train is departing, the OCR portal will verify that the boxes are in acceptable condition when they leave the facility.

Only the beginning of a new era

Visy ADDS automatically digitises the condition of shipping containers. This tool presents a massive opportunity for operators and the industry alike. The ability to automatically know the condition of a box as it arrives at a terminal would have qualified as sci-fi only two decades ago. Today, operators can utilise deep learning technology to automate processes, provide better customer services, and make prudent business decisions.

Sharing damaged cargo data with third-party systems like the TOS, creating a website for customers, or automatically generating and sending EIR reports are only the beginning of this new era in terminal automation. It will be amazing to see where vision technology takes the industry after another 20 years of development.

Interview with Stephan Piworus,
Global VP Sales Marine & Ports,
IDENTEC SOLUTIONS AG

Volatility and schedule unreliability force terminal operators to digitise and automate

by **Przemysław Opłocki**

The perfect storm of disruptions, such as Brexit, the COVID pandemic, and the Russian attack on Ukraine, has shaken the maritime supply chain to its core, increasing volumes and putting enormous pressure on port logistics, especially container terminals. We are talking with Stephan Piworus, of IDENTEC SOLUTIONS AG, about remedies to the resulting challenges like ship delays, lack of accurate data, and balancing profitability with necessary investments and new technologies.

■ **We are talking today about challenges for container terminals in general, focusing on the European and Baltic Sea regions. Some of the issues are volatility and ship delays. How does it look in the current situation, especially with the war in Ukraine?**

Yes, volatility and ship delays, or lack of schedule reliability, pose serious problems for container terminals. Volatility is something that we have been facing for many years already with bigger vessels and a lot of mergers, which automatically brings the volatility in the market. But I think when it comes to ship delays or schedule unreliability, these are issues that have become worse now in COVID times. When looking at this situation, I remember the time when I used to work for a terminal operator myself. Back then shipowners were always aiming

at a schedule reliability of 90%. And right now, it went down, I think below 50%. There is a big gap there. And there are many, many reasons for all these issues that the shipowners are facing at the moment. But the end result is that the yard utilization is heavily increasing, and it's hard for the container terminal operators to cope with that situation. It's very unpleasant. Only way out is to digitize and then automate your processes and make sure you got the right data in real time in order to become more flexible and make best decisions. Establishing common standards, like TIC4.0, will be crucial, too.

The war in Ukraine has definitely some impact. Already with the annexation of Crimea and the subsequent sanctions, container throughput in most European ports steadily declined. Now it drops

even further. But container throughput of goods to and from Russia, compared to bulk cargo, is on a much lower level and the effect is not nice, but not so dramatic for most European container terminal operators.

■ **What about the Terminal Industry Committee 4.0 (TIC 4.0), could you tell us something about this initiative?**

With all the challenges we just addressed, the best reaction right now for terminal operators is to digitise processes and invest in process automation. This is what we see at the moment. There is a big demand right now for process automation to face these challenges. And TIC 4.0 plays a major role here in terms of taking away risks and reducing costs. during the necessary digitalisation. A very helpful part of TIC 4.0 is that it's not only the terminal operators or just the equipment manufacturers who sit together, but it is all stakeholders. It's terminal operators, the equipment manufacturers, and the solution providers who try to promote, define, and adapt standards together, to eliminate loose ends, so to speak. If you have a great solution, you need it to be able to talk to other existing solutions in a container terminal independent from the manufacturer or solution provider, but it needs also to be prepared for any future development as well. For example, due to budget restrictions you only automate part of your terminal, but in the future you want to automate other parts as well, but you might consider doing this project with another vendor. It makes sense that all of these solutions easily communicate with each other so that implementation or replacement is "plug & play". With the current set-up where all the major stakeholders are involved, the biggest terminal operators and most important equipment manufacturers, this collaborative approach, willbe to the benefit of the whole industry. The terminal operator has less risk and implementation time goes down. This will not only bring down the cost, but also encourage terminal operators in their willingness to automate and lead to better quality by becoming much, much better and more efficient. I'm really supportive of this initiative.

■ **And what about the fleet management and asset utilisation?**

I believe it is crucial that all your data is digital and connected in real-time. And you need to make sure that even all your assets, e.g., the container handling equipment which is quite expensive and a big investment for container terminals, are smart and well connected by speaking the same language so that you can manage the fleet of your container handling equipment, or any equipment you have, and improve your asset utilisation as well. Not only saving a lot of cost, but also enabling much better planning and smart utilisation of equipment, in addition to knowing the status of the equipment, all in real-time. That permits the terminal operators to be on top of things and to make smarter decisions. Terminal Operating Systems for example can only be as good as the data input is, which usually defines the limits of the best systems. Poor data input = poor analysis = poor decisions. Making all your assets smart is very often even the groundwork for successful automation.

■ **And do carriers, when they choose the destination for their services and ships, also expect this kind of automatization from the terminals? That is, if you are not an automated terminal, we won't be coming to your terminal?**

I don't think so. The customers of a container terminal expect to get the best service for the best price. Nothing more, nothing less. But in order to achieve this there are no real alternatives to digitalization and automation. I think the good news is that semi-automated terminals can be as productive as fully automated terminals. Full container terminal automation is expensive and scepticism towards the ROI is always there. Therefor it can be an interesting alternative to automate just certain parts (e.g. gate, yard, reefer) and progress over the years with other parts enabling the terminal operator staying financially stable on the one hand and increasing terminal's productivity on the other hand.

■ **Could you elaborate more about planning and scheduling as it pertains to the sometimes-strained relationship between the technical department and operations?**

Yes, coming back again to that concept that everything is connected, the assets are smart, and you have all the information in real-time, helping you to be much better not only with your

operations, but also with your planning and scheduling. As a terminal operator, you usually have a technical department, which is taking care of all of the equipment and an operations department and by nature there are some kind of competitive goals between them, which leads very often to conflicts between these departments. The operations want to run in the best way, very efficient, with no delays, everything's on time, and with the maximum output. The technical department needs to make sure that all the equipment is working and that you don't have any unforeseen maintenance problems, e.g. one of the container handling equipment is down. But if you take a closer look at it, the competitive goals are sometimes even common goals. Most issues arise from lack of information or from information that was send too late. Still many terminal operators send Excel sheets back and forth to plan equipment and their shifts for the operations. deciding from a document, which is already outdated when it was sent, how to plan the shift. Very often this is still how it works. But if everything is transparent and you have all the information in real-time and everybody has access to it, that makes this process much, much smoother. Nobody has to provide any information or prepare any data and if something happens, you will see it right away, not with a delay because someone needs to tell you something or prepare the data

or in the worst case manipulate data. Tension between the two departments is taken away and everybody can concentrate on more important tasks. All in all it leads to better utilisation of your equipment and more efficiency. Also, it improves the safety of operations when you really know what is going on, for example, if you have a problem with tire pressure. When you have visibility and transparency, that helps a lot.

■ **So, the common goal is the best utilisation, efficiency, and safety in operations. How to ensure safety or even how to increase safety standards when there is significant growth in volume and productivity?**

Yes, safety has always been one of the most important factors and challenges for a container terminal and will always be. And, of course, if you have an increase in volumes and growth, along with what we mentioned in the beginning, volatility and so on, that brings more pressure to operations, and more pressure translates to a higher risk that things will go wrong – definitely an unpleasant situation. If you automate, however, you can take away a lot of these challenges. To put it simply, the fewer people you have in the yard, the safer it is. Usually, not much happens if someone sits in front of a laptop or computer instead of walking around between container handling equipment. But also smarter assets bring more safety to the game.

For example, you have shock sensors on your RTG or straddle carrier, and you realise that you have shocks in a specific area of your yard. When you realise and localize it you can act accordingly by defining this as a no-go area or a slow-down area. You can take action ahead of time before a crash to machine or injury happens. And you can only do a proper investigation if you have data, if you are aware that there's a problem. So, this helps a lot in improving safety and with the investigation process as well. But also predictive maintenance is a good example how you can become safer on the one hand and more productive on the other.

■ **Let's talk about the most significant challenges and your solutions at IDENTEC SOLUTIONS. As you already mentioned, the biggest challenge is really complexity – larger vessels, ship delays, less space, safety, and so on. How to stay profitable with all those issues on the table in the management of the terminal and how to handle them.**

Profitability is crucial that applies not only to container terminals, but to any other business area as well. Latest developments, we already discussed earlier, have made it more difficult for container terminal operators, but fortunately they can influence most of these challenges on their own by pushing digitalization and automation. Political conditions and framework are

more or less given, but the decision to invest in automation (even partially) enables them to stay profitable. I can see limitation for example, when due to bigger vessels, a terminal operator needs to invest in bigger ship-to-shore cranes in order to reach all the containers. That would be a major investment in your equipment and not automatically in automation and a challenge in terms of profitability. But what we have seen recently are a lot of automation projects all over the world, not only in Europe. Everybody automates or is in the process of installing automation solutions right now not only being a trend from the typical innovation leader in this industry, but even from terminal operators where you would never have expected that. Starting point is always a clear return on investment (ROI) calculation. And the reason is simple – with automation investments, we are more efficient and more profitable. It is just a simple ROI calculation.

■ **In terms of IT Tech solution projects, could you give us an example of how you try to help your clients deal with these challenges, perhaps a success story with your IDENTEC SOLUTIONS?**
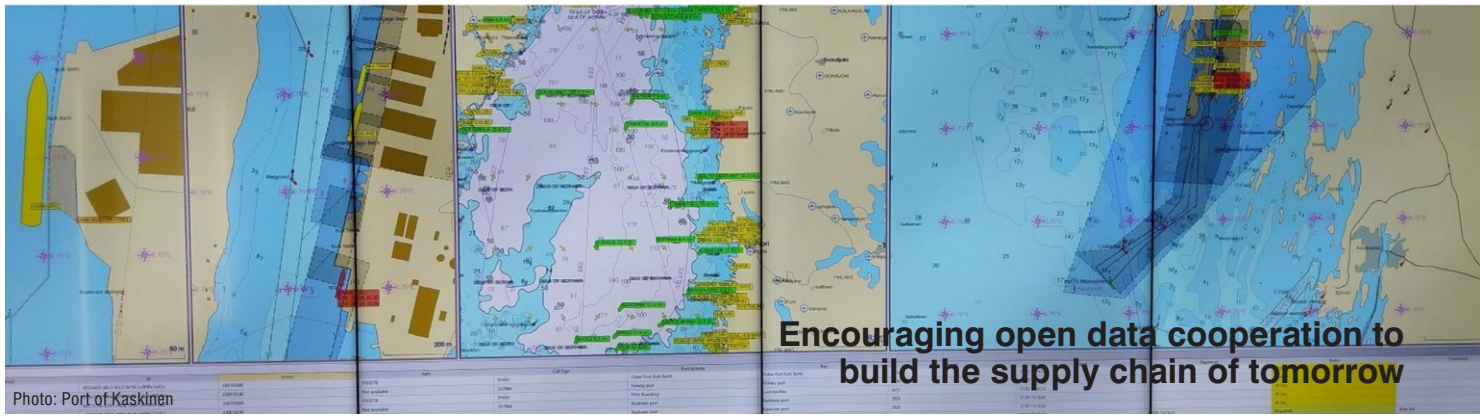
One of my favourite examples of a success story is in Algeciras, Spain, TTIA (Total Terminals International Algeciras), where we were from the very beginning.

The challenge there was to handle from scratch, getting the first semi-automated container terminal port in the Mediterranean operational in only 6 months. Biggest challenge in the beginning was to build trust and change their mindset coming from conventional terminal operators. They developed great and are still very happy, still using it today and in 2020 the Container Port Performance Index listed them amongst the top 10 terminals worldwide and the only one in Europe to achieve this level of performance. Although they have grown over the years, they have kept their flexibility, they have an accurate picture of their equipment in real-time, and whatever is necessary, they have the fleet management module, they have good asset utilisation, and also they have had proper planning and scheduling from the beginning because they have had that needed visibility. So, I think TTIA is definitely a good example of how automation through our solution called Terminal Tracker made TTIA work better.

We also have customers for whom we have installed our solutions like Terminal Tracker afterwards in a 24/7 environment although they managed so far to grow without us; Good example is our current installation at Eurogate Tanger in Morocco. They have had tremendous growth over the last years, incredible really, and they have had issues now that came along with that growth. So, in terms of yard capacity, in terms of having more and

more equipment, issues arose of how to better utilise assets and how to find enough qualified personnel; when you do everything manually, of course, you need more staff, and you need to find people who can do the job. Pressure increased because of their significant growth. And right now, we're installing Terminal Tracker there as well to overcome these challenges. And they are very happy with the first results here, but we're not quite finished yet – we have not gone live with all of the equipment, but hopefully, we will do this summer.

■ **Lastly, I'm really curious about artificial intelligence (AI). Do you have these kinds of solutions in your portfolio as well?**

In my opinion artificial intelligence is a very broad term, you might have some kind of more or less simple algorithm, and you can already say this is AI. Now if we keep this broad definition, I would say yes, we already have some AI in our solutions. But I think artificial intelligence has so many possibilities and will become more and more crucial for container terminal operators because of the challenges we already discussed earlier. However the groundwork for AI is always to have good data and preferably in real-time. Without this you don't even have to think about any artificial intelligence. And I believe this is the homework that still needs to be done by many container terminal operators. ■

Photo: Port of Kaskinen

Encouraging open data cooperation to build the supply chain of tomorrow

The digital logistics game

by **Patrik Hellman**, *CEO, the Port of Kaskinen*

"Digital" is the word of the (every)day. If you are not part of cyberspace, you are essentially pulling out the port development plug. Many Argonauts are sprinting for what seems to be the golden fleece of our times, irrespective of the industry involved, namely replacing the old way of management thinking with the future-attuned mindset. That and, of course, the right tools to walk the talk. However, the race is more of a marathon, requiring careful planning rather than rushing headlong into what was glittered by the silver-tongued marketing hotshot.

The goal might sound straightforward: to digitalise the operational and administrative works of a port. Yet, what are the most essential and valuable digital instruments to put into play? Is it all just 'nice to have stuff,' or can you better your port business with digitalisation, perhaps also lowering the carbon footprint for good measure?

The digitalised logistics game zone

The elephant-in-the-room-obstacle is the somewhat conservative and protective way of thinking, which still exists within the port sector. There is this fear of giving away too much information, "the family silverware," instead of trying to understand the benefits of being with others part of an 'open code,' that is, putting those 'knifes and forks' to exemplary work. The goal should be streamlining the A-to-B-to-C data chain, making this source open to everybody in the logistic ecosystem. Or the ecotech system, if you please. Getting that what-when-where-how full awareness, and even more,

a way of simulating and predicting future operations and movements should be something to strive for.

Let us use some imagination. What if the future business in shipping, road haulage, rail, airline, and port operations – the movement of goods – was a digital game run from different global and regional control centres, and the information stream was an open set of players and variables. The business – trading – would not be the business itself but a digitalised game zone. Almost like a casino or a strategy video/board game where you bet on certain events based on what you think will be the outcome. However, the difference would be in skill, not random luck, as true knowledge and experience with processing open logistic data would differentiate players. Ultimately, we would witness digital twins run by Artificial Intelligence (AI) playing with each other to sort out the best outcome of getting goods overseas. That way, perchance, we could avoid "cancelling Christmas" because the global supply chain is, at present, ill-fortuned.

Why risk?

Sure thing, but maybe it starts to sound more of science-fiction than your daily glamourless logistics. Or does it? The 'Big Picture Challenge' is that there is not enough accurate data on cargo movement, without distinction for the used transport mode – or ports for that matter.

It is common knowledge that vessels spend some 30% of their life cycle at quays instead of ploughing the seven seas. Naturally, ships have to berth to load- or unload the freight; still, more often than not, they idle waiting for the goods to arrive, there is not enough service supply in the port, or because some black swan has decided to turn things on their head. Media coverage is packed to the brim about container ships stuck here and there, but tramp and bulk traffic are also plagued by subpar vessel-cargo alignment. Compare it to the airline business, where the ideal turnaround for aeroplanes is a maximum of two hours on the ground, with low-cost carriers staying for one hour (or even less).

Coordination and supply of land transport can add insult to injury, to mention the hunt for empty containers only. Weather is also a factor that can be rough to incorporate because of its unpredictability (surely, climate change won't make things easier in this regard). Again, unprecedented events, long-standing as the current pandemic or one-offs such as the Ever Given incident, disrupt the logistics chains, shredding the schedules of ports, cargo owners, and carriers. The impacts of the Suez Canal jam are still with us today.

Perhaps one should think of the logistic chain as a single entity comprising all chains – not just one item going from place A to B. It is, however, easier said than done, as the human factor comes into play. We cannot simply control all cargo or vessel movements as an agent, broker, or stevedore. We, therefore, end up concentrating on a few operations we can wrap our heads around. And since everybody is doing the same, we finish with relatively inefficient logistic chains. That is not all. Cargo owners and shippers are very reluctant to try to search for different or more competitive logistic routes. "Why risk a seems-to-be working system, when you do not have good enough information about the alternatives?" It shouldn't be the way of thinking, in any case!

Back in the port, one focuses on the operative and administrative functions and how to digitalise them. The challenge is that the way things operate in a harbour is split up into many single operations or operative entities, each more or less siloed. Without having the whole ongoing picture, there is no complete understanding of the processes, thus integrating and making them digitally workable. Also, not every operation and process are worth digitalising – but you must see the forest through the trees to discern what-why-and-how will be better of by making it digital.

The most critical issues for ports are time and place. One wants to maximise berth, warehouses and storage area usage. You want to plan to be efficient since time is of great essence. The port needs to move the machinery as little as possible to save time and energy and minimise its carbon footprint. One also wants to know the (exact) arrival and departure times of vessels, vehicles, and cargo to effectively coordinate processes, including maximising the input of human resources.

A fairly long way to go

Sensor data, identification, and timestamps are the most valuable information in digitalising the logistic chain. Ideally, you would want to know in advance when the cargo is planned to leave point A heading for the port at point B – and when it leaves in real-time. Cargo owners or shippers would like to know when the vessel arrives, while the receiver at point C wouldn't mind knowing when the delivery could be expected. Those handling the cargo at different stages within this process are busy wanting to know when it is their turn to do what, when, and where.

It is a complex system that is nowadays administrated via telephone and email or local communication modes. Somebody might still be using a telefax… As things stand today, the described mixture cannot be handled efficiently on a bigger scale. And that is why digitalisation will come in handy.

Unfortunately, there is not yet a fully-ready system that would 'talk' with everybody on the same level and share the information equally to anybody connected. There is no coherent approach to dealing with all these challenges. Every player is just learning to transform port management and cargo movements into a digital information stream. And even if there are many providers of digitalised systems, some specifically catering to ports and a few of them very much ahead of others, we still have a fairly long way to go. It goes beyond high-tech, too; there are many other third-party issues (think insurance policies, legislation, business protection rules, cybersecurity) in need of careful consideration.

The field in front of us is still full of unturned stones. AI and automated logistics chains? Reliable timetables? Widespread data sharing? Pure sci-fi? Brace yourself!

The fun begins

Honesty is the best practice, they say. That is why this read poured much cold water on the transport & logistics status quo. It is because I firmly believe we are – should be! – going towards a digital and automated logistics ecotech system.

Yet, the system won't set up itself; cooperation is pivotal. It isn't very sensible if stakeholders are trying to gain a competitive advantage by developing closed systems. The intention behind it seems obscure – is it better service for the customers or tethering them so they will think twice before seeking an alternative? This way, we will achieve nothing, just repeating the past, but in a more refined, digitalised way.

There are steps taken with the Maritime Single Window and the Single Window Environment for Customs on the EU level. Several national and cross-border projects have picked the gauntlet of addressing data exchange for better freight traffic. There are the Finnish-Swedish EfficientFlow, Fintraffic's Vessel Traffic Services, the recent teaming up of the Finnish next-gen logistics tech-pioneers Awake.AI and Youredi, or the fastest growing Finnish IT company Unikie whose PortActivity App is used in almost every port in Finland, to name but a few. Atop that sit solutions that enable even smaller ports to tap into the digital revolution: automated warehouses, digital twins, and terminal operating, traffic and port management systems.

Interestingly, getting that digital and automated logistics ecotech system online will be just the start. The fun with building specialised digital operative and administrative tools for the needs of a specific stakeholder, such as ports, will begin. Yet, no sooner than all 21st century Argonauts board the e-Argo. Let the game begin!

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Photo: FuelTrust

Why accountability in bunkering is required to create greener supply chains

In technology's trust

by **Jonathan Arneault**, *CEO, FuelTrust*

The marine fuel sector is historically opaque in its operations. Fuel users and suppliers often lack the information they need to understand the history and complete make-up of the products they handle. However, knowing how a fuel will combust in an engine is key to understanding how a vessel performs and the emissions it will produce. The lack of accurate information about fuel provenance and quality hinders day-to-day operations for individual organisations, likewise the delivery of the industry's future environmental and sustainability goals. Here is how this information can be put into the hands of shipowners and bunker suppliers.

FUELTRUST
POWERING BETTER DECISIONS

FuelTrust leverages its maritime technology platform to authenticate relationships across the marine fuel life-cycle, digitally verify data from shared sources, validate decarbonisation and compliance, and identify potential bunker fraud and risk. With deep insight into when, where and from whom quality fuel is supplied, our solution allows you to alleviate the financial impact of bad fuel, mitigate regulatory risk, and empower sustainable shipping. Click www.fueltrust.io to find out more.

Quality and fraud issues are well known in the bunker industry and frequently accepted by vessel operators as an unavoidable cost of doing business. Discrepancies in the quantity of fuel delivered during bunkering are often overlooked, even though deliveries can be up to 3% less than that stated on the bunker delivery note (BDN). These low-transparency transactions tot up to billions of dollars lost by shipping each year.

In addition, the industry faces its biggest challenge – tackling climate change by meeting the shipping industry's decarbonisation and the wider sustainability targets. Shipping is being pushed to be more transparent and open by regulators and influential stakeholders calling for the sector to deliver greater (environmental, social, and governance) accountability. For instance, nearly 50% of the global ship finance portfolio comes from signatories to the Poseidon Principles, which set strict finance access criteria for shipowners and operators and, therefore, their ability to operate.

The Poseidon Principles and all emissions trading and credit methods currently measure vessel emissions using government guidelines based on generalised calculations: a one-size-fits-all approach formulated to simplify enforcement. They overlook the range of different engine types and how operations and maintenance decisions might influence their performance. At a vessel level, emissions are estimated using manufacturer specifications and ranges classified by fuel type and grade. The resulting figure is only a rough approximation of the emissions of a vessel.

Calculating ship emissions using these broad-brush methods results in vessel owners and operators being charged or taxed too much relative to their actual emissions – even if they have taken actions to improve their performance.

Breaking the fuel DNA code

FuelTrust uses Artificial Intelligence (AI) and blockchain-enabled technology to authenticate relationships across the marine fuel life-cycle to provide more accurate fuel and emissions tracking. This approach allows

users to create a decentralised, immutable store of information – a single shared source of truth, if you will, recording the fuel's life-cycle. In this way, we eliminate the opaqueness that has been typical of the bunker sector.

We then analyse the data recorded in the blockchain using our proprietary AI Digital Chemist™, a tool analysing information from suppliers, BDNs, certificates of analysis, and vessel operation data to create a chemical digital twin of the fuel. It then replicates interactions in the fuel at a molecular level to identify how it has been blended, what reactions would have taken place between molecules, and what occurred during combustion. This provides a precise 'DNA' of fuel at the batch level, enabling us to report fuel characteristics and emissions accurately.

The experience of tracking, recording and analysing these data sets using our Bunker Insights™ and Carbon Baseline™ products often reveals huge discrepancies in fuel characteristics. One issue discovered while working with our clients and their counterparties' data is a stark difference in fuel energy densities. Based on our data analysis on 14m barrels of very low sulphur fuel oil across 28 batches, we identified a difference in performance between batches of fuel of up to 3%. For a fully laden Panamax container ship, this would equate to a 50t fuel saving on a voyage from Vancouver to Portsmouth in the UK – or up to 469 nautical miles of extra sailing distance on a typical bunker.

For shipowners and operators, such insights are crucial to understanding where and when to buy fuel. They also come in handy when dealing with regulators and seeking potential carbon credits based on their decarbonisation initiatives.

Buildi with buyers

For fuel suppliers, our findings represent an opportunity to market a superior fuel offering. Due to the lack of insight into the fuel supply chain, suppliers cannot currently gain any advantage by supplying better quality fuel. Documenting the life-cycle of fuel batches allows suppliers to gain a competitive edge by providing reliable evidence of fuel quality and building trust with buyers. Over time, they can use these data to build a reputation as high-quality suppliers.

Fuel suppliers must also protect themselves in the event of quality claims, and FuelTrust's products document a fuel's journey through the supply chain without the risk of disclosing commercially sensitive information. In the case of claims, our Bunker Insights™ provides parties with pre- and post-purchase insight into the life-cycle history, chemical compatibility, and regulatory compliance of fuel – alerting all parties to potential risks and problems.

Creating a cleaner world

Future fuels and stakeholders' increased interest in tweaking their operations will continue to drive the shipping industry and the bunkering sector to increase their understanding of the fuels they use and supply. FuelTrust is both commodity and fuel agnostic. We can use our technology to trace the origin and outcomes of alternative fuels such as green ammonia and biofuels – or even fuels and materials in other supply chains like chemicals, aviation fuels, or metals.

The importance of this cannot be overstated. Fuels presently represent over half of the expenses involved in operating a ship, and the cost of new fuels is anticipated to be much higher than existing fossil fuels. Today, maritime fuels make up 12% of the global fuel market but lead to over 30% of emissions, so ensuring accuracy and accountability in bunkering is critical to creating a cleaner world.

During the decarbonisation transition, the industry will need to deliver accountability and value for investors, regulators, customers, and consumers alike. Achieving this will impose tremendous logistical challenges. Fortunately, by accurately simulating and analysing the contents of fuel tanks and engines, we can create a trusted, transparent fuels supply chain that can deliver insight and accountability quickly and cost-effectively. ∎

Photos: Aircoat

The AIRCOAT project: a new coating solution for reducing maritime shipping emissions

Sailing on air

by **the AIRCOAT Team**

To achieve the greenhouse gas emission (GHG-E) reduction goals outlined in the European Green Deal, the aim of which is for Europe to be the first climate-neutral continent, the maritime shipping industry must reduce its footprint: by 50% by 2030 and 90% by mid-century. This can hardly be ticked off by a single measure alone. Ship resistance reduction means (via advanced coatings, air lubrication, hull management of biofouling, hull form design) are the necessary drivers to reduce emissions. Shipowners cannot solely focus on alternative fuels, which won't be on hand in the medium-term in large quantities, nor other solutions such as slow steaming, which is well understood but will increase delivery times and the number of ships needed for transport. As such, hull optimisation technologies look increasingly tempting – for newbuilds and retrofits alike.

AIRCOAT

AIRCOAT stands for AIR-induced friction-reducing ship COATing. It is a Horizon 2020 EU funded project promoting a passive air lubrication technology with the potential to revolutionise the ship-coating sector. Head to aircoat.eu to discover more. You can also watch the project's Final Event by going here.

Since 2018, the AIRCOAT project has been targeting the development of a bio-inspired green solution to create a passive air layer on ship hulls underwater – so-called air lubrication. The goal is to reduce drag and prevent biofouling, thus lowering fuel consumption and emissions.

The AIRCOAT technology consists of a structured foil that retains air when submerged. Due to the lower viscosity of air (low resistance to deformation) in comparison to water and the air barrier, drag reduction and limited attachment of fouling organisms are expected. The foil will also help avoid releasing biocide anti-fouling substances into the water.

Johannes Oeffner, Project Coordinator of AIRCOAT and Team Leader at Fraunhofer Center for Maritime Logistics, highlights, "We have developed production lines and testing facilities, produced a foil prototype, coated a research vessel and applied a test patch to a container ship, performed a vast number of calculations and simulations and spent many hours with hydrodynamic and biofouling experiments. We have tackled a lot of challenges, had to make some compromises and learned a lot which will help to advance AIRCOAT further for being a future ship efficiency technology."

From plant to a lab to a ship

AIRCOAT is responding to one of the main challenges of the European Green Deal: nothing less than halving shipping emissions by 2050. Today, maritime transport still emits around 940mt of CO_2 every year, about 2.5% of global GHG-E. Because it can reduce up to 10%
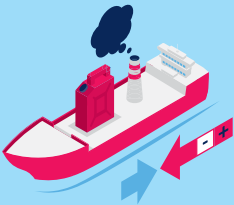
What is friction and why is it important?
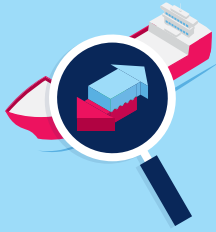
The movement of water along the ship hull causes skin friction resistance.
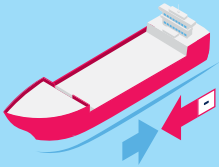
This frictional resistance works against the movement of the ship, reducing their speed.

To conserve speed, ships have to exert more force in order to move through the water, which increases fuel consumption and CO_2 emissions.

What solution does AIRCOAT provide?

By covering the ship hull with the passive AIRCOAT layer, the air acts like a lubricant between the hull and the water.
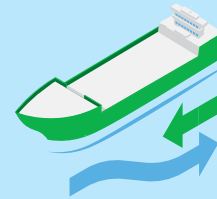
The air layer lowers the frictional resistance of the ship, minimizing the speed reduction.
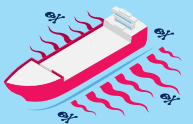
The AIRCOAT technology has the potential to save 73 million tonnes of fuel at any speed and 225 million tonnes of CO_2 emitted in relevant ships.

What is biofouling?

Ship hulls are often covered in marine life and organisms – this is called biofouling.

Common anti-fouling paints wear off, containing chemical substances that can harm the sea.

Biofouling increase surface roughness, which increases friction...

... increasing their fuel use by 40%...

... and increasing their emissions.

What solutions does AIRCOAT provide?

The passive air layer created by AIRCOAT separates the ship hull from the water, reducing or preventing biofouling.

The AIRCOAT coating does not harm the sea.

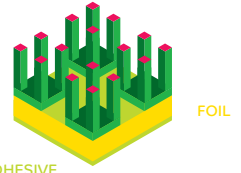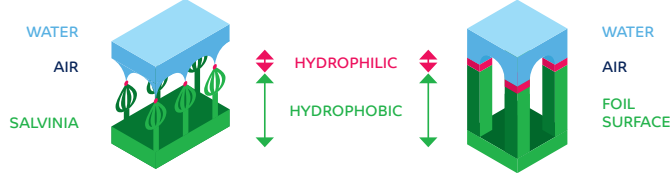AIRCOAT protects ships from the added friction due to biofouling...

... thus reducing their fuel use...

... and decreasing their emissions.

1. Development of the surface/foil implementing the Salvinia effect, that is able to trap a layer of air when submerged in water.

SALVINIA FLOATING FERN

WATER
AIR
SALVINIA

HYDROPHILIC
HYDROPHOBIC

WATER
AIR
FOIL SURFACE

FOIL
ADHESIVE

2. Apply the AIRCOAT material onto a self-adhesive foil.

3. Large-scale production of the AIRCOAT foil.

4. Application of the AIRCOAT foil on the hull of ships.
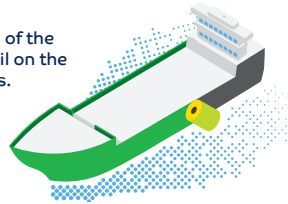
of the ship's velocity per year, biofouling is an important factor in increasing fuel consumption and, consequently, the industry's carbon footprint. Many solutions exist to reduce biofouling or drag, but none addresses both.

Professor Thomas Schimmel, Scientific Coordinator of AIRCOAT and Director at the Karlsruher Institute of Technology's Institute of Applied Physics, explains the bio-inspiration methodology that AIRCOAT foil uses, "It was amazing to understand the mechanism, how the plant keeps a layer of air under water and to produce first artificial air-keeping samples in our lab – which by the way still are keeping the air layer even after years under water. But this was just the beginning. It was the step from the plant to the lab. The step from the lab to the ship had still to be performed, and progress has been achieved during the past four years. Starting with small, fragile samples on the centimetre scale, we meanwhile produce elastic foils on the kilometre scale. And the structures which in the beginning were on the scale of one millimetre are now on the micrometre scale."

The innovative eco-friendly air lubrication technology developed within the project coats the ship hull with a thin and permanent layer of air without the need for continuous pumping or air bubbling. The solution is inspired by Salvinia Molesta, a floating water fern that forms a permanent air layer when submerged

in water. The air retaining ability of the so-called Salvinia effect relies on a complex micro- and nano-structured surface with hydrophobic and hydrophilic characteristics. AIRCOAT has technologically implemented this natural phenomenon to produce a bio-inspired hull coating technology that combines three key advantages: reducing the hull's underwater friction; minimising fouling (as fouling organisms find it rather impracticable to settle on a layer of air); and getting rid of toxic anti-fouling substances.

The AIRCOAT foil is introducing advanced technology in hull coatings and, as such, will come with strong investments from the vessel owners' side. What makes AIRCOAT a lucrative choice is the expected operational savings. The solution brings direct business profit to the ship operator by materialising savings in fuel consumption and hull maintenance costs between dry dock intervals whilst promising significant investment returns.

Testing, testing

Several remarkable project advancements have been made in developing a foil with a surface structure to retain air and realise drag reduction.

First, there is the geometry and the size of the surface structure. Theoretical calculations and simulations on a high-performance computer cluster have shown that drag reduction increases with surface structure and that 10% is possible
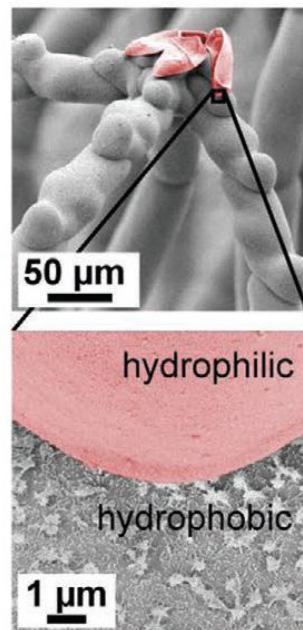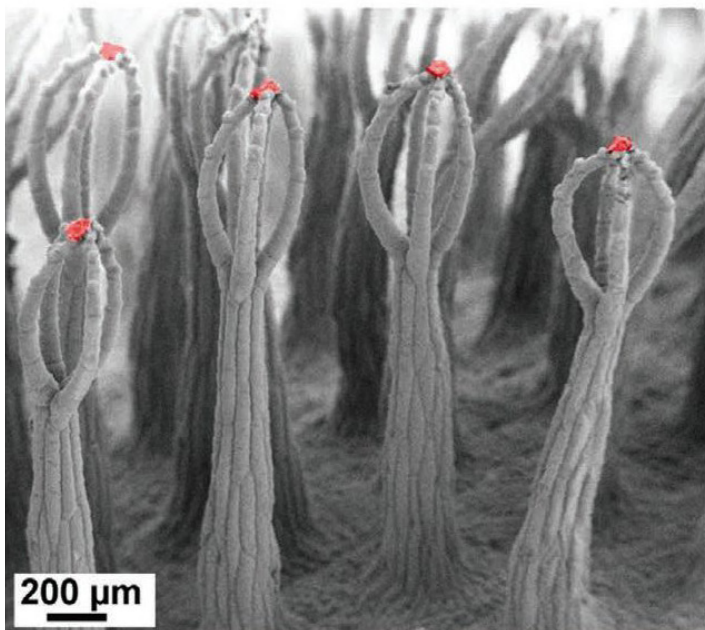
applicability and operational durability.

Fourth, testing the solution. A ten-metre-long research vessel in the Mediterranean was coated on one side with the air-retaining foil. Meanwhile, the first 'real' maritime conditions demonstration was performed on a container ship in Romania, where the foil was attached to a part of the hull.

Lastly, a laboratory check of the anti-fouling quality has been carried out. Experiments have indicated that diatoms, a special kind of micro-organisms widespread in natural aquatic environments, avoid growing on air layers. They, however, like to inhabit the same surface when the air is removed for a comparative experiment.

Tool up!

In the pursuit of energy efficiency gains, it is crucial that all efforts also preserve the integrity of marine ecosystems. After all, what good can come from climate action that leads to adverse environmental impacts? The maritime sector has been working to phase out harmful compounds from anti-fouling coatings since 2001; however, negative effects of anti-fouling biocides on marine life are still being detected. Established anti-fouling coatings have an average duration of five years between applications, which generates costs, i.e., funds that could be directed towards other green investments aboard ships or in port/ terminal infrastructure.

for frictional drag reduction. Hence, depending on ship speed and length, the size of the surface structure has to be adapted to reach equal drag reductions.

Second, the production of the air-retaining foil in a novel, kilometres-long roll-to-roll process has been developed. To reach the deep-water and high-speed stability of the air layers, it has been necessary to manufacture the individual structures down to the micrometre scale.

Third, appliquéing the foil on ships: industry procedures have been developed to manually apply the self-adhesive prototype foils to commercial vessels within standard dry-docking processes. Demonstration tests with a container ship showed the coating's function

Further incentives to the shipping industry to invest in environmentally friendly solutions to tackle biofouling are essential to ensure that solutions put in place today are contributing to both climate and marine protection goals. In addition to offering significant fuel efficiency gains, AIRCOAT is a retrofit technology: it can be put into place on existing ships, which avoids early tonnage retirement and the need to build new vessels to reap the technology's benefits. In practice, it allows for a much faster transition to a greener fleet. With 50% of the European tonnage being under 15 years, retrofit solutions give the industry the tools to quickly adapt. ■

How technology can bring greater order and certainty into logistics
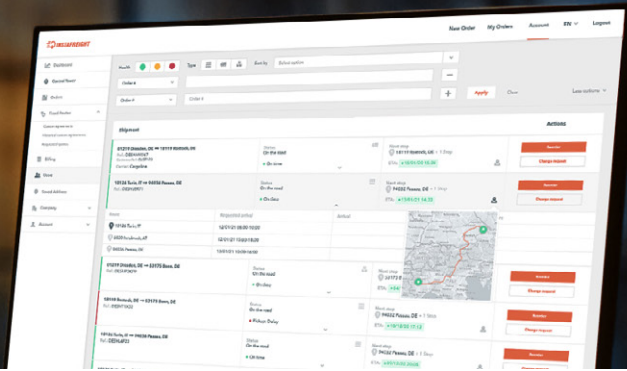
A spring tender season in turbulent times

by **Fitzwilliam Scott**

Rising diesel prices, driver shortages, closed borders, blocked trade lanes – by and large, shippers cannot complain about the lack of challenges. Although not every one of these can be resolved immediately, logistics service providers are working hard on solutions. A digital approach can help secure capacities and handle fluctuating fuel prices in this difficult tender season.

INSTAFREIGHT

InstaFreight offers digital B2B transportation services that enable fast and easy processing of freight transportation. For shippers, the company's fully digital process (from quotation and order placement to track & trace and freight documents) allows for increasing efficiency while cutting costs. For carriers, InstaFreight finds suitable transports according to one's vehicle fleet, helping to optimise capacity utilisation and pay in a fast and reliable manner. Visit www.instafreight.de/en to learn more.

Since the pandemic, the story has been making news headlines: shippers are struggling to secure production processes and deliver their products. Global turbulences stand behind this precarious situation, including the most recent one: Russia's aggression on Ukraine. They are affecting entire economies and thus also the worldwide logistics chain. Meanwhile, the coronavirus hasn't gone anywhere, still capable of closing down cities the size of Shanghai. Additionally, the European Commission's Mobility Package will bring about new labour regulations in a region that has been struggling with a truck driver shortage for a long time.

All of the above affects the availability of raw materials, building components, cargo space, fuel, personnel, and transport capacities, forcing companies across the board to incur costs and trickle them down to consumers. Even before the turn of 2019/2020, organising shipments successfully had often been a delicate equation in terms of efficient running times,

freight rates, and the best transport modes used. However, many of the most popular trade lanes are currently disrupted due to geopolitical turmoil, with COVID-19 continuing to curtail cargo space.

It is not easy for shippers to manage their logistics efficiently in such circumstances. One of the possibilities to get regular demands fulfilled is a tender, as the strategic development of a diverse carrier network is becoming increasingly important to secure capacities in the long term.

Keeping the chain unbroken

No truck, no shipment – it doesn't get any simpler. In general, obtaining capacity at a competitive price is one of the biggest advantages for shippers when tendering business. This factor is becoming ever more crucial due to the growing driver shortage, the pandemic, regulations on CO2 taxation and cabotage, and political instabilities affecting the usually finely balanced global division of labour and the supporting logistics industry. But

even with a closed tender, the agreed capacities cannot always be guaranteed, e.g., in the event of driver scarcity or the closure of mainstream trade routes.

To minimise the risk, it makes sense to commission contractual partners with a diversified, extensive carrier network. This is where digital logistics platforms come into play. "InstaFreight offers its customers an extensive network of transport partners through its cooperation with over 25,000 carriers. In addition, we are expanding our charter offer by managing freight capacity on a growing trade lane network. That way, capacities can be secured in the long term," says Philipp Ortwein, the company's Co-Founder & Managing Director.

Another factor that affects the efficiency of transport logistics is the accessibility of trade lanes. Current geopolitical disputes are impairing international routes and thus hinder the transport of goods. One can have the proverbial truck, but now the wisdom goes no road, no shipment. InstaFreight offers alternative intermodal solutions for such cases. Shifting volumes from road to rail is a way to secure the supply chain in crisis times, along with saving CO2 and reducing freight costs. Especially if the cargo is heavy, transported over a long distance, and not time-critical, companies benefit financially from intermodal transportation.

Fuel prices and freight rates: in check

"Money makes the world go round," states the character starred by Liza Minnelli in the musical Cabaret. In addition to securing capacities, the optimisation or flexibilisation of freight costs also plays a significant role in the tendering business.

Due to the rising diesel prices since the outbreak of COVID-19 and their recent explosive increase when armed conflict came back onto European soil, shippers are trying to hold onto their old tender agreements to avoid freight cost increases. This approach makes sense strategically. That said, even the existing tender contracts are renegotiated again and again due to the rising diesel prices – a time-consuming and resource-intensive undertaking.

One solution is the so-called "fuel floater cost model," used for recurring business. Within it, diesel prices are automatically adjusted to the current market value at any given time – without the need to renegotiate contracts. "Our transport partners are thus protected against rising fuel costs, while shippers benefit from falling fuel costs
– a fair and transparent model for both sides," explains Ortwein. "As a digital service provider, we have the technology to quickly roll out this model across our customers' entire carrier base – saving them a lot of administrative work," he adds.

With freight rates fluctuating even stronger over the last months, it becomes increasingly difficult to keep an overview of the current market prices. Tendering business is an effective way to benchmark freight costs and check if the current agreed freight rates are still competitive. With securing capacities being the most pressing challenge for many shippers, getting the best price might be second-listed. Still, it remains an important factor – especially for large companies with considerable volumes to move.

Getting past the wall

The current situation in the transport business illustrates that stable supply chains cannot be taken for granted. Transport prices are record high in many regions, and capacities are very scarce. Yet, there were many empty runs in European land transport: roughly 30% before the events that shook the world. Furthermore, with more than 770,000 transport companies, the market is very fragmented.

Through platform technology, InstaFreight makes this capacity more accessible to shippers looking for reliable transport partners, proficiently organising their supply chain management. InstaFreight successfully closed its Series B funding round at the beginning of this year. More than $40m will help the Berlin-based logtech company continue its way to digitise the road freight market to, from, and within Europe. Heliad and the European Investment Bank led the financing round, with all previous investors of InstaFreight also participating. This commitment underlines the necessity to maintain a resilient, efficient, and sustainable shaping of overland transportation. "Land transport is still highly inefficient, and we as InstaFreight provide more sustainability and efficiency through a technological approach, thereby contributing our share to secure global supply chains," underlines Ortwein.

It was once said that "If you run into a wall, don't turn around and give up. Figure out how to climb it, go through it, or work around it." Even in turbulent times, shippers can turn the tender season into a strategic advantage by utilising the digital processes of logistics service providers. They help achieve flexibility in ever-changing situations through their broad and diverse carrier network, adaptable freight cost models, and alternative transport solutions like intermodal. ∎

Photos: ZeroNorth

Digital voyage analytics to support shipping's decarbonisation

by **Pelle Sommansson**, *Chief Product Officer, ZeroNorth*

At ZeroNorth, we have recently integrated a new service into our platform to provide ship operators with the voyage insights they need to analyse, forecast, and proactively strive for their Carbon Intensity Indicator (CII) goals. Here are my thoughts on why the CII solution – and digital (energy efficiency) technologies in general – will be critical for the future greening of ship operations, including the shift to climate-friendly marine fuels.

ZERO NORTH

born from Maersk Tankers, ZeroNorth was founded to change the shipping industry through digitalisation. Working alongside our customers and partners, we truly believe that we can support shipping companies worldwide to optimise their business while reducing shipping climate footprint. This is what empowers us, a team made up of some of the most creative and strategic minds in shipping, with over 90 years of experience in the industry. Set a course for zeronorth.com to discover more.

as shipping becomes increasingly influenced by charterers, shippers, and consumers seeking to meet decarbonisation targets, it is necessary for the industry to take immediate action. We must also acknowledge that pressing regulatory requirements, including the International Maritime Organization's (IMO) CII, require compliance across the global fleet. Whether this is through designing next-gen vessels, working on the structural frameworks that hold back emission reduction progress, or by implementing new solutions and technologies, there are actions that we can take today that will set us up for success in the future.

Critical to future profitability

Introduced by the IMO at the 76th gathering of its Marine Environment Protection Committee, CII regulations will be implemented in 2023 to support the organisation's longer-term objective of reducing international shipping's carbon intensity by 40% by 2030 vs the 2008 level. It sets out mandatory requirements for all cargo and passenger (Ro-Pax and cruise) vessels above GT 5,000 that trade internationally.

The scheme results in a score (from A to E, like that found on home appliances) that indicates how efficiently a ship transports goods or passengers (measured in grams of CO_2 emitted per cargo-carrying capacity and nautical mile). The rating requirements will become 2% more demanding each year. By the end of 2026, there will be an 11% reduction compared to a reference line of 2019.

Shipowners and operators will be required to record their vessel data via their Ship Energy Efficiency Management
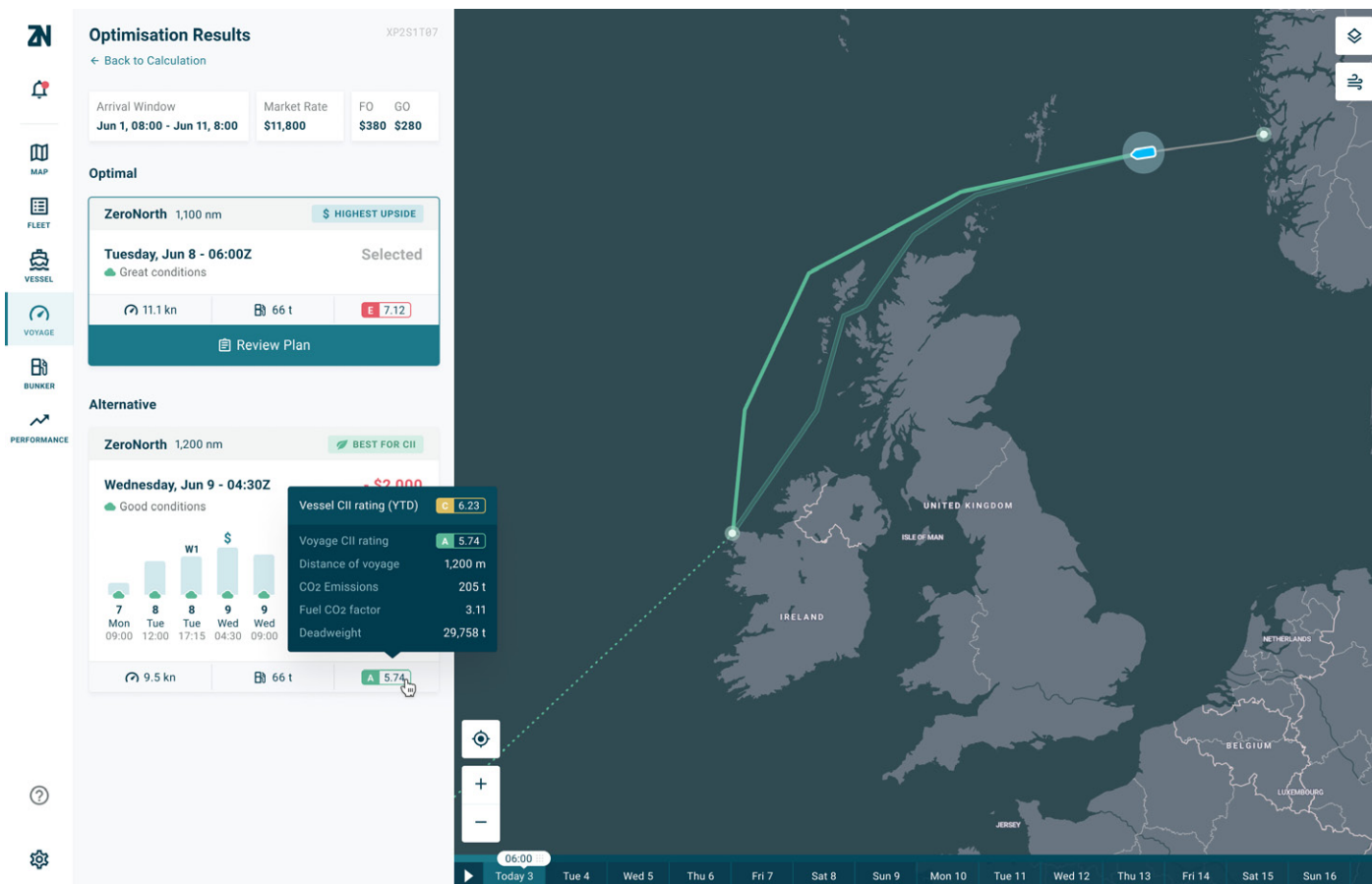
Plan (SEEMP). An improvement action plan must be submitted if a vessel is rated D or E. The reality is that many ships with a low CII rating will cease being commercially attractive. Therefore, shipping players must look beyond compliance to sustain or improve their fleets' operational efficiency or risk losing commercial viability.

The CII will be a critical operational key performance indicator from a regulatory perspective, but beyond that, it will create transparency and force efficiency. It is not an exaggeration to say that CII reporting is critical to future profitability. Doing nothing isn't an option, but accurate accounting can be highly complex and confusing. Luckily, as with many challenges the industry has had to navigate, digital technologies can be deployed to provide part of the solution. In December 2021, ZeroNorth launched a CII analysis and optimisation solution that supports owners and operators by enabling them to proactively implement plans to improve revenue and reduce emissions whilst complying with CII regulatory requirements.

To monitor…

ZeroNorth's emissions optimisation solution is the most comprehensive CII offering on the market to date, and it fits seamlessly together with ZeroNorth's existing cloud-based voyage, vessel and bunker optimisation platform.

The new service enables operators to view recommended voyage routing options to support a vessel's CII rating goal. Because the functionality is integrated with real-time weather route and voyage optimisation, CII recommendations will be made alongside options that reduce emissions and improve revenue, ensuring that owners and operators can prioritise maximising their competitive advantage – even while sailing.

This flexibility allows for different priorities to be set for separate voyage parts, where, for example, a vessel may need to sail at full speed for one time-critical leg of the journey. After that, reduced speed or alternative routing might be advantageous in reducing the crossing's overall CII.

Beyond the immediate decision-making for specific voyages, historical and year-to-date CII data derived from noon reports is made available for each vessel in an easily understood numerical and graphical format. The calculations consider necessary ship factors, such as type and deadweight, to provide a CII rating for the year-to-date and year-by-year performance monitoring. The solution also generates alerts when a vessel is at risk of non-compliance.
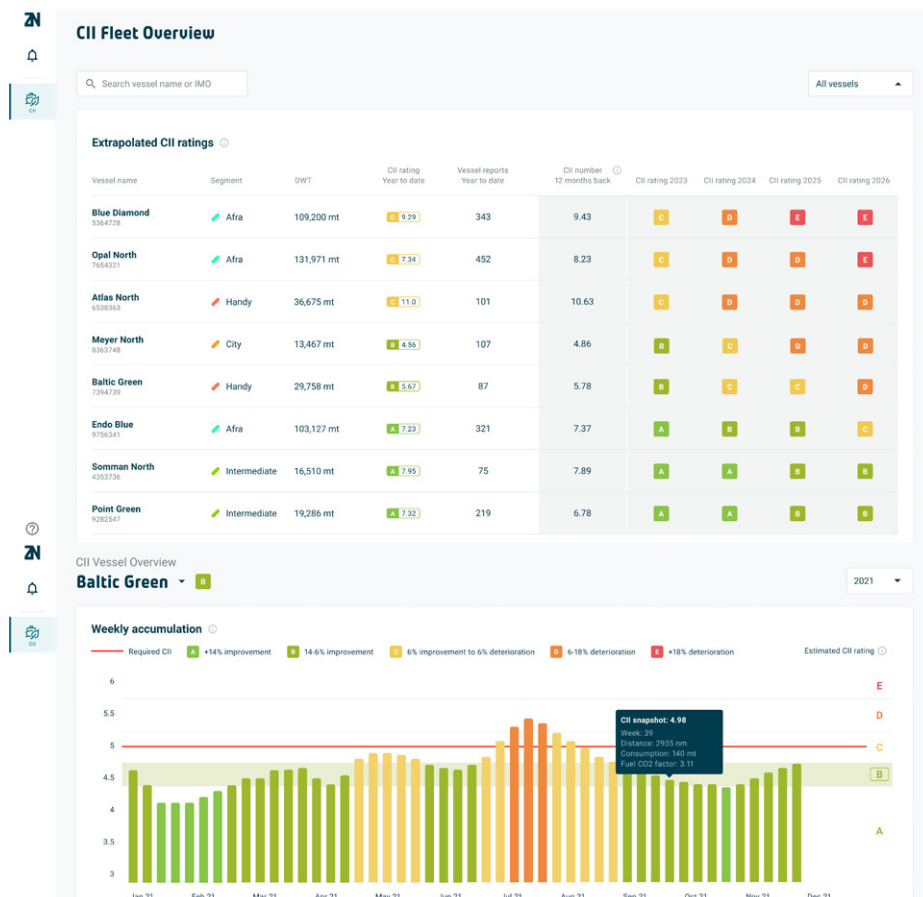
The accumulated data is used to predict each vessel's next CII score, opening the way for ship operators to vary voyage and vessel parameters and instantaneously see what impact their choices have on future CII ratings.

…optimise…

By combining in-depth analysis of all the factors affecting voyage and vessel performance with sophisticated algorithms and human expertise, owners and operators will be provided with an informed decision-making platform to either sustain or strive for their vessels' CII rating goals whilst maintaining a focus on commercial performance.

They will have on-the-spot access to various options based on voyage route, vessel speed, fuel prices, and CII rating, instantly seeing the results of their choices through simulation, instead of waiting for the voyage to be underway and historical data gathered.

These functionalities enable operators and charterers to agree on a course of action before signing contracts. Balancing CII requirements while meeting commercial expectations of charterers – not to mention making the most of the market conditions – is not easy. Meanwhile, masters are ultimately responsible for the vessels' safety and actual sailing, so there is

a requirement for a space that enables collaboration and joint decision-making. It is one of the pillars that the ZeroNorth platform has been designed around.

A single, comprehensive intelligence platform is important because higher-quality data from noon reports and onboard sensors improve ship performance and voyage optimisation. This, in turn, drives better CII reporting and analytics, again enhancing vessel optimisation. Without system integration and powerful data analysis, progress would be impractically slow.

…and lead

ZeroNorth continues to build functionality into the system and incorporate suggestions from shipowners and operators. Although decarbonising shipping is a large and complex task, even daunting, the urgency to act immediately cannot be ignored.

Owners and operators need to find cost-efficient solutions right now to fund the green transition since future low-to-zero emission marine fuels are likely to be between two and eight times more expensive than what goes in the tank today. Putting it vividly, every dollar we save today in efficiency gains is worth $2 to $8 in the near future.

It's nothing less than inspiring to realise that the money saved today via digital solutions can pave the future decarbonisation pathway for our sector..

"THE BEST MAP OF THE NEW SILK ROAD!

MARCO POLO*

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

3D printing propeller blades – towards remarkable high-quality, instant availability, increased sustainability, and lower costs

Ready to compete

by **Peter Tommy Nielsen**, *Head of Department, 3D Print & AM Technology, FORCE Technology*

In the shipping industry, stagnation caused by wear, accidents, or other factors that put a ship out of service is a well-known expense driver. Often a repair service requires specialised and approved operations regulated by classification societies. Though costly, it makes perfect sense, as the best possible service should be applied to reduce the risks of failures outside the service intervals. The question is: can we do better?

fORCE Technology is a tech consultancy and service company that strives to create positive technological change and make the world more sustainable and safer. The company helps others become technological and sustainable frontrunners for the benefit of society. Each year, thousands of customers entrust us with their products, materials, structures, largest potentials or worst challenges since we create security and value based on impartiality, confidentiality, and knowledge. Go to forcetechnology.com to discover more.

We deal with three categories when viewing spare parts. First, the plug & play option, a ready-made spare part component (considered a consumable good to a certain extent). Second, there are high value and 'large' spare part components often manufactured when needed (in some cases, the piece is ready, just in case, due to insurance purposes). Here, refurbishment is possible if the timeline and expected quality allow it or the specified material isn't available. Third, extensive service that includes several parts of the two above.

Imagine

Highly skilled service companies take care of these categories. Although strategically placed worldwide, one still might find the locations 'too distant,' by which we mean service accessibility, material availability, costs, or timeline. Moreover, considering that the typically accepted manufacturing method is based on subtractive technologies, such as turning and milling, it also implies that

a larger workpiece should be available. This setup will result in the 'production' of scrap. In other words, these solutions work; yet, there is room for fine-tuning.

Imagine a manufacturing world where all critical components and wear parts are stored as 3D files in the cloud. These blueprints can be downloaded by appointed and qualified additive manufacturing shops, printing the pieces on demand and precisely when the replacements are needed. Think of a print machine that only requires a 3D drawing and build material in the form of wire or powder, which you can shape according to your specific needs.

Additive manufacturing is not limited to polymer materials or space industry applications (or just for the fun of it). Thanks to its flexibility and efficiency (read: lower costs and lead times, plus local availability), 3D printing is a growing market. At FORCE Technology, we have scrutinised many different cases over the past couple of years. For example, print production of a 7.0 kg component for an F35 jet fighter showed
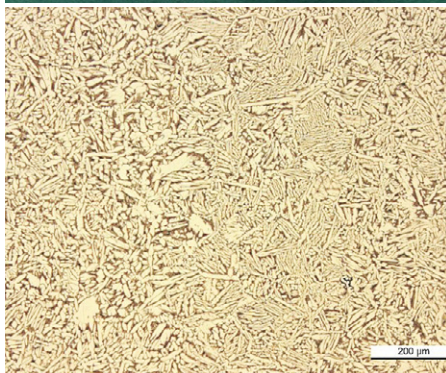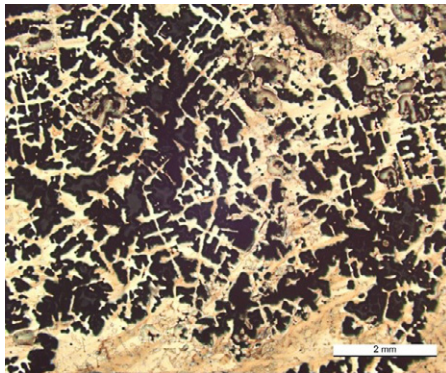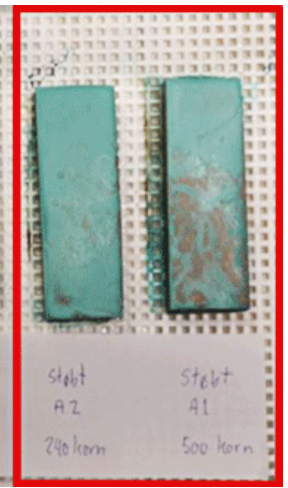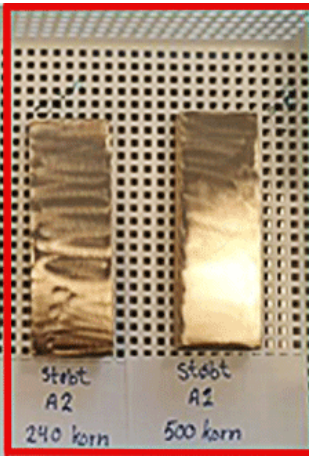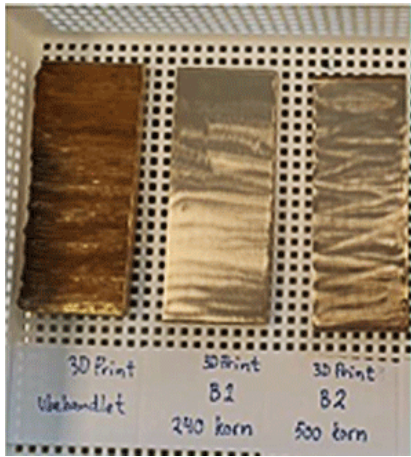
reduced material consumption and time of production in the 90% parallel with acceptable quality.

3D printing vs traditional casting

Another study by FORCE Technology compared the wire arc additive manufacturing (WAAM) technology directly with traditional casting. As a production method, WAAM has been known since the 1920s. Today, the technique is utilised with CAD files and a robotic arm, quite a novel combination. WAAM is well-suited for large-scale components, meaning production isn't limited by space but by the robot's reach.

The work focused on propeller blade manufacturing in aluminium bronze (as propeller blades are already a subject of repairs). We included a bronze cast for direct quality comparison purposes. For casting, the requirements for processing propeller blades include raw material, a crucible, a mould, and post-processing. For 3D printing: wire material, a welding machine, a robot, and post-processing. Although casting has been used for thousands of years, while 3D printing is a new technology, the study delivered compelling findings favouring the 'newcomer.'

The images show three printed propeller blade samples (left) and two cast samples (right). The latter received some surface finishing, while the former set was taken right out of the 3D printer. Next, we exposed all samples to the same salt mist procedure. As can be seen in the bottom picture, the printed pieces experienced mild oxidation. The oxidation would have been even less if the samples had been subject to surface finishing. The cast samples experienced strong oxidation, independent of surface finishing.

The mechanical properties of the cast and printed samples also showed

remarkable differences. Due to defect formation during the casting process, the cast samples did not meet the mechanical properties stated in the standard for the material. The 3D-printed samples, to the contrary, obtained values that were very close to the standard material. The propeller blade samples' visual appearance and microstructure differed notably (left image – cast, right – 3D-printed).

Best of both worlds?

On top of the significant quality benefits, 3D printing is often a more cost-efficient alternative to casting. Additive manufacturing can yield direct production savings compared to casting since there is no need to create and maintain a mould. Furthermore, it can grant a higher degree of design freedom. Finally, 3D printing optimises resource use, with printing powder often made of recycled material.

Looking ahead, working with welding-based additive technologies, hybrid manufacturing – the combination of traditional and additive manufacturing – isn't something unthinkable. Mastering this method would allow for building special features on a turned shaft, saving heaps of material.
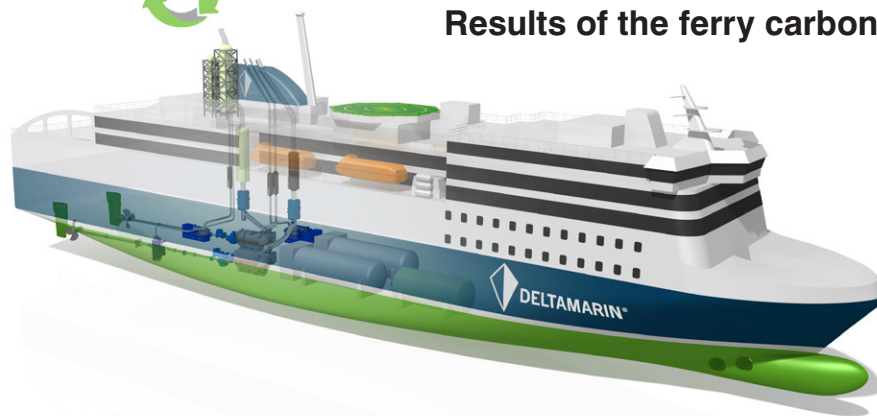
Photo

Capturing the carbon in a ship

by **Esa Jokioinen**, *Director Sales & Marketing, Deltamarin*

The shipping industry is under much pressure to cut its greenhouse gas emissions in the coming years. We at Deltamarin are seeing this first-hand. Today, each of our design projects involves us examining and implementing various technologies to enhance performance and reduce the carbon footprint. We are investing heavily in our research & development to gain and maintain industry-leading knowledge of the technologies implemented on ships. One emerging technology that has maybe received less attention in the maritime greening context is post-combustion carbon capture.

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deltamarin is one of the leading companies in ship design and offshore engineering in the world. Services are offered from concept development and engineering to project management during shipbuilding and commissioning as well as a wide range of services for operating vessels to maintain the fleet in excellent condition or even upgrade it. The company has invested extensively in developing sustainable and cost-efficient designs both for cargo and passenger vessels. Please check www.deltamarin.com for more info.

In short, such a system can extract CO_2 from a ship's exhaust gases, after which the captured material is liquefied, stored onboard, and eventually discharged to shore for either permanent storage or further use. Deltamarin recently participated in a joint industry project with Total, Minerva and DNV. We studied zero-emission pathways for tankers, with carbon capture technology examined among many other options. One of the conclusions was that it could provide "the 30% step" in carbon footprint before going into more expensive low- or zero-carbon fuels.
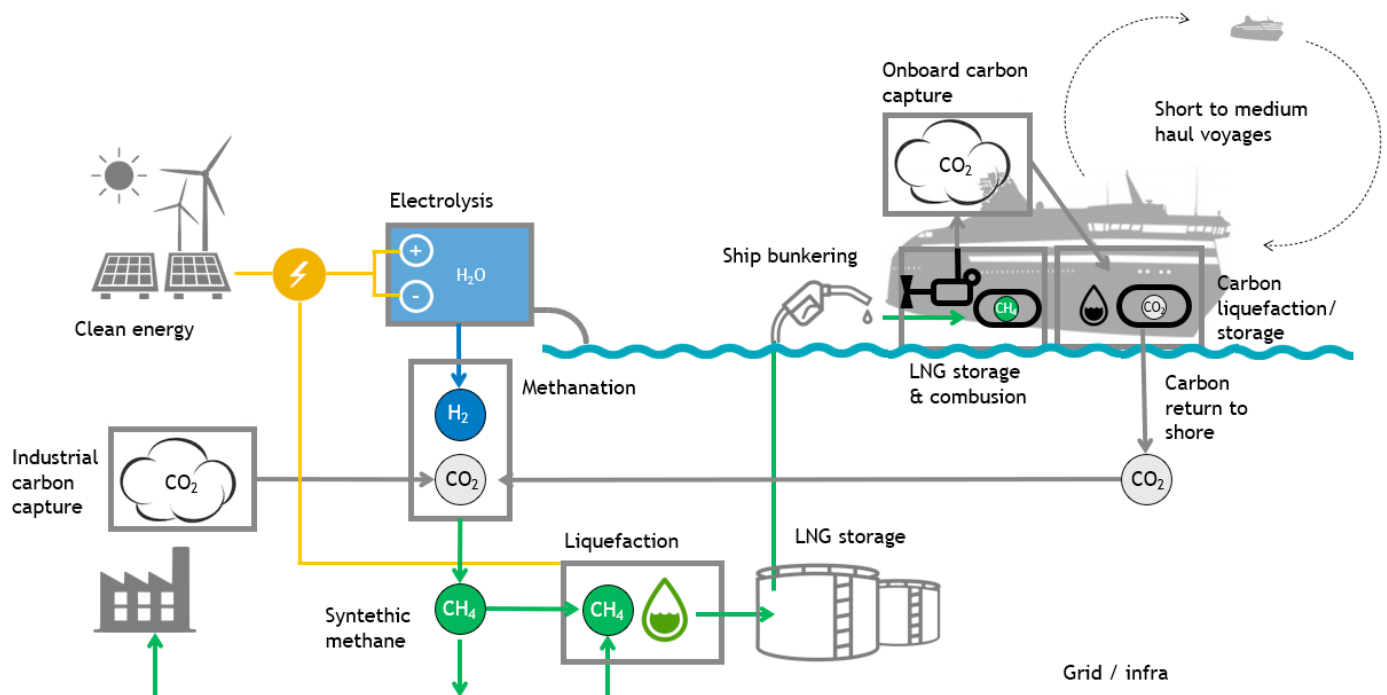
The project has been thought-provoking and led us to scrutinise the potential applications of carbon capture further. Specifically, earlier this year, we joined forces with Wärtsilä Exhaust Treatment to study how the system could be implemented in passenger-freight ferries (ro-pax). Our partner has recently announced that it has product development underway, and the company is also installing a pilot plant at its test facility in the Norwegian Moss.

Why ferries?

Our starting point was that ro-paxes could be good candidates for carbon capture as they operate on fixed routes where the captured CO_2 can be frequently discharged to shore, and less volume is needed for onboard storage. Many of the ferry operators have also selected liquefied natural gas (LNG) as their fuel. LNG has some inherent benefits with an absorption-based carbon capture system as it offers clean exhaust gases, and the engine fuel supply can be used as a heat sink for liquefaction of the captured CO_2.

If green energy is available in the operational area, it would also be possible to use the captured CO_2 to produce synthetic LNG through electrolysis and methanation. It would then make part of the CO_2 circulate back into the fuel supply. Obviously, such infrastructure would also require some adjacent industrial users.

The study compared a medium-sized 155 m-long ferry newbuild with alternative fuel arrangements for marine gas oil (MGO), heavy fuel oil (HFO) and LNG, the last two coupled with a carbon capture system. Dimensioning of the exhaust gas treatment, the carbon

Onboard carbon capture

Short to medium haul voyages

Electrolysis

Clean energy

Ship bunkering

Carbon liquefaction/ storage

LNG storage & combusion

Carbon return to shore

Industrial carbon capture

Methanation

Syntethic methane

Liquefaction

LNG storage

Grid / infra

capture system, and related auxiliaries were made in close co-operation with Wärtsilä, taking into account the ship's heat balance. The vessel was then compared in the technical aspects of CAPEX, OPEX, and emissions across three different routes. Compliance with the current and upcoming regulations, like the Energy Efficiency Design Index (EEDI) and the Carbon Intensity Indicator (CII), was also checked.

The study concluded that a carbon capture system is technically feasible within the given arrangement of the case ship without compromising cargo or passenger spaces. The achievable CO_2 capture rates vary depending on the operating profile – from roughly 25% at the lowest for the HFO scenario to nearly 40% for the LNG ship. When comparing the emissions against an MGO ship, the aggregate reduction with LNG and carbon capture could exceed 50%.

The additional CAPEX required for carbon capture and related auxiliaries was calculated in detail using our cost modelling plus information received from Wärtsilä. When put into the scale of the total newbuild cost, carbon capture implementation requires about 5-to-7% extra investment.

It looks promising!

Of course, the key question is: can this also make commercial sense, and if so, under what circumstances? Achievable capture rates depend on several factors, e.g., how much waste heat is available for the system. The capture rates can be analysed when the heat balance of the ship, space restrictions for the systems, and the configuration are known. After that, the payback time for

carbon capture systems depends on two main things: how much fuel is burned during the operation (frequency and speed on the route) and the level of tax applied on CO_2 emissions (the CO_2 tax and CO_2 disposal cost difference to be precise).

The HFO ship with carbon capture reached payback times of less than five years at around €110/tonne of a CO_2 tax on the most intensive route. In general, the LNG ship with carbon capture had quicker payback times, as the capture rates are higher than for the other options, while the investment in the system is a bit lower. LNG with carbon capture already reached a five-year payback at €50/tonne on the fastest route. On slower routes, the payback times for both fuels were longer, but each of the examined combinations was under ten years, and half of them were below five years at €150/tonne.

The end conclusion of the study is that carbon capture looks technically feasible for ship integration – a very interesting option in reducing CO_2 emissions from ferries indeed. The technology looks particularly promising for LNG-fuelled vessels due to some inherent benefits of the fuel.

As the technology will be built on existing knowledge of exhaust gas cleaning systems, it can also be expected to become available sooner than some low- and zero-carbon fuels, which might require longer timelines to make the supply and distribution infrastructure available. Naturally, each ship and operation is different. Still, carbon capture onboard a vessel definitively provides an up-and-coming alternative for ferry owners and operators who wish to set their course for decarbonisation.

Photo: Pixabay