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Tug / tanker collision due to hydrodynamic forces

A collision between a tug and a tanker in the Corpus Christi Ship Channel, Texas was caused by hydrodynamic forces pulling the tug towards the tanker

he US National Transportation Safety Board has released its report into a collision between a tugboat "Mark E Kuebler" and a tanker "Nisalah" leading to \$7m damages in January 2023, in the Corpus Christi Ship Channel, Texas.

There was \$3m of damage to the tug and \$3.9m of damages to the tanker. The tugboat's hull was breached by the tanker's propeller, which was also damaged in the collision.

It found that the tug was drawn towards the tanker by hydrodynamic forces.

NTSB recommends that operators of a small vessel like a tug should maintain a safe distance until the larger vessel slows and the hydrodynamic forces are reduced. Or it should ensure it has sufficient reserve power to counteract the hydrodynamic forces.

NTSB also recommends that speed limits should be set for "advanced manoeuvres such as stern-first approaches."

Following the collision, the tugboat's operating company instituted a policy limiting stern-first landings of tugboats on assisted vessels to speeds of seven knots or less.

The story

At the time of the collision, the tanker was moving at nearly ten knots.

Five tugboats were assigned to assist the tanker in coming into the harbour, with Mark E Kuebler assigned the "starboard quarter" position.

The mate of the Mark E Kuebler decided to turn the tug around 180 degrees to connect the towing line, for reasons of the geometry of the tanker's hull and the location of the winch and cable on the tugboat, so the tug would be able to run alongside the tanker at a point of the tanker's hull where the ship's hull was vertical.

While doing this spin manoeuvre, the tug fell back near the stern of the tanker. As the tug

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moved away from the tanker, the stern of the vessel was drawn in towards it by hydrodynamic forces and the two collided.

1 1529:41 MARK E. KUEBLER (9.2 kn)
TED C. LITTON (10.5 kn)
APOLLO (9.9 kn)
NISALAH (9.6 kn)
2 1520-58
MARK E. KUEBLER (2.8 kn)
TED C. LITTON (10.3 kn)
NISALAH (9.5 kD)
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3 1530:10 MARK E. KUEBLER (8.0 kn)
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The tug's movements as illustrated in the NTSB report. (1) tug moving alongside the tanker (2) tug turns 180 degrees (3) tug aims to regain position (4) tug is pulled towards tanker and vessels collide The maximum rated speed of the tug was thirteen knots. The tug was already moving into position at 11.6 knots. So, there was little reserve propulsion power available.

The mast and stacks of the tug struck the hull of the tanker first, then the stern of the tugboat hit the tanker.

The tanker's propeller then struck the tugboat, slicing through its hull, and the tug crew were not immediately aware of this.

The tanker's master and pilot went to the starboard bridgewing and observed the mast on the tug had bent over, so the pilot called the tugboat to confirm that the vessel was okay.

The tug captain responded that the tugboat's mast had hit the tanker but was otherwise fine, and the tugboat would continue the job.

Shortly after, the tugboat captain radioed the Nisalah pilot again to state that the tugboat was getting a bilge high-water alarm.

The pilot ordered another tug boat, Connolly M, to switch out with the Mark E Kuebler at the starboard quarter position. No lines were passed between the tugboat and tanker at any time before or during the incident.

The tug crew inspected the tugboat and discovered water flooding into the machinery room. Because of the danger of sinking due to the flooding, the captain intentionally grounded the tugboat in the bank outside of the Corpus Christi Ship Channel.

The Nisalah pilots and crew saw no indications of damage to their vessel, and the tanker proceeded to the terminal and moored without further incident.

Read the full report

https://www.ntsb.gov/investigations/ AccidentReports/Reports/MIR2404.pdf

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OCIMF News

News from OCIMF over January and February: SIRE 2.0 moves to phase 3 of the roll out, a small increase in piracy incidents, a workshop on enclosed space incidents, collaboration with other associations

CIMF's SIRE 2.0 moved to phase 3 of the roll-out, the final testing phase, on Jan 22, 2024. During Phase 3, the ability to request SIRE 2.0 trial inspections is available to all programme users for familiarisation and testing purposes.

All SIRE 2.0 trial inspections will be fully anonymised upon publication and therefore will not be used for vetting purposes.

For all users of the programme, including vessel crew, this final phase provides a critically important opportunity to test readiness for SIRE 2.0 inspections, OCIMF said.

Participants will benefit from being able to familiarise personnel with the new regime and make sure that any remedial actions highlighted can be taken before SIRE 2.0 replaces the existing SIRE programme.

Security

The ReCAAP Information Sharing Centre (ISC) launched its 2023 Annual Report at a Nautical Forum meeting in Singapore on 9 January, OCIMF reports.

Krishnaswamy Natarajan, Executive Director of the ReCAAP ISC, said: "While the total number of incidents of armed robberies against ships in Asia has increased in 2023, I am heartened to note that there have been several arrests of the perpetrators.

"These arrests serve as a deterrence and send a strong signal to the organised criminal groups that any acts of armed robbery against ships in Asia will be severely dealt with.

"We continue to see a high number of incidents in the SOMS [Straits of Malacca and Singapore], one of the busiest shipping lanes of maritime trade in the world.

"I urge the littoral States of the SOMS to do more to eradicate the organised criminal groups operating in this area by engaging the land and maritime agencies...and to respond promptly to all reported incidents."

The International Chamber of Commerce's International Maritime Bureau (IMB) released its Piracy Report for 2023 on 11 January, OCIMF noted.

The report recorded 120 incidents of maritime piracy and armed robbery against

ships in 2023 compared to 115 in 2022. This included the first successful hijacking of a vessel off the coast of Somalia since 2017, reported on 14 December.

IMB Director Michael Howlett said: "This is a cause for concern and the IMB is once again calling for all Masters and vessel owners to continue following the recommendations and reporting procedures as per the latest version of the Best Management Practices."

Operation Prosperity Guardian, a US-led, multinational coalition, was formed in December 2023 to respond to Houthi-led attacks on shipping. On 10 January, OCIMF's Maritime Security Committee was briefed by US Navy officials.

OCIMF working

groups OCIMF's Onshore Power Supply Working Group organised a workshop with equipment manufacturers to discuss the challenges of establishing a flexible high voltage cable suitable for use in hazardous locations.

They discussed minimum technical requirements, differences in certification requirements between ship and shore, and compatibility with national codes.

The Emissions Capture and Control Working Group meeting discussed progress on creating an extensive map of threats and associated barriers

with emissions capture onboard.

The Environment Committee discussed the status of environmental targets for 2024-25. They are working on information papers on onshore power supply, the risks associated with propulsion power limitation, and Emissions Capture and Control. They are also reviewing environmental content of the next version of TMSA, TMSA3.

The Engineering Expert Group is developing guides on Emissions Capture and Control and using onshore power supply for tankers. It has completed review of a Guide for Implementation of Sulphur Oxide Exhaust Gas Cleaning Systems and a publication on the Risk Associated with Propulsion Power Limitations.

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OPENING

The Structures Expert Group is reviewing the following documents: Recommendations for Oil and Chemical Tanker Manifolds and Associated Equipment; Transfer of Personnel by Crane between Vessels; Recommendations for Liquefied Gas Carrier Manifolds; Safe Access on Ships with Exposed or Raised Deck Structures.

The Ship to Ship Interfaces Expert Group said 1,000 comments have been received from industry about the revision of its Ship to Ship Transfer Guide. The working group is split into subgroups to manage sections and address all comments. This is a joint industry publication with CDI, ICS and SIGTTO.

The Ship Shore Interfaces Expert Group discussed lack of maintenance on hard-to-reach areas of marine loading arms. It discussed implications for terminals and ports on the use of engine power limitation to reduce greenhouse gas emissions.

It noted that there is "not much activity" being seen from ports and terminals on Maritime Autonomous Surface Ships (MASS). The IMO's aim is to finalise a non-mandatory MASS Code by 2024/25 and then adopt a mandatory Code by 2026 for it to enter into force by 2028. OCIMF bought all of its seven committee chairs to the OCIMF office in February to participate in a workshop, to "explore ways to strengthen relationships and improve communication and coordination at the committee level."

Enclosed space

During February OCIMF held an industry workshop on enclosed space facilities in London. There were presentations from InterManager, the Institute of Marine Engineering, Science and Technology (IMarEST), International Association of Oil & Gas Producers (IOGP), HiLo Maritime Risk Management and the OCIMF Human Factors Committee.

With other associations

OCIMF signed a MOU with the International Marine Contractors Association (IMCA), in a move aimed to "strengthen safety and environmental sustainability within the offshore sector." The organisations will "explore synergies in environmental initiatives."

Possible areas for joint work include dynamic positioning, competence and training, maritime

security, offshore marine operations, maritime autonomous ship systems (MASS) operations and assurance, environmental sustainability.

OCIMF held a meeting with the International Association of Ports and Harbors (IAPH) to explore opportunities for the two organisations to work more closely together. Shared areas of interest include data collaboration, climate and energy linked initiatives. OCIMF asked for IAPH's support in promoting the launch of SIRE 2.0 and tablet-based inspections.

The collaboration between OCIMF and the International Association of Oil and Gas Producers (IOGP) continues. OCIMF is promoting IOGP's Life Saving Rules across the broader maritime sector. IOGP's Safety Committee is collaborating with various OCIMF committees.

Output from the collaboration includes publication of guidance for management of survival craft on offshore installations, work on the FPSO asset integrity assurance, and work on ship husbandry and diving support.

This is a summary of OCIMF newsletters for January and February 2024. The full text is on the OCIMF website **www.ocimf.org** under "news and events" then "newsletter".

Okeanis Eco Tankers 50% equity increase

Equity in Okeanis Eco Tankers has increased 50 per cent from \$85m in 2018, when the company was incorporated, to \$130m now. Executives from Okeanis Eco Tankers shared the company's financial story in a Capital Link webinar

keanis Eco Tankers' equity has increased from \$85m in 2018, when the company was incorporated, to \$130m now.

It has returned 1.1 times its initial market capitalisation in dividends paid to shareholders, so investors who invested in the company's IPO in 2018 would have had a return of over 100 per cent, taking into account dividends, buy backs and return on capital.

CEO Aristidis Alafouzos and CFO Iraklis Sbarounis told the company's financial story at a webinar organised by Capital Link on February 2.

The company's fleet is 6 Suezmaxes built

between 2016 and 2020, and 8 VLCCs built between 2019 and 2022, according to its website. Its office is in Piraeus, Greece. It is listed on both the Norwegian stock exchange (Oslo Bourse) and the New York Stock Exchange.

It seeks to provide investors with the best attributes of a private shipping company together with the open-ness required of a public company, Mr Alafouzos said. It claims to be the "youngest tanker company in the market."

Today, the company claims that its spot market earnings on VLCCs outperform other listed peers by 21 per cent on a time charter equivalent basis, and its earnings from Suezmaxes have 41 per cent outperformance compared to listed peers on a time charter equivalent basis.

Mr Alafouzos attributes this partly due to having "superior and more efficient ships", and partly due to "commercial decision making."

In the early days, "it wasn't easy to convince investors to support a Greek management team," he said.

To increase investor confidence, it asked 3 of its US based investors, all hedge fund managers, to sit on the company's board, and they are still on the board today.

Tanker market

Looking at the tanker market, much of the growth in oil production is happening West of

Suez, such as in the US, Brazil and Guyana. Demand growth meanwhile is happening East of Suez. So, voyages are lengthening, Mr Alafouzos said.

The Ukraine war also lengthened voyages. Instead of Russia supplying Europe, Europe is importing oil from farther away, and Russia is sending its oil to China and India.

Then there is the issue of vessels being diverted around the Cape of Good Hope to avoid the risk of attack from Houthis in Yemen.

Today "most Western owners" are diverting tankers. This means a big increase in transit time, such as for oil loaded in Libya, Norway, Rotterdam or the Black Sea, going to Asia. A 15–20-day voyage from the Eastern Mediterranean becomes a 45 day voyage.

A large proportion of Russian tankers are still going through the Suez Canal, he said.

There has been an immediate tightening on the clean (product) tanker market; there's indications that there will be tightening on the crude market, although it had not yet happened at the time of the webinar (February 2024).



Aristidis Alafouzos, CEO (left) and Iraklis Sbarounis, CFO (right) of Okeanis Eco Tankers (screenshot from webinar)

Companies are using VLCCs where they previously used Suezmaxes, to reduce the impact of the extra days.

A further impact on the market is the US placing sanctions on vessels in the 'shadow fleet' for evading the price cap regulation, with 25 Afromaxes being sanctioned so far.

Once vessels have been placed on the US Specially Designated Nationals and Blocked Persons list ("SDN List"), they are not accepted anywhere with friendly relations with the US.

"They can no longer continue trading," he said. "Some are sitting laden, some in ballast. But they are all sitting."

It is not possible for a company to buy a sanctioned tanker without getting sanctioned themselves.

The options to Russia are to try to find more Western ships willing to carry the 'grey trade' (thus reducing the ships in the 'Western' market), or force Russian cargoes to comply with the price cap regime so they do not get sanctioned.

A further market factor is that the shipyard capacity to build new tankers has greatly reduced in the past 2 decades. The top yards have many orders for higher profit margin vessels such as LNG carriers and container ships, so are not making much room for tankers.

"We cannot see the order book for VLCCs materially grow until after 2028," he said.

This is a big difference to when Okeanis placed orders for 8 VLCCs at Hyundai in 2018, with 7 delivered in a year, and other tanker orders being built for other owners at the same time. Hyundai was delivering 24 vessels every year at the time.

Concerns about how long people will be

shipping crude oil, and the future propulsion fuel, have also increased wariness in newbuilds.

"I personally strongly believe there's a longer future for fossil fuel as it is the cheapest and most efficient fuel source," he said. "This insecurity about ordering is to our benefit."

Another factor affecting today's market is the scrapping of vessels built during the boom in newbuilding between 2008 and 2012. With the economic life of a vessel at between 17.5 and 20 years, these vessels would normally be scrapped between 2025 and 2032.

With all these factors, "we're quite bullish that we are well protected going forward," he said. It also means its vessels have a high second-hand value, should it ever wish to sell them.

The company keeps its fleet 100 per cent on the spot market, where it believes it can get higher returns, and the risks are manageable.

"Time charters are very undervalued," he said. "Our current interest isn't to time charter vessels."

In 2020, it had 80 per cent of vessels on time charter. "Now we feel there's tremendous upside [to spot], we want spot exposure as high as possible.

The company does not have any plans to make further newbuildings. As well as the high cost, it would also interrupt its plans to pay dividends to shareholders.

You can watch a video of the webinar here https://youtu.be/ fVRMug8pSpl?si=NEDXMmg6mHQsNzHV



DNV: will we reach IMO 2030 targets?

DNV presented modelling about whether shipping will reach the various IMO 2030 and 2050 targets at a webinar. It also gave an update on legislation, and the current perspective in shipping companies

he good news is that achieving IMO's emission target of a 20 per cent reduction in total CO2 emissions from shipping by 2030 compared to 2008 is "quite reasonable in our estimates," said Tore Longva, Maritime Decarbonization Director at DNV.



Decarbonization Director

at DNV (screenshot from

webinar)

He was speaking at DNV's Maritime Energy Transition Summit on Feb 7.

In 2008, the shipping industry emitted 800 MT of CO2 equivalent on a tank to wake basis.

DNV estimates that shipping has reduced

its total emissions by about 13 per cent from 2008 to 2022, although shipping activity (cargo transported) increased 42 per cent in that period.

This means energy efficiency per tonne has improved by 40 per cent already, another of IMO's 2030 targets.

If trade grows a further 12 per cent by 2030, it means energy efficiency needs to be improved by a further 15 per cent by then to reach the total emissions target, DNV calculates, and this seems achievable.

2030 zero emission fuel target

IMO also has a target of 5 to 10 per cent of maritime fuels or technologies to be "zero or near zero greenhouse gas emission" by 2030. This looks much tougher to achieve That's the bad news..

DNV has mapped two thousand projects to produce carbon neutral fuels around the world which could be used by shipping. Most of these are not specifically planning shipping as their customers. For example zero carbon ammonia can be used as fertiliser, and methanol can be used in the chemical industry.

It has identified which stage they are at – planning, investment decision or operational – and assigned a likelihood of them going ahead. The final estimate was world production of 45m to 65m tonnes of carbon neutral fuel by 2030 on an oil equivalent basis. The shipping industry uses 280m tonnes of fuel a year calculated on an oil equivalent basis (although it is nearly all fuel oil).

So, if the shipping industry is to find 6 per cent carbon neutral fuel by 2030, that would be 17m tonnes a year, so between 26 and 38 per cent of total low carbon fuel production. And bear in mind that shipping only uses 3 per cent of all fuel produced in the world today.

Knut Ørbeck-Nilssen, CEO maritime with DNV, said he thought that for shipping to receive such a large proportion of the global supply of carbon neutral fuels would be "highly unlikely, bordering on the impossible."

Defining carbon neutral fuels

As part of this analysis, there needs to be careful consideration of whether a fuel truly counts as carbon neutral.

If CO2 is emitted to the atmosphere in making the fuel, it effectively means "shifting emissions onshore," Mr Longva said.

Guidelines and regulations for CO2 emitted in producing fuels are included in the EU Renewable Energy Directive and IMO Lifecycle Assessment Guidelines.

For example, there are statements that well to wake emissions must be below a certain threshold, such as a 70 per cent reduction on emissions if fossil fuels were used. If renewable electricity is used to power electrolysers, it must come from 'additional' renewable electricity, not electricity which would be otherwise used somewhere else. If it is a biofuel, it should not come from a land which formerly had a high 'carbon stock' such as forestry.

There are also specifications on operational practises, such as use of water, chemicals, and waste. You have to review emissions made in extraction, processing, transport, and distribution.

"Each actor in the supply chain needs to keep an account and be audited on where they get their feedstock, a calculation of their emissions," he said. "The Proof of Sustainability is handed to the next link in the supply chain. This goes all the way up to fuel bunkering."

The bunker supplier needs to provide some kind of 'proof of sustainability' together with

the bunker delivery note. And when the ship produces its emissions report, this should be included in the documentation, so it is possible to verify that the emissions are as claimed.

Is full decarbonisation possible?

Could we ever achieve full decarbonisation, or net zero by 2050? DNV has done modelling to try to work out how decarbonisation could be achieved.

It believes a third of the necessary reduction could come from energy efficiency measures, said Eirik Ovrum, Principal Consultant, Environment Advisory, Maritime, DNV.



Eirik Ovrum, Principal Consultant, Environment Advisory, Maritime, DNV (screenshot from webinar)

commercially viable.

alternative fuels, with more than half of ships planned to be built able to operate on alternative fuels. The word 'alternative' is applied to fuel which needs a different engine to a conventional fuel, he said.

Further reduction

can come from using

webinar) he said. Decarbonisation would be easier if shipboard carbon capture or nuclear power were

DNV did some basic modelling to determine whether onboard carbon capture or nuclear propulsion could be viable, based on a 15,000 TEU container vessel.

For shipboard carbon capture, a vessel could have 4,000m3 of tanks, and offload four times during a round trip.

The economics were compared to a conventional ship, a dual fuel methanol ship, and a dual fuel ammonia ship. Different price scenarios were looked at, due to uncertainty about what the fuel prices will be.

Two shipboard carbon capture cost models were made. A high-cost model used a carbon storage cost of \$80 per tonne, and worked on the basis that the carbon capture system would use an additional 30 per cent of fuel. The low-cost model used a \$40 per tonne price for CO2 storage, and 15 per cent additional fuel



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DECARBONISATION

requirement penalty to run the capture system.

The results showed that onboard carbon capture can compete with other decarbonisation solutions, he said.

It looked at nuclear propulsion. This is already in use on 160 vessels, mostly naval vessels, which are subject to different regulations. It assessed use of a small modular reactor, which is being developed by the nuclear industry for use on land. It found it would be technically feasible to use on a ship.

Commercially, it estimated the costs at 8 per cent of the total capital cost per year, guessing the capital costs based on other prices of land based nuclear power. The result showed that commercially, nuclear power could compete with other decarbonisation solutions.

A major obstacle, of course, would be gaining regulatory acceptance.

"Our recommendation are that shipowners should reduce energy consumption now, consider all options, focus on fuel flexibility, and consider long term strategy," Mr Ovrum said.

Overview of regulation

At the IMO MEPC 81 meeting in March 2024, there will be an important decision on a greenhouse gas intensity fuel standard, said Eirik Nyhus, director of environment for maritime at DNV.

This will limit the carbon impact of fuel which is used by engines, which is a separate issue to the amount of fuel which is being burned. The standard will have increased stringency over time. It is a similar concept to Fuel EU Maritime.

"You will see the fuel mix in shipping



Eirik Nyhus, director of environment for maritime at DNV (screenshot from webinar)

as the intensity regulation," he said.

The decision needs to be made at IMO now in order to bring regulation into force in 2027-28, so there will be sufficient time for legislation to be implemented.

MEPC 81 is also

"We don't know what

associated with GHG

emissions is going to

come out, entering into

force at the same time

We are also seeing EU regulations. EU ETS (in force now) and Fuel EU Maritime, which will come into force in 2025.

"Impact-wise they are a little bit different," he said. "EU ETS imposes a cost on shipping emissions associated with port calls in Europe. With Fuel EU maritime, if you burn conventional fuels in 2025 you will be noncompliant from day one."

The UK has agreed there will be a maritime emission trading scheme coming into force in 2026. "The date and the design features are not finalised, we expect to see final decisions quite soon."

So, there is something every year - EU ETS in 2024, Fuel EU maritime in 2025, UK ETS in 2026, new IMO regulations in 2027-28. Plus, a review of CII in 2025.

"I am sure there will be other changes that also impact shipping. It is going to be a quite impactful decade," he said.

"Decisions are being made about what kind of changes to make to business models and fuels. It's all going to matter hugely."

Shipping industry perspective

Shipping companies have the challenge of how to navigate and accelerate the energy transition at the "top of their minds," said Knut Ørbeck-Nilssen, CEO maritime with DNV. The drive to decarbonise is coming from "stakeholders throughout the value chain," particularly cargo owners, as well as regulators.



Cargo owners "are listening to their customers and to society at large. They understand their responsibility and obligations to make supply chains greener. They expect their maritime partners to help them achieve this," he said.

CEO maritime. DNV (screenshot from webinar)

Shipowners "need to make thorough examinations of these technologies and decide what the best fit is," he said. Then they should make short-, mid- and long-term decarbonisation plans.

"The actions we take now can both deliver short term results and ripple throughout the 21st century," he said.

You can watch the talks on video here

https://www.dnv.com/maritime/webinarsand-videos/on-demand-webinars/access/ maritime-energy-transition-summitrecordings-and-speakers

How TotalEnergies is decarbonising

TotalEnergies is decarbonising its maritime operations in multiple levels – its operations, with new technologies and with new fuels. Sebastien Roche explained how, speaking at a DNV webinar

otalEnergies (formerly Total) is a major oil and gas producer, tanker charterer, and a fuel supplier. It is decarbonising its maritime operations in multiple directions, including in better vessel operations, with energy efficient technologies, and with alternative fuels.

Sebastien Roche, general manager shipping performance and innovation, TotalEnergies Trading and Shipping, explained how, speaking at DNV's Maritime Energy Transition Summit on Feb 7.

TotalEnergies sees its work to decarbonise shipping as part of wider efforts to decarbonise its oil and gas production and transport, he said. "TotalEnergies has the ambition to be a major player in the energy transition."

On TotalEnergies' own vessels, the focus is "to optimise and take the best out of existing ships and available technologies while preparing the fleet for the future," he said.

Three levels

"We work simultaneously on three levels. The first is the optimisation of our operation and voyage execution; the second is working on energy efficiency technologies and ship design; the third is working on alternative fuels," he said.

For the first level, optimisation of operation and voyage execution, TotalEnergies sees that there are a number of different approaches which can lead to reduced fuel consumption, which have a low capital expenditure, he said.

Digital tools can be helpful. "We feel that data is still very underused by our industry," he said. For example, TotalEnergies managed to implement energy efficiency monitoring on its fleet "with minimum investment." Weather routing services could be used to optimise the voyage and route "to shave off a few percent."

For the second level, energy efficient technologies and ship design, there is "plenty of low hanging fruit with limited capex, short

TANKER OPERATOR HAMBURG REPORT



Sebastien Roche, general manager shipping performance and innovation, TotalEnergies Trading and Shipping (screenshot from webinar)

running a rotor sail on one medium range tanker to test the relevance of this technology for our business," he said.

Then, there are many options requiring higher financial commitments. As the costs of emitting carbon grow, such as under the EU Emission Trading Scheme, "all of them are showing shorter and shorter payback," he said.

Alternative fuels

For the third 'level,' alternative fuels, TotalEnergies is keen on LNG.

"We see LNG as a transition fuel, the best mature technology available, with a bunkering network in the main hubs. We started several years ago with this technology. Today we charter 11 LNG dual fuel oil tankers. This is the fuel of choice for new orders today."

TotalEnergies calculates that its LNG fuelled VLCC has half the greenhouse gas emissions of a similar vessel in 2008. Figures for LNG carriers are "roughly the same." This is the result of improving energy efficiency and voyage optimisation, as well as changing fuel.

"It is not perfect though. I have in mind the methane slip issue. The industry is committed to work on it. Significant improvements are already achieved and further to come."

TotalEnergies recently decided to diversify its portfolio of alternative fuels, such as including methanol. "We confirmed several comments for methanol dual fuel newbuild tankers in various smaller size segments, ships hitting the water

payback," he said. For example, low friction paint, variable speed drives for heavy electrical consumers, using batteries and air

lubrication.

"We are

starting next year and onwards," he said.

"Biofuels is another solution which is technically and commercially available today. We work closely with our affiliate TotalEnergies Marine Fuel, which has a marine biofuel supply chain."

"Again, like LNG, nothing is perfect. With biofuel one of the pain points is limited availability for shipping. Our industry must be very cautious on feedstocks and tradeability of the biofuel," he said.

"Collaboration is key in this maritime journey," he said. "We will not be able to do anything in isolation, this is crystal clear. All the initiatives can only materialise when we partner with right and likeminded stakeholders."

For example, to build an LNG dual fuel ship, "you need a first-class shipyard, equipment manufacturers, class society. You need to partner with the right shipowner who is ready to commit, invest long term money, invest in training of the crew. This is something new for the seafarers."

TotalEnergies' role

As a charterer, "we use our strong balance sheet and creditworthiness to commit long term on innovative projects," he said. "That allows us to enable these projects to materialise."

For a vessel on time charter, TotalEnergies is in charge of bunkering the ship, and carries the risk that the required fuel is not available. This factor "is very relevant for alternative fuel," he said.

TotalEnergies is also aiming to facilitate trials of new technologies on its time-chartered fleet. It has already done tests of biofuel and a shipboard carbon capture system on an LNG carrier.

"We look seriously into opportunities to invest and support, technically and financially, the development of decarbonisation technologies," he said.

TotalEnergies is also a fuel producer and supplier. "This gives us an additional level to

provide and support decarbonisation," he said.

Data sharing

The company would like to see better data exchange between parties. "Our industry needs data transparency. This is key to gaining mutual knowledge and awareness," he said.

"We are a signatory and founding member of Sea Cargo Charter, to encourage and promote this transparency and shipping decarbonisation in general."

ETS

TotalEnergies is comfortable working with the EU Emission Trading Scheme because it has been working with it for many years with its facilities onshore, such as refineries.

"We see this ETS cost being passed to the charterer. So, it was a matter of incorporating this new tax into the trading value chain and to manage our exposure."

"So far it has been a smooth implementation on the ETS side. We have developed and implemented the right tool," he said.

More generally, "We believe monetary incentives are good drivers and powerful instruments for decarbonizing," he said.

"All the technologies and new alternative fuels we care about are more expensive than the current fossil fuel. Without a sustainable and economically viable business case, most initiatives will remain voluntary, and stay very limited."

"For large deployment and uptake of the decarbonisation solutions, the industry needs an international playing field without loopholes with the right carbon price, maybe in combination with a fuel measure like Fuel EU Maritime."

You can watch the talks on video here https://www.dnv.com/maritime/webinarsand-videos/on-demand-webinars/access/ maritime-energy-transition-summitrecordings-and-speakers

Different types of sail

The three main types of wind sail for ships seen so far are the Flettner Rotor, Wing sails and Suction Sails. DNV's expert Johanna Tranell explained

he Flettner Rotor "is the most mature solution," for wind power on ships, said Johanna Tranell, Engineer in Hydrodynamics and stability at DNV, and a specialist on wind power.

There is a cylindrical structure which rotates around its own axis. In wind that creates a low

and high pressure area which generates lift and drag forces. These are perpendicular to the wind direction.

The sail creates its own drag, and so it is most suitable for slower vessels, such as tankers, bulk carriers and ro-ros. The sail can be lowered to go under bridges, she said. A second type, "wing" sails, are like an aeroplane wing mounted vertically on the deck. It moves the ship forward in the same way as an aeroplane wing gives the aircraft lift. Air has a longer distance to pass over the wing on one side, leading to reduced pressure on that side.

They can be made of hard-shell material,

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with lift devices such as flaps to generate more lift. These have higher aerodynamic efficiency, which probably makes them more suitable for faster vessels. Or they can be made of soft material such as a textile, which reduces the weight, and can help with stability. It can be easier to bring down and put on the deck.

A third type of sail is the suction sail also called "ventilated foil" or "turbo sail". The suction sail looks similar to a Flettner Rotor, but it does not rotate. It is oval shaped and vertical.

There is an electricity powered air suction system. The suction delays flow separation in the air, which improves the lift.

At the date of the webinar in February 2024 there were 37 vessels in operation with wind assisted propulsion, with 52 in the order book.

There were 17 vessels in operation with Flettner rotors with a further 16 being built; 7



had rigid

sails and 9

more being

built; 10 had

suction sails

and 26 more

being built.

there is one

vessel in

operation

inflatable

with an

In addition

Johanna Tranell, Engineer in Hydrodynamics and stability at DNV

sail, and two vessels in operation (and one on order) with a wind kite.

Owners were stating they were seeing fuel savings of 5-10 per cent, with some claims of 25 per cent and more for newbuilds.

"Some ship types are better suited for wind assisted propulsion than others; some sail

technologies are better than others for certain ship types," she said.

Different systems work best at different wind angles, so you need to consider the wind direction as well as the speed on the routes where your vessel trades.

You can run simulations of past voyages over multiple years, and at different times of year, using hindcast weather data, to tell you which wind conditions are seen most often.

If you are planning a system which requires electrical power, you need to consider if there is enough power supply onboard. And if you are generating more auxiliary power to run the sail, that will affect the overall fuel saving.

It is important to consider deck space, and the effect on stability, weight of the vessel, and if the structure can take the weight of the sails. Also, if the sail will obstruct a navigator's view.

Altera and Berge Bulk on decarbonisation

Altera Infrastructure, Berge Bulk and Njord Solutions told their decarbonisation stories in a DNV webinar

ltera Infrastructure, formerly the offshore shipping division of Teekay, started its 'green shipping program' in 2015, developing a new generation of shuttle tankers.

These vessels have predictable trading patterns and short voyages, so many decarbonisation options are possible, such as using batteries charged during port calls, said Ingvild Sæther, President and Chief Executive Officer, speaking at the DNV Maritime Energy Transition Summit on Feb 7.

They often need to be kept stationary at sea using dynamic positioning, which could perhaps be powered using batteries.

The vessels were ordered in 2017, and could be seen at the time as a "revolution" rather than an evolution, she said. They were built with batteries, and had capability for LNG fuel.

There were systems to capture the oil vapours and blend them back into the fuel. Shuttle tankers are frequently loaded and discharged, and every discharge leaves tanks full of oil vapour.

In total, these vessels reduced emissions by 40 per cent, she said.

Altera did see challenges getting all of the new systems onboard ships to work together properly, particularly with the travel restrictions of COVID. Crews onboard needed to learn how to operate the vessels in the most efficient way. Alterna also needed to find the right way to work with customers, who may benefit from lower operating costs if they are paying for the fuel, but are not paying the capital expenditure.

Berge Bulk

Berge Bulk has ambitions to be carbon neutral by 2025, and have the first zero carbon vessel on the water in 2030, said Paolo Tonon, Technical Director.

It owns and manages 80 vessels, the majority being capsize dry bulk carriers and VLOCs (very large ore carriers). It typically operates vessels for their entire life.

It has been offering customers "carbon neutral voyages" from 2025, with the carbon neutrality achieved through offset schemes certified by "highly recognised" organisations.

The main priority for shipping companies should be paying continuous attention to energy efficiency, he said. Berge Bulk has improved its "annual efficiency ratio", the metric for calculating CII, by 46 per cent since 2008, he said. That has been achieved with newbuild vessels with new hull designs and propeller designs, and more efficient engines.

It has also invested heavily in digitalisation, with tools to "design the best voyage, look after every single energy consumer on the vessel, to spare each gram of fuel being burned," he said.

The company is building a "Newcastlemax"



Speakers in the session "Managing today's fleet in changing circumstances – The role of technology and fuels". Top left, Ingvild Sæther, President and Chief Executive Officer, Altera Infrastructure; bottom left, Fredrik Pind, Managing Director, Njord Solutions; centre, Trond Hodne, Global Business Development Director Maritime, DNV; top right, Paolo Tonon, Technical Director, Berge Bulk; bottom right, Adrian Macmillan, Head of New Energy Shipping, Woodside Energy

bulker fitted with Yara Marine's "WindWings". It anticipates that they will "be able to cut easily 15 per cent of fuel consumption."

The vessel will be deployed between Brazil and China. That is "normally a trade you can find a certain abundance of wind," he said.

It also has a vessel with air lubrication, and has made much use of shaft lubricators. "We will continue to retrofit those techonlogies," he said.

For alternative fuels, Berge Bulk is testing biofuels on "a number" of vessels and voyages". It is looking actively into methanol and ammonia. It is discussing with customers and partners the possible strategies to implement

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these fuels. It will "mostly likely happen with new builds in the near future."

Berge Bulk is looking at shipboard carbon capture, for its existing vessels.

A challenge in the dry bulk sector is that there is some distance between the shipping company and the end customer of goods. It has not seen such direct pressures from customers like the container shipping sector has done. And the costs of decarbonisation are "immense", and cannot be borne only by the shipping company.

Njord Solutions

2024 will be a year of "significant action" with energy efficiency technologies, compared to 2023 where there was a lot of discussion

but not so much action, said Fredrik Pind, Managing Director of Njord Solutions, a vessel performance consultancy founded by Maersk Tankers.

"The industry has not embraced the full scale yet," he said. "There's a big gap between what can be done with technology and what is being done."

"There's a significant number of low hanging fruits. Basic technologies, well proven. They can deliver, in a combination, more savings than we have seen with air lubrication."

Njord Solutions typically finds between 9 and 10 technologies to be appropriate for vessels it works with, and this can lead to 10-12 per cent fuel savings.

When used with more novel technologies such as wind and air lubrication, you can achieve 20- to 30 per cent savings, he said.

The challenge is figuring out the right combination of technologies for each of your vessels.

Wind "is not applicable everywhere," he said. It will provide better returns when you have trading routes in areas with high wind.

The higher cost technologies can provide higher rates of return on investment, but can be harder to get funding for, he said. They can be perceived to have high risk. A good way forward could be to combine easier, lower risk, lower reward technologies, with high risk, high reward technologies.

Woodside - shipping increasingly interested in blue fuels

The shipping industry is increasingly showing interest in blue future fuels due to their being much less expensive than green fuels, said Adrian Macmillan from Woodside Energy in a DNV webinar

he shipping industry, and other industrial buyers of low carbon fuels, are increasingly showing interest in 'blue' fuels made with gas with carbon capture and storage, due to their having a lower cost, said Adrian Macmillan, Head of New Energy Shipping, Woodside Energy, based in Perth, Australia.

He was speaking at a DNV webinar on Feb 8, "Maritime Energy Transition Summit 2024."

Mr Macmillan thinks the shipping industry needs to commit to buying future fuels at much bigger volumes if fuel producers will have confidence to invest in a supply chain. Currently there are plenty of demand signals from shipping but they are not firm enough demand signals, he said.

Blue vs green fuels

The discussion about blue (made with carbon capture) vs green (from renewable) fuels has changed, he said.

"If I reflect back 12 months ago, the conversation was very much about green, green, green, but many parties not truly understanding what that meant," he said. "We've seen quite a transition over the last 12 months."

"If you look at a 'gas with CCS' solution [blue] that's significantly cheaper than a renewable based solution when we have a 2030 focus," he said.

"At this stage we see a lot of interest in gas with CCS options compared to our 100 per cent renewable options."

"It's easy to look at 2050 solutions. The world

needs to move to a renewables based solution by 2050. [But] how do we get a cost effective transition? We need to do whatever we can to meet lower carbon intensity from well to tank with minimum cost."

"We can offer both to the market, but we see strong interest in the lower carbon options with 'gas with CCS' there."

Shipping companies, and also power generation companies, are increasingly discussing fuels in terms of the overall carbon intensity involved in making them, rather than the pathway by which they were made, he said.

"At Woodside, we tried to stay away from colours [blue and green definitions]," he said. "They aren't particularly helpful. It doesn't necessarily give you the clarity of the carbon intensity of the future fuel products."

Firm demand volumes

From an energy producer perspective, the orders made so far for dual fuel vessels don't translate into a large demand volume for future fuels, compared to interest being shown by other possible industrial customers for these fuels, such as aviation.

There is much indication of a big demand from shipping, or "demand signals", but they are not "firm demand signals," he said.

Woodside committed in 2021 to spend \$5bn by 2030 on new energy products and low-carbon services. It is considering the best way to make these investments. From the maritime sector, "we need clarity of where, when, how much, how frequently, carbon intensity of that delivered product," he said.

"At least in the near term, 2030 time frame, [volume commitments] are going to be required for investment decisions to be made [by the fuel producer]," he said.

"By 2050 hopefully we're back to a spot market with large volumes of future fuels available."

It is important for a fuel supplier to know where the fuels will be supplied to ships. While ammonia and hydrogen may have zero carbon in the fuels, as soon as they are transported to a customer, there will be carbon emitted in their transport. So the overall fuel supply has a carbon intensity, which reduces their value as a future fuel.

All future fuels, biofuel, methanol, ammonia and liquid hydrogen, "are going to probably be three to five times [today's] fuel cost," he said.

Collaboration

To make future fuels available and adopted, "there's a number of parameters we need to work with," he said. There's a need to "collaborate with multiple parties across the supply chain."

"There's many global efforts underway looking at how do we get these commercial and technical elements aligned together. Those are really good vehicles. Good technical and regulatory progress is being made."

Ardmore's choice of vessel performance technologies

Ardmore Shipping is implementing and trialling a wide range of technologies to improve vessel performance, some not discussed much before, such as ultrasonic cleaning and microboilers.

roduct / chemical tanker operator Ardmore Shipping, based in Cork, Ireland, is using and trialling a number of interesting performance technologies. Ardmore assessed over one hundred technologies during 2022 - and is trialling or fully implementing twelve of them

Garry Noonan, Director, Innovation at Ardmore, and a former marine engineer onboard vessels with BP Shipping, told us what the company is doing.



Garry Noonan, Director, Innovation at Ardmore

Ardmore is exploring using ultrasonics for cleaning propellers, hulls, and speed logs; very low load boilers; and microboilers. It is using or trialling automation to keep the vessel at constant power; variable speed drives; propeller boss cap fins; more frequent speed optimisations; harvesting rainwater; and super-smooth coatings.

Ardmore is also pursuing a unique approach to shipboard carbon capture, where the CO2 rich solvent is kept onboard and separated onshore.

Ardmore takes its ESG (environmental, social and governance) responsibilities so seriously it has created a sustainability committee within its board of directors.

It is chaired by Dr Kirsi Tikka, a former senior executive with the American Bureau of Shipping. The other members are Mats

They gave us an update

Berglund, former chief executive of Hong Kong bulker operator Pacific Basin, and Helen Tveitan de Jong, CEO of Carisbrooke Shipping Holdings, an operator of thirty-four bulk and project cargo ships.

Ultrasonic cleaning

Ardmore is trialling ultrasonic propeller cleaning. This means using a very highpitched noise or 'ultrasound,' which agitates a material, leading to a cleaning effect, such as particles being shaken off.

It is experimenting with ultrasound around the propeller, which may help prevent a build-up of microfouling on the propeller.

It is exploring the use of ultrasound around the sea chest (where a vessel takes in sea water), to see if it can help prevent fouling taking place. Some countries have regulations requiring sea chests to be kept clean because they are concerned about microbes in fouling being moved around the world.

Ardmore is looking at using ultrasound to try to keep speed log sensors clean. This has an indirect impact on vessel performance, in that accurate speed log measurements are very important in assessing vessel performance. Fouling on the speed log can impact the accuracy of the readings.

With ultrasonics, it is possible to experiment with different frequency sounds, to try to find the frequency which is most effective at stopping the fouling. You may need a diver to visually inspect if it is working.

Low load boilers

Ardmore is looking at ways to run boilers at 5 per cent of maximum load. So far, it has only been possible to run boilers at 20 per cent of maximum load. "We've approached boiler manufacturers to see if we can get that down further," he said.

Currently, if the vessel requires much less steam than a boiler at 20 per cent load produces, the boiler is continually switched on and off. But every time the boiler switches off there is a need to blow cold air through the furnace to make sure there are no products of combustion left in the combustion chamber. So, running continuously at a lower load would be more efficient, Mr Noonan says.

Microboiler

Ardmore is exploring the use of compact marine boilers or "economizers," which generate steam using waste heat from auxiliary engines when the vessel is stationary. One example is the Alfa Laval Aalborg Micro.

This means that, while the main engine is not running, the micro boiler can supplement the boiler hence reducing the boilers fuel consumption. When the main engine is running, surplus heat from the main engine can generate the required steam.

Ardmore anticipates fuel savings of one tonne to 1.5 tonnes of fuel a day from using microboilers.

Ideally, every generator on a ship could have an associated compact boiler, but there is not enough space. "It is only realistic for one," he said.

The compact boilers are being installed on Ardmore vessels during dry docks. By the end of Q4 2024, they should be installed on nine vessels, Mr Noonan says.

Constant power

Ardmore implemented Manta Marine's "FuelOpt" propulsion optimisation technology across its entire fleet during 2023. This is an automation system which keeps the engine operating at a constant power. This means that the fuel supply to the engine does not fluctuate, and the engine is continuously doing the same amount of 'work,' which means it is more efficient.

Most engine and propulsion control systems are designed to keep the vessel operating at a constant RPM, like a car

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always at 70 kilometres per hour. But this means the work done by the engine is always going up and down.

For example, the engine will do more work to keep the vessel at a constant speed if the vessel suddenly faces a strong wind, just as a car engine works harder to get seventy kph speed when going up a hill.

Fuel savings of typically 1-2 per cent over the voyage are typically possible by maintaining constant power, without the voyage taking any longer overall, Mr Noonan says. A computer model of a voyage showed "conservatively" a saving of 2 per cent. So, a small saving, but one achieved at very low cost.

Of course, it is possible to keep an engine at constant power manually, by keeping your eye on the engine power meter. But this requires mental focus and attention, doing a task which can easily be done by machine.

Variable speed drives

Another useful technology is the "variable speed drive," a system for adjusting the frequency of electricity supplied to rotating equipment such as a pump. In doing so, it can slow the rotating equipment down, and reduce its power consumption.

Much rotating equipment does not have adjustable speed, just an on-off control. Ships are designed with higher power than they need most of the time in case they ever need the full power. But this means they are wasting energy the rest of the time.

It is hard to specify the savings from this because it depends on the environmental conditions the vessel is operating in.

A specific example of where savings can be achieved is on power for the seawater pumps which bring in water to cool the engine. When the vessel is operating in a cold climate, less cooling water is needed, so the pump does not need to run at the same power. There can be savings of "on average a tonne of fuel a day," he says.

Similarly, less power may be needed at different times of year for engine room fans and air handling units for accommodation.

Propeller fins

Ardmore has installed propeller boss cap fins on the propellers of many of its vessels. This is a physical device which reduces hub vortexes on the propeller and has been proven to lead to worthwhile efficiency savings. "We would also roll this out across any new vessels we bring into the fleet," he said.

More frequent speed optimisations

Ardmore is making more frequent optimisations of vessel speed, working together with a company called Deepsea Technologies (www.deepsea.ai).

Normally, speed is only adjusted daily. This software generates recommendations on the optimal speed for every 10 minutes of the voyage.

The system takes multiple factors into account, such as the cost of the ship per day when a slower speed makes a voyage longer. If freight rates go up, it makes financial sense to go faster. It also considers the changing cost of bunker fuels. "This is not a revolutionary idea, it is more an evolutionary idea," he said.

Previously the work was done using Excel, which is labour intensive. "It is about trying to find that optimisation without us doing massive calculations," he said.

Rainwater

Ardmore is harvesting rainwater for cargo tank washing. If seawater cannot be used to wash the tanks, the ship needs to desalinate water onboard, or purchase water in a port, which all involve more energy and costs.

There are already systems to channel rainwater which falls on the vessel's accommodation area and send it to drains. Instead, it can be sent to tanks.

"We're taking rainwater which falls on the vessel, filtering it, and testing it," he said.

Coatings

Ardmore is exploring new hull coatings, which are "ultra smooth," so low friction and very hard for anything to stick to. And because the surface is hard, it is not damaged by cleaning. Conventional anti-fouling coatings are degraded every time they are cleaned, so you might not clean them as often as you would like to for fuel efficiency reasons.

It is looking at a coating called Seacoat which provides this (see separate article).

It is also looking at graphene coating on the propeller, which provides a very smooth, hard wearing surface coating.

Shipboard carbon capture

Ardmore believes shipboard carbon capture,

removing CO2 from the ship exhaust and storing it onboard, will be a "prominent part of the energy transition going forward," he said.

Ardmore's proposed carbon capture system is different to systems used on land. On land, there are two stages, one where the CO2 is dissolved into an amine solvent, and a second stage, where CO2 is separated from the solvent by heating it, so the solvent can be re-used, and CO2 sent to be sequestered.

Ardmore's proposed maritime system would only include the first stage, and then store the CO2 rich amine liquid in a tank onboard. The second stage, separating the CO2 from the amine, would then take place on land. This means that the ship does not have to provide the necessary heating to separate CO2 from the amine, or to handle CO2 in gaseous form.

One of the vessel's tanks would need to be converted to store the amine solvent. This does not require any heating or pressure. "It's not a massive upgrade - we could do that at sea or in water," he says.

Ardmore is currently seeking a partner who is interested in developing the necessary infrastructure and systems, he said.

One challenge is that there would need to be a worldwide network of reception facilities for CO2 rich amine. Ardmore's vessels operate on the spot market, rather than trading the same route all the time, and so it would be very hard to have a reception facility in every terminal a vessel might be using.

How to manage it

To manage and make decisions about all these energy saving measures, Ardmore has a team of staff dedicated to the energy transition drawn from other areas of the company, including legal, commercial, technical, and "everything in between."

People from different backgrounds bring different perspectives. "We don't want [only] 10 engineers sitting in the room," he said.

"It is easy to throw technologies [onboard]. But we need to be conscious when it is enough. If you throw too much at them, stuff starts getting missed."

There can be a preference for 'passive' technologies, which can be operated on ships without the active involvement of crew. One example is autonomous robots for hull cleaning. "If we have a resident robot we can clean whenever the vessel is stationary," he said.

Seacoat's super smooth coating – 4-12% fuel saving

Seacoat of Pinehurst, Texas, claims that shipping companies using its supersmooth coating save between 4 and 12 per cent on fuel. It is also very hard, so not damaged by cleaning

eacoat of Pinehurst, Texas, produces a coating for ships which is extremely smooth and hydrophobic. It leads, the company says, to fuel savings of between 4 and 12 per cent.

Seacoat recently received its second order for two vessels to coat a hull from tanker operator Ardmore Shipping (see separate article in this issue).

The company is working with "4-5 tanker operators", but Mr Bowlin is not able to reveal the names of the others.

The US Navy has used its "SEA-SPEED" coating since 2001 on Special Operations Craft (SOC) and fast transport vessel hulls due to its suitability for high speed and durability in extreme conditions.

As well as tankers, it has been applied on small supply and crew vessels, ferries, bulkers, and container ships.



A very smooth hull

In a LinkedIn quote, Yeshen Tian, Coating Superintendent with Infinite Marine Services of Shandong, China, said, "I am very fortunate to have been involved in this dry docking and witnessed the outstanding product performance of Sea Speed V 10 system: hard film, extremely smooth, and environmentally friendly."

In the most recent ship hull application, the surface roughness was measured to be twelve microns. One micron is a thousandth of a millimetre, so this means the variation in thickness of the coating is just a hundredth of a millimetre.

By comparison, silicon coatings typically have a roughness around seventy microns, says John Bowlin, director of engineering with



John Bowlin, director of engineering, Seacoat

Seacoat. Conventional coatings typically have a roughness of 125 to 175 microns.

It is the smoothness of the coating which leads to reduced friction as the ship goes through water, leading to lower fuel consumption.

"As a general rule of thumb, a 20-micron differential in smoothness will typically decrease fuel consumption 1 per cent," Mr Bowlin says.

Company background

Mr Bowlin has a PhD in chemistry. He developed the coating through personal funded research in the late 1990s, when he was frustrated by how often he needed to re-apply antifouling coating on a personal boat.

After developing a "Single Pack Siliconized Epoxy Coating" he applied for a patent for it.

"We figured out a way to make these coatings into a very abrasion resistant film that's still flexible and exceptionally smooth," he said.

Today, the coating is manufactured at Seacoat's facility just outside Houston, and then shipped all over the world. The technology has been through six iterations over the past 20 years.

As a small company, Seacoat faced a lot of scepticism from the industry about its coating,

he said.

The support from Ardmore Shipping has been extremely helpful. "Ardmore Shipping has great people, very progressive people. They take initiative, they take measured risk."

Today's interest in improving vessel performance has led to increased market interest. "The popularity of this material, since mid last year [2023], has grown exponentially," he says.

Coating features

The "Sea-Speed V 10 X Ultra" coating is based on silane and Siloxane chemistry, which has one silicon atom connected to four hydrogen atoms combined with the other component which is two silicon atoms bound to an oxygen atom.

The coating is "completely non-toxic," he says. There are no restrictions anywhere in the world on cleaning hulls coated with it.

It can be applied in any shipyard, and has been applied in yards in China, Southeast Asia, and Europe.

The cost of the coating, at approximately 26-28 dollars per square metre, is like other "premium anti fouling systems," he said, and it is less expensive than other silicon coatings. It is applied in three coats.

The coating comes with a 10-year warranty. Other hull coatings on the market will typically last for 5 years, Mr Bowlin says. This factor alone reduces the costs by 50 per cent.

In a simulation test, it was found that the coating was not damaged at all after one thousand cleaning operations.

"Most cleaning operations, especially when you are dealing with self-polishing coatings, can remove 5 per cent to 15 per cent of the coating," Mr Bowlin said.

www.seacoat.com



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Pradeep Chawla – how seafarers can be motivated to learn

Pradeep Chawla, former head of QHSE and training with Anglo Eastern Ship Management, and now founder of digital learning company MarinePALs, explained how to create an organisational culture which supports learning

f you want an environment where people are motivated and supported to learn, you need the right organisational culture, where seafarers feel they can trust office staff and are trusted in return, believes Pradeep Chawla, founder of digital learning company MarinePALs.

Mr Chawla formerly held the role of head of QHSE and training with Anglo Eastern Ship Management for 31 years. The company currently has over 650 vessels under technical management and employs 32,000 seafarers.

We need to focus on people's motivation to continually learn, because we have probably reached the limit of how much it is possible to improve by writing more procedures. "We have beaten 'procedures' to death. There is a checklist for everything you do," he said. Yet accidents continue to happen.

To have a trusting relationship between seafarers and office staff, seafarers must not feel that they might be blamed for anything which goes wrong on ship, when they were doing their best to prevent it from going wrong.

This means a working environment where it is understood that people may fail at their work, and learning from this is better than blaming people, he said.

During the years of 1998 to 2018, it was common for accident investigations to conclude that the reason for the accident was a failure made by a person.

"The right approach is to say, 'we understand you failed but what was the ecosystem around the seafarer which create this environment which allowed the person to fail..' That brings in processes, commercial pressures, various sets of other factors."

Near misses are very important for learning, because several near misses often come before an actual incident. But we can only learn from near misses if people feel safe reporting them. "Why do people not report near misses? Because half the time, the reaction from the office or charterer is, 'how could you do this, this is so stupid.'"

Shipping companies which do not have a close relationship between ship and the office are also "very unlikely to have a learning environment," he said.

Jetty collision example

In one example, a tanker had a collision with a jetty causing a hole in a tank and a spill, due to a tow line from a tug breaking (or 'parting,' to use the technical term).

The tug was supposed to connect to the tanker one mile from the berth, but the tugboat was late. The tanker continued towards the berth under its own power, being connected to the tugboat about 0.8 miles from the berth.

The tow line parted very soon after it took the force of the tug pulling the vessel. But 0.8 miles from the berth was not enough distance for the tanker to slow itself down. The reason tugs normally connect to tankers a mile from a berth is that if there is a parting of the tow line, which would normally happen immediately after the tug starts pulling the vessel, it provides more distance to recover.

A point on the map is agreed on by the pilot and bridge team, of the last allowable 'abort point.' "Once you cross this point you are at a point of no return without a risk to the ship," he said.

So, it was a mistake by the crew, but an understandable one, given that they did not expect the tug line to part, and were probably under time pressure. The crew had been highly experienced and 'top class', Mr Chawla said. The decision to continue had also been supported by the pilot.

Similar accidents may have been caused by mooring gangs not being in the right place as a vessel arrived, high currents, or delays.

So, the correct response from the company would be not to blame anyone, but to help



Pradeep Chawla, founder of digital learning company MarinePALs

seafarers in the company to understand what went wrong, so that the same mistake is not made again.

In this example, the tanker operator took the 25-page investigation report and created a 7-minute video showing what happened which could be shared. It did not blame anybody.

Not intending to fail

It is important that senior management recognise that seafarers are trying to do the right thing in nearly all cases.

"It rarely happens that they intentionally did something which was unacceptable. Circumstances happen [such as] someone getting distracted at a crucial moment."

A 'just culture' means starting an investigation with the premise the person did not intend to fail, he said.

If you find that the act was intentional, or grossly negligent, such as a captain under the influence of alcohol, then you can fairly blame them, but not otherwise.

"In my 31 years I may have come across two cases where I could get angry and say, 'this was gross negligence.' In all the others the human did not want to fail, was trying his best, may have been limited by lack of skill or experience, or external factors," Mr Chawla said.



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In one case there was a pilot who was a "very angry man" and shouting at people. The ship ran aground because people were too afraid to tell the pilot he had mis-identified a buoy.

Creating useful learning

The next question is how useful learning can be achieved. Useful learning can be broken down into a number of elements, Mr Chawla said.

The student needs to be engaged; the learning needs to transfer useful skills, not just theory; and there needs to be reflection on why the learning is happening, he said. In training about how to handle ballast water, for example, there is usually very little discussion on why the regulations exist. "We teach them, 'this is what you can't do, this is what you should do,'" he said.

A further ingredient is that the teaching should itself be motivational or inspirational, encouraging people to learn more. And it is helpful if it is collaborative, between student and instructor, and between different students.

Good training also needs to cover both human factors and technology factors, since accidents are often caused where these come together, he said.

MarinePALS

Mr Chawla left Anglo Eastern in July 2023 because he reached the company's mandatory retirement age of sixty-five. But rather than retire, he set up MarinePALS, a digital learning company.

MarinePALS also acquired an IT company, which builds the software. Today, there are 45 staff on the engineering team, and 15 developing content.

Anglo Eastern was the company's first client, and its learning systems are provided on all Anglo Eastern vessels. Since then, there have been further orders from a 'medium sized company' with seventy ships, and three smaller companies.

It offers to build custom videos for its clients. There have been specialist videos on bulk carrier hatches and tanker moorings.

The learning management system and it's contents are licenced to a shipping company which makes it available for crew, not bought directly by crewmembers.

Companies pay a single per ship fee for the entire package, with games being an optional extra. "So far everybody wants the games," he said.

The software is provided via a cloud server to an app on seafarers' mobile devices or laptops. For ships which do not provide crew with fast internet, the files can be downloaded from an onboard server.

The content is in English with subtitles or dubbing in other languages. Most shipping companies prefer English since English skills are part of the STCW requirements, Mr Chawla said.

Warning

The system is designed to 'facilitate' learning, encouraging people to learn, and making it easier, rather than telling people what they should know.

In a world where any information is a few clicks away, the challenge is making people want to absorb new understanding, and making it easy to absorb, not just providing them with information, he said.

MarinePALS has pioneered short training videos of upto 7 minutes in length. Even that may be too long - 5 minutes may be the ideal length for people's attention spans today, Mr Chawla said.

Many studies show that people's attention spans are reducing, and this trend is unlikely to reverse.



Can you spot all the problems in the fore peak tank?

So, provide a simple message such as what the consequences may be if something is not done. "On YouTube, if you don't engage the viewer in 20 seconds, you've lost him," he said. The only exception is if seeing the video is a mandatory safety requirement, in which case "the 20 second rule doesn't apply," he said.

"Our parents would read a newspaper from page one to the last page. Now everybody can choose what information they want," he said. "They usually absorb the information in short bursts."

The videos have a link to the relevant page of the company competency management system, so you can see where the company asks that its crew understand what the video is saying.

To encourage peer to peer learning, seafarers are given scores as they progress through the materials. You can see how your progress compares with other people in the company at the same rank.

The training is 'gamified' in other ways. For example, there is a port state control game, where you are asked to find defects in photographs of ship equipment as fast as possible, such as a chair which is missing a leg.

"Gaming of learning is an amazing thing," he said. "People don't realise that they are learning."

"It is not taking a 'port state control course." It is an activity you can do sitting with your friends on the ship," he said. As you play, "the system is assessing your capability to apply your knowledge of regulations," he said.

MarinePALS is also exploring virtual reality learning, for example so someone can 'walk' around the inside of a forepeak tank.

The system can be used for assessment, where someone is asked to find the structural faults in a tank.

In a classroom you can be taught about ways that cracks can occur, in virtual reality you can see the cracks and how they occurred.

MarinePALs is exploring the use of AI to generate video imagery to potentially reduce development costs. But so far Captain Chawla finds it is not so useful, because the AI has not had much maritime video to train on.

"If you ask AI model to make a video for two cars chasing each other, you will get a perfect one. If you ask for a video about a mooring winch, it cannot do it." If you ask for a ship captain, the AI might give you "something out of Pirates of the Caribbean," he said.

VIKAND's seafarer proactive healthcare program

Maritime healthcare company VIKAND, based in Florida, has launched a proactive healthcare program for seafarers, supported by advances in digital technology

aritime healthcare company VIKAND of Florida has launched a 'proactive healthcare program' for seafarers. It is designed to help seafarers and their employers spot health problems as they emerge and before they get too serious, rather than trying to fix them after someone has become unable to work.

The service takes advantage of a range of digital tools including for monitoring health, monitoring changes and communications with remote experts.

As an example of proactive healthcare, consider how public health services manage prostate cancer, recommending that people in higher risk categories take periodic tests.

The "proactive" concept copies the philosophy of using proactive maintenance for equipment, rather than reactive maintenance, so identifying emerging problems rather than waiting until things break.

If shipping companies could do more to spot and rectify emerging health problems before they get too serious, they could make big savings on the costs of fixing serious seafarer health problems.

Ronald Spithout, Managing Director of OneHealth by VIKAND, and a former president of maritime with Inmarsat, notes that a quarter of all maritime insurance claims are related to crew illnesses and injuries, and these costs are growing.

On average, a vessel is making a medical diversion every five years to handle medical emergencies, he said. One medical diversion can easily cost \$250k, and it cannot all be recouped from insurance.

The proactive service can reduce the number of times seafarers get serious onboard medical conditions by "up to 75 per cent," he said.

The proactive approach also implies taking a more rounded view of a person and the investment that the company is putting into them, rather than as someone filling a role.

The service will also help the European



Peter Hult, CEO of VIKAND

maritime industry to comply with its obligations under the EU Supply Chain Act, which will come into law by 2025, requiring companies of a certain size to "carefully manage social and environmental impacts throughout their supply chain." This can include avoiding adverse impacts on crew, such as being rejected for a health problem which does not truly restrict them from working.

Accepting chronic disease

A further benefit is that by using the service, shipping companies should be less concerned about employing crew with so-called 'chronic' health issues which are long lasting but not immediately dangerous, such as high blood pressure.

Peter Hult, CEO of VIKAND, says that the shipping industry rejects 10,000 seafarers each year due to chronic (persistent) disease.

Meanwhile, studies have found that 20 per cent of all company CEOs have hypertension (high blood pressure), and they are still CEOs. If such stressful work can be done by someone with high blood pressure, it should not be an obstacle to working on ship, Mr Hult said.

Similarly, crewmembers have been rejected for having an overactive thyroid (more common in women, typically at between 20 and 40 years old), although it does not affect their ability to work. Seafarers have a perverse incentive not to be truthful when filling in questionnaires before going onboard, because they may be rejected for health issues, even though they would not prevent them from working.

Meanwhile, industry associations say there is already a shortfall of 9 per cent of trained officers, and this problem is going to get worse.

Seafarers with chronic conditions are likely to be older and more experienced, so it also means the industry is rejecting its most experienced seafarers, he said.

The service

The proactive healthcare program was formerly launched at an event at the US Embassy in London on February 7.

The service is offered for a single flat fee per person.

The program uses VIKAND's "OneHealth" solution, which uses advanced digital technology combined with advances in healthcare. It covers both mental and physical health.

There are many different ways technology can get an understanding of someone's health or collect information about the physical parameters and the mental or physical health influencing habits of a person. For example, gathering data about their sleep, food, exercise,



Ronald Spithout, Managing Director of OneHealth by VIKAND, speaking at a launch event for Vikand's proactive healthcare program at the American Embassy, London

exposure to sunlight or clean air.

VIKAND is supplying an extensive kit of medical hardware that can measure vital peripherals needed for a doctor to diagnose a patient, such as for temperature, blood pressure, glucose, heart-rhythm.

Many people already use wearable devices that connect with the smartphones and that

could gather valuable data around the physical wellbeing of the wearer. Some of these could be used for chronic disease monitoring or health preservation.

VIKAND is also reaching out and talking to seafarers, getting an understanding of the circumstantial habits that may have an influence on their mental wellbeing.

In all cases VIKAND provides a seafarer or vessel with a direct video connection with a medical professional in the event of any concern.

On one ship, a Filipino seafarer had depression, and the cause was found to be that the person was only provided with Indian food.

The maritime industry is seeing around fifteen seafarer suicides a year, Mr Spithout said, and better awareness may help prevent those.

As part of the service, the captain receives a call once a month from a health specialist, to discuss health issues, including food and exercise provided to crew.

Idwal – inspections and data to monitor your fleet

Idwal of Cardiff, UK, has a service offering for shipping companies to monitor the condition of their fleet, based on inspections from independent inspectors around the world using a common structure, and data analytics

dwal of Cardiff, UK, has launched a service "Idwal ID" to help shipping companies get a better understanding of vessel condition, based on a combination of live inspections and data management. The company describes itself as being in the "ship inspection, technology and data business."

The company manages a network of vessel inspectors around the world, all independently employed. A shipping company can be provided with an inspection of their vessel anywhere in the world, to the same standard and to the same format.

The aim is to support shipping companies in maintaining and gradually improving the condition of their ships.

The information can help companies determine where they want to spend money, or where they are able to reduce their spending. It can help companies be better prepared for vetting inspections, better able to prioritise maintenance, and able to better manage risks overall.

Idwal ID

The "Idwal ID" service, launched in January 2024, is described as a "a comprehensive condition improvement programme, delivering defect management, fleet analytics and benchmarking."

From data from inspections, shipowners and charterers can see how their whole fleet compare.

Ship inspection data can be viewed by vessel classed, when the next inspection is due, or what the algorithm calculates to be the ship's risk.

You can do other interesting analysis, such as to compare all your ships at a certain age.

You can review all the defects found by inspections, including written reports and images. You can see whether the defect has been resolved.

You can compare ships managed by different ship management companies in your fleet, or compare ships by size range, for example to see if your Suezmaxes have more defects than your VLCCs.

The data analysis is based on inspections done over the past 5 years.

While companies can only see specific data about their own ships, they can see an average of all the data in Idwal's database so they can see how their own ships compare to the average.

It is useful to be able to see both the detail of individual inspection reports and how a vessel or group of vessels compares with the global fleet, said George Haysom, CCO at Idwal.



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It is easier to make a decision to fix a problem when you know that having the problem makes your ship inferior to most other ships.

You can combine the data with other inspection data such as from port state control inspections.

Having the data may also mean fewer ship visits are required by the ship superintendent, or the superintendent's checks do not need to be so thorough. It can mean that decisions can be made more based on data, and less on instinct.

Idwal has worked together with many shipping companies to develop the service, including tanker operators Tufton. Other companies involved are Anglo American, CMA CGM, Cobelfret, Fednav, and Swire Bulk.

Inspection process

The inspector follows a structured survey, collecting five hundred data points.

There are twenty-one categories, including condition, maintenance, ESG, crew welfare and regulatory compliance. There is a question about crew wi-fi, its speed and whether it is provided free of charge.

There is a structured methodology to filling in a report, which ensures that the reports are consistent, accurate, free from bias, and intuitive to read, Idwal says. Idwal has a dedicated "surveyor management team" to ensure all surveys meet company standards, and the inspections are consistent around the world.

An algorithm crunches the numbers to generate an "Idwal grade," giving the vessel a score for its asset integrity and risk.

So, the service uses a mix of people onboard ships, or "boots on the ground," and digital technology.

Company background

Idwal started life as a subsidiary of Graig Shipping of Cardiff, UK. The name comes from Idwal Williams, who founded Graig Shipping in 1919.

Graig Shipping staff saw the opportunity to set up Idwal as a separate company in 2010, after they identified that marine surveying around the world lacked "quality and standardisation," says Nick Owens, CEO of Idwal. There was no unified output which people could trust. So they developed as a "technology enabled inspection business."

Today, Idwal operates independently of Graig. It is backed by Lloyds Development Corporation, the private equity arm of Lloyds Banking Group.

Idwal is based in Cardiff and has offices in

Singapore, Shanghai, Tokyo, and Athens.

It says it has inspected 15 per cent of all the vessels in the world since 2019 and has done 10,000 inspections between 2019 and 2023. There were fifteen inspection reports delivered every working day on average in 2023, so 3,000 inspections during the year. It has done 12,500 inspections since the company was founded in 2010, in one hundred countries.

The company claims to arrange more ship inspections than any other company in the world.

Sale of vessels

Idwal already claims to be the market leader in inspections for vessels being considered for purchase (like a mortgage home surveyor). It says 45 per cent of vessels sold in 2023 globally had an Idwal inspection report.

In February 2024, Idwal announced it was appointing Frank Andersen to lead a new transactional services department, arranging inspections for ships being sold.

Mr Andersen was formerly with AP Moller Maersk, including being managing director of five offices in Asia. He also led the Singapore office of Klaveness.

www.idwalmarine.com

Ballast water management developments

Recent BWMS developments include IMO's plans at MEPC 81; an explanation for suspended solids; Q88 updates; fines in Conakry; US penalties; LR record keeping alert; warning about unqualified testing companies

he IMO's Marine Environment Protection Committee (MEPC 81) meeting on 18-22 March 2024 will review developments with ballast water regulations to date.

In more detail, the Ballast Water Convention (full name "International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004") entered into force in September 2017.

At the last MEPC meeting, MEPC 80 in July 2023, plans were approved to review how well the 'experience building phase' had gone, and what issues need to be considered now.

This will lead to development of a package of amendments to the convention.

Issues of concern with the regulations as they stand include a need for clearer regulations for what happens when ships operate in challenging water quality [see next section]; guidance of temporary storage of sewage and grey water in ballast tanks; how to approve modifications to ballast systems which already have type approval; and use of electronic record books.

Understanding suspended solids

Ballast water filter equipment company Filtersafe published a blog post and illustration showing why so many ports see 'suspended solids' (muck) in their water. A high level of suspended solids is sometimes referred to as "challenging water quality" (see previous section).

The IMO's D-2 standard requires that ballast systems can treat water with suspended solids up to fifty parts per million (the jargon is 'Total Suspended Solids, or TSS).

But some of the world's busiest ports have much higher levels of suspended solids that this. Shanghai, for example, has seen 1,000 parts per million of solids (0.1 per cent solids).

This means that the regulations as they stand cannot be properly applied in many ports in the world, because the ports have more suspended solids than the systems were required to be designed to handle.

High levels of suspended solids can be caused by water running off soil and into rivers

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upstream (known as soil erosion).

A faster flowing river will carry more suspended particles than a slower one, because with a slower one there is more time for them to settle out.

The river may also be fed from a sewage or wastewater system, which is not removing all the solids, or has been overwhelmed due to heavy rain.

With densely populated areas, there is a lot of pavement which accumulates dust and other debris. When it rains, the water washes the pavement, and the dirty water runs into nearby bodies of water.

Q88 updates

Version 6 of the tanker industry standard questionnaire, Q88, has been released, with questions about the ballast water management system.

Users of the Q88 will now be asked to provide input on their vessel's ballast water treatment systems, as well as greenhouse gas performance data, scrubbers, energy and consumption ratings, and NOx emissions compliance data.

The questionnaire is for sharing data between charterers and owners, to support pre-fixture decision making.

This revision is the work of a collaborative effort between the Q88 group at Veson Nautical and the INTERTANKO Vetting Committee, Q88 Working Group chaired by Captain Ashley Cooper, Group Marine Director, Scorpio Ship Management S.A.M.

The questionnaire was originally developed by INTERTANKO, and a company called Q88, since acquired by Veson in 2022.

Fines in Conakry

Vessel operators have been given heavy fines for doing ballast and de-ballasting operations in Conakry Port, Guinea, without getting permission, according to reports from Africa P+I services, passed on by Japan P+I Club.

Fines can be as large as 150 per cent of total port disbursement costs.

The Maritime Code of the Republic of Guinea specifies that oil tankers of 150 gt or less, and other ships of four hundred gt or less, must retain polluted ballast water onboard until it can be discharged in reception facilities ashore.

For bigger tankers and ships, there are further requirements for oil filtering, alarm devices and automatic stopping of hydrocarbon discharge.

Clean ballast water cannot be discharged to the sea unless treated by an approved process.

Further information is here https://www. piclub.or.jp/en/news/39225

Shipowner pays \$248k US penalties

The US Environmental Protection Agency settled with an unnamed US shipping company in February 2024 to pay \$248k penalties for ballast water related violations for two general cargo ships, reports Singapore marine environmental services company Maritec.

The violations included untreated ballast water discharge, vessel inspections, and discharge monitoring.

Between January 2019 and August 2020, Vessel A discharged untreated ballast water eight times in water. It also failed to conduct comprehensive annual vessel inspections at least once every 12 months in 2020 and 2021. The penalty 'agreed' was \$111k.

Between May 2018 and September 2020, Vessel B discharged untreated ballast water seven times. It also failed to report biological indicator compliance monitoring after a treated ballast water discharge in December 2021.

Vessel B also failed to conduct comprehensive annual vessel inspections at least once every 12 months in 2018, 2019, and 2021. The 'agreed' penalty was \$137,250.

LR – make sure you fill in the form

Lloyd's Register issued a "Statutory Alert" in January 2024 about ballast water record keeping, based on IMO's BWM.2/Circ.80 – Guidance on ballast water record-keeping and reporting (July 2023).

The circular includes an updated example ballast water reporting form (BWRF) and guidance on how to complete the form.

It says some port states may require the submission of a form for ships bound for its ports, offshore terminals, or anchorage areas.

The circular also includes an example form for logging ballast water operations by tank. It is not required, but keeping tank by tank logs is a best practise, LR says.

Warning - ballast testing companies

Marcie Merksamer, Vice President of EnviroManagement, Inc. and Chair of the IMAREST Ballast Water Special Interest Group, says she has increasingly seen new market entrants to the testing market who "appear to have limited or no experience with the relevant ballast water regulations," and may not follow the specifications of IMO, or the US regulations.

She has also seen IMO commissioning testing reports which miss out basic information such as the make and model of the ballast water management system that was tested, or the sampling and analysis methods employed.

For testing under the US Environmental Protection Agency requirements for a VGP [US



Marcie Merksamer, Vice President of EnviroManagement, Inc.

Vessel General Permit for Discharges Incidental to the Normal Operation of a Vessel] there have been cases where the incorrect parameters were analysed, samples exceed holding times, and reports do not list the critical information, she said.

Shipowners should bear in mind that IMO's commissioning testing requirement was created to protect the interest of shipowners, at the request of their industry associations, to ensure that they have a correctly installed and functioning system. But if the systems are not tested properly, because shipowners go to a poor-quality provider to save money, it is all wasted.

Companies are required to become approved testing service providers under IMO's 2020 Guidance for the commissioning testing of ballast water management systems (BWM.2/ Circ.70/Rev.1).

This review should confirm their qualifications, the sampling and testing methodologies they employ, and their quality control and assurance practices, she said.

Scanjet's tank monitoring system

Scanjet PSM, a Swedish tank equipment company, reports that its new "Connect" monitoring system was used on a refit of oil tanker Cactus, a 164,000-dwt vessel flagged in Panama. The tanker operator was not disclosed.

As part of the refit, Scanjet provided replacement APT1000 data transmitters in titanium for all the vessel's ballast tanks.

These transmitters were configured to operate in analogue mode (4 to 20mA), which meant that cabling from the existing system could be re-used, making the upgrade much easier.

All the tank level data is brought into a main processing unit and displayed on a 22-inch touch screen.

The entire system and equipment could be sent to the vessel preconfigured and customised for immediate installation.



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