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OCTOBER - DECEMBER 2024

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MAIB investigates tanker jetty contact

MAIB published its investigation into a chemical tanker contacting a jetty on the River Thames causing damage which took 11 months to repair. The conclusion appears to be that the pilot should have waited for a tug

The UK Maritime Accident Investigation Board (MAIB) released its report into the contact of a 129m chemical tanker Ali Ka with Oikos Jetty 2 on the River Thames at Canvey Island, just outside London, on Oct 25, 2022, at 4.36am.

MAIB is scrupulously careful not to allocate blame in the report. But readers might draw their own conclusion that the pilot should have waited for a tug. A tug was not available during the current high tide, so the crew would have needed to wait for the next high tide.

What happened

The contact happened as the vessel was departing the berth. There was a Port of London Authority pilot onboard and no tug.

While manoeuvring off the berth under pilotage, control of the ship was lost and it made contact with another fuel jetty at the site.

The impact caused minor damage to the ship but severe damage to the jetty, taking 11 months to be brought back to its original capability.

There was no pollution and no injuries. The vessel also ran aground, and two tugs were required to move it.

The online report gives a comprehensive report of the dialogue, but perhaps it is sufficient to say here that the master had been concerned that a tug was not being used, and also contacted the ship's agent to discuss leaving without a tug.

A tug was not available at the time. When a tug would have been available, at 5am, the water depths would have been too low to do the manoeuvre due to tides.

The pilot was already concerned that preparations for sailing were behind schedule and was making efforts to hurry the departure.

The pilot joined the phone call between the master and agent. It became a heated three-way conversation and ended with the pilot saying that 0500 was too late to conduct a safe move.

After the accident, the pilot and duty port controller were suspended from duty pending a Port of London Authority investigation.

The port controller was cleared of all disciplinary charges in January 2023. The pilot retired in March 2023 after 22 years' service with the Port of London Authority. At this point all disciplinary processes against the pilot ceased.

Investigation findings

MAIB found that the pilot "was highly likely to have been severely fatigued," based on the advice of a specialist consultancy.

Although no evidence was available about the amount of rest the pilot had in preceding hours, the consultancy said, "Pilot A's sleep/wake history made it highly likely that he was experiencing an elevated level of fatigue at the time of the accident."

"Pilot A demonstrated behaviours and performance consistent with a fatigued individual," the consultancy said. "It was highly probable that these behaviours and the performance played a direct role in the course of events leading to the accident."

It was found that the pilot's plan missed key information and was compromised by incoherencies in documentation. Also, the master/pilot exchange was ineffective and did not result in the bridge team fully participating in an appropriately modified and agreed plan.

The investigation found that there had been previous accidents in the same location. These were not recognised as warnings, and risk controls had not been reviewed. For example, there could have been a regulatory requirement to use a tug.

The terminal was considered "a critical piece of national infrastructure", being connected to the UK fuel distribution pipeline network, for both road and aviation fuels.

The terminal's risk management processes could have better covered the risk of vessel collision with shore infrastructure at a critical site, such as to require tugs, MAIB said.

Recommendations

A recommendation was made to the Port of London Authority (PLA) to conduct collaborative risk assessments of all high-risk berths in its area, in particular by reconsidering tug use over a range of environmental conditions.

It should provide guidance to pilots and other stuff on "dealing with the recognition,

TANKEROperator

Vol 23 No 5
Future Energy Publishing Ltd
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1 year (7 issues) - £195
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escalation, and safe resolution of challenges." The PLA should review the risks of pilot fatigue and perhaps have a better fatigue risk management system.

Vessel operator Transka Tankers were recommended to review and revise its Bridge Resource Management training to include agreeing and assigning roles and responsibilities, support to embarked pilots, diligent exercise of the master/pilot exchange, and challenge and response procedures specific to working with an embarked pilot.

It was recommended to review and revise the policy for the accurate setting of safety contours [line determining safe and unsafe waters] in its Electronic Chart Display and Information System (ECDIS) to best support pilotage and the appreciation of risk during manoeuvring to and from the berth.

Oikos Storage Limited was recommended to conduct collaborative risk assessments of its berths and consider assurance mechanisms, for cases where the safety of its infrastructure is dependent on what people from other organisations do. Particular regard was to be given to pilotage and tug use over a range of environmental conditions. TO

Download the full report

https://assets.publishing.service.gov.uk/media/668d306c7541f54efe51bc3a/2024-6-AliKa-Report.pdf

OCIMF news – SIRE 2.0, shore emissions capture

OCIMF launched SIRE 2.0 in September; it is also making guidelines for shore emissions capture equipment, which will be required in California

In September OCIMF launched the SIRE 2.0 inspection program.

"The secretariat, OCIMF members, and many others in the industry have carefully established the building blocks of a robust inspection system," OCIMF said.

"Every stakeholder within the SIRE programme plays a role in ensuring the quality of the reports it generates.

"OCIMF is undertaking several pieces of work to improve the consistency and quality of inspection reports, including the increased use of data analysis to evaluate the programme's performance and pinpoint areas for improvement.

"Inspection report quality is crucial to OCIMF and all report users, as it forms the foundation of trust in the programme.

"Achieving high-quality reports depends on the support of all stakeholders in the SIRE programme. It is essential that all stakeholders follow the provided guidance, act with integrity, and report any concerns."

"The support of OCIMF's industry partners and stakeholders who contributed their resources, knowledge and time has been invaluable.

"SIRE 2.0 inspectors, ship crews, ship operators, chartering organisations, submitting companies, marine terminals and the collaborative partnership developed with INTERTANKO have all been essential to reaching this milestone."

SIRE 2.0 represents a significant milestone for OCIMF and the maritime industry as well," said Karen Davis, director of OCIMF.

Participants on OCIMF's "pilot" SIRE 2.0 inspector training course

"The release of SIRE 2.0 ensures this industry is better equipped to identify, understand and respond to emerging issues and to resolve root-causes of risk."

OCIMF ran a "pilot" inspector training course for SIRE 2.0 in London on October 14-18.

The course was run for 24 employees of OCIMF submitting companies represented on the VIP (Vessel Inspection Programme) Steering Group.

The course was designed to test aspects such as maximum candidate numbers, logistics of tablet delivery to new candidates, the use of technology in the delivery of the programme as well as the allocation and completion of pre-course study.

Shore emissions capture

OCIMF's Emissions Capture and Control (ECC) Working group met in Houston in September and discussed the guidelines it is developing for ECC safety.

The state of California is requiring tankers calling in Port of LA and Long Beach terminals to use either shore power or emissions capture and control systems (ECC) from January 2025 to meet emissions regulations for vessels at berth. It will apply to tanker calls at all Californian ports from 2027.

This ECC service can be provided from a barge which is able to process the vessel exhaust. The OCIMF guidelines will include design and positioning of an ECC collector, potential impacts of ECC technology on tanker machinery, risks associated with hazardous substances on the ECC barge, competency, and training requirements among other factors.

Staff

Darron L. Biddle joined OCIMF this summer on a three-year secondment from ExxonMobil as New Publications and Advocacy Director,

taking over from Saurabh Sachdeva.

Mr Biddle was a deck officer onboard tankers for 11 years, and subsequently worked as a marine adviser and supervisor in both upstream and downstream ExxonMobil companies and divisions.

Christopher Holland will join OCIMF as Offshore Adviser in November, on a three-year secondment from Chevron. He is an experienced marine engineer who for 28 years has executed the design, fabrication, operational planning, and life extension of offshore facilities' hull and marine systems.

Jenny Long joined OCIMF as Quality Assessor, on a 3-year secondment from BP Shipping, where her most recent role was Marine Advisor on the Assessment and Inspection team.

Ms Long has acted as Alternate Qualified Individual and Incident Commander, managing incident calls from the BP-operated fleet and third-party vessels on charter to BP. Previously, she worked in the BP voyage operations team as a Ship Operator and Voyage Operations Superintendent.

Events

OCIMF attended a meeting of INTERTANKO's Nautical Sub Committee held at the European Maritime Safety Agency (EMSA) headquarters in Lisbon, Portugal on 17 September.

Discussions took place on onshore power supply, engine power / shaft power limitation, Fujairan Anchorage re-organisation, the S-100 standard for e-navigation, autonomous shipping, the "R-mode" system to combat GNSS spoofing and jamming, water routing systems, and a security update of the Red Sea and Persian Gulf.

OCIMF participated in an Equinor "Working Safety with Suppliers" event in Stavanger in October.

This programme has been running since 2007, to "better understand safety and security challenges, establish an environment for collaboration and knowledge sharing and work beyond established barriers towards safer operations," said Karen Davis, director of OCIMF.

"I want to thank Equinor for allowing us to share our perspectives – and learn from others. You have proven that bringing together stakeholders from primary activities along the value chain to work collectively will make our industry better," she said.

SOx EGCS paper withdrawn

OCIMF has withdrawn a 2016 information paper "Guide for Implementation of Sulphur Oxide Exhaust Gas Cleaning Systems, first edition (2016)" as the content is no longer current.

Tanker operators are recommended to see IMO guidelines which are more up to date. MEPC.340(77) 2021 Guidelines for Exhaust Gas Cleaning Systems; MEPC.1/Circ.899 2022 Guidelines for Risk and Impact Assessments of the Discharge Water from Exhaust Gas Cleaning Systems; MEPC.1/Circ.883/Rev.1 2021 Guidance on indication of ongoing compliance in the case of the failure of a single monitoring instrument, and recommended actions to take if the Exhaust Gas Cleaning System (EGCS) fails to meet the provisions of the EGCS Guidelines. TO

Making competency management systems work

For a competency management system to work, it needs to be regularly reviewed. The competencies in it need to be specific and measurable, we heard at an OTG webinar, with speakers from Seapeak and INTERTANKO

A competency management system (CMS) is a structured way to manage the competency of vessel crew.

It involves breaking down the requirements of job roles into specific 'competencies' required to do those roles, which can all be assessed.

Then as a manager, you can check crew are competent in doing the tasks you are assigning them, and see who is ready for promotion.

Crew can see what they need to do, to move up the ranks. Customers (charterers) can be assured that crew are able to do their jobs.

It is not a new idea in tanker shipping. Seapeak (formerly Teekay LNG) had its competency management system first approved by DNV in 2004.

OCIMF and INTERTANO first presented a paper, "Behavioural Competency Assessment and Verification for Vessel Operators" in 2018. Intertanko produced the "INTERTANKO Competency Management Guidance" in 2021.

Staff from Seapeak and INTERTANKO, and consultant Andy Easdown, discussed further at a webinar on CMS organised by Ocean Training Group (OTG) on October 9.

Seapeak

Gas carrier operator Seapeak (known as Teekay LNG until early 2022) has had a competency management system approved by DNV since 2004.

"It provides a straightforward and uncomplicated framework of appraisals and training," said John Reid, training and recruitment manager with Seapeak.

The company has a fleet of 49 LNG carriers, 35 LPG carriers, 8 multigas carriers, and 2 very large ethylene carriers, according to its website.

The company has 2600 seafarers, with 40 different nationalities, including 150 cadets from 12 countries. It has 300 shore staff with offices in Glasgow, Singapore, Copenhagen, Vancouver, Manilla and Madrid.

Seafarer training centres around the world do not always train seafarers to the same standard. When they come to Seapeak, the CMS ensures that they are all brought to the same training standard.

The CMS enables the company to ensure it has a high standard of training across the fleet, and seafarers have good knowledge of what is required to do their tasks, such as the equipment they are required to know how to use.

"It is important we have a standard onboard learning and development process which all seafarers regardless of nationality can relate to and follow," Mr Reid said.

It is something customers are interested to see. When they conduct 'due diligence' they often ask Seapeak how it manages competency. Having a CMS approved by DNV proves very helpful, he said.

Mr Reid believes that Seapeak's results on objective assessments, such as OCIMF inspections, are better than companies that don't have competency management systems in place. However it is not possible to directly correlate having a CMS with improved performance.

Much of it could be done on spreadsheets, but having a software system means that that all the data is held in one place, and seafarers can access their own data, including onboard and when on leave. It is also much easier for an outside auditor to check. In future, seafarers will be able to access information about their appraisals through the system.

Development pathways

As part of its CMS, there is a structured competency development pathway for people to move up the ranks, such as from third assistant engineer to chief engineer, or from cadet to captain. Factors include length of experience, certificates, training, passing promotion interviews and attending seafarer conferences.

The main components needed to make a CMS work are a competency profile relevant to each rank, and a comprehensive appraisals process, Mr Reid said.

With these together, people can see what they need to be able to do in their current role and for a role they may wish to progress to, and there is a system to determine what competencies they have acquired. So you have a "fair and achievable promotional pathway."

The company then needs to provide support to seafarers to progress along the pathway, including with career development guidance and providing training opportunities.

The company employs two career development officers, one for deck staff and one for engine staff, to help seafarers progress through the rank structure. "It shows there's a clear and achievable pathway to the top rank with no barriers. It is up to you how far up the ladder you go," he said.

The career development officers offer all vessel officers a career discussion after they have signed off a vessel, so seafarers know the company is there to support them in promotion, if they want it. They are also asked if they are interested in coming to work in the shore office in the next 12 months. The company can easily see which seafarers are motivated to get to the higher ranks.

Reviewing it

Seapeak has a competency management committee which meets quarterly to review how well the system is working, Mr Reid said. This committee includes HSEQ staff as well as training staff. They look through near miss reports and try to identify areas training can be improved. This can mean adding to the list of required competencies for a role or changing them.

It might identify there are new required competences for working with specific technologies, if it emerges that crew are not familiar enough with them.

Frans Ubaghs, INTERTANKO

INTERTANKO and OCIMF have been working together to develop competency management systems for some years, said Frans Ubaghs, Senior Vetting Manager and Deputy Marine Director at INTERTANKO.

This started with development of the Behavioural Competency Assessment and Verification (BCAV) guide in 2018.

INTERTANKO developed a document called INTERTANKO Competence Management Guidance (ICMG) in 2020-2021 describing 72 competencies onboard, such as for navigation, cargo operations and mooring.

Since OCIMF represents tanker industry customers, tanker operators can be assured that competency management is something their customers want to see, he said.

Many of the requirements in ICMG are based on incidents which have occurred. All the competencies are measurable, he said.

It would be very hard for someone or a company to seek to develop all competencies at once, but they could seek to develop one at a time.

The systems can easily become very complex, so it is important to "start with very simple tools," he said.

Behavioural competencies include teamworking, communication, ability to influence others, situation awareness, decision making, result focus, leadership. It is possible to drill further down to "very specific behaviour competencies". An assessor can be trained on how to assess these.

For behavioural competency, it is important to get "commitment from the bottom", in other words seafarers at all ranks need to support the initiative.

"The competency management system is not set," said Mr Ubaghs. "It is evolving all the time with incidents happening. New technologies bring new competencies with them. Competency management has to evolve."

Andy Easdown

A CMS helps encourage people to develop skills while working onboard ships that are useful working in offices, such as teamwork and communication skills, said maritime learning consultant Andy Easdown.

Mr Easdown is a former learning advisor with Shell, where he introduced a maritime competency management system covering both shore staff and seafarers. He also worked as global marine HR training manager with Lloyd's Register, where he introduced a competency management system for surveyors.

Mr Easdown sees the role of a competency management system as something which can help the company encourage development of the right competencies, and to support people in managing their own career development, so they can see what competencies they need to develop to progress.

The CMS means that you have a common language to discuss competency in the company, he said. "Everybody knows what you mean, you are not having to spend a lot of time explaining."

Competencies covered within the system need to be specific and measurable, so it is possible to objectively assess whether people have them, he said.

Otherwise assessors will be making subjective assessments, which can be decided by factors such as whether they like someone personally.

For example, for navigation competency, you want to know if someone is aware of applicable regulations and company requirements, and can apply them in doing a passage plan.

Someone who is competent will be able to communicate what they are doing, as well as do the technical task, he said.

Mr Easdown noted that competency management is mentioned in a number of elements of TMSA, including assessment of competency, preparation for promotion, competency of navigational officers. CMS is more or less required for the higher levels of TMSA, if you want to be able to demonstrate that you have a structured means to manage competency.

Many companies would prefer to develop their own people rather than recruit externally, because their own people are already familiar with how the company operates, he said.

It is important that seafarers appreciate the value a CMS can bring to them personally, and do not see it as an "imposition from the shore crowd," he said.

When seafarers need new competencies, such as the ability to work with new technology, a CMS can easily be amended. "CMS is giving people the skills to handle and manage [technology change]."

In a similar way, a company Safety Management System may need to be regularly updated. One thing which "comes up time and time again" is that the process actually being followed onboard is different to how the safety management system describes that it should be done.

There are many new competencies required to work with future fuels, he said. Shipping companies need to identify the competencies which people need to work "in this new environment," how they are expected to think differently.

For example, if there is a hydrogen fire, the solution might be to ventilate the space to allow hydrogen to escape, rather than conventional fire extinguishing methods. TO

Geopolitics, decarbonisation, technology

Maritime industry leaders from IMO, EU, German government, Hapag Lloyd, German Shipowners Association, MAN, VARD and DNV discussed geopolitics, decarbonisation and technology in the opening ceremony event at SMM

"Without shipping, half the world would freeze, and the other half would starve," said Dr Gaby Bornheim, President of the German Shipowners' Association, also Managing Director of container and bulk carrier operator Peter Döhle Schiffahrts-KG.

She was speaking at the first panel session of the opening ceremony event for the SMM trade show in Hamburg, which had a theme of geopolitics and maritime.

Geopolitics having an impact on shipping is nothing new, noted Magda Kopczynska, Director General DG Move, EU Commission. "Shipping always reflects geopolitics."

Arsenio Dominguez, Secretary General of IMO, noted that the Red Sea situation "has taken up most of my time since January."

On the topic of public perception of shipping, perhaps it is unrealistic to expect the general public to care much about it, he said. "People don't generally think of shipping as a very important part of their life, that's a reality," he said.

The public were aware of shipping during the Covid period, and it was the only mode of transport which continued to operate normally, he said. But once Covid "turned into a regular cold", people forgot about shipping, until the next crisis with public awareness, the Ever Given obstruction of the Suez Canal.

"I'm really focussing on developing the importance of shipping," he said, including with work with the United Nations.

EU's Ms Kopczynska added that it is human nature that "we don't think of things when they work."

From left to right: *Arsenio Dominguez, Secretary General, IMO; Dr Gaby Bornheim, President, German Shipowners' Association; Magda Kopczynska, Director General DG Move, EU Commission; Knut Ørbeck-Nilssen, CEO, DNV Maritime; Alberto Maestrini, Chairman of VARD and Head of Offshore Division FINCANTIERI; Dieter Janecek, Coordinator for Maritime Economy and Tourism, German Federal Government; Dr Uwe Lauber, CEO MAN Energy Solutions; Andrea Thilo (moderator)*

Decarbonisation regulation

IMO is on track to be able to specify "by the end of next year" the measures to drive decarbonisation up to 2050, said Arsenio Dominguez, Secretary General IMO.

He was speaking in the second panel, on reaching zero emission by 2050, with participation from IMO, EU, MAN and Hapag Lloyd.

"This is a transition, not going to happen overnight. We know the challenges, we focus on them," he said.

Asked about regulatory acceptance of nuclear energy, Mr Dominguez said, "It is on the table at IMO, recently added. Nuclear is an energy source that can help achieve decarbonisation."

Asked how fuel suppliers are supporting decarbonisation, Mr Dominguez said new fuels could be available quicker than people expect, based on the speed that low sulphur fuels were made available.

"In 2020, we were told it would take 5-8 years to roll out [low sulphur fuels]. When we got to 2022, the fuel was there," he said.

"If we slow the process down, we will not be part of the [low carbon fuel] market," added Dieter Janecek, Coordinator for the Maritime Industry with the German Federal Government.

EU's Ms Kopczynska said that when LNG was first introduced as a marine fuel people questioned whether a vessel could be bunkered in a port, and no-one is doing that now. So, ammonia bunkering may become widespread much faster than people expect.

"We are a little bit surprised by the speed the sector is embarking on the transition," she said. "I am quite sure we will get answers including safety and security with ammonia."

EU sees its three regulatory packages, EU ETS, FuelEU Maritime and Alternative Fuels Infrastructure Regulation (AFIR) as a "holy trinity."

AFIR sets mandatory national targets for EU member states to deploy 'alternative fuel infrastructure', in particular electricity and hydrogen, for road vehicles, vessels at the quayside and stationary aircraft.

"I am disappointed some EU member states don't jump at the opportunity to build [low carbon fuel] infrastructure in Europe," she said. And low carbon fuel production will also

happen outside the EU.

"What the maritime world really needs is complete regulatory predictability," she said. "We are not going back."

When asked who will pay the price for decarbonisation, Ms Kopczynska replied, "look at the price we pay for relying too much on fossil energy."

One obstacle is slow government decision making in the West, said Dr Uwe Lauber, CEO MAN Energy Solutions. On a recent trip to China, he was surprised to see how fast decisions can be made and implemented. "They talk once, they go, maybe fail, they go again. In Germany we have no way to make a decision."

The European shipping industry knows it will need hydrogen in massive quantities, yet, "I do not see real actions. The plan to execute is not there."

Decarbonisation technology

Decarbonisation technology is ready, said MAN's Dr Lauber. "LNG is a first step; methanol [has been ready] for 6 years; ammonia is the new kid on the block."

Renewable energy plants are already being built which will generate green hydrogen to be used to make synthetic fuels, he said. There are many technologies ready for better energy efficiency, including coatings and new propeller designs.

One of the biggest challenges with improving energy efficiency is to improve the existing fleet, he said. And it may not make financial sense to convert an older vessel. In that case, "does it make sense to throw it away?"

Dr Lauber said he hates LNG fuel being considered a "bridging technology". It could be a permanent technology as we move to bio or synthetic gas, he said. Also, an LNG fuelled ship "can convert easily to methanol."

Dr Lauber cautioned against spending too much time considering nuclear fuel, since for now it is only a future dream. The main topic to address is "decarbonisation today," he said.

A challenge with some future fuels is the lower energy density, noted Alberto Maestrini, chair of shipbuilder VARD. For example, hydrogen storage will need six times the volume for the same energy content of fuel. "Are you ready to sacrifice the end user space to put in more fuel?"

There are still many uncertainties about availability of future fuels, and how the costs of converting vessels to fuels like ammonia can be justified commercially, said Captain Silke Lehmkoester, Managing Director Fleet, Hapag-Lloyd. There is also the need for more crew training. "Ammonia is coming with a hazard," she said.

"Energy efficiency has a great potential - it is under communicated

We need to lift that up a lot," said DNV's Knut Ørbeck-Nilssen.

With carbon capture and storage systems onboard, it is still too early to determine what the capture rates will be. "Pilot projects show promising results," he said. "It's not a challenge on the technology side."

The tougher challenge will be solving the need for CO2 reception facilities in ports around the world, and how carbon credits associated with this are allocated, he stressed. "This is not easy."

Asked what it would take to encourage German shipowners to build CO2 carrier vessels, which are needed for the growing European onshore carbon capture and storage industry, Dr Bornheim the from German Shipowners' Association gave a one-word answer, "support".

All the speakers at the SMM opening ceremony

AI and cybersecurity

"If AI does not bring productivity people are not going to use it," said MAN's Mr Dr Uwe Lauber, speaking in the third panel on AI, cybersecurity and autonomous technology, with participation from MAN, Hapag Lloyd, VARD and DNV.

"AI needs to be cheaper, faster and safer."

The biggest issue is accessing data from shipbuilding and operations, and then putting it together so it is meaningful, he said.

Speakers were asked whether they thought the hype of AI was justified.

"I think shipping sees it as an opportunity," replied MAN's Dr Lauber.

For example, "we provide seafarers with upfront information. I can check the condition of the turbocharger on a Fincantieri ship on my smart phone."

"We are just at the starting point. A couple of years ago, this was a dream. We have to see AI as a future," he said.

AI digital tools can help operate engines in a more efficient way and help operate the very complex systems involved with ammonia and methanol engines, he said.

"It is not about hype," added Alberto Maestrini, chair of VARD. "It is a tool, getting productivity gains. It is also about results. People want to see that it works."

VARD uses AI tools to ensure its designs meet applicable regulations, for example, he said.

EU is not keen to regulate AI as a technology, but more in the context of how it works to support the industry, said EU's Ms Kopczynska.

Autonomous and remote control

MAN's Dr Lauber believes that autonomous [ships] which 'drive' themselves are far in the future. Remote-control vessels, however, are already being delivered. "That is the application where we see the most benefits."

Remote control technologies have high value in tasks which require specific skills, but are not needed all the time.

An example is the operation of 'walk to work' gangways which are used for personnel transfer between moving vessels, such as from a crew supply vessel to a FPSO. These have stabilisation systems, so the gangway does not move when the vessel beneath it does.

The specialist operator of the system does not personally need to be onboard the crew transfer vessel, he said.

A challenge with remote controlled vessels is integrating data from the different sources on a ship. Much of the building of the integration systems can best be done by shipyards, he said.

EU's Ms Kopczynska said that "increasing level of autonomy will definitely be happening," even if we do not see fully unmanned vessels on the water. This leads to safety concerns which the EU needs to address.

Hapag Lloyd's Captain Silke Lehmkoester said that much of the work of seafarers is doing regular maintenance and surveillance, tasks which cannot be done by machines, so there will continue to be a requirement for people onboard. This [full autonomy] is very far away," she said.

"We have crews continuously derusting and painting. It is a huge part of what we do at sea," she said.

People are needed onboard "if a dangerous goods cargo is on fire or there is a huge spillage, or if a reefer is broken down," she said.

However, Hapag Lloyd has made big steps to develop remote work technology. One example is monitoring reefer container temperatures. "4-5 years ago we had crew walking onboard with pencil and paper. Now it is all remote. Chief engineers just check the ones with alarms."

Alberto Maestrini, chair of VARD, agreed that "autonomous is a far-fetched idea. It is very far away."

However, the return on investment can be clear, particularly where high skilled crew are needed for certain specific applications, he said.

DNV's Knut Ørbeck-Nilssen agreed that there is a need to distinguish between entirely unmanned vessels and vessels with a high degree of autonomy, where people are still present, but machines do much of the work.

Entirely unmanned vessels have niche applications such as drones in wartime, or very specialist short sea vessels. "In deep see we will not see unmanned vessels," he said.

Cybersecurity

Cybersecurity is an increasing threat as "vessels become more advanced and connected," said Knut Ørbeck-Nilssen, CEO DNV Maritime. "I think industry is at early stages of this."

"For me, hackers are getting more aggressive, trying to attack our software," added MAN's Dr Lauber. "These algorithms, which are going to chase us, are changing quite fast."

"It would be a nightmare if an attack was successful on one of our power plants."

Hapag Lloyd's Captain Lehmkoester added that GPS hacking is a big potential problem, particularly if the watch officer does not realise it has been hacked.

Other issues

The fourth panel focussed on collaboration, European shipbuilding, security, female seafarers, and retirement, with all speakers participating.

Many factors associated with decarbonisation are beyond the industry's control, or happening outside the shipping industry, said DNV's Knut Ørbeck-Nilssen. "We have to collaborate beyond our industry to make it happen, we are not an island,"

Europe should take care of its shipbuilding industry, MAN's Dr Lauber warned. There is a "dangerous trend" of seeing manufacturing, including of ships, as 'low tech' and something which can be done in lower cost countries, while design engineering is kept in Europe. The problem with this approach is that shipyards decide where to buy their components from, and non-European yards may prefer non-European components, he said.

Dr Gaby Bornheim, President of the German Shipowners' Association said that shipping companies primarily need security for their trade routes. "Only if this is granted can we facilitate decarbonisation."

Dr Bornheim also noted that the number of female seafarers in German shipping increased from 5.8 per cent in 2022 to 7 per cent in 2023, but then only grew to 7.1 per cent in 2024. Although 37 per cent of trainees were female. "There is a long way to go," she said.

The message should be, "we have a fascinating industry, you can make a career on your own, you can see the world," she said. "We can make it only if you (men) let us go."

"This is the most exciting decade for maritime," said DNV's Knut Ørbeck-Nilssen. "We have an incredible gravity on the young generation."

EU's Ms Kopczynska noted that 40 per cent of people working in shipping and shipbuilding will retire in the next 10 years. "We need 40,000 new people," she said. "The maritime industry is often seen by young people as backwards looking." TO

ABS: companies reviewing decarbonisation plans

Many shipping companies are currently reviewing the decarbonisation plans they made a few years ago, to see if they need tightening, says ABS

Decarbonising shipping "is proving challenging," said Vassilios Kroustallis, Senior Vice President global business development, ABS, in his introduction to the ABS Sustainability Summit, held in Hamburg on September 2, before SMM.

"The significant decisions we need to take in the coming months are (complicated) by geopolitics and the uncertain investment environment," he said.

Also, "we are seeing a tsunami of regulation designed to change behaviour."

The main players in the market made their decarbonisation plans some years ago, said Panos Koutsourakis, Vice President of Global Sustainability at ABS. But now many companies are revisiting their plans. "Today is not a passive period, it is a market checkpoint," he said.

3-4 years ago, the shipping industry had very little understanding or experience with alternative fuels and energy efficiency technology.

"Everything is getting more mature," he said.

Also, regulations are not static, and the IMO is evolving, learning from industry and its experience.

Shipping companies have to think about both energy efficiency and clean fuel adoption today.

Energy efficiency methods have been available for a long time, but in the past it was optional, he said.

Today route optimisation software has been standardised. "Shipyards are offering this by default."

On the fuel side, "half of gross tonnage ordered last year was with alternative fuels," he said, mainly bigger vessels.

Decisions about retrofitting vessels to work with alternative fuels are more complicated. ABS has done studies to show it can be worthwhile retrofitting technologies on some vessels older than 10 years, he said.

"Owners have to find a balance. Some ship types and companies might not be in such big demand in the next five years."

For Fuel EU Maritime, making calculations are the "easy part," he said.

The commercial decisions are much harder, including on how to pool vessels together. Shipowners "have to work with other shipowners and come together with charterers," he said. "It has never been done in the past. it will create new dynamics in the industry."

Vassilios Kroustallis, Senior Vice President global business development, ABS

Shipboard carbon capture

Shipboard carbon capture will be eventually required for vessels running on fuels containing carbon, which will continue to be sailing for decades to come, Mr Koutsourakis said.

If there is only 5-10 per cent uptake of alternative fuels by 2030, as is predicted, then there will need to be many other methods to achieve the required 20-30 per cent carbon reduction for the global fleet.

"Carbon capture will be important. It is not easy. The infrastructure is not there. It makes additional energy demands on the ship."

ABS Outlook

ABS has just published its 6th "Outlook" publication on maritime decarbonisation.

"We have recalibrated everything," Mr Koutsourakis said. ABS now predicts that demand for oil-based fuels will be 5 per cent lower than in its previous editions. It has added more granularity to its predictions of the future fuel mix.

Some factors will influence other factors, for example coal demand will decline, so owners of coal transporting vessels may be less inclined to invest in efficiency technology.

For shipyards, ABS expects vessels to be built in new parts of the world, including the Philippines, the Middle East and India.

ABS is advising its clients on how to develop their decarbonisation strategy. It is also investing in development of digital solutions which companies can use to identify opportunities and better understand their fleet operations. TO

Navigator Gas plans for ammonia fuel

Liquefied gas carrier Navigator Gas plans to promote maritime ammonia fuel by purchasing it as fuel, by transporting it from production terminals to bunkering ports, and by investing in bunker stations

Navigator Gas of London plans to promote zero carbon ammonia fuel for ships in three ways. By transporting it from production sites such as in Texas to maritime bunkering ports; by investing in ammonia bunker stations in Northern Europe; and by using it as fuel for its own vessels.

Mads Peter Zacho, CEO, explained more, speaking at the ABS Sustainability Summit in Hamburg on September 3 during SMM week.

Navigator Gas is part of the BW Group and claims to operate the world's largest fleet of handysize LPG, liquefied ethylene, ammonia and other petrochemical gas carriers. It has 56 semi- or fully refrigerated liquefied gas carriers, 25 of which are ethylene and ethane capable.

The Company owns a 50 per cent share in an ethylene export marine terminal at Morgan's Point Texas, on the Houston Ship Channel. It anticipates that it will also own and manage port logistics systems for the ammonia supply chain for shipping.

Navigator Gas is already comfortable with carrying ammonia on ships – it is 20 per cent of all the cargo it carries. "We are reasonably comfortable with the safety aspects," Mr Zacho said.

Green solutions in shipping are "centred around ammonia," he believes.

The Maersk Mc-Kinney Møller Center for Zero Carbon Shipping has estimated that decarbonised ammonia fuel could cost the same as low sulphur fuel oil by 2030 for transatlantic container voyages.

This is taking into account the support from US Inflation Reduction Act on US carbon capture projects, and the avoided costs of emitting CO2 from the EU ETS and FuelEU maritime. Further data is in its publication "Assessing impacts of EU and US policies on accelerated deployment of alternative maritime fuels."

Mads Peter Zacho, CEO, Navigator Gas

Navigator Gas announced in August 2024 that it is building four 48,500 cubic metre ethylene carriers which can carry a variety of gas products including ammonia. They are fitted with dual fuel engines which can run on ethane, and will be 'retrofit-ready' to run on ammonia fuel.

It plans to transport 1.4m tonnes of low carbon ammonia from Texas to the rest of the world from 2029 to 2030.

Your climate strategy

The steps any shipping company should take are to first start calculating and disclosing your emissions including Scope 3 (supplier emissions) if possible; work out what is important for your business and stakeholders, including what you can afford (some people call this a reality assessment); set your ambition, if you want to lead, compete or comply in different areas; set short, medium and long term targets and get staff involved; then execute the strategy. "It's pretty simple", he said.

"If you stick your head in the sand, it's not a strategy."

Navigator Gas set its strategy in late 2022 / early 2023, with a goal to reduce greenhouse gas emissions by 20 per cent by 2030.

Global concerns about climate change will accelerate, even though there are many other concerns, such as energy and economic security, and military conflict, he said.

"For my part, I don't like passing on problems or costs from my own actions to others. In particular I don't like passing problems to children."

"I hope we will see an ambitious carbon price levied on shipping.

The cost will move down the chain and end with the end consumer," he said.

The additional cost to the consumer for purchasing products delivered with decarbonised shipping will be on average 2 per cent, he said.

Technologies

Navigator Gas is implementing 10 different energy saving technologies onboard its vessels. They have been implemented on 18 vessels so far during dry dockings.

These 10 technologies include anti-fouling paints, route optimisation software and propeller boss cap fins. They are all well tested, he said.

Since dry docks are done at 5-year intervals, the next dry dock for any vessel is the last opportunity to do something before 2030, he said.

Energy efficiency measures have a useful impact. "We consider them low hanging fruit and 'must do', he said"

The company estimates that fuel consumption can be reduced by 16 per cent with these 10 technologies, so not quite enough to reach the 20 per cent target. "We have to add another layer," he said.

CO2 transportation vessels

Navigator Gas also plans to enter the CO2 transportation market as it emerges. It is in a strong position to do this, as a specialist in carrying all kinds of liquefied gases. The company estimates that the UK alone will want to transport 25m to 30m tonnes of CO2 a year.

"We have been preparing to transport CO2 for the last 5 years," he said.

In July 2024, it signed a MOU with power generation company Uniper for a study into CO2 liquid transport from a proposed carbon capture plant on the Isle of Grain, Kent, UK, with a floating CO2 storage facility and jetty.

The input to the carbon capture plant would be flue gas from a gas power generation plant.

The MOU was signed via Navigator's joint venture project with Malaysian oilfield services company Bumi Armada, "Bluestreak CO2".

Bluestreak plans to design and eventually implement a comprehensive "Co2 value chain" including liquid CO2 shuttle tankers delivering to a floating CO2 storage unit or floating CO2 storage and injection unit.

TO

DNV and forecasts for the future

An event organised by DNV at SMM to launch its "Maritime Forecast to 2050" report included perspectives from IMO's Secretary General about plans for the future, and perspectives from ABN Amro, Shell and Grieg

Arsenio Dominguez, secretary general, IMO emphasized that IMO "continues to be on track" to decarbonise and for shipping to achieve net zero by 2050. He was speaking at an event during SMM in Hamburg in September 3 to launch DNV's new "Maritime Forecast to 2050".

While we wait for alternative fuels, energy efficiency measures can make big improvements, he said. "This is a transition, not an overnight shift."

There will not be a final decision about the methods to decarbonise at the next MEPC meeting (82) in early October 2024.

Arsenio Dominguez, secretary general, IMO with Knut Ørbeck-Nilssen, CEO of DNV Maritime

Members will be assessing the potential impact of decarbonisation on global trade, and that assessment will inform the decision making process.

The final regulatory package is expected to be revealed at MEPC 83 in April 2025, and MEPC 84 in October 2025.

IMO will seek to create an "architecture" or economic and technical measures to drive decarbonisation.

The final decisions have not yet been made, he said.

The IMO will also seek involvement of the energy sector, which will need to make the low carbon fuels available, he said.

The biggest message to the audience is "don't lose faith in IMO," he said.

"We are not slow. We need to take actions which relate to what is good for the sector."

The shipping industry also needs to improve its gender balance, "in addition to bringing in younger generation," he said.

We are working and listening to you, to have a sustainable future for shipping."

Mr Dominguez's most important personal goal for 2025 is to work for safety and security of seafarers, he said. "I'm working very hard with all the member states."

He would also like to "focus on promoting shipping better - to bring more attention to younger generation," also working closely with member states.

Shell

Carl Henrickson, General Manager Ship Management & Innovation, Shell; Kjerstin Hernes, chief strategy officer, Grieg Maritime; Knut Ørbeck-Nilssen, CEO of DNV Maritime

Carl Henrickson, General Manager Ship Management & Innovation, Shell, said he is "cautiously optimistic" about shipping decarbonisation. "I believe there are enough solutions to make a fist of hitting 2050 targets."

This optimism is not "my own gut feeling" but comes from "people I deal with from day to day," he said.

Shell has a "technology maturation plan" to 2035. It is trialling 120 different decarbonisation methods, including air lubrication, shaft power generation, wind and fuel cells.

It sees fuel cells as relevant to tanker operations because converting a fuel to propulsion power via fuel cell and motor can be more efficient than with a combustion engine. This can compensate for the lower energy density of fuel fuels – the fuel takes more storage space per calorific value, but the propulsion output per calorific value of fuel is higher.

A conventional ship propulsion system may have efficiency of 35 to 50 per cent, while a fuel cell can have efficiency of 60 per cent and an electric motor can be 80-90 per cent efficient.

Shell is also looking at using machine learning to optimise trim of the vessel.

Mr Henrickson said he believes that the methane slip problem (when using LNG fuel) "is solvable". It is developing two technologies to address this, one which is Shell owned, the other developed jointly with another company. It expects to see methane slip reduced 90 per cent with these technologies.

Some people have questioned why we can't have a fully fuel flexible ship, i.e. which can run on any fuel.

In the past the answer might have been that there were "too many barriers", he said. But if ship engines are made using interchangeable modules, more flexibility could be achieved. The decision of which modules to purchase could then be made later, when more knowledge was available.

Shipboard carbon capture is seen as a "logistical challenge not a technology challenge," he said. "You will need hundreds of reception facilities, connected supply chain facilities and disposal facilities."

It could work on a 'green corridor', where facilities are made available for a specific route. But beyond that "I think its really challenging," he said.

Mr Henrickson is keen to see industry move to what he calls "compliance pathways" (perhaps incorporating a bundle of technologies), rather than selecting from a catalogue of solutions, as they do now. Also, a great commitment to low carbon fuels.

ABN Amro

Asked how she assesses the current state of decarbonisation, Anastassia Tcherneva, head of shipping & Intermodal, ABN Amro said she was "cautiously optimistic."

"We have also taken a big leap of faith and seen increasing investment. I don't believe we have reached the tipping point.

Financial investments need to have the right incentives. Ms Tcherneva quoted Charlie Munger of Berkshire Hathaway, "Show me

the incentive and I'll show you the outcome."

In her work within the financial system, Ms Tcherneva can see what while everyone agrees to the need to decarbonise, the financial incentives are "not so visible."

"The direction of travel is crystal clear," she said.

Other perspectives

Kjerstin Hernes, chief strategy officer, Grieg Maritime said that the company is investing a lot of money in decarbonisation. But the industry is "lagging behind with achieving the effects we want."

We need a more environmentally friendly industry but not stop sailing (From it being too expensive).

"Digital development is a less painful way of reducing cost compared to other options," she said. "We are working hard to better utilise it.

Its not as fancy as AI and robotics but still highly relevant."

Wybcke Meier, CEO, TUI Cruises, said the company operates the "youngest and most energy efficient fleets," and the majority of newbuilds have a dual fuel engine. The company has a carbon reduction road map, and is implementing technologies such as new hull coatings and air lubrication. It is testing a hull cleaning robot. The company expects 12 per cent efficiency savings by 2030 through technical and operational measures.

On the negative side, two of its itineraries have become longer due to the dangers of the Suez Canal and need to go around South Africa.

"My hope for next year is we talk about carbon capture corridors and try to get them to conceptual stage," said Knut Ørbeck-Nilssen, CEO of DNV Maritime.

TO

OceanScore shares insights on FuelEU Maritime

FuelEU Maritime is much more complex than a tax; using biofuel can actually save you money – more insights about FuelEU Maritime were shared during an OceanScore event at SMM

FuelEU maritime "is a very complex regulation," said Albrecht Grell, managing director of OceanScore, speaking at a company event in Hamburg held in September during SMM week. "Every question [once] answered creates two more questions."

Shipping companies need to recognise that it does not function like a tax. It requires them to reduce the carbon intensity of the fuels they use. So, decisions need to be made about what fuel to use, how to use shore power, and managing the overall 'balance' of a fleet, including pooling. These questions are interdependent, making answering them even more complex.

EU ETS, in contrast, does function like a tax, with a known fee to pay depending on how much of what fuel is used. To comply, companies need to understand how much fuel they have used (and so how much CO2 they have emitted) and make the payment.

OceanScore calculates that shipping companies will initially find ETS much more expensive, costing around 200 euro per tonne of bunker fuel used. If they choose to initially pay the FuelEU Maritime penalty for non-compliance, rather than buy low carbon fuels, they will initially pay 62 euro per tonne of conventional fuel used.

But the requirement to continuously reduce fuel intensity under FuelEU Maritime, and the growing penalty for repeated non-compliance, mean that FuelEU Maritime will rapidly get more expensive.

However, companies which buy low carbon fuels beyond the required level will have an 'overcompliance' they are then able to sell to other shipping companies. This overcompliance could be worth "hundreds of euros per tonne of biofuel used," Mr Grell said.

Consider a container ship going between two ports within the EU, combusting 12,000 tonnes of heavy fuel oil and 1,000 tonne medium gas oil a year. The greenhouse gas intensity works out at 91.67 g CO2 equivalent per megajoule of energy (gCO2eq/MJ). This is above the January 2025 FuelEU Maritime limit of 89.3 gCO2eq/MJ.

This "negative compliance balance" can be calculated as 328 tonnes of very low sulphur fuel oil (VLSFO) equivalent. Based on this, the company could pay a penalty of 786k euro and satisfy the requirements for 2025.

However, if the company replaced all the heavy fuel oil with B25 waste cooking oil, at a cost of $1,200 a tonne, its greenhouse gas intensity is now 75.5 gC02eq/MJ, OceanScore calculates.

Albrecht Grell, managing director, OceanScore

This is much below the required maximum intensity of 89 gCO2eq/MJ. The compliance surplus is equivalent to 1951 tonnes of very low sulphur fuel oil.

This compliance surplus could be used internally to balance the use of 86,800 tonnes of light fuel oil (6.7 vessels consuming 13,000 tonnes of fuel a year), OceanScore calculates.

This company may typically pay 187 euro per tonne to replace heavy fuel oil with biofuels, considering the less energy produced per tonne of biofuel.

But it would save 395 euros per tonne on FuelEU Maritime penalties. These could then be 'sold' to another company within a pool. If the agreed price was equivalent to the penalty the other company avoids paying, it earns 395 euro per tonne.

There would also be 55 euros per tonne savings on ETS costs. This means a net saving of 263 euro per tonne (-187+395+55). With 12,000 tonnes a year consumption that means saving $3.2m.

Waste cooking oil is calculated to have a carbon intensity of 16 gCo2eq/MJ, much better than for example rape oil, because it is entirely a waste product. (Rape oil, as it would be considered a food product, would not be compliant under FuelEU in any case).

Shipping companies should note that biofuels which can also be used as foods are not accepted to have a reduced carbon intensity under FuelEU

Maritime, because the scheme does not intend to encourage food to be diverted towards use as fuels.

The steps shipping companies should go through are first to work out their baseline (current consumption and resulting ETS cost, FuelEU penalties) for each vessel. Then they can compare the costs and benefits of different bunkering options, using cold ironing or even wind assisted propulsion. Once they have chosen and implemented their strategy, they should form pools to buy or sell their compliance balances or deficits, Mr Grell said.

Methanol made purely from fossil fuels has a higher carbon intensity than conventional fossil fuels in the Fuel EU Maritime calculation metrics. This is because emissions are calculated on a 'well to wake' basis rather than 'tank to wake'. For this grey methanol as well as for conventional fuels, the EU provides default values companies are required to use. The increase is because CO2 emissions are normally made when making methanol from fossil fuels.

If ships borrow from the following year's "balance", they also pay 10 per cent more. Ships in a pool cannot 'borrow' from the future at all.

If ships are operating from a non-EU port to an EU port, only 50 per cent of the ship's energy use is covered by the FuelEU Maritime requirements. But all use of low carbon fuels can be allocated to the EU 50 per cent.

Additional factors

Shipping companies need to also consider any methane and nitrous oxide emissions their vessel may make in the calculations, said Edwin Pang, founder of consultancy Arcsilea and chair of RINA's IMO Committee.

The global warming potential from methane is calculated as 25x that of CO2 by mass of gas, and nitrous oxide calculated at 298x, Mr Pang said.

These factors may change to 28x and 265x respectively, depending on whether data in the IPCC fourth (2007) or fifth (2014) assessment report is used.

FuelEU Maritime has a requirement for ships to use shore power (electric) when in port. The regulation applies to container ships and passenger ships from January 2030 in a port providing shore power, and to all ships from January 2035 if berthing at a port with onshore power supply capacity.

The non-compliance penalty is calculated at the total electric power demand of the ship at berth in kW (including hotel and cargo handling workloads), the number of non-compliant hours, and 1.5 (euros per kilowatt hour).

Companies non-compliant for more than one year can pay 10 per cent more for the second year.

The EU will be creating supplementary legislation on matters such as what criteria enables a technology to be accepted as "zero emission"; how onshore power supplies should be used; what the requirements / standards should be for "tank to wake" emissions; how penalties will increase over time; how greenhouse gas emissions for e-fuels (known as 'Renewable Fuels of Non-Biological Origin' or RFNBOs) will be calculated, Mr Pang said.

OceanScore funding and development

OceanScore clients include V.Ships and Norbulk.

OceanScore has released its FuelEU Planner to support the simulations now needed to prepare budgets and get ready for charter party negotiations. The company plans to release further software in December 2025 to help companies plan and manage their FuelEU Maritime compliance. It will have the same interface as its ETS software.

OceanScore is planning a Fuel EU pooling marketplace in April 2025 for OceanScore customers to trade.

In September 2024 OceanScore announced that it had closed a 5m euro "Series A" funding round.

New investors included Stolt Ventures, Motion Ventures, and Portline, along with various angel investors. Further investment was made by existing investor "theDOCK". All previous investors including MSC and Peter Döhle have retained their shares.

The funding will be used to develop new solutions, expand customer service and data teams.

Nir Gartzman of theDOCK said, "OceanScore's impressive growth and exceptional team align perfectly with our mission to support startups that aim to make global trade more sustainable while introducing viable business models."

"Their success in building a market-leading ETS solution, used by shipping companies worldwide, gives us great confidence in OceanScore's ability to dominate also the FuelEU Maritime market."

TO

BAR Technologies – sails with a performance guarantee

BAR Technologies provides its "WindWings", a high-lift rigid wing, with a performance guarantee. CEO John Cooper told us about how to build customer confidence, his contract with Union Maritime, and the typical savings

BAR Technologies, a UK company which produces rigid sails, known as WindWings for ships, is providing a performance guarantee of how much thrust the sails will generate.

Under the terms of the guarantee, the customer will receive a form of compensation if the promised thrust is not achieved.

The guarantee is offered to improve customer trust in its data, says John Cooper, CEO of BAR Technologies.

Shipping companies are being promised a wide range of energy saving devices each with various promises, and realise that vendors can have a strong incentive not to be completely honest in order to make a sale. Providing such a guarantee changes the incentive.

The performance guarantee is expressed in terms of the thrust they will get from using WindWings, with a certain wind speed and

angle. This is similar to the way that car companies will tell you what miles per gallon rate you can expect in urban and rural driving.

One of its tanker operator customers Union Maritime did not ask for a guarantee, but BAR Technologies asked them to accept one anyway, because it would help other customers feel they could trust the data better if they knew BAR Technologies was backing up its claims with financial costs, Mr Cooper says.

Union Maritime is currently building twenty tankers of medium range and long range (MR2 and LR2), in China and Vietnam. They will all have WindWings fitted in a shipyard in China.

WindWings data

Cargill, MC Shipping and BAR also asked DNV Maritime to verify the emissions data. In this case, DNV asked for the raw data so it can make its own calculation, not to audit WindWings calculation, he said.

To get good data, it was necessary to compare the same vessel's operations both with and without the WindWings, in the same weather and tidal conditions.

DNV found that when sailing in favourable conditions, the two WindWings installed on the MV Pyxis Ocean reduced energy consumption of the main engine by 32% per nautical mile. This vessel is a Kamsarmax bulk carrier under management of MC Shipping Singapore Branch and chartered by Cargill,

Each WindWing can reduce emissions by on average five hundred tonnes per year, or about 1.5 tonnes per day. The savings crossing the Pacific are typically higher than on the Atlantic.

The saving is calculated per wing, on the basis of how much the thrust force on the wing will replace fuel supplied to the engine. It does not depend on the size of the ship.

The thrust of a sail is measured in Newtons. It can be measured directly using a strain gauge fitted to the wing.

This can be converted to power using the equation "power = force x speed." So, you can calculate how much of the engine's power is replaced by the sail's power.

The Wings

Seafarers on the Berge Olympus, which was recently fitted with four WindWings, really liked having the sails, Mr Cooper said. They were often drawn into discussions about them over the radio with crew on vessels sailing past. They found the sails to be low noise and provided a "comfortable ride."

Savings from sails can be greater if the vessel has a hull designed to work better with sails. There are ship design companies specialising in this.

The structural spars are made from marine grade steel; the shells are made from composites, the same material used for wind farm blades.

The Wings do not need to be powered to spin continuously (like flettner rotors), nor do they require continuous powering of suction fans (as is the case with turbo sails).

They are available foldable or non-foldable, with the folding systems running on electric power. They provide thrust in up to 40 knots wind speed, more than this and they are folded down. They can endure up to 100 knots wind speed.

So far they have been installed with four shipping companies, tanker, and bulker operators.

BAR Technologies has also launched smaller, 20m and 24m high WindWings®. These are suitable for vessels under 100m, including chemical tankers. They will be manufactured in China and Spain from the beginning of 2025. These new models have been added to the growing portfolio of WindWings®, with the larger models being 37.5m in height and designed for larger ships.

Background

BAR stands for Ben Ainslie Racing. It was the design company for competitive sailor Ben Ainslie, designing his yacht for the 2016 America's Cup race.

The company also designs sails for leisure marine / yachts, workboats, and special project vessels.

BAR Technologies received launch funding from the European Union under its Horizon Program. It received initial support from trading company Cargill, which paid for one of the first Wings to be installed.

WindWings fitted to a chemical tanker

Removing the need for a stern tube

Propeller shafts pass through a 'stern tube' between the engine room and the sea, as they rotate on bearings, lubricated by oil. An alternative design with water lubrication means less friction and so higher performance

Conventionally on ships, the propeller shaft rotates in what is known as a 'stern tube'. The propeller (in the sea) is on one end; the engine is at the other.

The stern tube functions to support the weight of the propeller, and to prevent water entering the engine room. It is filled with lubricating oil, which is at a higher pressure than the seawater.

Disadvantages of the stern tube are that the propeller and shaft need to be removed to change the bearings; the bearings inside it add friction, reducing engine performance; and there is a risk that lubricating oil could enter the sea, which can happen if the seal is damaged for example by fishing nets.

Shipping companies also face the costs of purchasing, storing, monitoring and disposing of this lube oil, which can be 1500 to 3000 litres on a ship.

In December 2023, Thordon Bearings and Wärtsilä announced they were forming the "Blue Ocean Alliance" to develop and promote a ship design which does not require any stern tube.

The Alliance has developed an alternative design, with stronger bearings, seawater lubrication, no stern tube, and a shorter shaft.

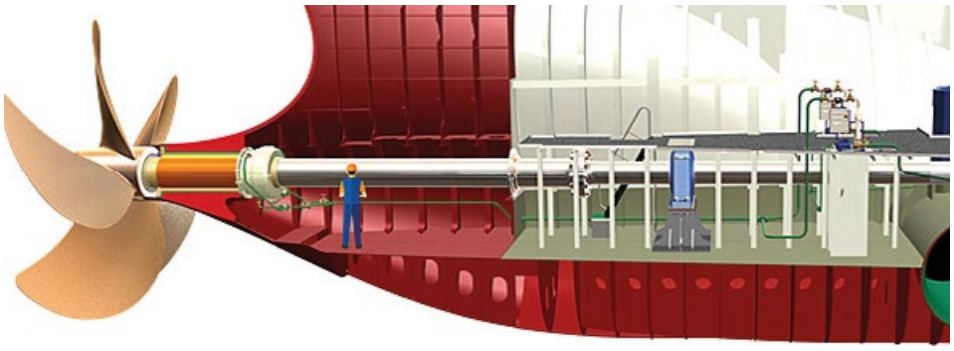
Also involved are the National Technical University of Athens (NTUA) School of Naval Architecture & Marine Engineering, naval architect SDARI (Shanghai Merchant Ship Design & Research Institute CSSC) and classification society, ABS.

The bearings are made from elastomer polymer. These have very strong abrasion resistance and come with a 25-year guarantee.

With this design, the shaft requires one fewer set of bearings to support it. This means less friction and less chance of bearing failure. It means the engine room space does not need to be so large.

The seawater for lubrication is filtered, to ensure there are no particles in it which could damage the bearings. A pump draws in seawater, raises the pressure, and sends it continually flowing around the shaft from the engine room side to the sea side. It then flows out to the sea.

The system uses 150 litres of water a minute, filtered to remove particles over eighty microns. It is at 7 bar pressure.



The "Sterntubeless" design

The bearing can be replaced from inside the vessel without removing the propeller or going to dry dock. It can slides in an out.

With less complex maintenance, there is less risk of damage being caused by maintenance itself. The shaft can be easily inspected, with someone entering a "stern inspection chamber."

If the propeller shaft needs realignment, it can potentially be done in one day, if it can be removed without the ship going into dry dock.

Testing has been done of designs to check that the shear force on the engine caused by the propeller and shaft is within an acceptable range.

The costs of implementing the system are similar to on a normal vessel design, but the costs of the stern tube are saved. Since the stern tube is built and installed by the yard, it is not possible to know how much the saving is.

The OPEX is lower because there is no need to buy lubricating oil, and no seal needed on the seawater facing side. The reduced number of bearings, and lower friction, may mean lower fuel consumption.

Thordon bearings estimates the annual savings of over $1m, based on reduced fuel consumption, reduced drydock and maintenance costs, shaft alignment optimisation, lower bearing wear rates, and potential increase in cargo carrying capacity from the engine room taking up less vessel space. This design eliminates the risk of stern tube oil pollution and possible associated fines.

"It is the most significant ship design intervention in more than a century," said Anthony Hamilton, technical director of Thordon Bearings.

"Yards have been quick to see the commercial, operational and environmental advantages of a sterntubeless ship, compared to a design with a traditional oil-lubricated shaft line," he said.

Commercial products

ABS has issued an Approval in Principle with Chinese shipbuilder CSSC in Shanghai to build a vessel with the design.

Requests for quotes have been received by shipbuilders in China and South Korea for container ships and gas carriers, Thordon Bearings said.

Dr. Chen Kang of SDARI said, "since 2022 when ABS granted Approval in Principle (AiP) for our sterntubeless container ship, there has been considerable market interest in the concept."

"It offers naval architects, builders and ship managers greater freedom and flexibility for optimizing energy efficiency."

In June 2024, ABS published guidelines for the Requirements for Sterntubeless Vessels with Water-Lubricated Bearings and introduced the ABS STBLess-W Notation.

At SMM in Hamburg in September 2024, Thordon Bearings announced a design of a vessel which does not have a stern tube, which it calls "Thordon-Blue Ocean Stern Space".

There have not been any orders yet for a ship with this design, but Thordon Bearings believes the first order "could be close." TO

NAPA – software for managing shipboard work permits

All large shipping companies have structured "permit to work" systems to ensure that everybody understands what work is being done. NAPA has software to make it easier to manage

"Permit to Work" systems ensure that safety aspects of maintenance work onboard ships is centrally managed. This central management ensures that work tasks do not conflict with each other, the relevant people are informed, and safety precautions are met. Tasks cannot begin without approval, expressed as the issuance of a "Permit to Work".

The drive for work permitting systems increased after the disaster on offshore oil platform Piper Alpha in the North Sea in 1988 when 169 lives were lost.

The cause of the accident was high pressure gas being sent through a section of pipeline sealed only with a thin metal disk after a pump had been removed. Two separate maintenance tasks were being conducted at the same time, without the right people being aware of it.

Many shipping companies have a permit to work system as part of their safety management system (SMS).

Permit to Work systems do not require software, they can in theory be managed with a single paper-based process.

But having a software-based system means that requests for permits can be made electronically, and they can be approved electronically. There is no need to physically go to wherever the record book is located and wait for the authorisation to be approved. On a ship, this can take 30-60 minutes.

Tommi Vihavainen, Director, Development, NAPA safety solutions

See tasks which are being drafted, waiting for authorisation, waiting to start, ongoing and closed

With a software-based system, everybody can easily see what has been approved and what work is in progress around the ship. There is no risk of handwriting being misread or illegible. All the data onboard a ship can also be accessed by shore staff. The data can be more easily analysed later, for example to compare maintenance tasks done on different ships. It can be used to plan long term maintenance.

The digital system can also include automated checks for errors. As data is entered to request the permit, the software does data validation checks. Approving officers are guided through a series of questions to make the relevant safety checks before issuing the approval.

NAPA's permit to work software

NAPA, a company mainly known for vessel design software, has developed a permit to work software system for ships.

Carnival Cruise Line and Virgin Voyages were involved in the development of the product.

The company is already in discussion with a number of other vessel operators, including cargo shipping companies.

The NAPA software can work on any vessel which has a computer network. The software is installed on a server and accessed using desktop and web user interfaces.

It can be accessed on the bridge, in the engine and cargo control rooms, and available on wireless devices. Data is also made available on shore.

It can be configured to incorporate the layout of the ship, such as including deck numbers or fire zones.

It integrates with other NAPA tools for vessel operations including its logbook software and decision support software.

The challenge with implementing the system is ensuring it works together with the users, fitting together with their daily work, says Tommi Vihavainen, Director, Development with NAPA safety solutions. It has been developed in close co-operation with customers and their onboard crew members.

Every company manages permits to work in a slightly different way, and the software can be customised to the way they do it.

WiseStella's software to support SIRE 2.0 inspections

WiseStella has developed software you can use to run a trial SIRE 2.0 inspection, to help you prepare for the real thing

Many shipping companies and seafarers are apprehensive about SIRE 2.0 inspections. To get practise, you might want to try WiseStella's software to do a simulated inspection.

The software is loaded with all of the 1400 questions which a SIRE 2.0 inspector might ask, indexed against different shipboard crew positions, so a crewmember is asked a question relevant to their work.

Just like on a real inspection, the questions are categorised into core questions which get posed every time, and rotational questions asked every third or sixth inspection. There is functionality to add conditional questions (which are asked in certain situations) and campaign questions (asked when the oil company is making a targeted effort to reduce a certain risk).

People in different roles, such as master or second engineer, can see the questions they are likely to be asked. They can make sure they are familiar with procedures they may get asked about.

Companies can use the software to do a pre-inspection. Ship staff can use it to do a self-assessment, or the software could be used by an outside consultant conducting a 'mock' inspection.

Ferhat Abul, managing director, Wise Stella

The software can run on tablet computers, just like the real OCIMF inspection software.

Shipping companies might use it to get a sense of which of their vessels and crews are best prepared for the real inspection, and which need more work.

The software helps the company develop a list of high priority 'action items', such as specific training programs.

So far, 10 shipping companies have purchased the software, and others are trialling it. They are typically companies with 10-20 ships.

The software will be further developed, with new dashboards and improvements to the user experience.

Wise Stella also plans to offer analytics on the data, such as to help companies see how they compare with others on specific questions, or to identify where their biggest risks may be.

It plans to develop supporting training modules so crew can take training in areas the inspection finds that they need.

Wise Stella was founded by Ferhat Abul, a former quality assurance and training director at Scorpio Ship Management's Istanbul office. He has also worked at DNV as senior auditor/ surveyor, HSEQ and business development area manager. So, he has experience in both auditing and being audited.

The chief technology officer is Ali Demiral, a former business intelligence consultant and architect with Maersk Line and Adidas. Dr Rafet Emek Kurt, also a co-founder, serves as board advisor. He is a reader at the University of Strathclyde, UK, specialising in maritime human factors and safety.

Wise Stella is headquartered in Singapore. It was founded in March 2024.

Other WiseStella tools

WiseStella offers a range of software tools relating to assessment, OCIMF requirements, competency and well-being management.

There is a behavioural competency assessment tool "Wise BCA" for companies to systematically assess behavioural competency in line with the OCIMF's guidelines.

The "Wise Human Factor Self Assessment" (HFSA) software can be used to self-assess your current level and set targets to get to your next level.

It is in line with OCIMF's HFSA guidelines.

The "Wise Well-Being" software can be used to monitor and evaluate wellbeing of seafarers, and then determine if improvements need to be made.

WiseStella is planning to work with a company of expert psychologists, to develop a software module giving companies advice on how they can improve crew wellbeing.

The "Wise TMSA" software can be used by companies to self-assess their TMSA rating, answering questions in the software. They can see how their self-assessed score is improving.

The "Wise Safety Climate Assessment" tool is for companies to run anonymous surveys within the company to find out people's perception of the organisation's commitment to safety, or its 'safety climate'. This perception of safety has been shown to directly relate to safety performance in a company.

There is a "Wise Incident Investigation and Root Cause Analysis" tool to help identify the root cause of incidents. It has functionality for uploading evidence of what happened to support the investigation, including from a mobile device. In future, the company hopes to develop AI tools which will suggest possible root causes of an incident and suggest these to the investigator.

Tank monitoring and measurement systems

Tank monitoring systems provider Scanjet shares advice about how to get the most out of tank monitoring and measurement systems and avoid mistakes which could lead to safety issues and delays

By Mark Jones, sales director, Scanjet PSM

Vessel owners and managers looking at purchasing a new tank level measurement solution or updating existing systems are faced with a proliferation of complex choices.

Careful consideration is required to ensure the best possible fit for operational needs and to facilitate seamless integration.

Depending on the size of tanker and cargo carried, requirements may vary from just a few points to multiple measurement locations. These monitor vital information including service and bunker fuel tanks, cargo tanks, trim and list measurement, and draught measurement.

For tankers carrying hazardous liquid cargoes, safety risks are increased, with the danger of explosions, fire or large-scale pollution.

Underestimating system needs and specifications can lead to a shortfall in expected performance, which may result in system deficiencies down the line, with attendant unexpected additional costs and delays due to non-compliance.

The systems are subject to a harsh marine environment, with weather extremes adding additional complications. Robust and reliable performance is essential.

Compliance requirements must be fully considered to ensure that the installed system carries the required Marine Society Type Approval, Intrinsic Safety Certification, and meets any relevant IMO or SOLAS regulations.

Scanjet PSM has assembled a guide covering aspects to consider when installing tank sensors and control systems.

You should consider what the system needs to deliver and how requirements will change over time. Designs should offer the flexibility for expansion or modification.

Cost vs accuracy

When selecting the right measurement solution, you balance purchase cost against with the level of accuracy required.

Radar is top in terms of accuracy. It is a non-contact level measurement option which uses variable frequency electromagnetic waves to reflect from the liquid surface. Considered desirable especially for hazardous cargoes such as chemicals but a higher cost than other measurement principles and not automatically the best choice for smaller tankers.

Electro-pneumatic systems use lower cost equipment but installation costs are generally higher due to the pneumatic piping required.

Hydrostatic level transmitters and offer a good all-round solution with a high degree of accuracy. In addition, there are savings to be achieved using the latest generation of digital transmitters which require only one shared cable for data and power to connect all points.

For service and water ballast tanks, hydrostatic or electro-pneumatic measurement are more likely to prove the best options.

This accuracy consideration extends to the choice of hydrostatic transmitters – for example, selecting absolute transmitters when gauge pressure measurement would offer far better accuracy.

Sufficient allowance should be made for system design, manufacturing and delivery lead times while factoring in logistics costs plus the attendance of an engineer to validate the installation, system configuration and sign off for warranty purposes

Provide full information

To ensure system performance it is essential to provide full and accurate information in the right format. It should include the following:

Full specification of data exchange requirements regarding interfaces to external systems such as alarm management system and/or Loading Computer.

Accurate specifications of measured liquids, tank calibration tables and physical location of sensors

Tank calibration tables should be provided in electronic format as editable spreadsheets, although PDFs may be acceptable where OCR scanning and conversion is possible.

Since full information may not be available at time of manufacture the latest systems and digital transmitters like those produced by Scanjet PSM allow configuration to be uploaded to the system during commissioning via USB.

In the same way further updates can be uploaded without the need for a specialist engineer to attend.

Sensor compliance

Industry regulations may define the entry point for sensors, so it is important to check for compliance.

For example, many marine societies will not permit side entry on fuel oil tanks, as well as to conform with IECEx, ATEX and UKCA standards.

Where intrinsic safety is an issue, design rules dictate that if the system fails, there should be no risk of sparks being generated in the hazardous areas.

The system must use both certified instrumentation and the correct Safety Barrier to limit power to the Hazardous Area.

Type approvals for factors such as shock and vibration are required for use in marine environments. A secondary safety barrier may also be mandatory.

Other accuracy considerations

It is important to note that hydrostatic or electro-pneumatic instruments cannot measure liquid below their physical mounting point. The “Dead Volume” below this point has to be accounted for.

Incorrect Specific Gravities stored in the system vs the specific gravity of the fluid being

measured will give inaccurate tank readings.

Sensor outputs will be affected by varying trim and heel conditions. These can be compensated for in the monitoring system.

Small inaccuracies in the sensor installation height measurements can translate into large volumetric reading errors

Especially for double bottom tanks which may be relatively shallow, it is essential to make allowances for the vent pipe height when selecting the nominal range of a transmitter, which would otherwise see a significant overload, potentially beyond its design characteristics.

Installation and commissioning

Record accurate information relating to the actual physical fitting height of the sensor

Check sensor outputs when the tank is empty. The latest transmitters have simple zero adjustments to correct for any small errors.

For absolute sensors, check and calculate output based on actual barometric pressure.

To avoid damage to measurement diaphragms, never apply point pressure when testing the output.

Use appropriate protection when using metal ties to secure sensor cables in cable trays. For gauge pressure transmitters ensure the vent pipe within the transmitter cable has not been trapped, kinked or crushed as this will prevent it from correctly measuring the atmospheric reference pressure.

For gauge pressure transmitters use a vented junction box and ensure the ventilation is not blocked.

Remember that a hazardous area safety barrier protects the equipment attached. If a barrier is tripped it is an indication of a fault in the system or its wiring. Ensure the fault is located and rectified before replacing the barrier.

TO

Handheld 3D scanning tools in equipment repairs

3D scanning tools are proving very helpful when repairing vessel equipment, when the equipment is too large to move, reports MarineShaft of Denmark.

The company repairs rudder and propeller equipment on large vessels including tankers and container ships.

It has done 3D scanning on propellers and propeller blades, propeller shaft cones, rudder blade cones, and foundations of cranes on ships.

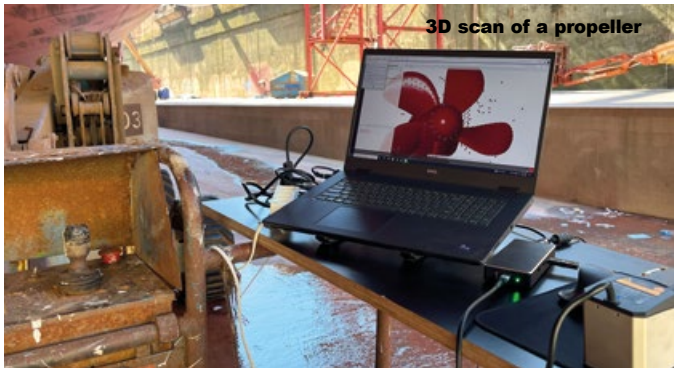
Here are three examples of how it was used.

1- It did a 3D scan of a rudder cone in China, to determine its dimensions for machining, positioning and fitting of a rudder stock, tiller and rudder blade one.

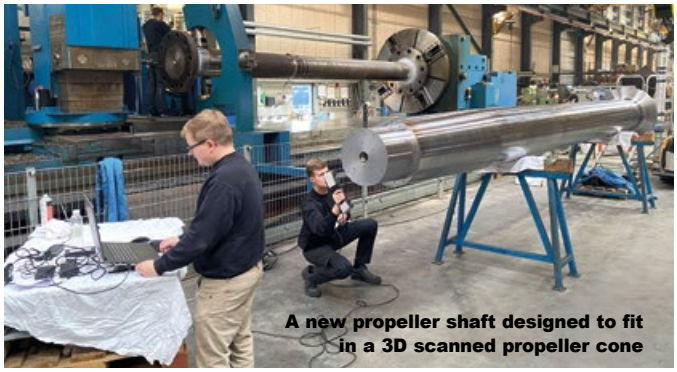
2- It did a did a 3D scan on a propeller on a vessel in dry dock. The vessel had experienced noise and vibrations from its propellers. It was possible to do the scan without dismantling the propellers.

With the 3D scan data, it was possible to identify deviations in the geometry of the blades, make recommendations to the customer, and finally adjust the propeller during the dry dock.

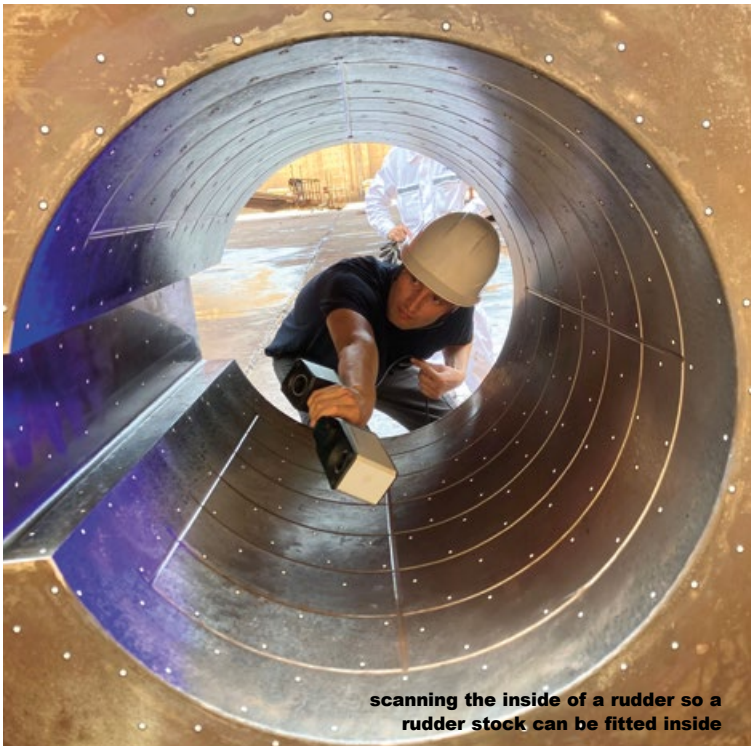
3- It used 3D scanning of a propeller cone to identify any geometrical deviations. The data was used to manufacture a new tail shaft, to fit into the propeller cone.



3D scan of a propeller



A new propeller shaft designed to fit in a 3D scanned propeller cone



scanning the inside of a rudder so a rudder stock can be fitted inside

CMT's acoustic analysis for engine scuffing

Severe wear or "scuffing" on an engine cylinder liner increases friction of the piston and so reduces performance of the engine. CM Technologies of Glückstadt, Germany, has developed an acoustic sensing system to spot it

"Scuffing" is sudden severe wear on the liner of a cylinder in an engine, which increases friction as the piston goes through the cylinder. This friction decreases the performance of the engine.

Scuffing can be caused by a failure of lubricant film, plastic deformation of the surface, accumulation of wear debris, and chemical changes.

On an engine piston it can be caused by sliding surfaces being welded together in the heat.

It can be worsened by the higher combustion temperatures and pressures of modern engines.

The scuffing causes the engine to make a difference noise. But it may not be immediately obvious to the ship engineers that scuffing is occurring, because the engine makes lots of different noises.

As the scuffing gets worse, eventually the engine will heat up, and finally the piston will be unable to get through the cylinder, and there will be an engine failure. The temperature rise can be easily detected by sensors. But the temperature rise may only occur half an hour before the engine fails. The acoustic change can be detectable several hours before that.

CM Technologies of Glückstadt, between Hamburg and Bremen, Germany, has developed an acoustic scuffing sensor, which listens to the sound of the piston going through the cylinder to hear if the sound changes.

The system is delivered pre-trained to detect a scuffing sound, it does not need to be trained on that specific engine. The audio analysis only needs to analyse a certain frequency range of sound.

The sensor can be placed outside the cylinder, beneath the coolant jacket, so it is easy to install.

The sensor is described as a "a state-of-the-art acoustic emission transducer". It is configured to detect sound at between 300 and 700 KHz.

If scuffing is detected, an alarm can sound in the engine control room.

The system also has a way of sensing when the engine is firing (combusting fuel to push the piston down the cylinder), so it does not attempt to analyse the acoustic signal during the firing.

This is done by fixing a magnet on the flywheel (which is rotated by the piston). There is a sensor to detect the magnet's position. When the piston is at the top, and the cylinder is firing, the magnet will always be in the same place.

Scuffing is more of a problem on two stroke engines, because the piston moves at slower speeds, said David Fuhlbrügge, operations manager of CM Technologies.

Four stroke engines are lubricated in a different way which typically makes scuffing less of a problem, he said.

CM Technologies is a specialist in monitoring technology for technical systems. TO

Alfa Laval – many companies replacing BWMS

Alfa Laval is being asked to replace many ballast water management systems onboard vessels, although customers do not want their names in the press. It is also moving forward with its wing sails and its ammonia technologies

In September 2024 Alfa Laval reported that it had an order to replace 18 ballast water treatment systems for a "major European shipowner". It was not able to reveal the name.

"This significant order shows the high demand for the replacement of malfunctioning systems," the company said.

Alfa Laval has replaced more than 250 systems from 30 different manufacturers over the past 2 years.

One reason shipping companies are changing systems is that they find the manufacturer of their original system has left the market. Or it has reduced its commitment to customers, no longer providing support or upgrade options, Alfa Laval said.

"This is especially challenging when the systems purchased are not functioning properly."

"We have been contacted by an increasing number of shipowners and ship management companies worldwide who are experiencing issues that their current supplier cannot resolve", said Tobias Doescher, Head of Global Sales, Business Development and Marketing, Alfa Laval PureBallast.

Alfa Laval does not normally remove the existing system completely, but determines which components can continue to be used, and replaces other components. It can work with both ultraviolet and electrochemical systems.

Sails

Separately, Alfa Laval is proceeding with its

joint venture with shipping company Wallenius, called Oceanbird, to develop wind propulsion for shipping.

Oceanbird's sails are rigid "wing sails" which act like aircraft wings, with air flowing across the wing and creating thrust because of a lower pressure on one side.

There is an adjustable flap on the wing, which can increase the distance air needs to flow over one side of the wing (just like on an aircraft wing) and so adjust the thrust force.

Oceanbird seeks to create the wing with the biggest thrust out of all the wings on the market. This means its wing is very large, 40m high, 14m wide, with an area of 560m2 (40 x 14). It is made from high strength steel, glass fibre and recycled PET.

The sail can be folded, to avoid strong winds or bridges. There are two separate hydraulic and control systems for folding down the sail, so one is a back-up.

Ammonia technology

Alfa Laval is developing a range of technologies to handle ammonia fuel onboard.

The challenges with ammonia fuel are its low flash point, low calorific value and high toxicity.

Ships need advanced systems for tank containment, boil off management, fuel supply, and purge / vent control. Alfa Laval is developing all of this.

It is also developing a steam boiler which can run on ammonia fuel, to safely handle boil-off gas, as well as generating useful steam.

It is developing a fuel supply system for feeding the fuel to the engine. This links to a valve system which isolates the engine from the upstream system, and a vent treatment system for ensuring a controlled vent release to the atmosphere. The marine design will be completed by the end of 2024 with the first marine delivery expected by end of 2025.

It also has a heat exchanger for ammonia heating and cooling in refrigeration systems. This can be used for ammonia fuel gas supply systems, raising ammonia to the required pressure.

Ammonia's Scanjet brand provides tank management systems for ammonia carriers, monitoring cargo and preventing overfill.

Alfa Laval is able to test ammonia systems at its test and training centre in Aalborg, Denmark.

Alfa Laval recently signed a MOU with WinGD, ABS and K Shipbuilding to jointly develop an ammonia-fuelled MR tanker design.

TO

Becker focuses on optimising hydrodynamic performance

If you buy your rudder, propeller and other equipment affecting vessel flow properties from the same supplier, all the components could be chosen for the best overall "flow" outcome

Becker Marine Systems of Hamburg, Germany, is re-focussing its marketing offering to helping shipping companies optimise hydrodynamic performance, rather than selling individual components.

The optimised hydrodynamic performance is achieved by having the right combination of steering gear, rudder, Mewis duct, propeller and dagger board. All of this is provided by Becker and its partner company Nakashima Propeller of Japan (which itself acquired Becker in 2021).

The potential efficiency improvements from having a better rudder, propeller and Mewis duct combination could be 3-4 per cent on a modern ship or 6-8 per cent on an older ship, said Henning Kuhlmann, managing director of Becker Marine.

So far, Becker has supplied 2700 vessels with various energy saving devices, mainly new builds, he said.

The company has a computational fluid dynamics (CFD) design office in Yokohama, Japan, staffed by German and Japanese engineers, which works to improve hydrodynamics on all three components.

Henning Kuhlmann, managing director of Becker Marine, presents developments to journalists at SMM in Hamburg

The rudders built by Becker Marine vary in size from 1 m2 to 125 m2. The largest rudders are used on VLCCs and the largest container vessels.

Becker recently sold a full package, including Mewis duct and propeller, to Odfjell Marine, for a retrofit installation on a 37,000-dwt chemical tanker. This illustrates how a ship can be converted to optimise its hydrodynamic performance, Becker Marine says.

Euronav

Becker Marine announced a contract to deliver five "full spade" rudders for Euronav, size 125 m2. These are the largest rudder blades the company has ever manufactured.

They will be installed on VLCCs being built at Qingdao Beihai shipyard.

They have a twisted 'leading edge' (the side of the rudder which water flows around). The upper half of the rudder blade is orientated in

one direction, the bottom half in the opposite direction. This spreads the water pressure (generated by the propeller) around the rudder blade.

The twisted leading-edge technology was introduced by Becker 20 years ago.

It also reduces cavitation (creating small air bubbles), which means an increase in rudder efficiency.

The company also has an order for similar sized rudders for ten x 24,000 TEU vessels being built at Jiangsu New Yangzi Shipbuilding for CMA CGM.

Dagger board

In September 2024 Becker announced a new product, a retractable 'dagger board', a device for vessels with sail assistance, to keep them on course, similar to devices used on yachts. It is described as a "anti-leeway fin". It can be incorporated into many different ship designs.

When using wind assisted propulsion, there can be a lateral force on the ship from the wind, taking it away from the desired course. The daggerboard reduces the strength of this force, so less compensation by the rudder is needed, thus increasing efficiency.

The dagger board on a cargo vessel needs to be a different shape to on a sailboat.

There are two available models: a vertically retractable dagger board with an adjustable fin angle, and a fixed fin dagger board that can be folded out from the hull.

Both dagger board models can be completely retracted into the hull, avoiding interference in shallow waters, during engine-powered navigation, or while manoeuvring in harbours.

It has an order for three dagger boards for ro-ro vessels being built for Louis Dreyfus in Wuchang Shipyard. These vessels have a wind assisted propulsion system and will be used to carry components for Airbus aeroplanes. The vessels also have Becker flap rudders with a twisted leading edge.

There has also been an order from specialist "cargo by sail" shipping company TOWT of Le Havre, France.

The company does not want to develop sail technology itself, Mr Kuhlmann said. "Hydrodynamic performance is what we are best at."

Steering gear

Also, in September 2024 Becker announced a new steering gear for ships using low pressure hydraulic fluids

The steering gear converts steering control movements in the bridge to movement of the rudder.

There are eight types of Becker steering gear available, with torques ranging from 160 KNm to 500 KNm. It is designed for smaller vessels. TO

Modelling boil-off with Danelec's BOG simulation

Managing Boil-off Gas (BOG) aboard LNG carriers is a complex challenge. Danelec's BOG Simulation platform uses digital twin modelling to simulate vessel operations and cargo ageing

As LNG carriers transport their cargoes, the cryogenic liquid natural gas evaporates as heat from the environment enters the tanks.

This results in the steady accumulation of boil-off gas (BOG) within cargo tanks.

Vessels either use this as fuel or reliquefy it during their voyages.

Not consistent

The chemical composition of that BOG is not consistent throughout a voyage.

Although it consists predominantly of methane, LNG is a mixture of several compounds, including ethane, propane and other hydrocarbons alongside a relatively small amount of nitrogen.

Despite the small concentration of nitrogen within LNG cargo, this component has a large impact on the quality of the BOG.

Because nitrogen has the coldest boiling point of all the compounds within LNG, it tends to boil-off more quickly than the surrounding hydrocarbons, resulting in a vapor that is rich with inert nitrogen gas.

This poses a problem when utilizing the BOG in engines or reliquefication plants, as the presence of nitrogen lowers the energy density of the gas, leading to increased BOG consumption to meet power demands and possible technical issues within vessels systems.

Over the course of a voyage, as the nitrogen boils-off, the relative concentration of nitrogen in the LNG and BOG diminishes, increasing the energy density of the cargo and gas.

This phenomenon is referred to as cargo "ageing" or "weathering".

The dynamic impacts of cargo ageing on BOG rate and energy density makes it difficult to predict voyage outcomes and execute voyages efficiently, particularly for nitrogen-rich cargoes.

So vessels carrying such cargoes from loading ports like Freeport (Bahamas) and Papua New Guinea contend with increased BOG rates. They must carefully monitor gas composition to avoid the risk of engine knocking (abnormal ignition in the engine).

These challenges imposed by high-nitrogen cargoes often result in vessel overconsumption, because charterparty agreements do not take the variability in loaded cargo composition into account.

In addition to the complexities imposed by cargo ageing, vessels operate in dynamic weather conditions that also affect the BOG rate and vapour pressure within the tanks.

Arriving correctly

Managing the pressure and temperature of the cargo is a critical task for safety reasons, and because LNG carriers are required to arrive at discharge terminals below a set maximum vapor pressure and cargo temperature.

Vessels accomplish this via BOG consumption in their engines, through reliquefication, and by burning gas in a gas consumption unit (GCU).

Vessels sometimes even have to have sail in circles to achieve required cargo temperature and pressures, says Konrad Gessler, Director, Ship Performance Product Management at Danelec.

The complex interplay between these systems, operational decisions, and their effects on cargo pressure, temperature, and ageing makes optimizing voyages a difficult task.

Danelec's simulation

Danelec of Farum, Denmark, a specialist in vessel performance and voyage data recording technologies, has developed a digital boil-off gas simulation tool powered by machine-learning to model vessel systems, cargo ageing, weather, and their impacts on voyage performance.

This solution enables operators to predict

cargo and performance outcomes using digital twins of their vessels, unlocking the full potential to maximize efficiency in LNG carrier operations.

It is an online platform capturing real-time data from vessels.

The BOG-Simulation platform is used by onshore teams to simulate vessel performance and cargo condition in forecasted weather conditions throughout ongoing voyages, allowing operators to better anticipate changes and adjust strategies in real-time.

By simulating voyages before loading and departure, users can predict voyage outcomes ahead of time to support pre-voyage planning.

Danelec's solution is also used to optimize vessel operations to meet specific goals - operators can receive optimal recommendations to maximize LNG delivery, minimize fuel costs, or minimize emissions and EU-ETS exposure.

Users can receive data-driven recommendations during the voyage to enhance operational decision-making in meeting those goals.

For example, to adjust speed, engine mode, reliquefication/subcooling rates, and Gas Combustion Unit (GCU) use.

The recommendations show how they can do this while meeting critical arrival schedules and charter party obligations.

Beyond vessel operations, simulated voyage outcome results from this tool have been used by operators when negotiating with arrival terminals to increase onerous arrival pressure requirements that require significant cargo conditioning.

Danelec has shown that vessels are able to save up to 50 metric tonnes of LNG for every 1kPa increase in required arrival pressure.

The company believes that simulating voyages and modelling cargo condition provides unparalleled actionable insights into operations, enabling vessel charterers and owners to maximize cargo delivery, minimize fuel consumption and emissions. TO

ERMA's shipboard carbon capture, propeller fins, shore power

ERMA FIRST GROUP of Greece is developing shipboard carbon capture systems with a contract with Capital Gas; also propeller boss cap fins it promises can reduce fuel consumption by 2.7 per cent, and shore power systems

Capital Gas has signed a letter of intent with ERMA FIRST GROUP (EFG) to include its shipboard "CARBON FIT" carbon capture solution onboard four 22,000 cubic metre liquefied carbon dioxide (LCO2) carriers that are due delivery from Hyundai Mipo Dockyard in 2026.

In this system, CO2 in the flue gas dissolves in an amine solvent. The solvent and CO2 are separated in a second stage, using heat.

The CO2 can be reliquefied onboard and stored in tanks, for later discharge (perhaps together with the CO2 cargo, if it meets the CO2 specification).

Capital Gas is using Babcock's LGE ecoCO2 system for CO2 liquefaction.

The capture system needs both heat and electricity. Electric power is needed to run electrical components such as pumps, blowers and valves. Electricity demand is 400-450kWH/t CO2, which can be sourced from the vessel's auxiliary generator. Heat is needed to separate CO2 from the solvent. Heat demand is 800kWH/t CO2, which can be sourced from the vessel's boiler.

One challenge of shipboard carbon capture is that the flow of flue gas is intermittent, and carbon capture systems require a steady state flow of CO2. To get around this problem, the system treats around half of the total flue gas flow, not all of it, so it can always have a steady flow. It removes 90% of the CO2 gas from the part of the flue gas that it treats, so 40%-50% of total vessel emissions.

The company has Approval in Principle (AiP) from both Lloyd's Register and DNV for the technology.

It has worked together with Technology Centre Mongstad in Norway, the world's leading CCS equipment testing centre, to accelerate the

The ERMA FIRST "FLEX SERIES" devices to improve propulsion efficiency

development of an OCCS for large commercial ships through knowledge sharing.

It is developing a simpler calcium hydroxide system for shortsea vessels. In this system, CO2 in the flue gas is absorbed by the calcium hydroxide in a reactor to form calcium carbonate in slurry form. This can be stored onboard for later disposal at authorized facilities. It will absorb 25%-40% of the CO2 in the flue gas.

The company expects the first commercial sales in the second half of 2025. It already has clients showing an intent to make orders.

Propulsion efficiency

ERMA FIRST has a range of devices to boost propulsive efficiency which it calls the FLEX SERIES.

This includes a propeller boss cap fin, the FLEXCAP, a device placed at the hub of a ship's propeller. The fins catch and absorb rotating water force. This weakens the vortex in water flow around the propeller hub and boosts thrust. The company claims it can improve overall performance on average by 2,7%, compared to 1%-2% for most competitor solutions.

A challenge when installing boss cap fins is that ship propellers do not have standard characteristics, and it is prohibitively expensive to design a new boss cap fin for a specific propeller. To get around this problem, ERMA FIRST GROUP has a standard range of fins, caps and flanges, which can be combined to make a boss cap fin suitable for any given propeller.

This enables the shipowner to receive a bespoke propeller cap at the cost of an off-the-shelf model, ERMA FIRST GROUP says. It means the cost is low enough to give the shipowner a Return on Investment (ROI) in less than 12 months. For example, for a Kamsarmax the ROI is within 5-6 months.

It has two other propeller flow devices in the FLEX SERIES.

The FLEXRING guides water flow towards the propeller, with a ring design. it "increases speed in areas where flow is otherwise obstructed. It also creates some thrust on the duct and, with proper alignment of the fins, a pre-swirl effect. This leads to efficiency gains between 3%-7%," ERMA FIRST GROUP says.

The FLEXFIN has a set of fins which "guides the flow around the hull in such a way that ensures more even distribution, reducing water resistance, optimising flow to the propeller, and consequently boosting efficiency by up to three per cent," ERMA FIRST GROUP says.

Shore power

The company is developing systems to connect vessels to shore electrical power. Tankers are required to use shore power or an emissions capture and control system in certain Californian ports from 2025 (see page 4), and shore power requirements are being introduced in Europe under Fuel EU Maritime.

The ERMA FIRST BLUE CONNECT system enables the vessel to connect to the port's electrical grid for running onboard equipment and systems.

It has approval in principle from Bureau Veritas and it is recognised as an energy saving device by DNV.

The first installation of Blue Connect will be made in Q4 2024. There are orders for 4-6 units to be delivered by Q1 2025. TO

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