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Workboat Deliveries
Insights on some of the latest designs to hit the waterways.
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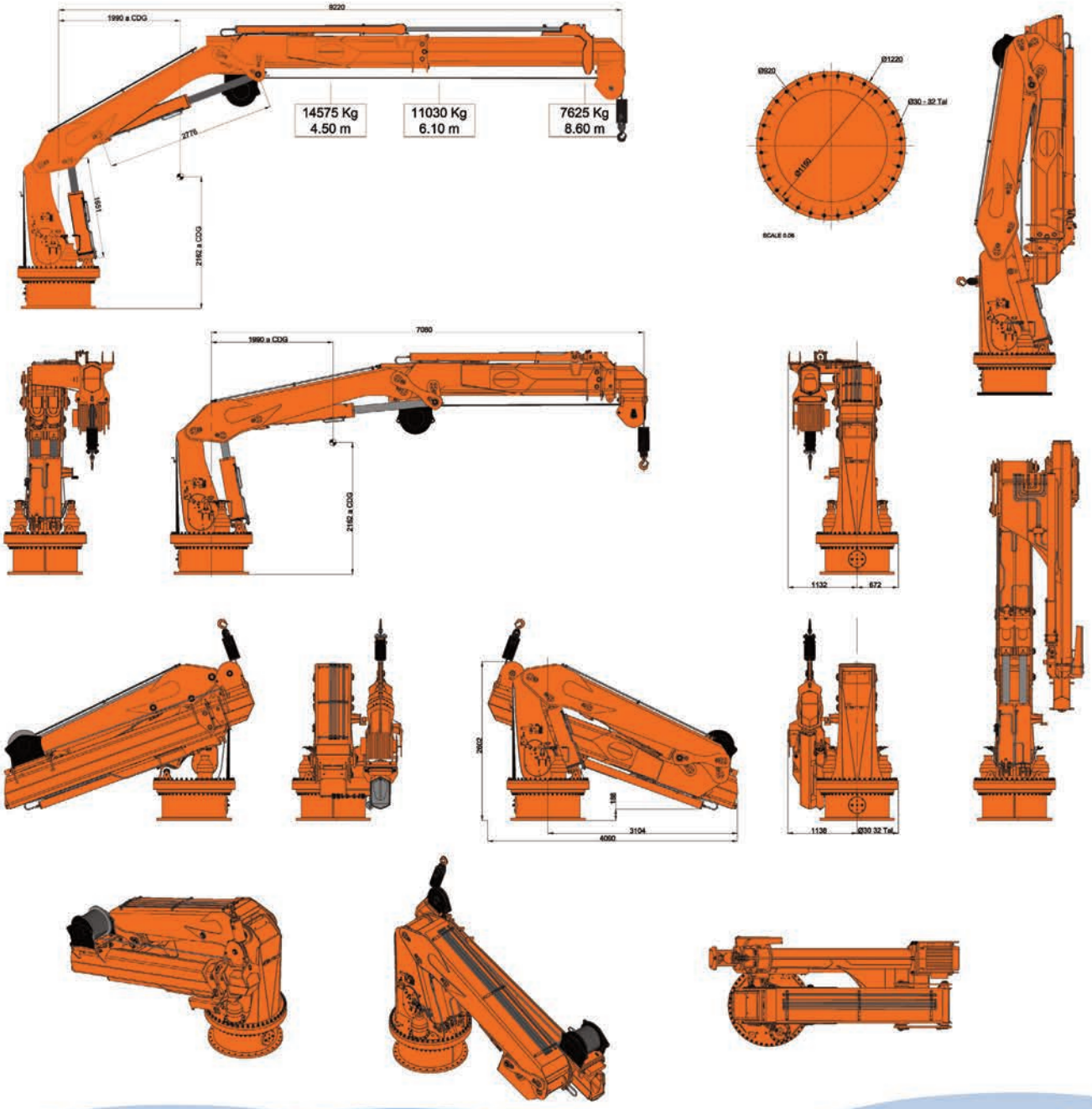

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Chalk it up to "2020", but producing a "Workboat Annual" – as I've done annually for the past 28 years – feels both familiar yet positively bizarre, particularly without the regular meeting of the industry at the December event in New Orleans.

While so much remains different from our normal working lives, one constant is our in-depth coverage of people and companies moving this maritime business forward. In that regard, I am pleased to present insights on Wilson Sons, the largest integrated port and maritime logistics operator in Brazil which also happens to operate a fleet of more than 80 workboats. As the maritime industry globally absorbs an abundance of new rules and regulations that materially transform the industry, particularly in regards to emissions and automated operations, we visited recently with **Marcio Castro**, Executive Director Tugboat Division, Wilson Sons, who discusses with *Maritime Reporter* the size, shape & technical direction of the fleet under his guise. While Wilson Sons owns and operates its own shipyard for newbuild and repair, it has an enduring relationship with Damen, and Castro has some interesting insights, in particular regarding its process for technology evaluation and adoption.

At the center of any vessel owner's decision board today are perhaps more questions than answers on the propulsion and fuel selection for the future. These new assets should have a working life of 30 years or more, meaning that they will not only traverse through but ultimately reach the strict new emission rules planned for 2050. In discussions with the owners, naval architects, builders, OEMs and class, the only certainty is that there is no single, silver-bullet answer to the propulsion and fuel conundrum. It is, and will remain a step process, and this month we have a pair of features discussing a critical component of that process: battery technology. On page 20 **Bartolomej Tomic**, the managing editor of *Maritime Reporter's* sister-publication *Offshore Engineer*, interviews **Geir Oscar Løseth** from Kongsberg Maritime on an interesting hybrid battery solution for a trio of Island Offshore platform supply vessels.

Then starting on page 54, I interview **Brent Perry**, CEO of Sterling PBES and chairman of the Zero Emissions Shipping Technology Association. Perry has a long-history and unique insights on the creation and evolution of battery solutions in the maritime sector, and his company is pushing hard to deliver outside-the-box innovation, including the global launch of its cartridge battery solution.

Finally, starting on page 70 is my interview with **Rear Admiral John Okon**, Commander, Naval Meteorology and Oceanography Command. Any fleet is only as efficient and effective as the quantity and quality of information it has on the environment into which it intends to sail, particularly true in the case of the U.S. Navy and this missions it carries out globally. RDML Okon is forthcoming on the increased utilization of autonomous systems – under, on and above the water – in this regard.

Gregory R. Trauthwein
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Marcio Castro, Executive Director Tugboat Division, Wilson Sons

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Rear Admiral John Okon, Commander, Naval Meteorology and Oceanography Command

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Tip #18

Creating a Culture of Learning

We all think about how to train to produce better outcomes – because better training outcomes mean better performance, safer operations, and employees who are more engaged and more satisfied. But there is a much "bigger picture" goal that only the most thoughtful of maritime organizations work to achieve. That goal is to create a "culture of learning". It is a little hard to express a concrete definition for a culture of learning, but it is amazing how clear and powerful it is when you experience it. In an organization with a strong learning culture, personal and professional development are an ongoing part of the job. They are intrinsic to what the company does and incorporated into each employee's job description. Training is not something that is treated as a periodic hurdle to jump over and leave behind as quickly as possible. Instead, learning is a continuous, valued process engaged in daily, throughout each person's career. Most importantly, although a strong learning culture could be viewed as a set of policies, it is really a company value held and promoted throughout the organization which influences every decision including hiring, operations, promotion, sales, and more.

So many of the benefits of a strong learning culture are self-evident. But let's talk about a few of them here. First, it has been shown over and over that organizations with strong learning cultures perform very highly for employee engagement and retention. The often-heard argument that investing in an employee's training simply benefits the next organization he or she works for does not hold in practice. Instead, continuous investment in employee training and development tends to create a dedicated, long-term employee base. That is incredibly valuable. Strong learning cultures are also synonymous with employees who pride themselves on professionalism, safety and performance.

Additionally, strong learning cultures tend to perpetuate themselves once they are established. An operator, once known for its focus on learning, will attract job applicants with compatible values. These are applicants who care about their career and their performance and wish to develop themselves professionally. Candidates who dislike training and are professionally disengaged are unlikely to apply to work at such a company. Similarly, during the transition to a culture of learning, it is possible that employees without a strong professional drive may leave as they find the new company culture at odds with their values. Together, this means that over the course of years, the company's professionalism and learning culture will only strengthen, and that safety and performance will continue to improve.

So the big question is, how do we implement a culture of learning? There are many answers to this. First and foremost, the people at the top of the organization must both communicate and demonstrate their own commitment to learning. This is paramount and must come before all else. In addition, there are a common set of techniques that are shared by companies with a strong learning culture. For example, companies with the strongest learning cultures involve everyone in the management of the learning process. From the bottom employee to the top, each person has a say not only in their own development (which is important), but also in how learning can evolve and improve throughout the organization. All but the newest employees can act as a learning mentor to one or more other employees. All learning planning committees should have broad and inclusive membership from employees at every level, and from a diverse set of departments. These committees are informed by regular employee polls and other forms of input from the employee base. Communication and transparency regarding corporate learning values, decisions, successes, failures, and changes should be prominent and continuous. Plus, of course, the approach to learning must be continually measured and updated as part of a continuous improvement process.

There are so many parts to this, and each organization will be different in their details of implementation, but the pillars are leadership from the top, communication, transparency, and the involvement of every employee in the management and direction of learning.

There is much more that needs to be said, and will be said, on this topic in future training tips for ships. In the meantime, keep healthy and sail safely.

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GPS Unreliability

The Global Positioning System (GPS) has become vital to the maritime community. Proper use of properly functioning equipment can allow ships to safely navigate worldwide. It's signals are now integrated into a variety of shipboard items, including the automatic identification system (AIS) and the electronic chart display and information system (ECDIS). It has been copied by Russia's GLONASS, Europe's GALILEO, China's BeiDou, India's IRNSS, and Japan's QZSS.

Originally developed for the US Navy for ship positioning and navigation, GPS's very precise timing has proven invaluable to modern electronic commerce. Bank transfers and credit card transactions would be greatly hobbled if the system shut down. From a pure economic perspective, the GPS timing function is of more importance than its positioning and navigation functions.

Like all radio-based services, GPS is subject to interference from both natural and human-made sources. A GPS unit can lose reception in the presence of devices designed for intentional radio jamming. Solar flares can also disrupt GPS equipment. For this reason, the US government strongly encourages all GPS users to maintain backup/alternative positioning, navigation, and timing capabilities. In addition, the government is currently fielding new GPS signals that are more resistant to interference.

Regardless of these improvements, the major vulnerability is the low power of the signals from the satellites. Land-based radio navigation systems, such as LORAN-C, broadcast with greater power and are significantly more difficult to jam. These land-based systems were also not vulnerable to solar flares and presented greater resistance to electro-magnetic weapons. LORAN-C (now retired from service) was not as accurate at GPS, but new land-based systems under development have the capability to rival GPS accuracy without GPS vulnerabilities.

It is official policy to the United States Government to fully develop and implement an accurate back-up system for GPS, but funding and urgency for such action has lagged.

The US government regularly reports on GPS interference in locations like the Black Sea, the eastern Mediterranean, and waters off China. These incidents of interference are suspected to have been caused by the Russian and Chinese governments, probably as tests and demonstrations of their capabilities. If international tensions were to rise dramatically, it should be assumed that GPS interference would become more widespread. While military-grade GPS receivers would probably be minimally impacted, commercially available receivers would be vulnerable.

The GPS service is provided by the United States government, which can selectively deny access to the system, as happened to the Indian military in 1999 during the Kargil conflict between India and Pakistan in the Kashmir region, or degrade the service at any time. Periodically, the GPS signals in selected areas are degraded for a short time, but advance notice is provided.

The most serious problem, as mentioned above, is that the satellite signals are relatively weak. This enables both jamming and spoofing. Jamming, either by a malicious actor or by someone seeking to hide their own activities, is a continuing problem, Short-range jamming transmitters, although illegal, are easily obtained and used. More powerful and longer-range jamming capabilities have been mostly limited to state actors, at least to date.

Spoofing involves sending signals on the GPS spectrum to one or several receivers with false information. It has been demonstrated that a ship can be tricked into following a bogus track-line if it relies solely on output of its GPS receiver. So many vessels have placed excessive reliance on GPS and electronic navigation that this presents a real danger. This is particularly true since the technology to spoof GPS signals is not that difficult to obtain.

All of this highlights the need for a backup system that can stand in for GPS when the GPS signal is unavailable or unreliable. E-Loran is one such alternative. It was under development by the US Coast Guard until funding was unexplainedly cut. Other nations have run E-Loran trials, but no overall program has been developed. Other alternatives have been considered on a theoretical basis. Only the United States has the technology and leadership capability to effectively tackle this problem. Something must be done soon, before the entire positioning, navigation, and timing system on which the modern world relies becomes further unreliable. Failure or unavailability of GPS without a reliable alternative is a super-high consequence problem, with probable costs in the trillions. Continued dithering is not an option.

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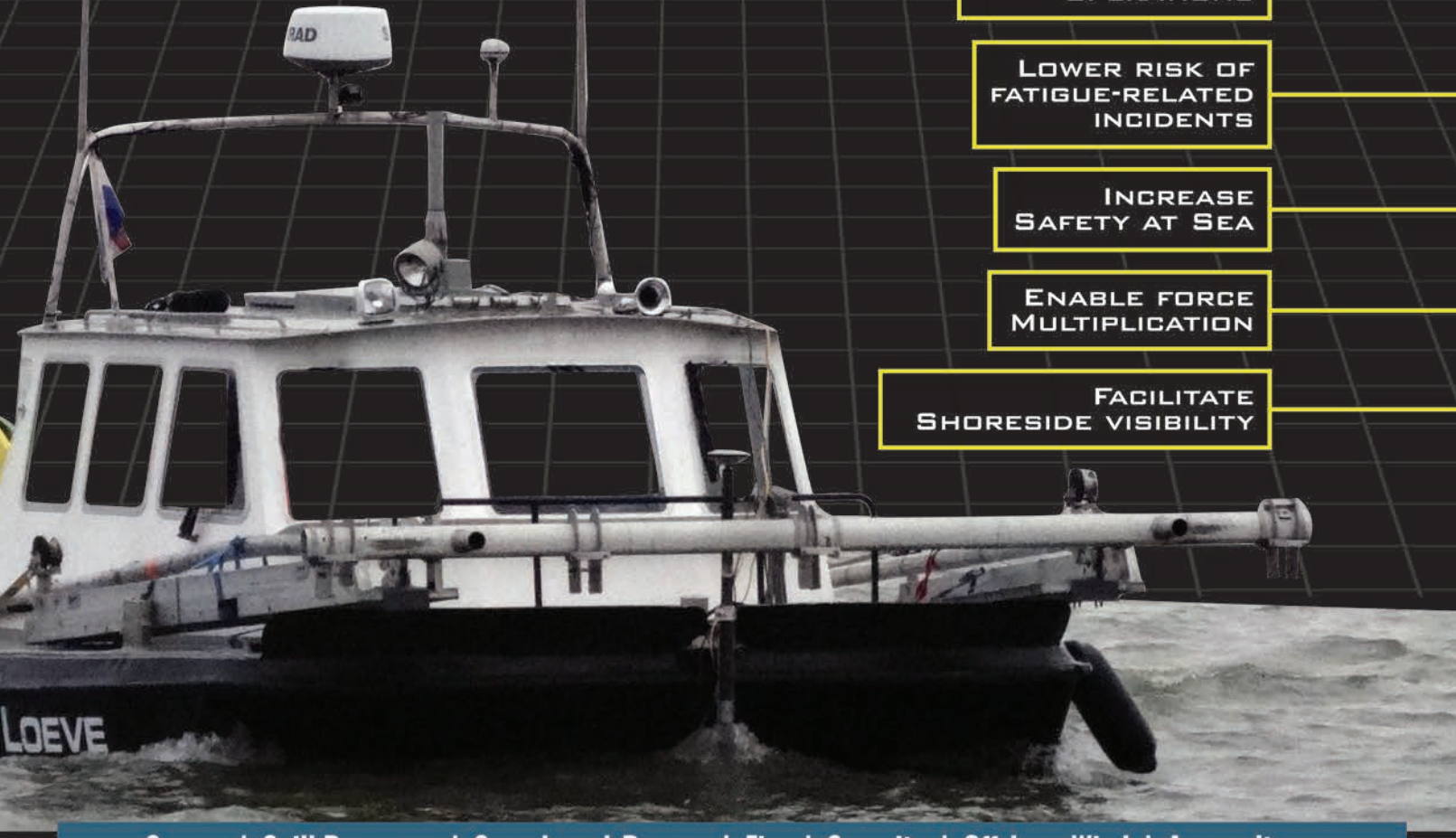

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Engineering Ethics, Seaworthiness and

The Right of Clients to Kill Themselves

I had only been working as a graduate engineer for a few years and was minding my own business working for a yacht designer when my boss asked me to get in touch with a person who was looking for engineering analysis.

I called the number and arranged for the person to meet me at the office.

A few days later a tall very athletic man walked up the stairs and introduced himself as Ned Gillette. He unfolded a drawing with a design for a rowboat, and said he intended to use it for a row from South America to Antarctica.

I was young, but sufficiently surprised to answer somewhere along the lines of: "And you are obviously suicidal."

"Far from it", Ned replied, "I want to stay alive and need somebody to do some analysis on this design. We expect the boat will capsize a couple of times and we have inverted the boat and know it will come back, but we need an engineer to take a closer look to make sure we are not missing anything. Your boss told me you might want to do it because it is so interesting."

"Wait a minute, my boss gave it to me because he is not charging me for this work? So I am supposed to help you kill yourself in Drake Passage for free?"

"Well", Ned said, "I make my living doing adventures like this. I don't have any money, but I am a rep for the Northface and I am sure I can comp you for some nice camping gear."

I did need a new tent and I was sufficiently interested to dive in. I fired up the IBM XT hydro software and managed to wrap my head around inverted stability with loose objects and people in the cabin and other people possibly floating on the outside trying to right the boat, or simply wash away and die from hypothermia and prepared a risk analysis and had some suggestions.

Ned was very pleased with the suggestions and supplied me with a top of the line tent and left. I actually never saw the boat, and never saw Ned again.

Soon thereafter I ran into the Engineering Code of Ethics. It was new to me, but I realized that possibly I had violated the Code because I had actually worked on the design of something that was really dangerous. I was not yet licensed, but it gave me pause for thought.

There were two issues that worried me. First, should I have refused to do the work because I could not make it reasonably safe? I have since spent more time thinking about that and realize now that reasonably safe is a complicated issue and depends on who uses the object. In this case there was an adventurer who only was putting himself and his volunteer crew at risk (there was a crew of four total) and I had clearly conveyed that I could not make his trip safe, I could only make it safer, but that is pretty good by itself.

Next, I took a closer look at the Code and concluded that the ethics contract is not so much between the Engineer and the Client, but rather between the Engineer and the Public. The central issue in an Engineer's Code of Ethics is to protect the Public. As such, if an individual wants to face death in Drake Passage, that by itself, does not violate the Code of Ethics. Having said that, there can be a moment, when death or injury occurs, that a wife or child will sue the engineer. Even in my youthful innocence I sensed that, because in the recommendation I clearly wrote that the trip would be very dangerous and all I could do was possibly make it a little safer. Maybe not a perfect defense, but at least a decent one.

At that time, I was also contacted by single handed ocean racers, and weirdly I shied away from getting involved in the design of single-handed racers. I now know what my gut was telling me; single handed ocean racing involves a different type of risk and involves the public safety. While a single handed ocean racer should be free to kill himself, they engage in a different type of unseaworthiness. The single handed racer cannot stay awake at all times and therefore these vessels operate without a proper watch for much of the time. As such, they could be a significant factor in a collision with a more innocent vessel. (All vessels should keep proper lookouts, but sometimes a vessel becomes disabled and the maritime adventure then counts on the other vessel to avoid collisions) A single handed vessel is intentionally unseaworthy and the designer would be complicit in creating it. Moreover, single handed racers are quite likely to be disabled and that puts the worldwide sea rescue services at risk in trying to recover these single handers. Putting these rescuers at risk due to a failure of a seaworthy vessel is a risk we all share, but to put them at risk for the benefit of an intentionally designed unseaworthy vessel is wrong.

One can go deeper down the rabbit hole and ask if Ned Gillette may not have put rescue services at higher risk too. In theory that could be true, but in those days in Drake Passage even calling a rescue service is quite long odds, them coming

out is highly unlikely.

Regardless, everybody was lucky I suppose, the boat did capsize three times, but she and crew did make it to Antarctica and Ned survived.

Many years later in the early days of the internet, after my tent had pretty much worn out, I wondered whatever happened to Ned Gilette. I did a google search and discovered that in 1998 he and his wife decided to go for an extended camping trip in Northern Kashmir. They were attacked by bandits and Ned was shot with a shotgun, but, with his wife, he still managed to fight of the bandits. His wife was also wounded. She survived, but Ned succumbed to his wounds before he could get properly treated. He had asked for a helicopter to take him to safety, but there were none to be had in those mountains.

A few additional interesting articles on the life and times of Ned Gillette:

bit.ly/34YpBlu
bit.ly/2I0MqMG

For each column I write, MREN has agreed to make a small donation to an organization of my choice. For this column I nominate the US Coast Guard foundation. https://coastguardfoundation.org/ Single handers or not, they do go out to pick them up

The Author

van Hemmen

Rik van Hemmen is the President of Martin & Ottaway, a marine consulting firm.

Complying with IMO Resolution MSC.337(91) Noise Level Code

Inter-Compartment Sound Transmission Regulations and Testing

One of the best things a marine operator can do for its crew or passengers is prioritize their comfort by reducing shipboard noise. Commercial and military marine vessels can be subject to very high noise levels produced by everything from onboard activities to aircraft. At worst, this noise can be hazardous—disruptively noisy environments can lead to discomfort, sleep-deprivation, and even hearing loss, which can in turn lead to lower job performance, safety risks, and diminished quality of life. Evidence shows that when noise levels are controlled, crews can be more productive and the potential for injury is reduced.

In response to the need for improved noise control measures, regulations around shipboard sound insulation and acoustical partition performance have become increasingly common. The International Maritime Organization (IMO) has adopted Resolution MSC.337(91) Code on Noise Levels Onboard Ships, which stresses that the sound transmission performance of partitions on certain vessels must meet specific requirements that allow for uninterrupted rest and recreation, regardless of noise in adjacent compartments. The purpose of the Code is to provide standards to prevent the occurrence of potentially hazardous noise levels on board ships and to provide standards for an acceptable environment for seafarers on passenger and cargo ships. The Code also includes requirements for measurements of noise levels and exposure. While the IMO code is the primary regulation we have seen applied in the USA, many other regulatory bodies include a requirement for designed and tested partition performance including the American Bureau of Shipping (ABS), Lloyd's Register, Det Norske Veritas (DNV) and others. The general trend in the more recent versions of these regulations is toward more common requirements for testing and verification of partition performance.

Image : NCE

Onboard partition testing with omnidirectional sound sources.

With the introduction of these stricter noise codes, the need for acoustic performance testing and enforcement is now greater than ever. Since IMO's adoption of a noise code that includes partition sound reduction index (Rw) requirements, Noise Control Engineering (NCE) has been working with naval architects to ensure vessels meet R¬w criteria. We have also been conducting in-situ testing more frequently. In the process of assessing hundreds of partitions for multiple vessels we have learned some practical lessons. Results of this work were recently presented by NCE at the Institute of Noise Control Engineering's NOISE-CON, North America's largest noise control technical conference.

Testing Methodology

The testing methodology involves the use of one or two omnidirectional sound sources operating in one of the rooms formed by the partition being evaluated. Sound levels are then measured at multiple locations in the source space, as well as on opposite side of the partition. The difference between the noise levels on either side of the partition are used

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Lab performance testing of typical marine partitions.

to calculate a standard performance metric after accounting for the partition surface area, room size, and other acoustic effects. This testing is conducted in accordance with ISO standards referenced by the IMO code.

There are many details that have to be considered in order to accurately test partition performance. For example, testing dockside can involve high levels of background noise. When all HVAC, air, and ventilation equipment is secured and the vessel is empty during second shift, reduced noise levels are obtainable—but creating these testing conditions isn't always practical. While the test standard does have some allowances for non-ideal background data, results must sometimes be presented with a caveat that assessing partition performance was limited by high background noise. Consequently, every effort should be made to reduce background noise during testing to obtain a clean data set.

In terms of design, installed partitions often do not perform as well as the manufacturer-published (lab-tested) Rw, due to many factors some of which are summarized here.

Partitions, Louvers and Door Jams

During a recent test, measurements were taken of sound passing through a partition dividing a crew lounge and a stateroom. According to the IMO code, partitions between these two types of spaces must achieve a rating of Rw 45. Tested in a lab, the double 1-inch joiner with a 2-inch air gap in between would provide a sufficient barrier. However, when installed on the vessel, this particular partition did not reach into the overhead structure; instead, it stopped at the drop ceiling and was flanked by noise traveling through the ceiling via the shared overhead space. Once the plane of the partition was extended upward through the overhead space with 2-inches of mineral wool, the partition met the requirements.

Ships are often required to have louvers in doors separating accommodation spaces for air circulation. When it comes to acoustics, this is effectively the same as having a large hole in the door, drastically reducing its ability to block sound. For some door designs, the louvre openings are offset from each other on either side of the door, allowing room for the inside to be lined with sound-absorbing insulation. This design can reduce the flanking path to the extent that the louver no longer significantly degrades the performance of the door.

Another typical flanking path for hallway-to-stateroom partitions is the door-jamb seal. When the seal is not large enough to fill the space between the door frame and the door, this can drastically reduce the partition's performance. In a recent test of a large vessel, every partition with a door failed the Rw criteria because they had no door seals. After door seals were installed, the results were significantly improved. Some vessels include double seals which, when combined with a tortuous-path louvre, perform well.

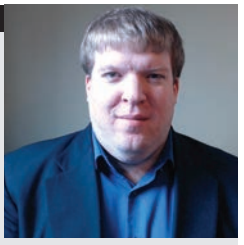
Conclusion

Many partition details, such as flanking, challenge the effectiveness of sound insulation. Resolution MSC.337(91) Code on Noise Levels Onboard Ships is clear: Solutions must be designed that incorporate and remedy acoustical weak points such as those outlined in this article. Regardless of vessel type, careful partition design, installation, and testing will result in improved operations, regulatory compliance, and greater comfort for all aboard. Minimizing crewmember and passenger exposure to harmful or disruptive noise is crucial to protecting their health and happiness.

The Authors

Beaudry & Hunt

Allan Beaudry (top) and Jeffrey Hunt The authors are engineers at Noise Control Engineering, LLC, an acoustical engineering-consulting firm, specializing in noise and vibration design, control, and measurement for the marine industry. allanb@noise-control.com



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Hybrids in the OSV Sector

On the back of a recent deal struck by Norway's Kongsberg Maritime to supply turnkey hybrid battery solutions for three Island Offshore's platform supply vessels, we interviewed Geir Oscar Løseth, Kongsberg Maritime's General Manager Sales, Advanced Offerings, to learn more about the push for hybrids on the OSV sector.

By Bartolomej Tomic, Managing Editor, Offshore Engineer

What is behind the Norwegian offshore support vessel sector's increasing drive to go hybrid?

Batteries and hybrid technologies are a key strategy for reducing fuel consumption and, consequently, emissions. Moving towards electric drive is also important in reducing maintenance costs and meeting charter requirements. Kongsberg Maritime is proud to offer vessels and technologies that are both more efficient and safer than previous standards, which is vital both for sustainability and safeguarding business in today's tough market.

You've recently received an order to upgrade three Island Offshore's PSV's to run on hybrid power, including a lithium-ion battery solution. Kongsberg has said that Island Offshore has set "a clear precedent in the market" by contracting Kongsberg for the upgrade. How so?

Kongsberg Maritime has cooperated closely with Island Offshore for many years and has developed a deep understanding of how their vessels are used. This has aided us in producing an ideal solution for the customer, which will

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adapt and scale for use on similar vessels.

How expensive is such an investment for an OSV owner in Norway? What is the payback time? Is there government support?

A typical turnkey solution costs $1.96 - $2.5 million. Without funding, the typical payback time is 4-6 years. However, in Norway, there are several government financial initiatives, ENOVA and NOX Fund being key enablers for several projects of this type.

Can you talk about charging patterns, capacity, capabilities, battery lifetime? How much have things progressed in this space?

We design our battery solutions to meet each vessel's requirements. Some need high charge rates; others may prioritize a long discharging period. All batteries have limits, and if they are used outside their design criteria, you will reduce their lifetime. A typical battery installation of this type will be designed to function efficiently for its intended purpose for 10 years before degrading below its design specification. More demanding design criteria, of course, drive costs, so we always adapt our proposal to our customers' needs, budgets, and project frameworks.

Apart from emissions reduction, what are the operational benefits of having such a solution onboard an offshore support vessel?

Key benefits are redundancy and safety, but battery and hybrid solution also grant the possibility to run the vessel more efficiently in several operational modes. This leads to a reduction in engine running hours and maintenance costs. For some customers, the possibility for zero-emission operation in sensitive areas such as exposed harbors etc. is also important. We have made our standard Containerized Energy Storage System with the option for charging via a shore connection too, meaning the vessel can be emission-free entering and departing port, and on the dock.

So, is it 100% safe to have Lithium-ion batteries aboard offshore vessels? Especially in the harsh offshore environment?

We have addressed this by designing our marine battery solutions with a high focus on battery safety. Kongsberg Maritime uses a 'three barrier' safety system, which allows us to offer our battery system in the market with a high level of confidence in its safety.

Our SAVe batteries use both passive and active barriers to prevent thermal runaway, with passive isolation to inhibit heat propagation between cells and modules, and active water mist cooling between modules. In addition, the batteries are carefully managed during both charge and discharge, with cells monitored and logged for voltage, temperature, and current to ensure optimal storage, life, and safety. Battery modules are housed in sealed cabinets which give us complete control over their surrounding environment and enable management of any released gases.

How many offshore vessels have you fitted with hybrid solutions so far?

We have so far delivered 62 hybrid/battery solutions, 43 of which are now in operation. The first battery system was delivered in 2012, and our first collaboration on hybrid systems with Island Offshore entered service in 2015.

Apart from OSVs, where else do you see battery usage as feasible in the offshore energy space?

In general, all market segments and vessel types can make use of battery power, in various ways. We have deliveries to several different segments.

While Norway is almost 100% powered by "green electricity" from hydropower, and charging batteries with such electricity can indeed be called green, not every country has that "luxury." Do you see this as an impediment to the rise of battery-powered/hybrid OSVs elsewhere? For example, in countries where electricity is produced by coal plants?

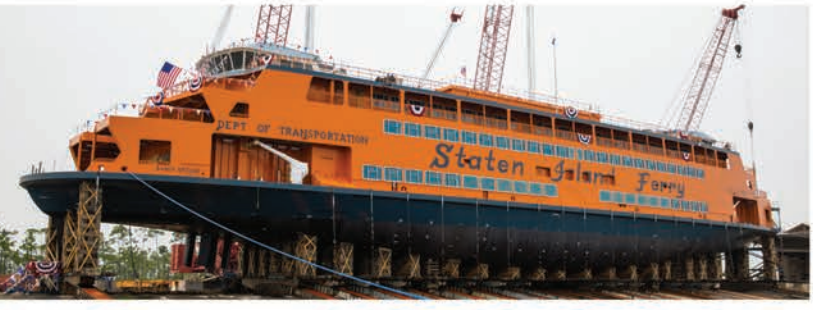
We believe that the key savings are delivered through better engine performance and reduced parallel operation due to redundancy. We, therefore, do not expect the main growth area to be in fully battery operated vessels, but more in hybrid solutions with other fuels such as LNG, Ammonia, Hydrogen, Bio Diesel or similar. For example, a hybrid power retrofit project on a Platform Supply Vessel yielded measured reductions of 20% in fuel consumption and 43% in engine running hours. This was achieved by utilizing a redundant battery solution connected to the main switchboard for Dynamic Positioning operations.

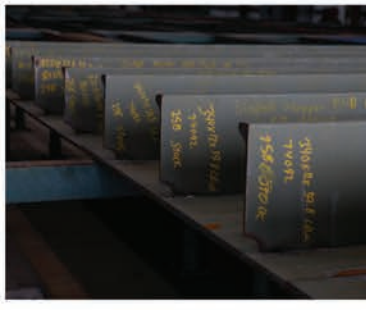
Do you see a future where all the offshore support vessels are battery-powered or hybrid? What needs to happen for this scenario to unfold?

On a global level, we need all major players to take action to reduce emissions. Hybrid operation with batteries is a part of such reduction. Kongsberg Maritime's solutions team emission reduction with significant other savings which is not the case for all suppliers' battery installations.

I believe that future OSV's will have more efficient power systems, whereby multiple power sources are used in combination. Batteries will be a part of the solution, but not all of it. If we look to the aviation industry, none of the airlines own their engines any more: the have a 'Power by the Hour' solution where they pay for use of the machinery, which remains the property of the manufacturer. I think this type of business model can be applicable for the marine industry, especially as power systems become more complex to maintain. Kongsberg Maritime is leading the market by already offering this kind of solution, and I think this will be a growth area for our business going forward.

Building Ships Now For The Future





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Data Consolidation is Essential

The digital transformation of shipping requires data consolidation in to a single dashboard to drive faster and accurate decision-making. This is a problem at vessel level. Different data formats and sources and the need to collect some data manually, rely on crew intervention. This problem is magnified many times at fleet level with impacts on safety, performance, morale and compliance.

Owners know they need better data; the problem is that many don't know where to start in adopting digital solutions. For the most part, it makes no sense to try and build their own. However a 'do nothing' strategy risks not being able to retain or grow their market share in future.

Shipowners and manager already know how hard it is to capture and process vast amounts of data, and what they need is a simpler way to understand the performance of their vessels across a fleet. Analysis needs to maximise operational and financial performance to understand how the assumptions in their financial models are holding up.

Platform building

If the industry is to make progress towards a safer more efficient and digitalised way of working, then the wealth of operational, class and regulatory data needs to be brought together with the external inputs to provide insights into how to maximise potential asset earnings.

By digitalising core operations around reporting, integration and fleet insights, owners can refine the way they engage with their managers and improve decision-making. The transformation process is designed around better asset management with inputs on environmental and vessel performance; improving compliance and driving up standards.

The reason that similar ventures have tended to fail is because their creators cannot harness the data that resides in systems and processes without the buy-in of a trusted and neutral third party.

Plenty of platforms take input on equipment performance or availability but often this is where they stop; the owner gets some operational bullet points but little more. In fact, OEMs are just one of the data sources that helps to create the full digital picture.

To create a platform that can meet today's digital needs requires a rethink of the processes involved. It also requires a component-based architecture design using hi-tech 'building blocks' that can be swapped in and out as needed. Design a system this way – and not off the shelf – and an owner can quickly start to see the data they need.

The Digital Solution

For ship owners looking for a way to accelerate their digital transformation, ABS has created MyDigitalFleet – a platform that collects data from some 160 different sources and provides real-time, risk-based analysis of vessel performance and compliance.

All these different data elements can be absorbed into a single system to enable faster decision-making against predetermined operational and risk profile. Having a dynamic understanding of asset performance benefits business; customer relationships, safety, compliance and financial performance, can support the evolution to a full digital business model.

Class is able to successfully bring together the technical and commercial aspects with safety and compliance data, hosted securely. The industry has not seen this level of data integration before; in fact the capability to ingest and analyse data in a standardised way has only become available in the last few years. This level of operational data provides a much more accurate picture of vessel position and performance, not just where the owner expects or hopes it will be. They will have a live view of compliance and a risk score that can advise on direct and indirect cyber vulnerability.

Understanding risk profiles clearly has direct benefits for safety, and it also means the owner can keep the asset commercially available and competitive. Data driven safety and maintenance moves the process from the present into predictive condition-based data, making it possible to forecast machinery 'health' and its performance.

This degree of process efficiency helps to maximise asset utilisation, positively impacts the top line, and drives compliance to support the bottom line. Common tools such as AIS data and weather forecasts can start to add real value because they enable the owner to be proactive in reducing both risk and operating costs.

Watch Kashif Mahmood on MR TV: bit.ly/35Xjz3S

The Author

Mahmood

Kashif Mahmood is the American Bureau of Shipping's Senior Vice President for Digital Solutions.

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What a Difference a Year Makes

This time last year, many owners and operators were rushing to put their compliance plans for the International Maritime Organization's (IMO) 0.5% sulphur emissions requirements (MARPOL Annex VI) into place before the January 1st 2020 entry into force, and doing everything possible to ensure supply of compliant fuel to meet their requirements in the coming months. Twelve months on, and the fears about bunker availability and excessive price differentials have largely dissipated under the weight of a global pandemic that sent oil markets through the floor.

While the rush to adapt may have passed, there is a new and arguably more troublesome equilibrium in the bunker market. Today, bunker purchasers must contend with more complexity, unpredictability and uncertainty around fuelling requirements, and have even less certainty around bunkering requirements in the longer-term, as the industry grapples with ever-more stringent emissions regulations on the horizon.

It is of course good news for vessel operators that the price differential between high sulfur fuel oil (HSFO) and marine gas oil (MGO) has been significantly lower than expected since the pandemic began. It is also good news for many that very low sulfur fuel oil (VLSFO) has also become available at much lower cost and in higher quantities than expected thanks in part to new refining capabilities and capacity. This gives operators greater flexibility than many had assumed. We have also seen a significant expansion in LNG bunkering capabilities for vessels equipped to burn gas, and – overall – we have seen that buyers and suppliers have been able to work together to learn from issues around fuel quality in newer fuel blends.

However, the sum of all these changes is that for owners, operators and bunker purchasers, this complexity and volatility carries with it continued financial and operational risk. Supply and demand scenarios cannot be taken for granted and nor can voyage plans be assured within the wider context of a world in a state of continued flux caused by the ebb-and-flow of the pandemic across borders. What is clear is that ensuring visibility, transparency and control over bunkering management in this age of uncertainty requires the help of digital technologies – the days of spreadsheets and last-minute calls to bunker suppliers should be behind us.

Currently, most shipping companies employ fairly cumbersome internal processes that are required to manage voyage schedules, handle port calls, raise bunker orders and reconcile invoices. These processes are always admin-heavy and require large teams to manage them. Thankfully, technologies to automate and streamline bunker management already exist, and are available to shipping companies of all sizes. These smart IT tools are available off-the-shelf as 'packaged solutions' (they do not need to be build or maintained in-house). Importantly, such solutions can be integrated into the existing IT environment of any shipping company to align with all existing operational software systems.

Image: © weerapong/AdobeStock

Many operators are now using sophisticated software algorithms to monitor voyage profitability for the ships in their fleet – but do not include the same capability in their bunker management processes. The integration of a set of bunker tools into existing scheduling software gives the operator an immediate and accurate forecast of anticipated bunker costs as the schedule is being created. Good software will also manage various bunker types and make accurate adjustments when switching to alternative fuel when, for example, the vessel is using a dual-fuel LNG system. When a ship's schedule hits a problem – poor weather, vessel breakdown, port congestion, for example - it is important for the operator to understand fully the impact of the delay on consumption while they also work to get the vessel back into its optimum operating pattern.

Using a combined voyage and bunker software package, an operator can run a series of options to understand how making changes to a vessel's speed or routing will affect bunker consumption. They can then select the solution that has least impact on the bottom line while fulfilling their planned port

calls. At the same time, they are able to see – at a glance – the amount of bunkers remaining on the vessel following any changes made to the schedule, and make adjustments in real-time. If onboard fuel is likely to fall below a pre-set minimum threshold, the software will alert the operator and suggest a suitable port to take on more bunkers.

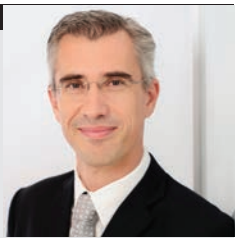
Importantly, aside from scheduling and planning, new bunker tools can also be used to streamline the purchasing process itself and can unlock significant cost savings. In Softship's software solution, the shipping company's existing bunker contracts are stored within the software and tied to all new orders. On delivery, the delivery order is then automatically matched with the original order and any discrepancies highlighted. Later, this information is used to reconcile invoices presented against agreed volumes and prices. Mismatches are highlighted before invoices are paid.

Using this type of software also gives much needed transparency over bunker consumption as up-to-date fuel statistics can be made available at the press of a button. This allows management to analyse and monitor consumption and cost per voyage, per nautical mile, per hour and compare it against the estimated bunker consumption based on the engine specifications. Remedial steps can be taken early on if required, and full financial transparency achieved.

Of course, looking beyond the current challenges all shipping companies face in operating in these unpredictable times, it is necessary to look further into the future. More accurate data collection around bunker consumption enables shipping companies to better understand their emissions footprint and to guide their operations towards efficiency.

A critical concern as owners, operators and managers work together to reduce greenhouse gas (GHG) emissions in line with the IMO's GHG Strategy target of reducing GHG emissions by 50% (against 2008 base levels) by 2050 is the ability to carefully monitor and control bunker usage. The European Union's plans to include marine emissions in its Emission Trading System, which adds a carbon price to the cost of fuel, will make such calculations even more critical in future – and we can expect similar regional environmental regulations to follow. Adopting IT systems that will aid such transitions while also optimising core operational process and maximising voyage efficiencies is a sound investment for any shipping company.

The Author



Fischer

Lars Fischer is Managing Director, Softship Data Processing.

Photo: Navtor

Smart Shipping & eNavigation: Integration is Everything

If you truly want to unlock the value of data you have to adopt a joined-up approach, says Tor Svanes, CEO NAVTOR. Fail in that, he argues, and you'll fail to get the competitive advantage your business needs.

If you go for a full check-up at the doctor's they won't just measure your weight.

They'll look at your blood pressure, listen to your heart, consider blood tests, assess cholesterol and, above all, ask questions that monitor your day-to-day performance. How are you feeling? Are you exercising? Sleeping okay? The list goes on. Only by looking at each element holistically, and then aggregating and analysing the information, will they be able to give you the "big picture" concerning your health.

"You have the body, strength and stamina of a 30-year-old Mr Svanes!"… for example.

So, what's my point here?

That one data stream is useful, if you're looking at a single item, but that only by integrating different streams from all 'systems' can you gain genuinely comprehensive insights and enhance overall decision making.

You can improve your health.

And that is maritime's challenge.

THE KEY TO SMART SHIPPING

Everybody now understands that vessel data is important, but not everyone knows how to use it. Similarly, most owners and operators know that good connectivity between ship and shore is essential for data exchange, but few really understand why. And, crucially, how to unlock its full potential.

This is something that has to change, because this is the key to smart shipping – to profitable, efficient and sustainable operations.

We need safe, secure, reliable, real-time data flows between vessels and shore, but we also need to integrate data to fully assess and optimise operations – both for single ships and entire fleets.

EMPOWERING OPTIMIZATION

Let's look at an example.

You have onboard sensors on a vessel recording fuel consumption. This data is shared with land so management can monitor performance. A team member may look at this in relation to, say, a noon report to ensure everything is on track. Great.

But if that information was combined with real-time weather and navigation data, engine shaft torque, rpm, and so on, you get an accurate insight not just of fuel consumption, but fuel consumption and engine performance under exact condi-

tions and on exact routes. You open a door into a new world of optimisation.

Taking this example further, if you know the weather and the appropriate vessel/cargo details you can – through a secure, reliable data gateway – stream data so you can actually test performance in real-time. I.e. you know what rpm should produce a speed of 10knots in good weather conditions, so you set the engine accordingly and monitor ongoing speed. If the speed isn't as expected then maybe you have a hull performance issue; bio-fouling may be taking hold and producing frictional drag, hampering performance (and adding cost for you, and the environment). This will allow you to set a schedule for hull cleaning at a time that suits your operations, and pocket.

This is the power of integration. But that's not all.

SIMPLY BETTER

Integrating data gives crew the ability to tailor various systems and performance to meet charter agreements, just in time arrival slots and other key operational criteria. But it

Tor Svanes, CEO, NAVTOR

Photo: Navtor

also means tasks can be increasingly automated, with a single platform that gathers all data (which NAVTOR is working on now) being used to produce required reports at the push of a button (for port authorities, environmental regulatory compliance, and for the shipping organisation itself). This delivers real efficiencies in terms of manhours, costs and workload, while also negating the potential for human error (a real danger with laborious administration tasks).

When these savings are multiplied across fleets the efficiencies are significant. For example, I personally know of relatively small shipowners that employ staff purely to compile EU MRV reports – a task that can be simply automated with the right system in place.

Staying on land, integrating data in this way gives a powerful fleet management tool, with intimate understanding of individual vessel performance leading to accurate comparisons and empowering overall optimisation.

As such this approach to data isn't just about finetuning vessels, it's about turbocharging your overall business. Integration really is the way to get ahead.

BENEFITS FOR ALL

Some owners might think this is out of their league, that this kind of data capture, integration, analysis and fleet management is exclusively for the big boys, with their new vessels and deep pockets. It's not. Most ships in the world fleet are not new, and most owners are under some kind of commercial pressure. That's just a fact.

At NAVTOR we believe in developing universal technology that helps everyone meet their operational and business goals – a true 'one size fits all' approach. And we know we're not alone.

This industry needs solutions that enable existing vessels to enter the smart shipping age, allowing them to function with greater efficiency, cost control, compliance and intelligence. Integrating data from onboard sensors, navigational sources, management offices, and more, onto a single platform gives them the upgrade they need.

By bringing together monitoring, performance and e-navigation data this industry can finally work towards a clean bill of health… and a very bright future.

Photos: Navtor

Cavotec and ASKO – Taking a Giant Leap Towards the Future of Shipping

All photos courtesy of Cavotec

By Mikael Norin, CEO, Cavotec

The future of shipping is here, and it will not surprise industry observers to see Norway in the pole position as autonomous vessels enter commercial operations. Norway has long been on the bleeding edge of shipping innovation. In 2015, the world's first battery electric car ferry entered operation in Norway's deepest and longest fjord, Sognefjord.

The ferry, MV Ampere, resulted from a government initiative and was a catalyst for innovation in the industry. Now, Norway is expected to equip some 200 additional berths with zero emission technologies before 2025. Cavotec were part of this development, supplying MoorMaster automated mooring to 50 berths and automated charging to around 20 berths to date – in Norway alone.

Today, we are on the verge of the next step change in creating a fully autonomous maritime supply chain and a safe and sustainable future. ASKO Maritime, the shipping arm of Norway's largest grocery chain, is looking to launch the world's first fully autonomous, electric, carbon-free ships, a move that would replace two million kilometers of truck transport and reduce CO2 emissions by 5,000 tonnes every year.

A key component in ASKO's plan was a system that could

automatically moor ships in port. Ships have relied on ropes and chains to moor since the dawn of navigation. This requires personnel on the ship and on shore. With an unmanned vessel, calling on a fully automated port, there is nobody around to throw ropes and nobody on the quay to catch them.

Cavotec has been developing an automated vacuum mooring technology – MoorMaster – for more than 20 years. Now, we have refined and enhanced the concept with MoorMaster NxG. This next generation vacuum mooring solution has been designed to ease introduction in thousands of ports across the world, speeding the industry's transition to the future of shipping.

We are extremely excited that ASKO Maritime has selected us to partner on introducing the world's first autonomous, zero-emission fleet of ships. It is a project that perfectly aligns with our vision for a more efficient, sustainable future: a win-win relationship. For us, there could not be a better launch customer for MoorMaster NxG than ASKO Maritime. For ASKO, the use of MoorMaster NxG means that its ships can shut off their thrusters right after reaching port and thereby consume less energy. This will translate into considerable operational savings and even extend battery lifetime.

A new era

I believe that in the future, ASKO Maritime's initiative will be seen as a breakthrough step towards a fully autonomous maritime supply chain. We are poised to see a proliferation of automated and zero emission technologies in the maritime world. At Cavotec, we want to usher in this era, and this has been the impetus behind developing MoorMaster NxG.

A key request from the market, which is reflected in the development of MoorMaster NxG, was to make it easier to implement automated mooring. So faster, smarter, installation was a key consideration for us. We also introduced continuous remote monitoring and maintenance to make it easier for a port to automate the steps to hands free mooring.

We have done all that in a radically reduced footprint – down by 40 percent in depth on previous designs. There are many container terminals with limited space between the existing quay edge and ship-to-shore cranes. MoorMaster NxG

can be installed in these terminals without the need for modifications to existing infrastructure. All in all, this has decreased installation times by 50 percent – and in some cases by up to 90 percent – in addition to drastically reducing costs.

We are also seeing a growing number of automated mooring applications with public access, such as ferry terminals. An aesthetically pleasing design was therefore important to us. Our engineers have done a fantastic job in creating a beautiful piece of machinery that will fit into any public space.

Profitable sustainability

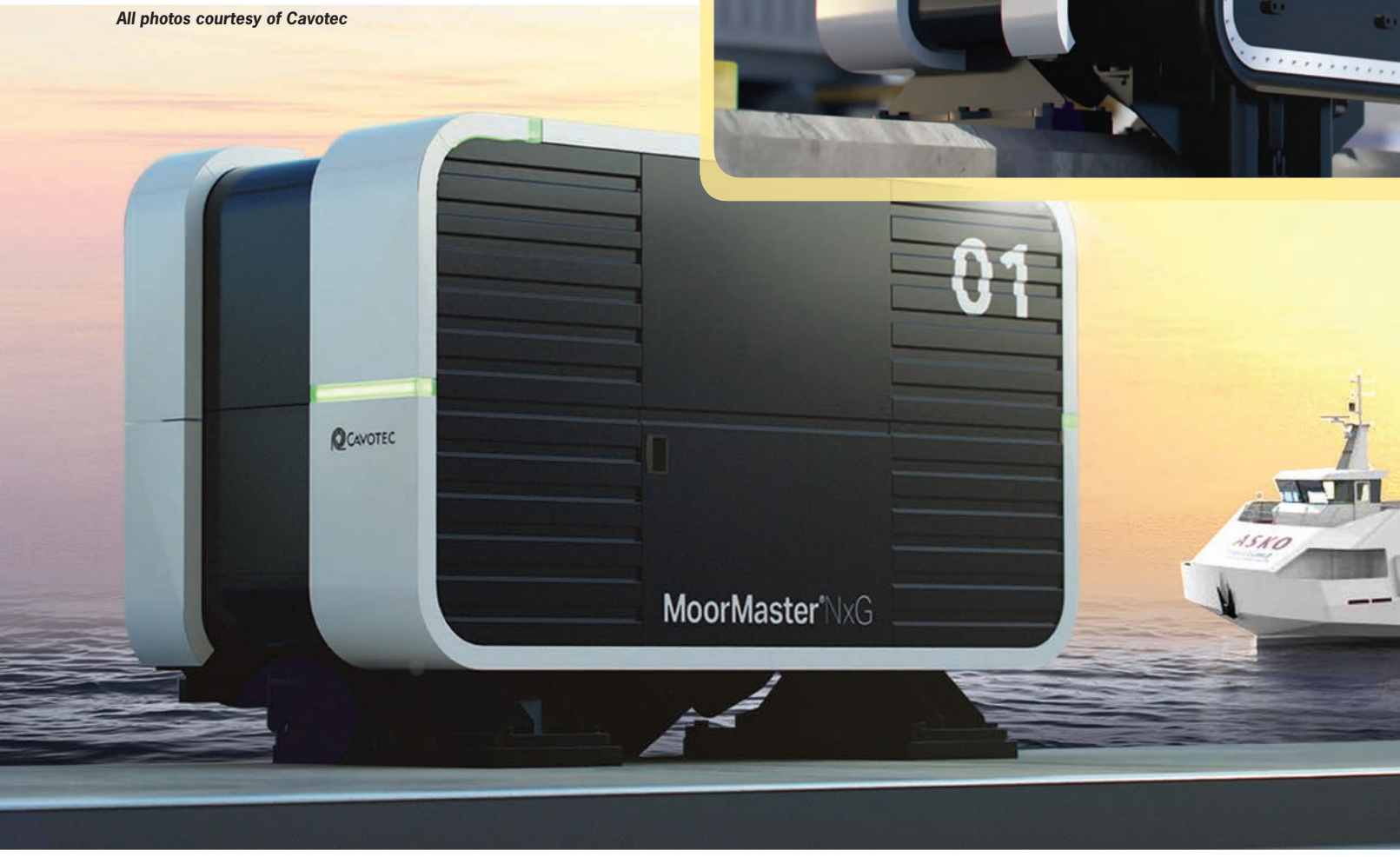
But looks are not everything. Automated mooring must produce real benefits to ports and shipping companies. One of the obvious benefits is time savings. Mooring typically takes between 20 minutes and up to an hour for large cargo ships. It now only takes 30 seconds with MoorMaster NxG. Those saved minutes matter. They allow for faster turnarounds or more time loading or un-loading. For shipping companies, every minute saved means ships can cruise at slower speeds to their next destination, thereby saving fuel.

For ports, MoorMaster frees up time and helps ports to make more of every minute. It reduces vessel motion for higher throughout and allows ports to make use of existing infrastructure for larger vessels without expensive modifications.

It all comes down to profitable sustainability. With MoorMaster, operators can improve efficiency and productivity and thereby profitability.

Additional benefits include reduced use of fuel and less pollution. Typically, sustainability benefits are viewed as a drag on financial results. But with MoorMaster, ports and shipping

All photos courtesy of Cavotec



companies become more profitable and at the same time contribute to a greener, less polluted world.

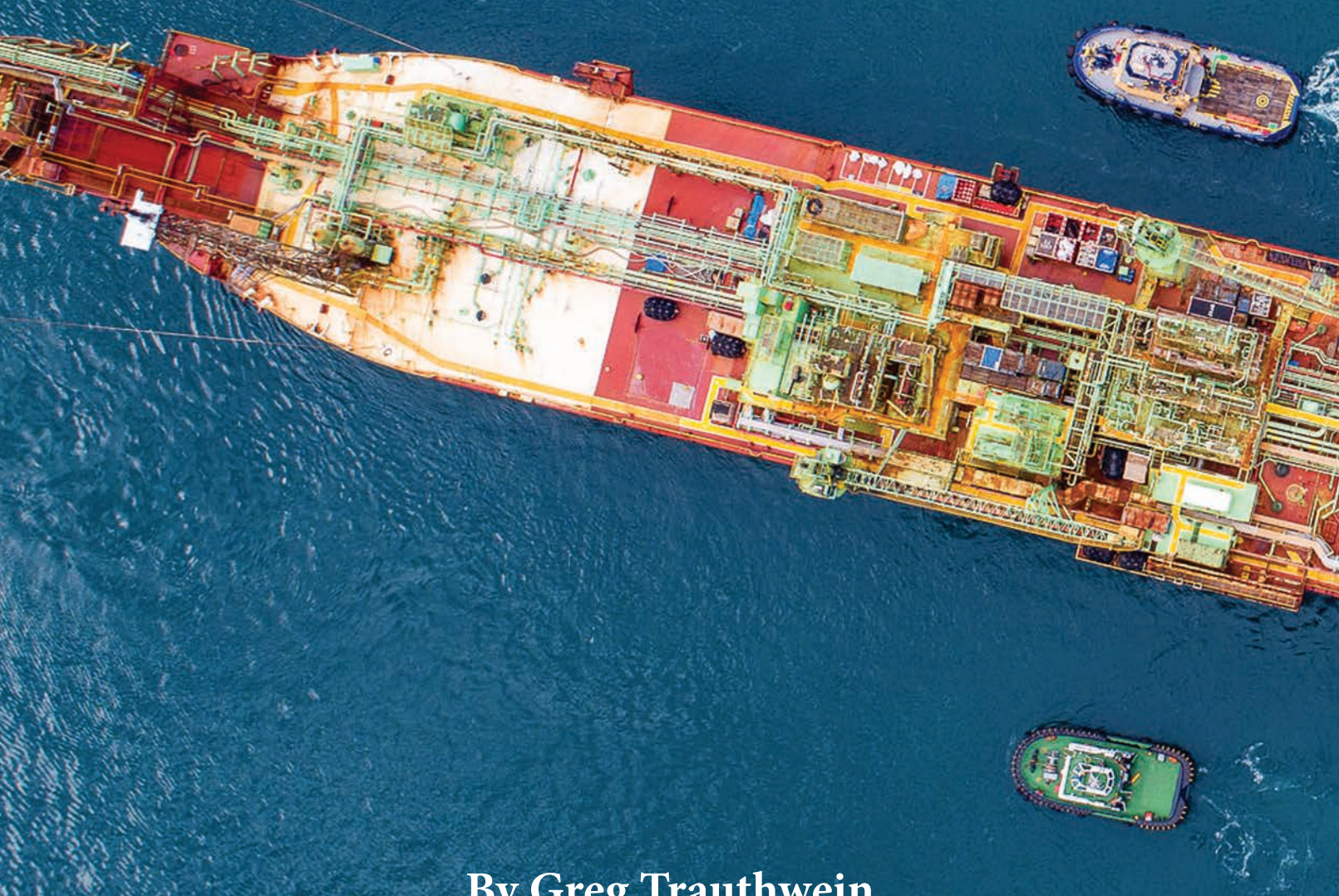
Value added safety

An investment in automated mooring is also an investment in the health and safety of people. Conventional mooring – with heavy ropes and chains – is hard, dangerous, manual labor that continues to cause large numbers of injuries and even fatalities every year. With MoorMaster, ships' crews and quayside personnel can focus on value added activities, such as loading and unloading cargo without literally putting their lives on the line.

I have no doubt the shipping industry will embrace new, safer, more sustainable mooring practices as the rate of innovation picks up throughout the maritime supply chains. At Cavotec, with the MoorMaster NxG, we could not be prouder of being a key enabler of the evolution towards the future of shipping and being a partner of ASKO is a first major step.

INTERVIEW:

Marcio Castro,



By Greg Trauthwein

Executive Director Tugboat Division, *Wilson Sons*

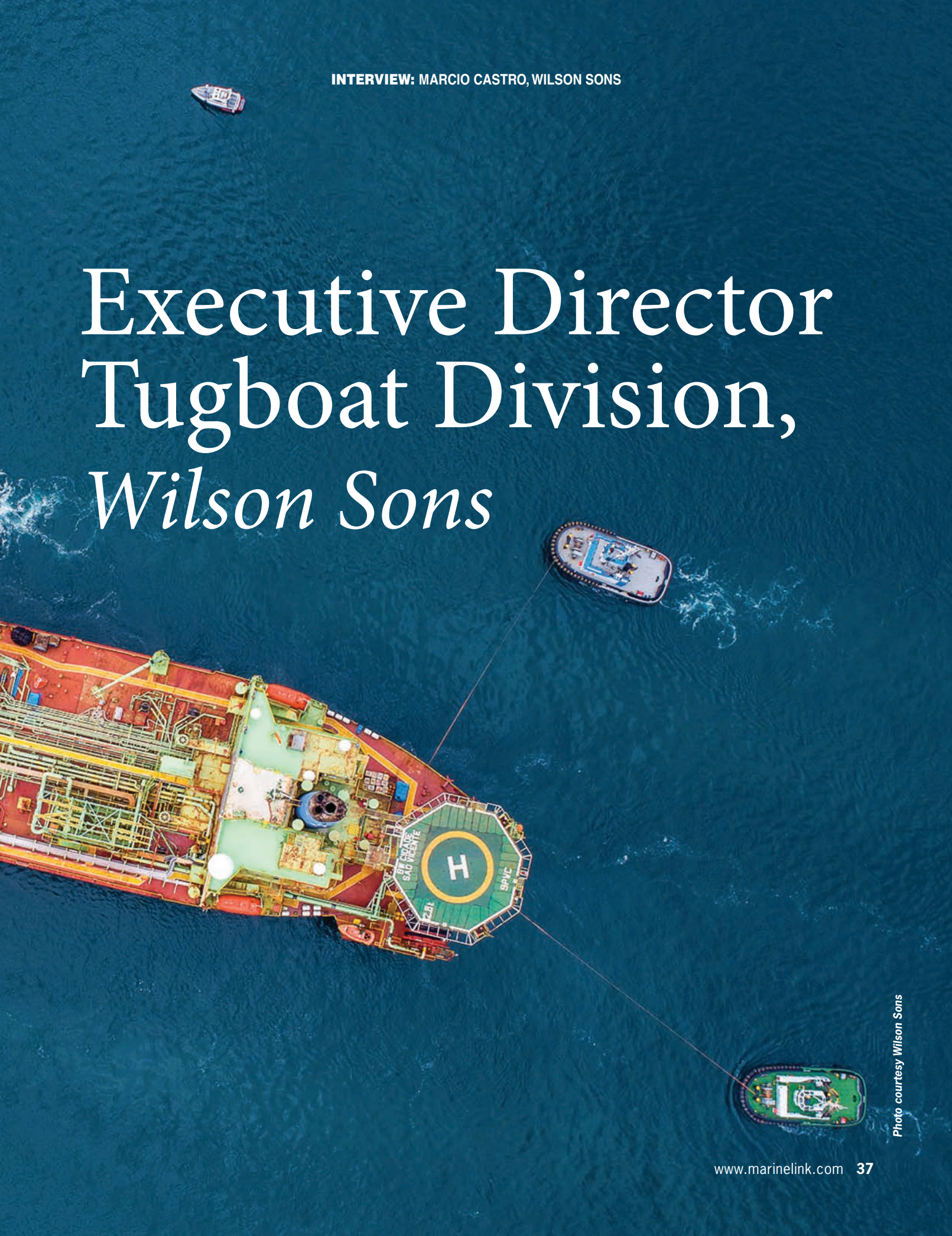
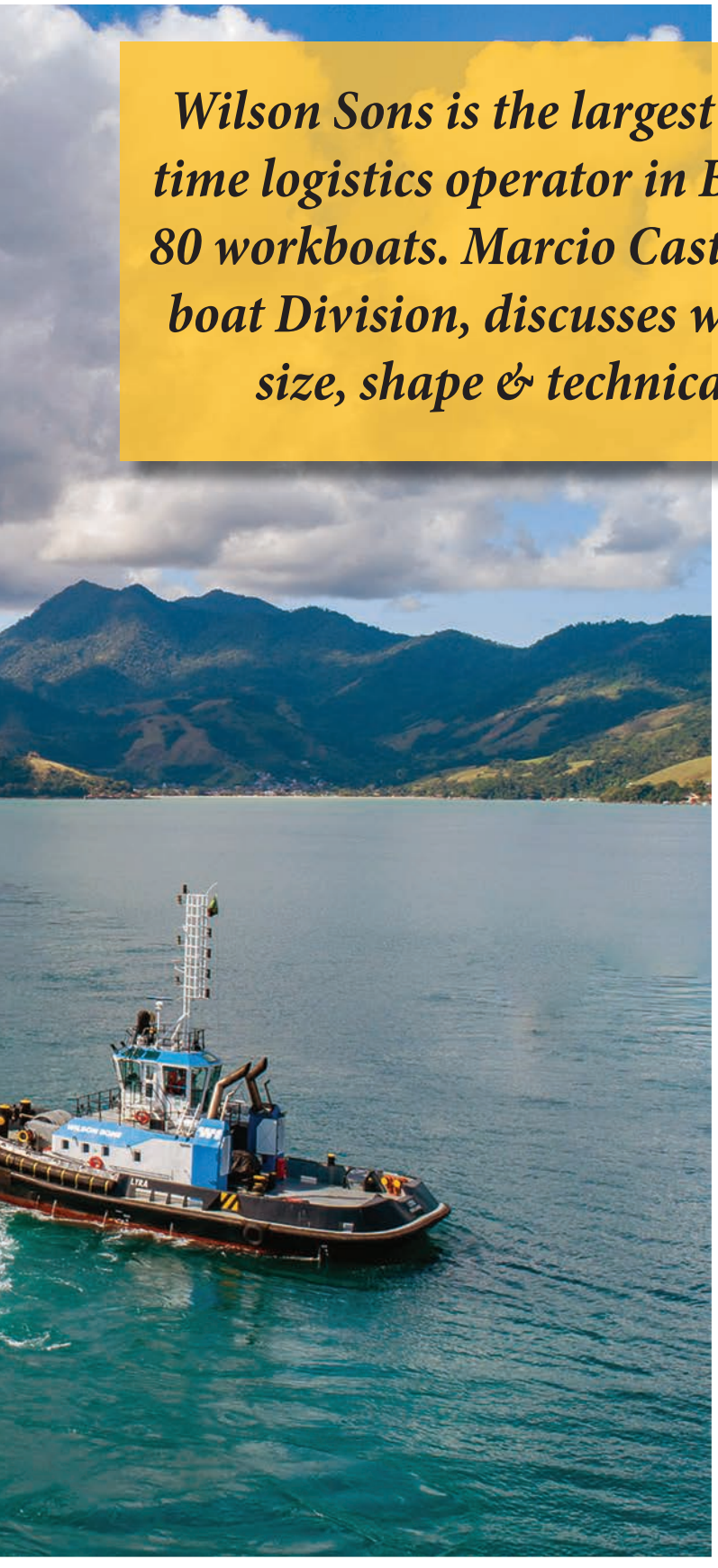


Photo courtesy Wilson Sons

Photo courtesy Wilson Sons



Wilson Sons is the largest integrated port and maritime logistics operator in Brazil, operating more than 80 workboats. Marcio Castro, Executive Director Tugboat Division, discusses with Maritime Reporter the size, shape & technical direction of the fleet.

Mr. Castro, to start, how did you come to a career in maritime?

I graduated in System Engineering at Rio de Janeiro State University (UERJ), I also have an MBA in Business Administration (Coppead/UFRJ). I joined Wilson Sons in 2003, starting a long career, with many positions as System Development Coordinator, Project Manager, Rio de Janeiro Branch Manager, São Paulo & Parana Regional Manager, Operation Director. Currently, I am the Executive Director of the Towage Business.

I'm sure many of our readers know the Wilson Sons name, but please give an overview of the company as a whole.

Wilson Sons is the largest integrated port and maritime logistics operator in Brazil and offers supply chain solutions based on experience gathered over 180 years. The company is made up of various segments. It manages two container terminals, one in the port of Salvador (Tecon Salvador) and one in the port of Rio Grande (Tecon Rio Grande). It also has 80 tugboats, the largest fleet in Brazil, 23 offshore support vessels, two offshore support bases (Rio and Niterói), dry ports and logistics centers (Santo André and Suape), two shipyards in Guarujá (SP) and one of the largest independent maritime agencies in the country. Allink is one of the largest and most respected companies specialized in ocean freight LCL consolidation cargo and also the only neutral air consolidator in Brazil.

How is Wilson Sons investing in its Tugboat fleet/division today?

We have just started the building project of six escort tugs with 80 TBP. These new tugboats will help us in our fleet renewal, to serve our customers large vessels that will start calling Brazilian ports. We will also be ready for new opportunities that can arise in projects of new terminals, LNG Operations, dedicated terminal towage and for the oil & gas industry.

"We have a close relationship with our shipyard ... and with Damen, who help us a lot with its projects and its long experience as a ship builder. ***Damen knows everything about equipment and new technologies being used/ launched globally and plays an important role offering the best solution to be implemented."***

Marcio Castro, Wilson Sons

Photo courtesy Wilson Sons

We are also investing in new technologies that can improve the efficiency of our operation, like AI in Tug Dispatching. The use of all the data that we have been storing since we launched our Operation Center, will be our focus, either to improve the efficiency of internal processes or to launch new products for the portfolio of our group. To achieve this, our fleet is getting fully connected allowing us to gather all the data our Tugboats can produce during the operations.

Are there any other current boat newbuild projects, either recently completed, ongoing, or planned for the near future?

We have just finished the delivery of a series of 14 tugboats. The last units were two 3212 Damen Project that reached 90 TBP, making them the most powerful tugboats operating in Brazilian Ports. All were built in our own shipyard located in Guarujá (left margin of Santos Port).

And we are now starting a new cycle of new buildings. As mentioned, we will be delivering six new tugboats from Q1 2022 until the end of 2024. All Damen 2513 projects, 80 TBP with Escort Tug notation. These tugboats will be IMO Tier III compliant, the very first in Brazil with this European pattern, aiming to attend some customers' requirements and in line with Wilson Sons Group target on emissions' reduction.

Can you give an overview of how Wilson Sons Tugboat Division examines, trials and selects technologies to retrofit on existing boats or incorporate into new boats.

We, as a tug operator, have a close relationship with our shipyard, responsible for building our vessels, and with Damen, who help us a lot with its projects and its long experience as a ship builder. Whenever we have to take a decision on implementing modifications, or the details of new buildings, we have in our opinion, the best team to help us. Damen knows everything about equipment and new tech-

nologies being used/launched globally and plays an important role offering the best solution to be implemented. Our shipyard, on their side, confirm if the implementation is feasible considering Brazilian Port characteristics. With a collaborative process, between these three parties, we can reach the best solution that meets the requirements of all the stakeholders of our industry, crews, clients, pilots, port and maritime authorities.

Maritime is in a transcendent phase, with sharp focus on reducing emissions. Please discuss marine emissions reduction in the macro, and specifically discuss how it is materially impacting how your fleet is built, operated and maintained.

Despite the fact that the emissions from the shipping industry is a small part of the total, it is important to have this awareness, that we all have to do our best to reduce the impact of our activities on the environment. All the players that are part of the maritime and port industry must work in a collaborative way to find solutions to minimize the emissions specially when they are in the port areas, located in crowded cities.

Wilson Sons, as a member of Brazilian GHG protocol program, is working to find and implement solutions to reduce our emissions for the operating vessels and for new buildings as well. In recent years, we've been reducing our emissions working on solutions like COR (Tugboat Operational Centre, from the Portuguese acronym), where we are always seeking efficiency in our fleet. At this moment, we are running three pilot programs with companies offering technologies that promise important reductions in fuel consumption and emissions. We are also investing in an AI Tug dispatching algorithm that will give us the best location to await the next maneuver, and the right moment and speed to sail to approach the vessel. For the new buildings we decided for IMO tier III complaint tugboats, the same pattern required for European ports. This decision is fully aligned with our clients and the Wilson Sons Group

In step with emissions is discussion on the "fuel of the future." Have you/will you experiment with alternative fuels and/or hybrid battery solutions for your fleet?

We are permanently analyzing the solutions that are being developed, to understand how viable they are for our operations. From the supply chain of a fuel in Brazil, to our operations profile, we check all the aspects of implementing these new fuel technologies. Hybrid and Electrical tugs are some examples of projects that we have studied taking into consideration also the Capex and Opex.

Which solution(s) do you see has the most potential to significantly impact your fleet's emissions.

Electrical projects would be the best solution in our opinion. But the battery technology must evolve in terms of time for charging and storage, allowing a higher autonomy. With diesel engines we have an autonomy of more than 30 days without refueling, the tugs are ready for operations most of the time, and sail long distances for moving between ports and for vessel assistance. Nowadays, electrical projects are feasible for very specific situations like a dedicated terminal towage with very few maneuvers per day, and plugs for recharging available all the time.

LNG is also a good solution, but we will need to wait for a better supply of the product. In Brazil, we have some small scale LNG projects that are creating a good expectation for our industry. As soon as we have a reliable supply chain, this solution will be on the table for new buildings.

"Autonomy" and "Digitalization" are increasingly discussed as a means to make vessel operations more efficient. How has Wilson Sons invested in 'digital' technologies to increase vessel and fleet efficiency.

Since we launched our Operation Center responsible for the tug dispatching we realized that we could use all the data generated to make better decisions in our operation. Ten years later, we are now using all that data to create products adding value to our operation. With our fully connected tugboats, we are now creating a Big Data warehouse with information coming from its equipment to go even further. We aim to be able to reduce the unavailable time of our equipment, and increase efficiency in fuel consumption, and safety.

Besides that, we have reviewed all our operation processes, digitalizing them and eliminating all paper on board. This revolution was promoted by our TugLab, a permanent initiative

Photo courtesy Wilson Sons

responsible for identifying, and making use of new technologies to guarantee the competitiveness needed to keep Wilson Sons as a leader in the Brazilian market.

Do you see "Autonomous Workboats" in Wilson Sons' future? If so, please explain.

I think that we still have a long journey ahead until we have Autonomous tugboats running in Brazilian ports. As a tug operator, what we sell to our customers safety for their vessels. During a vessel berthing/unberthing, many unpredicted situations may occur. An autonomous tugboat must be extremely tested to react to them, offering a higher safety level to the shipping companies, without adding risk to them, the terminals or port authorities. However, I also think that all technologies on board of autonomous vessels, will be gradually integrated by the

Size & Shape of the Wilson Son's Tugboat Division

Wilson Sons' tugboat division has 80 tugboats in its fleet, most built from projects designed by Damen, including:

- **74 ASD + 6 TSKN**
- **Four Escort Tugs**
- **16 equipped with Fire-Fighting 1**
- **53 Tugs over 50 TBP**
- **10 ready for Ocean Towage**
- **Mainly Caterpillar Engines**
- **Kongsberg and Schottel Propellers**
- **Average age. of 15 years**

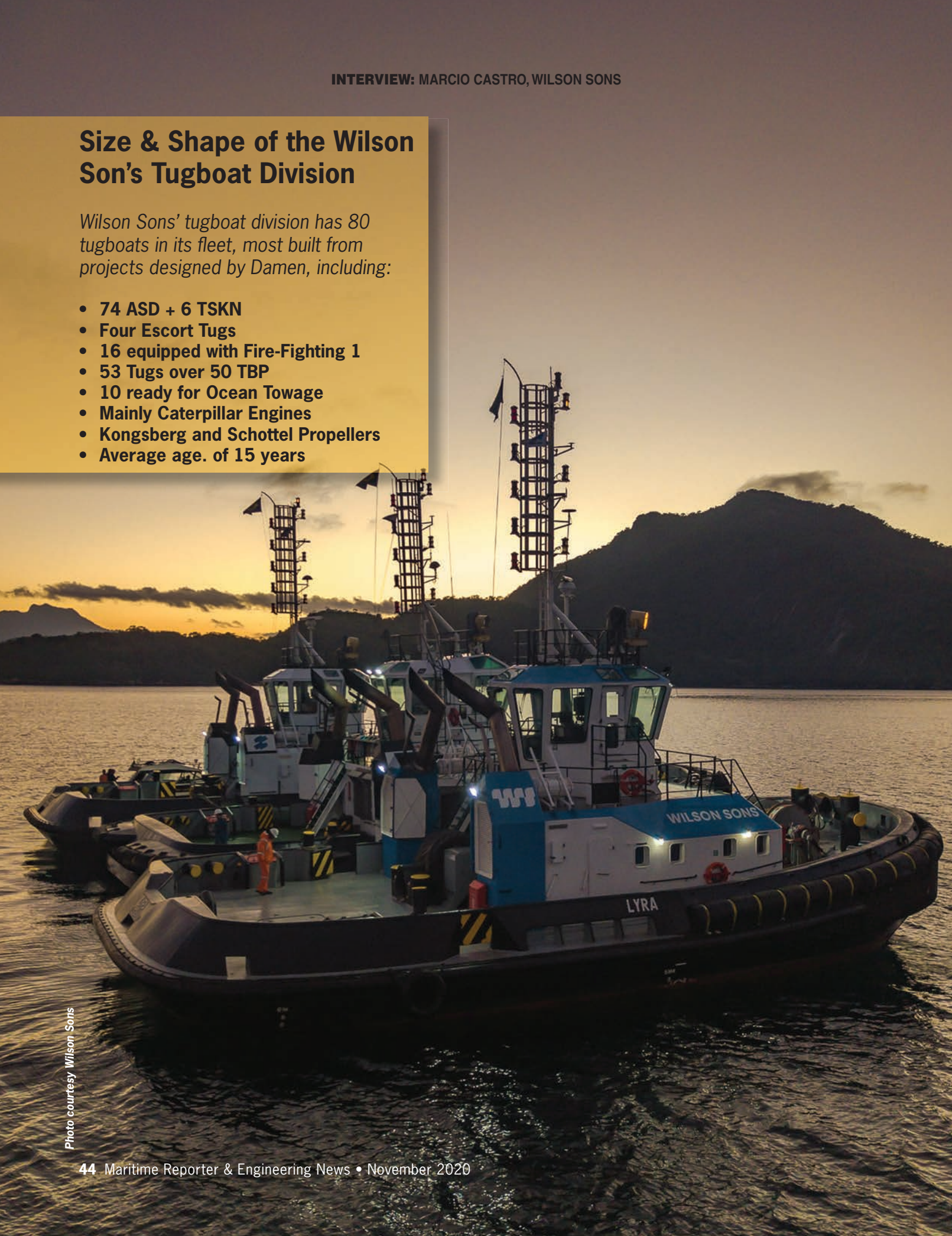


Photo courtesy Wilson Sons

current equipment, allowing the crew to test them and take advantage to the efficiency that they can bring to the maneuver. As soon as we have the reliability needed, the autonomy will naturally come.

When you look at your business today and consider the future, where do you see opportunity, and how are you investing to fulfill that opportunity?

The use of data will be a game changer for the port and maritime business. All the information that flows between all the stakeholders, if duly managed, can create a good environment for all. The Wilson Sons Group wants to play an important role in this new age.

When you look at regulations – international, national, local – what do you see on the horizon that has the greatest potential impact – positive or negative – on your business?

Environmental regulations have this potential impact. But I think that the big customer requirements on this green agenda will be ahead of these regulations. The private initiatives on reducing indirect emissions will drive all maritime suppliers. And we think that this impact will be positive for Wilson Sons, once we already have many initiatives aligned with this proposal, that may differentiate ourselves from other towage companies.

All leaders have challenges: What do you consider to be your greatest challenge to running a safe, efficient fleet of tugboats?

In our company, as we have countrywide coverage, from North to South, training our team is our main challenge. To make our messages related to Operations, HSE, M&R arrive clearly to more than 700 crew, is something quite complex. Our strategy to achieve the results in all agendas is to make use of the best channels to communicate directly to each person. The technology has helped us a lot in this, allowing us to make video calls with interactions from both sides, and creating training sessions that can reach all our employees. Even far from them, we want to be present, understanding their difficulties, reinforcing the values of the company, creating the most efficient environment.

Photo courtesy Wilson Sons

Crewing: In many parts of the world, finding and keeping quality crew is a perpetual problem, as the older generation retires and a 'life on the water' is not as attractive to the younger generation. What is the situation with your company? Can you give an overview of your cumulative boat crew team, with insights on how you attract, train and retain the quality crew that you need?

Our company is well-known as good for crew members. They come from the Maritime Authority School without any experience and, along the years, have the opportunity to grow and become a Master of a tugboat or a Chief Engineer in Wilson Sons. They come attracted by the good salary we pay, higher than others with the same education degree.

We have a training Center that tests them before joining the company. They are coming onboard with a better background than in the past. So we teach them by adding practical knowledge of HSE, Operations and M&R, the values and culture of the company, and what is expected from a good crew member. In this training center we have a full tugboat simulator, that lets them experience the hardest situations they could face in their daily activities. Giving them growth opportunities, we are naturally retaining them. It is not common to have our crew leaving the company to join a competitor.

No business discussion can be had today without discussing COVID19. How has the pandemic materially impacted your Tugboat Division Operations?

The company has been closely monitoring the advance of the pandemic reported by the World Health Organization, related to the spread of COVID-19. Our clients are getting dully attended without delays, and our operations continued to occur normally, following some protective measures implemented in all business units. A technical crisis committee was created to manage the actions resulting from this pandemic and established some measures. We're closely monitoring the evolution of the virus in the country and the development of the situation. The lessons we have learned and many solutions we provided during this pandemic, will be permanently used by our company.

AIS: the Good, the Bad & the Ugly

By Matthew Bonvento

Arguably one of the greatest tools in the current state of the industry, the Automatic Identification System (AIS) is also an under rated security concern. With performance standards being set in 1998 and IMO implementation adopted in 2000 under Regulation 19 of SOLAS Chapter 5, cyber security was not the greatest concern. AIS was implemented to enhance safety by allowing all users to identify vessels around them by name, thus facilitating communications. The unit allows for coastal states and port operators to monitor approaching vessels. In recent years AIS has been used to track collisions, allisions, groundings and other accidents. Hobbyists can work with AIS providers to mount antennae to their homes and assist in tracking vessels within reach. This data can then also be utilized by trade experts to track the movement of goods throughout the world. Coastal states even have virtual Aids to Navigation (ATONs) in lieu of actual buoys, especially in places where having a physical ATON would not be practical.

With all of these amazing uses one would think that this system would be robust and impenetrable. Recent experiments have proven that this is not the case. Dr. Gary Kessler, Cyber Security expert has researched and shown how terrorists, foreign or domestic, and nation states can easily broadcast an AIS signal to cause confusion in a waterway which can result in devastating consequence.

Why is a disruption to the AIS unit so terrifying? Recent trends have been highlighted in ship collisions showing a reliance on AIS. On 11 January 2014 the multi-purpose vessel Rickmers Dubai collided with Walcon Wizard an unmanned crane barge being towed by the tug Kingston. Within the synopsis, the UK MAIB accident report states that the bridge watch on the Rickmers Dubai did not maintain a proper lookout and was relying solely on AIS information displayed on the ECDIS. Neither the tug nor the barge were broadcasting on AIS, and thus not visible to the mate on watch who was not monitoring the RADAR.

There are numerous reasons why a receiver of AIS data may not be receiving the correct information or any information at all. This can include faulty installation or retrofit on board, other vessels may be suffering the same, have the AIS switched off, or not installed at all. Of course one of the easiest ways to disrupt an AIS signal is through the use of GPS spoofing. This well known phenomenon has gained recent notoriety during a series of spoofing incidents in Chinese ports last year. An article on 15 November 2019 in MIT Technology review highlighted how GPS spoofing can move a vessel's AIS location, course, and speed anywhere. This spoofing can put a vessel in the middle of a channel, when in fact it was sitting at the dock the entire time.

Use of traditional RADAR and ARPA skills coupled with appropriate use of a lookout can make a huge difference in avoiding collisions such as the Rickmers Dubai. There is a growing amount of accidents and near misses by navigation officers utilizing AIS tracking of a target, without the appropriate ARPA tracking, in determining the risk of a collision. This is not only bad seamanship, but against the International Convention on the Prevention of Collisions at Sea.

The ability to spoof a GPS of a local ship, thus disrupting the AIS broadcast is not new. What Dr. Kessler has brought to light is the ability to broadcast an AIS signal for a vessel or ATON that is not in fact even there. This is due to the fact that within AIS, there are very few protections that prevent the broadcast from being abuse. That weakness is the fact that there is no verification of the signal being transmitted from another vessel. As outlined in his recent paper, Protected AIS: A Demonstration of Capability Scheme to Provide Authentication and Message integrity, Dr. Gary Kessler furthering research has found some of the following weaknesses:

AIS protocol weaknesses, including:

- **Lack of validity checks:** AIS messages do not include any geographic validation information meaning that it is possible for a bad actor to send an AIS message from any location while purporting to be in another location.
- **Lack of timing checks:** AIS messages contain no time stamp verification information meaning that a cyberattacker can replay valid AIS information at a later time of their choosing.
- **Lack of authentication:** The AIS protocol provides no mechanism to authenticate the sender, thus anyone with the ability to craft or otherwise transmit an AIS packet can impersonate any other AIS device.
- **Lack of integrity checks:** AIS messages are transmitted in an unencrypted and unsigned form; this makes it simple for an interloper to intercept and/or modify transmissions.

An experiment conducted by Dr. Kessler demonstrated the vulnerability in the system. Using previously recorded

data, he was able to falsely broadcast the replicated data, thereby creating an AIS image that would show on an AIS overlayed ECDIS screen, when in fact nothing was there. The false broadcast contained all of the correct vessel information, and previously recorded track. Even though this "broadcast" was kept in house, with the right equipment and know how, this process can be easily duplicated, leaving us to wonder, why is such a system that we rely upon, so vulnerable? Because AIS was designed for safety reasons, such as communication and port state tracking. With the advancement towards Autonomous Shipping, the AIS will be relied upon much more than currently. The integration of ECDIS and AIS will be the primary tools used by the AI to handle collision avoidance and navigation on board an unmanned vessel.

In a presentation at the World Maritime University entitled "Vulnerabilities of the Automatic Identification System in the Era of Maritime Autonomous Surface Ships" Dimitrios Dalaklis, Michael Baldauf, and Momoko Kitada these very issues are raised. Dr. Dalaklis references that AIS was designed as "open architectures" and although security was not highly considered, the idea that "something is better than nothing" was the taken attitude.

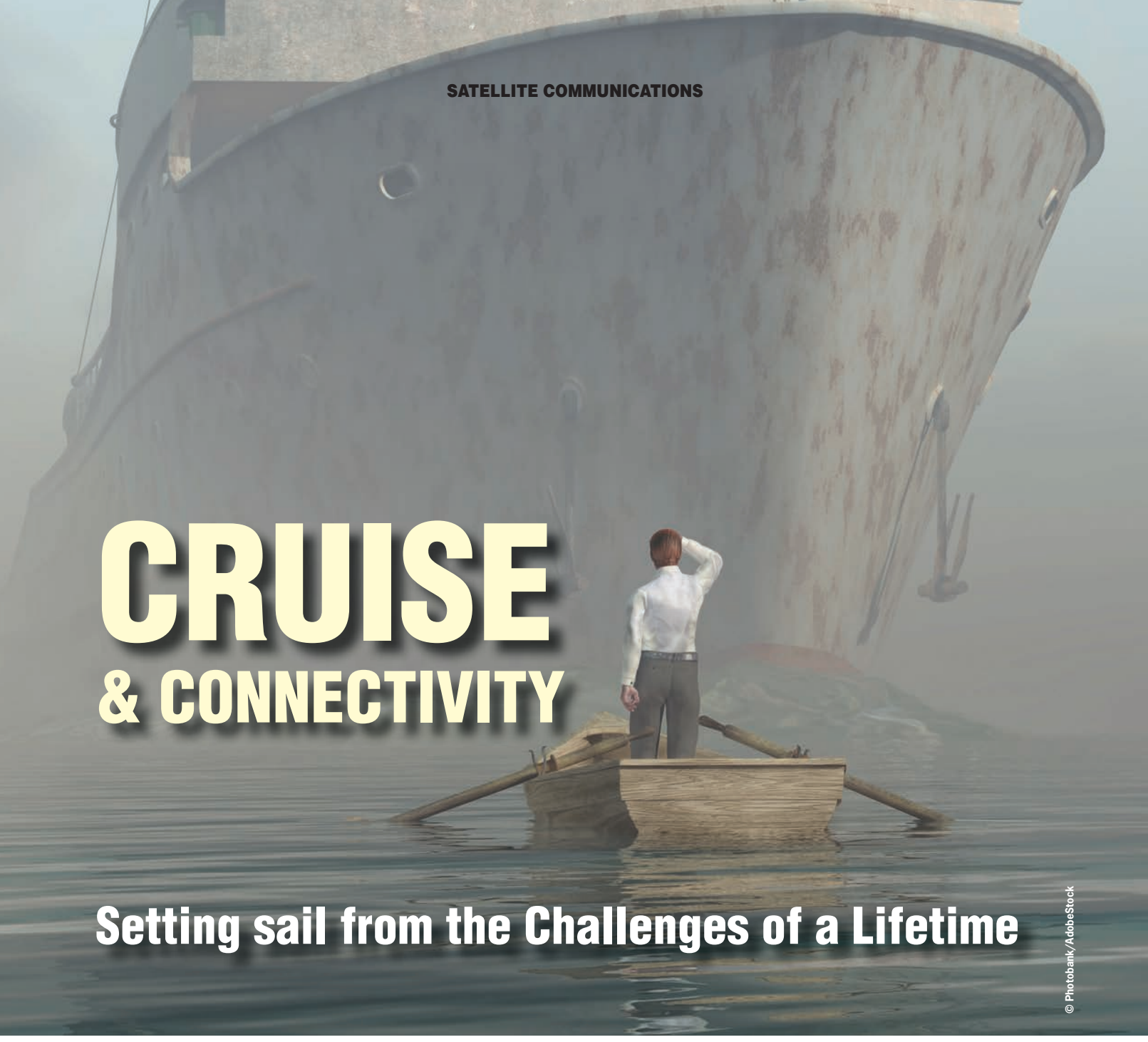
LRIT has been touted by some as the check sum to the AIS concerns. LRIT data is not openly accessible, therefore much more difficult to disrupt. The flip side of the argument is that the average watchstander cannot reference LRIT data to double check the AIS data being displayed in front of them.

Currently there is only one way to resolve this issue. Rule 5 must be our rule and guide until technology catches up.

"Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision."

CRUISE & CONNECTIVITY

Setting sail from the Challenges of a Lifetime



The shipping industry, and especially the passenger sector, has and continues to be severely disrupted by the COVID-19 crisis. The passenger sector is experiencing further delays, and the uncertainty around the return of sailings will put immense pressure on even the strongest balance sheets. Most cruise lines do not have planned sailings in the near future, and those beginning to sail soonest have mainly pivoted to hyperlocal itineraries, with many ports still closed to cruise traffic. The industry is plastered with major challenges during these unprecedented times. How will the industry recover from the pandemic?

A return on the horizon

Cruise lines remain hopeful of returning to the seas later this year and returning passengers will have cruise operators going to great lengths to make the onboard guest experience nothing short of exceptional.

But in order for the industry return to health a number of pieces need to fall into place, not all of which are in the cruise lines' hands. For example, people need to feel comfortable traveling and gathering — yet there is not much the cruise industry can do about this. To get to the ships, passengers by and large need to travel by plane, which brings with it risks.

Once on board, hygiene and social dis-

tancing will also need to be enhanced to minimize the risk of infections. There's no plain sailing, given that a cruise is an inherently social event, so at the end of the day, it will take a vaccine to get people truly moving again.

Not only this, ports must welcome cruise ships back. Many smaller ports were already pushing back on allowing the largest ships to berth pre-COVID. in the next phase, ports will need to weigh the economic benefits against possible health risk. This may push both cruise lines and travelers to seek itineraries with smaller ports or accelerate the trend toward expedition cruises.

The key to success

All aspects of the passenger experience, including connectivity, must be extraordinary to ensure the industry's return to operations and future success. Even before the pandemic, cruise lines competed against land-based resorts for vacationers. One of the indispensable tools in that battle has been the advent of broadband connectivity on board to enable an online experience for passengers and crew with as many of the comforts of home as possible. And it is clear to see why. Integration of reliable, high-speed broadband satellite connectivity will ensure that cruise lines never miss a beat and will keep passengers satisfied, allowing them to communicate on social media, stream video content or browse the internet, check work emails, and allow for medical diagnostics. It will also enable crews to monitor the vessel's many elements and become operationally more effective. The effect of lockdown has also resulted in higher expectations from the onboard connected experience as many people have been forced to work from home and have relied more heavily on "remote" connectivity tools to connect with family, friends, work and the world. As people return to travel, they will not go without the promise of constant connectivity.

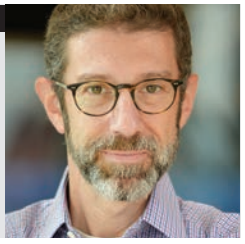
In order to deliver the communications services that are so important today, it's crucial that the right VSAT platform is in place. As cruise lines gradually begin to operate again, they will require the latest technology to enable the delivery of a best-in-class service to their passengers and crew.

Setting sail again

Like any other business, shipping organizations are facing intense pressure to operate more efficiently, decarbonise, comply with regulations, and meet the digital demands of today. These are clear challenges which the industry must address if it is to return to an even keel. Satellite connectivity enables all of this and more. By adopting VSAT technology, operators enable the broadband services that connect their vessels to headquarters and other vessels in their fleet, allowing in-depth monitoring and communications. It is this connectivity that results in streamlined operations that in turn save ship operators precious time and money.

ST Engineering iDirect will continue to innovate with its partners to ensure an ever-better cruising experience for crew, passengers, and the ship environment alike.

The Author



Faiola

Andrew Faiola is the Head of Mobility at ST Engineering iDirect.

Second Generation Intact Stability
New IMO Guidelines

By Kyle E. Marlantes, partner, Creative Systems & Dr. Peter Kim Senior Principal Engineer, ABS

The common perception of intact stability has remained largely unchanged over the last few decades, where a vessel's stability is evaluated using classical and static means: limits on righting arms, residual areas, and determining maximal VCG (or minimal GM) composite curves. These methods are familiar to most naval architects and are taught at a fundamental level in most naval architecture engineering programs.

But repeated incidents of dynamic failure in recent decades brings question to the adequacy of classical static stability criteria to provide a complete understanding of, and adequate safety margin for, a vessel's stability. Obviously, strictly static methods are not wholly sufficient in assessing the dynamic stability of a vessel in waves. Stability criterion are designed to protect people and property, and with safety and liability a primary concern, an improved regulatory framework to assess dynamic stability is required.

The IMO Second Generation Intact Stability (SGIS) guidelines provide dynamic stability criteria to make this type of assessment possible. The new guidelines were developed over many years and with input from subject matter experts around the globe. The groundwork for the new guidelines was laid by the IMO 2008 Intact Stability (IS) Code, which went into force for ships constructed on or after July 1st, 2010. Part A of this code allows Administrations the option to apply dynamic stability criteria to ships which are considered at risk of encountering critical stability situations in waves. However, Part A did not specify any specific criteria to be applied. The new SGIS guidelines fill this void.

The guidelines address the vulnerability of a vessel by dividing the dynamic response into five failure modes: Dead Ship Condition, Excessive Acceleration, Pure Loss of Stability in Waves, Parametric Roll, and Surf-riding/Broaching. Each failure mode is then evaluated using a multi-level assessment procedure, starting at level 1 and proceeding to level 3, with level 1 consisting of the most simplified and conservative initial vulnerability check, and level 3 comprising a direct stability assessment. In application, if a ship passes a level, higher levels are deemed unnecessary. If a ship design does not pass the vulnerability checks, or a direct assessment is not practical, then ship operations in specific areas, routes, or weather conditions should be limited, effectively satisfying the criteria through operational guidance.

As of now, the guidelines may be applied to ships that are subject to the 2008 IS Code at the discretion of the vessel's flag Administration. How and when this process will play out is still unclear, but preparedness and ability to address the new guidelines is certainly required for ship owners, operators, and naval architecture consultancies who may need to incorporate the guidelines into the design process. In addition, Administrations, and classification societies certifying ships on behalf of Administrations, will need to prepare for the significant undertaking in applying these dynamic criteria.

But the new guidelines present two significant challenges: First is ensuring that adequate technical knowledge exists within the general naval architecture community, not just in the hands of experts. The criteria, especially levels 2 and 3, require at least a basic understanding of nonlinear ship motions and hydrodynamics in waves—two subjects that are often given little consideration in basic ship design. Second, these regulations require the availability of, and hands-on experience with, numerical tools that can effectively perform the vulnerability checks in a practical and efficient manner. Developing and validating numerical tools to address highly complex dynamics is not a simple task, and the level 2 and level 3 vulnerability checks require extensive numerical calculations for the five failure modes.

To address the first of these challenges, the IMO Sub-Committee on Ship Design and Construction (SDC) has published technical background and examples for each of the five failure modes. These documents have been made available on the IMO website. In addition, the SDC is finalizing the development of Explanatory Notes that will provide further detail on the interpretation and application of the SGIS guidelines.

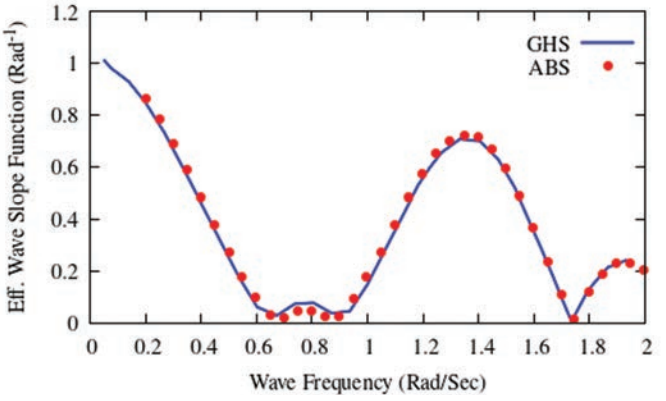
Addressing the second challenge requires collaboration within industry. Creative Systems, Inc. (CSI), the company behind the software product GHS, in close collaboration with the American Bureau of Shipping (ABS), has developed a complete solution for levels 1 and 2 of the SGIS guidelines. ABS has been working with CSI, providing technical interpretation, documentation, and vital testing of the new software. For this purpose, ABS has also developed an in-house numerical tool for independent verification of the GHS software, which

is widely used by ABS for the evaluation of the 2008 IS code criteria for ABS-classed ships.

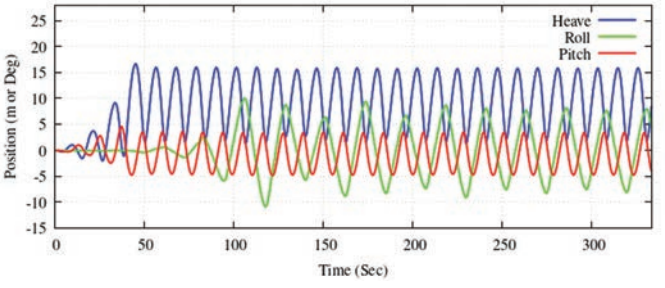
The direct assessment (level 3) presents a considerable challenge to designs that fail levels 1 and 2. A level 3 analysis is not something that can be carried out quickly, as the numerical demands are quite substantial, and physical testing presents rigid cost and scheduling limitations. A natural question, then, is how will level 3 typically be assessed? A recommended design practice is a sequential application of the criteria such that, if levels 1 and 2 fail, then level 3 or operational guidance will be required. Also note that the determination of operational guidance based on either a probabilistic or deterministic approach would require model tests or numerical simulations equivalent to level 3. In this regard, ABS continues to develop and validate a numerical tool for level 3. Recently, ABS participated in the Dynamic Stability "DYNASTY" working group of the Cooperative Research Ships (CRS) joint industry project to conduct model testing and validate numerical tools for level 3.

Also, a simplified approach for the preparation of operational guidance using the level 1 and level 2 criteria would be acceptable. From the ABS's perspective, the numerical tool for level 2 criteria will play an important role in the assessment of ship designs and also in the determination of operational guidance or limitations, as needed. Introducing level 1 and level 2 capabilities in GHS is therefore a critical step in providing the necessary numerical tools to address the new guidelines.

The new IMO SGIS guidelines truly bring intact stability assessments into a new generation. In years past, ship dynamics were often not a primary concern, or simply a rudimentary consideration in the design process. Under the new guidelines, the complexity and effort required by a level 3 assessment or preparation of operational guidance will make it prudent to develop designs that pass the first two levels. Therefore, the new guidelines will bring a change in the design process: requiring the consideration of ship dynamics as early as possible.



A typical effective wave slope function used in the assessment of the Dead Ship Level 2 Failure Mode, with comparison between ABS and GHS output.



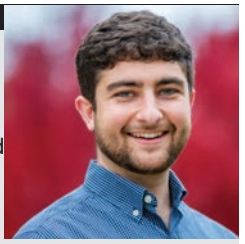
A typical nonlinear time domain response generated using GHS to assess the Parametric Roll Level 2 Failure Mode for a C11 containership in head seas.

The Authors

Marlantes & Kim

Kyle E. Marlantes (top) is a partner at Creative Systems, Inc., where he created the GHS SeaKeeping "SK" Module and led the development of the new DYNSTAB extension to meet the IMO SGIS guidelines.

Dr. Peter Kim is a Senior Principal Engineer at ABS since 2003, working in the Structures and Hydrodynamics group at ABS Technology in Houston.



Brent Perry & his Sterling PBES team are CHARGING AHEAD

Photo: Sterling PBES

Brent Perry, CEO of Sterling PBES is a 40+ year veteran of the marine business, and one of the pioneers in delivering battery solutions to boats and ships at sea. **By Greg Trauthwein**

Please give us a by the numbers look at Sterling PBES today?

Right now we are sitting in a position where we had anticipated delivering somewhere in the neighborhood of $20-21 million worth of product, which is about 35 megawatt hours. And we're scheduled to blow past that to almost $40 million. And we're looking at the following year as a year of over a $100 million, maybe $120 million with about a quarter of that already committed today.

Put in perspective the pace of acceleration of change you see on the uptake of new battery technology?

Today 80% of the vessels that are under design consideration include energy storage in some shape or form. Initially it was ferries and tugboats that had the practical application and made financial sense. That's now expanded to the point where a good portion of our business is being made up of blue water carriers. I'm the chairman of Zero Emissions Shipping Technology Association (ZESTA), and our role is to help influence IMO with sustainable legislation. Basically we're creating metrics within IMO that ships are going to be graded on their environmental contribution or their environmental impact, with freight rates decided by environmental impact too.

What are some of the unique challenges within the marine industry versus a land-based industry?

You have some application challenges in that marine tends to run 24/7/365. So you can't transfer a car technology into the marine industry. The user requirement, the service requirement, the uptime requirement is significantly different and that requires another level of execution at the engineering stage. The other is that, to be perfectly blunt, nobody needs a battery. A battery by itself is just an element. And ship owners and operators and fleet managers today aren't looking to become experts in energy storage, they want to buy a solution. So bringing in the power electronics, AC or DC, the batteries, the fuel cells, the new fuel structures that everybody's looking at and packaging them up into

something that is turnkey so that the customer basically can plug it in, in one direction or the other and run is maybe one of the more unique challenges about the marine industry, because it's such a complex infrastructure onboard a ship.

And the more that people incorporate energy storage, fundamentally, the better payback and the better improvement of performance that you have. I had a long conversation with an owner of 300 offshore vessels the other day, and (he) asked "what is the fundamental value of your industry?" I said, "it's a really simple, one-line drawing. You need generation on one side, you have the battery in the middle, and then you have the application at the end. And if I can figure out how generation is going to charge my batteries, at constant speed, constant power, and my batteries are going to supply all the dynamic load that the application needs. So that's the way I can deliver the fundamental payback that these guys need to have." If I do that, then you have a payback today of between one and three years. And these are systems that will be installed for up to 30 years. So the metrics today are to the point where we're not pushing into the space anymore, Greg, we're being pulled into the space.

When you look at the industry by vessel niche or geography, where do you see opportunity in the coming one to five years?

That's kind of the frightening part, Greg. Northern Europe and Scandinavia were the markets that started the ball rolling. It's a fundamental support mechanism of powerful government support, legislative support, social support, and a willingness to actually put projects in the water.

The Northern European market has sustained itself and is growing quickly, which we've seen that through commitment to zero emission vessels by 2030, 2040, 2050. Now, places like the Mediterranean, Southeast Asia, India, China, even North America are starting to take up the mantle ... they are basically where we were in Norway 10 years ago. The conversations I have with the ship owners and operators feels a little bit like déjà vu, except now we can point at the number of vessels that are actually working every day.

Can you share details of a recent project or two that illustrate the solution that you discussed?

This year, we saw the need for something beyond energy storage, and we created what we call CanPower, which

Photo: Sterling PBES

Sterling PBES created CanPower, a containerized micro grid, incorporating all of the fundamental safety and management systems. "And because we've changed the design of our battery a little bit, instead of it being 100-volt module, we've now doubled the number of cells. So it's a 200-volt module."

is a containerized micro grid. Basically it incorporates all of the fundamental safety and management systems, incorporates the AC power conversion equipment and the energy storage itself within a box. And because we've changed the design of our battery a little bit, instead of it being 100-volt module, we've now doubled the number of cells. So it's a 200-volt module.

We were able to increase the energy density of a 20-foot container to almost two megawatt hour, including the power electronics. On a commercial vessel, footprint size costs money, so the smaller the footprint the better. That one solution has completely transformed our business. Today we're applying it with offshore blue water vessels as a cold ironing solution. So not only does it supplement and augment their offshore performance by replacing generators in operation during transit, but it gives them the latitude to come into a port, either under electric propulsion, if that's part of the package.

So completely self-contained cold ironing with the ability to be a peak shave, black start, preventive performance augmentation tool when it's doing its regular trip. Which three years ago, the cost metrics did not make any sense for that at all. We've recently signed a deal to provide a fleet of LNG carriers with these cold ironing solutions. The other one which is really dear to my heart is a partnership we're building with a company called Cavotec, which provides the onshore charging connections for a lot of our battery systems. A partnership with a group like Cavotec to tie charging into our battery systems in a way that is suitable for these kinds of vessels is a unique way for us to offer a turnkey to the customer as well. **And part of that is an innovation which I'm revealing for the first time: We're launching the cartridge battery.**

What, exactly, is a Cartridge Battery?

We've looked at, for example, fast passenger vessels that can't add a lot of weight. We've designed a battery system that will plug into the boat like a battery will plug onto your drill. And with a small crane onshore, we can pick the battery up and off the boat when it's depleted, and drop in a fully charged battery.

And we build an infrastructure for charging the batteries on the shore, just like a car charging station. So we take away the need to manage fast charging, the added weight and everything that the battery system brings onto these boats. In essence it replace it with a battery system that's probably lighter than the old fuel heavy engine that you had.

So you can have three or four batteries on one ship, or you can have a single battery. But what we can do now is treat the battery like it's a switchable commodity within an infrastructure. They'll be able to use different batteries because the form factor is all the same. And that, I think, is going to revolutionize that aspect of the industry.

What do you see as the chief challenges to growing the battery business in the maritime sector?

Greg, the chief challenge is that the acceptance of this as a commercial technology has happened too fast. When you think about it, I have the oldest installed battery systems in the marine industry in the world, but I don't have a system yet that has been running for 10 years. When you think about the global adoption and the pace of business growth in this market, it usually would take 10 years to be in business just to prove that you should be in the business. The knowledge that we're gaining from every time a vessel travels with the battery is contributing to the improvement of the type approval standards, the engineering and the safety of the systems.

So managing that and working with the class and the flag authorities to ensure that we are always delivering a safe product and not letting the standards down, if you want, to deal with the demand of the market, but effectively making sure we keep everybody safe and do this, is a big challenge in the industry.

We've had our own technical issues in the applications as we've tried things that nobody had ever tried before. It's the nature of the beast.

But we learn from them and we incorporate them into our design and make it better for the next day. But that is probably, to me, the single biggest challenge that we face is that we have to keep up with the safety and the engineering standards.

Photo: VSTEP

Non-Traditional Simulation & Maritime FireFighting

By Matthew Bonvento & Captain Emil Muccin, USMS

Our COVID-19 Maritime world continues to change as our perspectives on education and training with the availability of online learning and conferencing, an increased use of webinars, and the use of simulation technology must evolve if we are to be able to continue to train and maintain skill sets as we navigate the current and predicted restrictions on movement. Changes made now may eventually become fully integrated in to future iterations of training in many industries.

An increasing use in the simulated experience can be similar to or completely different from what a mariner or student would encounter on the waters. A mariner utilizing simulation technology is able to navigate the artificial ship and waters, move around on board the ship, and importantly interact with equipment or features of the ship. Simulation has come to encompass many areas including: a ship's bridge, tug, polar environment, a lifeboat, cargo control system and even firefighting. This type of simulation is extremely realistic, functional and for many potential mariners maybe their introduction to cutting their teeth on ship handling, navigation and yes ship board firefighting.

Some key aspects of simulation include the ability of students and professionals to enhance their skill level, while providing hands on realistic training that is risk free. When a trainer has the capability of repeating training scenario's or building on them, it allows the student to progress while repeating and retaining skill based operations that lead to increased competence and confidence of the mariner.

In a recent paper entitled *Brain Points: A Growth Mindset Incentive Structure Boosts persistence in an Educational Game,* the authors can pinpoint the direct correlation between the use of video games and learning. "Constant interactive feedback provides a medium for showing students that their effort translates into progress. But most importantly, game incentive structures provide a way to support and reward behaviors consistent with growth mindset, such as persistence and use of strategy." (O'Rourke, Haimovitz, Ballweber, Dweck & Popovic 2014). And what is simulation, but an advanced and very expensive video game?

Today more than ever training needs to be specialized and supplement written and practical training assessments. Firefighting is a prime skill and function that can now be virtually simulated where the student can utilize their education and training to for example lead, plan, locate, control and extinguish a virtual fire aboard ship. This scenario typically only occurs at an approved firefighting facility under controlled conditions where a student may not be the on-scene leader. What better environment then permitting all students to take the lead and control a fire emergency team

to extinguish a ship fire? For how do students reinforce their skills by being able to take command and perform as the person in charge. This is called Recognition Primed Decision Making. Building on earwork The AlphAct Decision Support System for Emergency Responders have reported that experienced decision makers rely on their ability to draw upon past experiences in order to rapidly make a decision 80-95% of the time. (An T. Oskarsson & C. Reed Hodgin, 2010).

Of primary concern currently is the ability to meet the STCW and USCG standards as laid out in STCW while maintaining the requirements for social distancing and reduced classroom capacity. These current restrictions directly impact public and private training institutions alike. While traditional classroom content may be delivered via an online meeting platform, how can a student gain experiential knowledge about fire fighting without being able to fight a real fire, which is not an experience provided but a few times during the burgeoning mariners career. Until now.

VSTEP B.V. based in the Netherlands has developed a classroom training simulator, Response Simulator (RS for short), that allows firefighting students across several industries to work either alone or in tandem with other students in the steps necessary to control the spread, fight, and extinguish a fire. VSTEP believes that this technology can substitute some of the required hands on competencies which are proving difficult to sign off on currently. These simulations, which are instructor designed and driven are "played" like a first-person shooter video game in which the student controls an actual person navigating their way around a vessel. The realistic design of the simulation makes the student feel that they are actually on board and fighting the fire themselves.

For the student on the go, or the school with limited room, another option is the developing world of phone, computer, and tablet-based apps. Reminiscent of the Choose your own Adventure books that many of us grew up with, the AlphaAct simulation software allows the student options to take based upon previous decisions. Each decision leads to a set of available consequences, hopefully with the end goal of the vessel being saved and the fire extinguished. This technology which is expected on the market in the near future, will be available on personal devices, making it available to students wherever they may roam.

A critical aspect of this simulation technology is the ability of being able to tie together these virtual worlds into an integrated shipboard system that can perform similar to a ship at sea. This can be done today and permits educators to add an important aspect to training where, for example a ship fire can be coordinated virtually by both the fire emergency team and the ships bridge team. How better for students to be able to train than in an integrated shipboard environment where they can interact and interface in completing a series of tasks.

Lifeboat and Fast Rescue learners have also benefitted from the advances in simulation and Virtual Reality technology. Anthony Patterson of Virtual Marine in Canada have developed a platform that allows users to practice lowering, launching, and recovering of both lifeboats and fast rescue boats. The impetus for this system dates back to the early 2000's when the industry experienced numerous injuries due to lifeboat launching and recovery. It is now possible via Virtual Reality training to simulate a variety of conditions as well as allowing the operator ample opportunity to practice the necessary skills in the handling of small craft. Inevitably this reduces the wear and tear on physical equipment, while keeping the skills sharp and ready. Something that Mr. Patterson pointed out as well is the record generation aspect of simulation. Every training session creates a record for the individual learner, showing the time spent as well as the simulation and conditions. Critical for those companies that wish have the best trained seafarers.

Although there will always be a need for the firefighting student to actually lay hands on equipment, feel the heat of a fire through their fire fighting outfit, breath the air of an SCBA, and fell the actual accomplishment of successfully extinguishing a fire, that experience can only be repeated so often. Reinforcing those skills and knowledge through the use of simulator technology and applications can provide a maintenance of necessary knowledge as well as the reassurance to a company that their seafarers are able to carry out their duties when called upon.

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The Authors

Bonvento & Muccin

Matthew Bonvento (top) is an Assistant Professor of Nautical Science. Previously he served as Senior Manager for Safety, Security, Regulatory, and Quality Compliance for Vanuatu Maritime Services.

Emil Muccin holds the current position of Associate Professor of Nautical Science in the Marine Transportation Department at the U.S. Merchant Marine Academy and was formerly the Assistant Department Head of the Maritime Business division.

POWER PUMPING

The Sea Skipper Range

Australian Pump, based in Sydney, offers a range of high pressure, seawater compatible fire pumps called the 'Sea Skipper' range, each with a new high pressure 3-in. pump powered by a Yanmar 10-hp electric start diesel engine. "The most important thing about this development is the ability of the pump to produce the high volumes of water at high pressure." said John Hales, Aussie's Chief Engineer. For example, the pump can deliver 40 gpm at 80 meters head (105 psi). The pump can also be used as a salvage pump with flows of up to 120 gpm at 20 metrs head. Self priming in design, the 3-in. twin impeller pump owes its unique capacity to the pump's hydraulics. "When we designed this pump, we started out with a 3" high volume design and then worked on changing the configuration on the internals into a high pressure performance as well," said Hales.

The machine's compatibility to saltwater is a simple solution. Impellers and volutes are manufactured from bronze, whilst the body of the pump and other key components are marine grade aluminium, coated with a seawater resistant epoxy coating both inside and out. The pump also is fitted with a sacrificial anode and stainless steel fasteners throughout.

aussiepumps.com.au

ITALIAN INVENTION

Shipboard FiFi Training Tool

A pair of Italian firefighters have devised an innovative tool for use in shipboard firefighting training. "One of the most difficult situations for shipboard fire teams during shipboard fire is handling the hose line, advancing and retreating, especially in gas cooling operations," said LT Francesco Cecconetto of his and Battalion Chief Luca Beltrami's device. "Generally, the fire teams train themselves with empty hoses. But training with empty hoses does not give a real perception of the difficulties that firefighters will meet in a real firefighting scenario." The answer: filling the hose line with air, via LT Cecconetto's device, which is designed to deliver a real perception of hose line handling difficulties along staircases, vertical access areas, corridors and pinch points.

For more information, Email trauthwein@marinelink.com

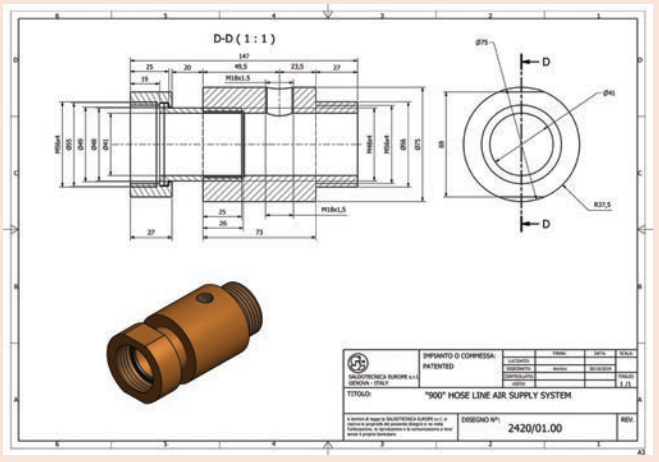

Image: LT Francesco Cecconetto

In the Yard

Workboats

The Shearer Group

Southwest Shipyard Delivers 250-foot Tank Barge

Houston's Southwest Shipyard delivered a 250 x 54 x 12.5-ft. 23,000 BBL tank barge that will primarily be used to deliver jet fuel to support the U.S. Navy assets.

The Shearer Group, Inc. (TSGI) said it was contracted by the builder to develop the barge design. The barge was designed to ABS Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways and applicable rules by the U.S. Coast Guard for barges Subchapter D & O products on rivers. It features six cargo tanks, two S6B3-429BPU Tier III Cargo Pump Engines, a reinforced ice framed bow, generator and HPU house, hydraulic cargo hose handling cranes, and an air conditioned tankermans shed.

Edison Chouest Offshore

ECO to Build and Operate First Jones Act SOV

Edison Chouest Offshore (ECO) will build and operate the first U.S.-flagged Jones Act compliant Service Operations Vessel (SOV). ECO, Ørsted, and Eversource announced the execution of a long-term charter agreement for the provision of the SOV.

The vessel will be built at a combination of Edison Chouest's shipyards in Florida, Mississippi and Louisiana.

The SOV will be more than 260 feet long and capable of housing 60 passengers. It will be equipped with passenger staterooms with private bathrooms, an exercise room, cinema/training room, internet café and multiple lounges.

The SOV will include a below deck warehouse to palletize storage for wind farm tools, components and supplies with step-less access to an elevator.

Furthermore, a daughter craft, with associated Launch and Recovery System and hydraulic height-compensating landing platform, will be installed for infield turbine repair operations. The vessel will operate on diesel-electric power that meets EPA Tier 4 emission standards and will feature a proprietary ECO Variable Frequency Drive (VFD) to reduce greenhouse gas emissions.

Bay Delivers Self-unloading Barge

Fincantieri Bay Shipbuilding has delivered a newly built self-unloading barge to VanEnkevort Tug & Barge for operation on the Great Lakes. The new barge, named Michigan Trader, measures 740 ft. in length, 78 ft. in beam, and 45 ft. in depth. The barge has a 265-ft. unloading boom and capacity for up to 37,000 long tons of cargo.

David Groh, president of VanEnkevort Tug & Barge, said Michigan Trader will be the fourth self-unloading barge in the company's Great Lakes fleet. The barge will be the 10th in the VTB fleet, with services on the Great Lakes, Mississippi River and Gulf of Mexico.

Fincantieri Bay Shipbuilding's vice president and general manager, Todd Thayse, noted that the Sturgeon Bay, Wis. has always provided repair services to VTB and built the hull for its first new tug the Joyce VanEnkevort.

Utilizing materials and parts from suppliers across the Midwest, the project's supply chain includes local suppliers such as Broadwind Heavy Industries of Manitowoc, Wis. which built the Michigan Trader's 265-ft. boom. Northern Machine & Repair Inc. provided its hatch covers, and Marine Travelift in Sturgeon Bay, Wis. manufactured the cargo hatch crane along with many more local parts and services.

Photo: Fincantieri Bay Shipbuilding

Sanmar

Seychelles Ports Authority takes Delivery of Tug from Sanmar

Seychelles Ports Authority (SPA) completed technical acceptance of a new azimuth stern drive (ASD) tug from Sanmar Shipyards. The latest addition is another of the Sanmar flagship RAmparts 2400SX, designed by Robert Allan Limited exclusively for Sanmar and designated the Bogacay XLI. Measuring 24.4 x 11.25m with a maximum draft of 5.7m, the new tug is powered by pair of Caterpillar 3512C main engines, each developing 1,765kW at 1,800 rpm driving Rolls-Royce type US 255 FP azimuth drives with carbon shafts turning 2,400mm diameter propellers inside high efficiency nozzles with stainless steel inner surfaces. Auxiliary generator sets are also by Caterpillar – a pair of 99ekW 400V 50Hz C4.4s.

The port side main engine also powers the pump that feeds the external fire-fighting system with a FFS supplied monitor capacity of 1,200m3/h located at the forward end of the bridge deck.

This machinery combination delivers a bollard pull of 60 tonnes and a free-running speed of 12 knots.

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Breaker II Delivered to NYPA

In late August 2020 Breaker II completed its delivery voyage to the Robert Moses Niagara Power Plant, operated by New York Power Authority, the nation's largest state power organization. The 56-ft., twin-screw tug was designed by Bristol Harbor Group of Bristol, RI and was constructed at the Blount Boats facility in Warren, RI. The vessel was designed with a reinforced hull for breaking ice efficiently. It will operate in seasonal ice near the entrance to and within the upper Niagara River. The dual-purpose vessel will prevent ice flow from clogging the intakes to the hydroelectric power plant and facilitate the installation and removal of ice booms.

The diesel powered 56 x 18.5-ft., shallow draft tug is powered by two Caterpillar Tier III series C-9 engines, each producing 375HP@1800 RPM.

Ship's service power comes from twin Caterpillar Tier III C2.2, 27eKW@1,800RPM marine generator sets.

Steel hull plating thickness' range from 3/4 inch, 5/8 inch and 1/2 inch with 1 inch and 2 inch thick skeg plates. Ice Belt plating and plating to 1/3 abaft of the stem is ABS Grade "D" including the 1 inch and 2 inch skeg parts. All other plating is ABS Grade "A" steel.

The vessel's hull, machinery, electrical systems and safety equipment complies with the new USCG Subchapter M – Towing Vessels. This is the first Subchapter M certified vessel built at the Blount shipyard.

Blount Boats

Breaker II under construction at Blount Boats in 2019, and after delivery and enrounte to the Robert Moses Niagara Power, above.

Damen

Damen ASD Tug for Con.Tug in Italy

Damen Shipyards Group delivered an ASD Tug 2813 to Con.Tug in Italy. Dubbed Gioia Star, it operate in Gioia Tauro, one of the most important transhipment ports in the Mediterranean.

The 85-ton bollard pull ASD 2813 features a smart layout with increased power on a very compact vessel. The vessel, like all those in the series, is designed to be ready for IMO Tier III regulations.

Tech Files

Deck Machinery & Heavy Lifters

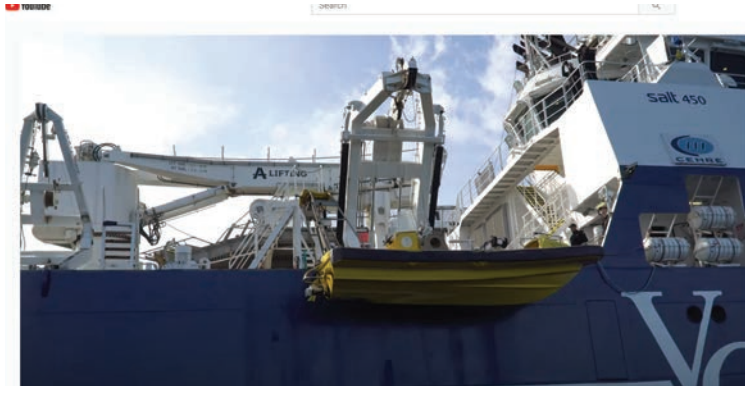
KENC V-Type Automatic Boat Landing System.

Photo: KENC

SOV/Gangway-Concept for Offshore Wind.

Marcelo Penna Engineering and Safeway

SOLUSV: New LARS for Unmanned Craft.



Vestdavit

MacArtney LARS for Fifth Asia Pacific RV.

MacArtney

Automatic Boat Landing System

KENC Engineering revealed two new automatic boat landing systems (ABLS) designed to provide safe transfer between a CTV and large vessels, available in two configurations. The ABLS is fully automated with an easy-to-operate control system and is equipped with hydraulic drives. "The H-Type is a proven system with low storage height and suited for larger vessels, where the V-Type has an incredibly small footprint with simple and straight forward vessel interfaces," said Cor Hilbrink, manager engineering. The base configuration of both ABLS systems are certified and compatible with all common CTV's.

Heavy Lift Crane 150000-3000

The Heavy-Lift Crane series (HLC) by Liebherr is specially designed for the installation of offshore wind foundations and sub-stations as well as the installation and decommissioning of offshore platforms. In June 2018, Liebherr- MCCtec Rostock GmbH and the Oslo-based company OHT agreed the contract for the Heavy Lift Crane 150000-3000 for Alfa Lift, the worlds' largest custom-built offshore wind foundation installation vessel. With a maximum lifting capacity of 3,000 tons at 30m and 1,000 tons at 76m outreach, the HLC 150000-3000 is ready for a wide range of applications and a key feature of OHT's Alfa Lift. The Norwegian contractor's new build vessel, of Ulstein Design, is currently under construction in China, due for delivery next year.

The manufacturing processes are now in the final phase at the Liebherr site in Rostock. The wedding of the machinery frame and the lower slewing column is the latest milestone of many in recent months and will be followed by the electrical and hydraulic connection of the two components.

Liebherr Heavy Lift Crane 150000-3000 for Alfa Lift.

Photo: Liebherr

Offshore Wind SOV/Gangway-Concept

Spanish engineering company Marcelo Penna Engineering and Safeway, the Dutch specialist in the design and manufacture of offshore transfer equipment, have joined forces to design an intelligent Service Operation Vessel.

The outcome of the collaboration is the DP2 MP625 SOV combined with the

recently introduced Safeway Gannet 3D motion-compensated offshore access system with its unique features such as 'zero impact bumpering' or 'hover-mode' and roll compensation capability. A big advantage of this cost-saving engineering solution is that the SOV can stay in a wind farm, even in the roughest sea conditions. And thanks to the distinctive Safeway Gannet 3D motion compensated gangway, the floating duo is able to offer a degree of safety, flexibility and effectiveness previously unseen in the international offshore gangway industry.

LARS for Unmanned Craft

Sea trials conducted by a combined team of engineers from Vestdavit and H. Henriksen have provided proof of concept for SOLUSV – a new launch and recovery system that is designed to simplify and enhance Unmanned Surface Vehicle handling. The tests took place on board a Vestland Offshore vessel, whose existing boat and davit system were modified to accommodate SOLUSV equipment before the team oversaw repeated Launch and Recovery cycles. The vessel's Fast Rescue Craft stood in for the USV for the purposes of the test and was equipped with a lightweight winch drum set up with dyneema rope and a robust Telescopic Pole.

Integrity Machining Acquires JK Fabrication, Inc.

Integrity Machining, makers of Kolstrand marine deck equipment, acquired all of the assets of J.K. Fabrication, based in Seattle, effective immediately. JK Fabrication manufactures Nordic winches and JKFab products.

MacArtney LARS for RV

MacArtney completed its order of a launch and recovery (LARS) system for Taiwan National University, the fifth Ocean Research Vessel (ORV) in the Asia Pacific region to date. MacArtney Asia Pacific provided the full LARS solution for the new vessel R/V New Ocean Researcher 1 (ORV 1), including slip rings, cables and docking heads. The 1,000 GT research vessel was completed on July 21, 2020. The full scope of supply included:

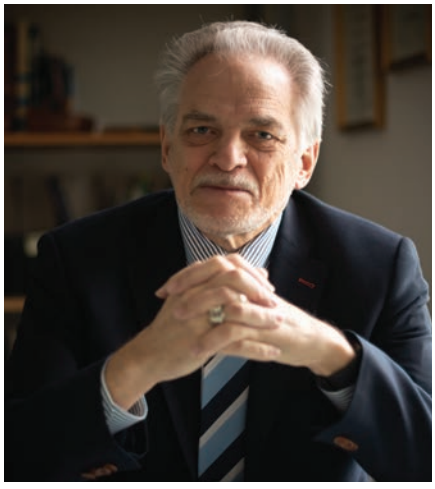
- MERMAC stern A-frame (15m)
- Two MERMAC side A-frames
- Wireless remote control foldable boom crane with 10-ton capacity and active heave compensation
- Hydraulic power units for A-frame and crane
- MERMAC storage and traction winch with 6,000 metres of ready spooled stainless steel wire, wireless remote control and constant tension technology
- MERMAC CTD (Conductivity, Temperature, Depth) winch, including 6,000 metres of armoured coaxial cable and slip rings
- Portable MERMAC winch with 4,500m of hybrid instrumentation cabling, slip ring and spare cable.

Gunnar Larsen, CEO, Havyard Group

Havyard Group

Havyard Group

Erlend Hatleberg, GM, Havyard



RAL

Norwegian Shipyard Downsizes, Flips Focus to Repair and Service

One Norwegian shipyard has opted to focus on ship repair and service versus newbuild – and downsize too – to ride out COVID-19 and its impact on the world economy. New Havyard Ship Technology announced that it will restructure its operations into a repair and service yard and reduce the number of staff, as employees were informed today at the yard in Leirvik.

"The strategy of becoming a service and repair yard is absolutely necessary to keep as many jobs as possible," said **Gunnar Larsen**, CEO, Havyard Group. Converting the yard into a repair, maintenance and modification yard means that the yard will undergo a downsizing process that will reduce the number of employees by around 100 in the coming year. "We know that this is difficult for the people affected, but we are doing it to save as many jobs as possible," said **Erlend Hatleberg**, General Manager, New Havyard Ship Technology.

Robert G. Allan Honored

Robert Allan Ltd. announced that **Robert G. (Rob) Allan** has been made an Honorary Member by the Society of Naval Architects and Marine Engineers (SNAME), making him one of only 50 living individuals to enjoy this privilege. Rob Allan is a third-generation naval architect, whose family moved to Vancouver from Scotland in 1919. Since graduating with honors from the University of Glasgow in 1971 with a B.Sc. in Naval Architecture, Rob Allan has been designing commercial workboats of all types, most notably high-performance tugboats for tanker escort and offshore terminal operations. In 1981, he succeeded his father as President of Robert Allan Ltd. and led the growing company to a position of international prominence in the field, including attaining several major International design awards for projects such as the unique Z-Tech tug design for the Port of Singapore.

Maracke Named CEO @ FSG

On 2 November **Philipp Maracke** takes over the management of the Flensburger Schiffbau-Gesellschaft (FSG) as CEO. Most recently Maracke was a member of the management of German Naval Yards Kiel where the 40-year-old has built up extensive expertise in the naval shipbuilding sector.

BMT names Behrendt Director

BMT appointed **Peter Behrendt** as its global Director of Strategy and Innovation. Behrendt joined BMT in 2017 as Managing Director for the Australian Defence and Security business.

BMT Names Sivandran MD in Asia

Suba Sivandran has been appointed the new Head of Asia for BMT based in Singapore. He holds an MBA in Strategy from HEC Paris.

Svitzer Names New COO

On 1 December 2020, **Ingrid Uppelschoten Snelderwaard** will take up the role as global COO of Svitzer A/S, reporting to CEO **Kasper Friis Nilaus**. Uppelschoten Snelderwaard joins Svitzer from her current position as Global Head of Equipment and VP

at Maersk and takes over from Svitzer's current COO, Leonardo Sonzio, who will be moving on to become Maersk's Head of Fleet Operations.

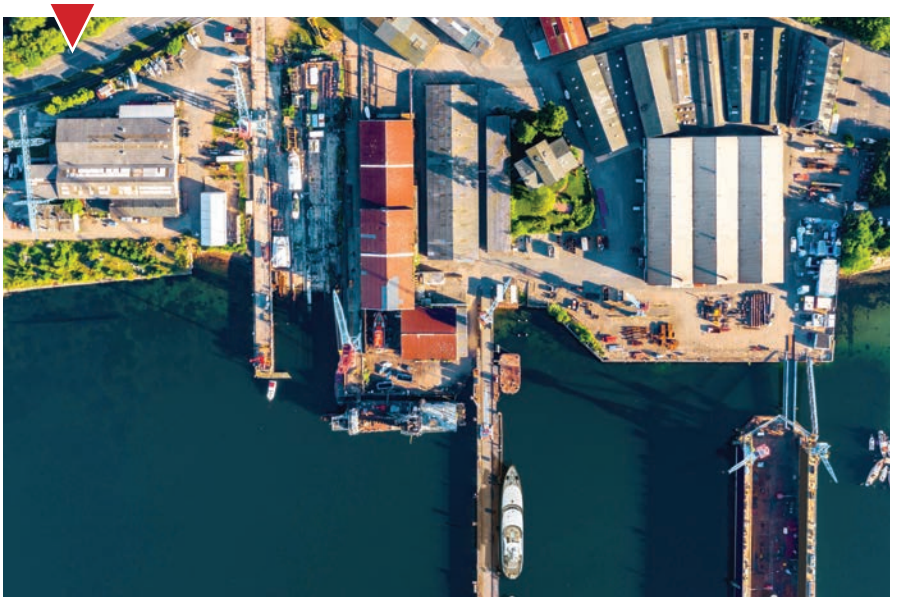
McFadyen to lead Aftermarket @ Fairbanks Morse

Fairbanks Morse named **James (Jay) McFadyen** as Vice President and General Manager of Aftermarket.

Historic Lindenau Shipyard Part of Nobiskrug's Expansion Plans

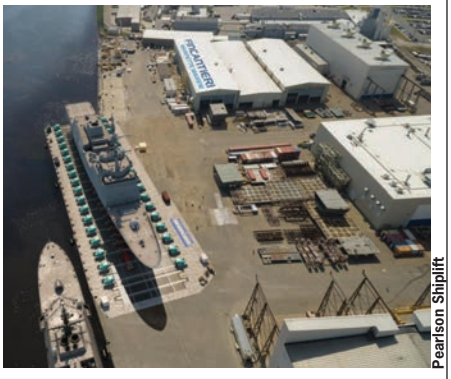
German shipyard NOBISKRUG, renowned for its fully custom superyachts such as Sailing Yacht A and Artefact, is expanding the capacity and capabilities of its new build and refit business. The expansion plans will include the historic Lindenau facility located in the city of Kiel. Nobiskrug continues to see high demand for new build projects and large refits despite the global economic impact of Covid-19 in 2020. The parent company Privinvest approved an investment package to upgrade the sister shipyard Lindenau located 45 kilometres away from Nobiskrug's Rendsburg facilities. The Lindenau site is located at the entrance of the Kiel Canal.

Historic Lindenau Shipyard Part of Nobiskrug's Expansion Plans



Pearlson Shiplift for Fincanctieri Marinette Marine

Pearlson Shiplift Corporation recently signed a multimillion-dollar contract with Fincantieri Marinette Marine to design and build a state-of-the-art shiplift system in the Wisconsin Naval Shipyard. Upon completion, the shiplift system will be the largest in the United States of America and represents a historic achievement for PSC and FMM. The new shiplift system will be approximately 500 ft. long and 82 ft. wide, and will be capable of handling vessels of nearly 10,000 tons, including the U.S. Navy's recently named Constellation-Class Frigates, Freedom-Class Littoral Combat Ships, and the Multi-Mission Surface Combatant (MMSC).



Pearlson Shiplift

Flensburger Schiffbau-Gesellschaft (FSG)

Philipp Maracke, CEO, FSG

BMT

Suba Sivandran, BMT

Svitzer A/S

Ingrid Uppelschoten Snelderwaard

Wärtsilä Airguard (Two Pipe) System

Introduced in 1998, the Wärtsilä Airguard seal has proven itself in the marine industry for its robustness and reliability. The company recently debuted the Wärtsilä Airguard Two-Pipe System. **Panu Sorvisto**, *Sales Director, Shaft Line Solutions, explains the significance.*

By Greg Trauthwein

In line with the full maritime product and service portfolio from Wärtsilä, shaft line solutions are offered not simply from the single product focus, rather through the spectrum of a solution package that is intended to deliver efficiencies and cost-effectiveness to shipowners

With this as a backdrop, Wärtsilä – via extensive R&D – offers a new shaft seal solution based on the Wärtsilä Airguard product technology, a solution designed to offer vessel owners a way to upgrade shaft seals in a lean and cost-efficient way.

In addition, the Wärtsilä Airguard is an alternative to using environmentally acceptable lubricants (EALs) as it eliminates the oil-to-sea interface. "We can now give customers a solution that meets VGP2013 regulations as well as reducing the CapEx and OpEx costs," said Sorvisto.

Wärtsilä Airguard Two Pipe System

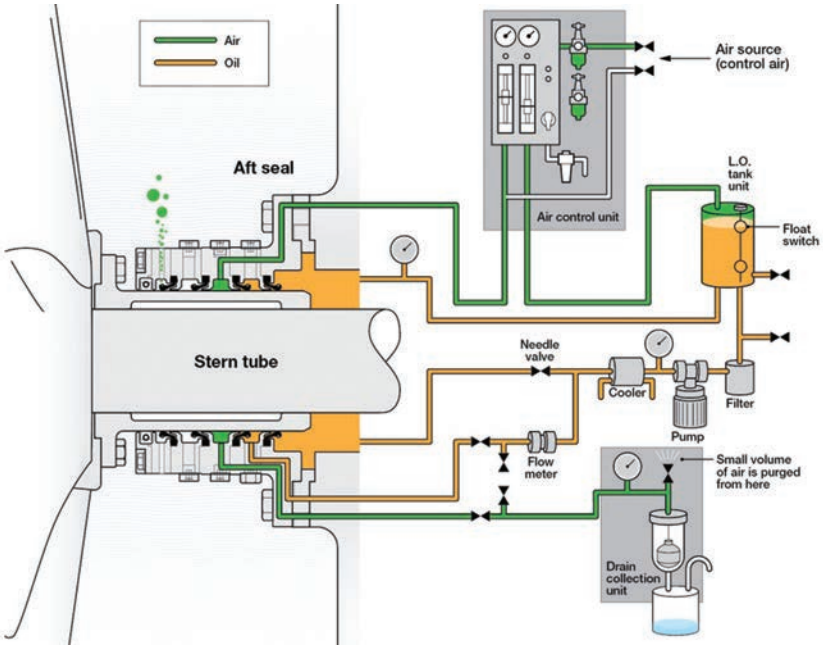
The new Wärtsilä Airguard Two Pipe system has been developed to significantly reduce the scope of installation work and limit a ship's time in drydock when a shipowner elects to retrofit with the Wärtsilä Airguard. The new two pipe solution uses the existing lube oil system and the auxiliary equipment, which helps to reduce costs and save equipment space. What makes the new two pipe system unique is the additional standby seal, made possible due to a new internal oil circulator, that improves seal lubrication and cooling. Looking at the system holistically for vessel owners mulling a shaft seal upgrade, key points for the new system include:

- Reduced piping arrangement to help lower installation costs;
- No requirement to remove stern tube for installation or retrofit;
- An innovative oil circulator to improve seal security; and
- A streamlined auxiliary system to reduce required space in the engine room.

"The first Airguard solution came out because there was a need from the market to have an environmentally sound solution," said Sorvisto. While the original solution has a strong track record over more than two decades, he said it had piping configurations, which in some retrofits and upgrades was not optimal because of the need to often work on the vessel piping system throughout the stern tube.

"We had cases where our customers approached us to upgrade their sealing system to the Airguard system," but when we discussed the modifications needed, "a good number of them said, 'well, it's too big job to execute during the normal drydocking so we'll skip it right now.'"

The original Wärtsilä Airguard seal has proven itself since 1998.



Wärtsilä

For more in-depth coverage, watch **Panu Sorvisto**, Sales Director, Shaft Line Solutions, **Wärtsilä**, on **Maritime Reporter TV**: bit.ly/3oZf4Pc

With this feedback in hand, Wärtsilä went back to the drawing board with its engineering team to devise a solution that required significantly less work and time in drydock to install the Airguard solution.

"We have plenty of brilliant engineers," said Sorvisto, so they put their heads together and started to think of a better solution. "The outcome was the two pipe solution."

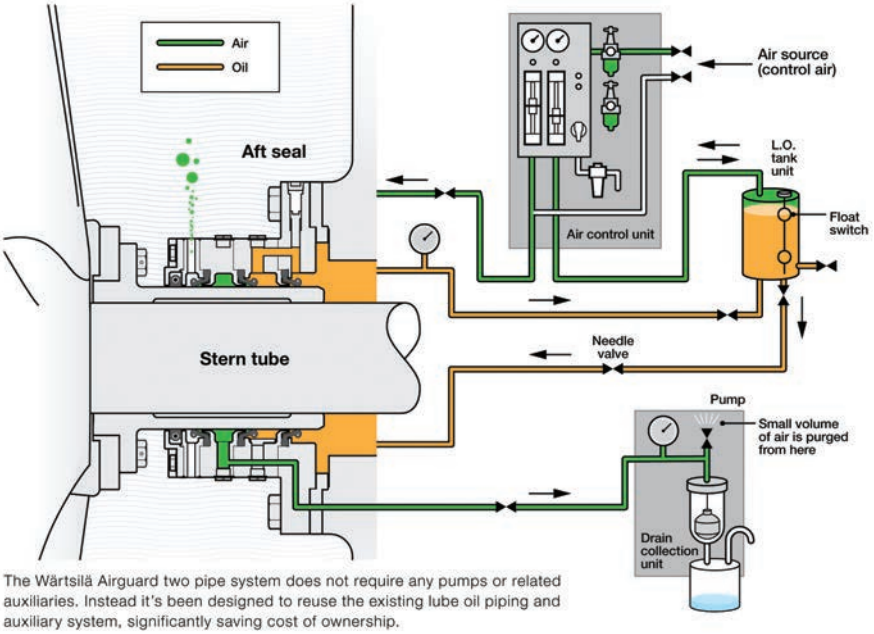
The two pipe solution effectively mitigated the need, in most cases, to remove the tail shaft to install the new Airguard seal.

"Part of the development process was to avoid the tail shaft removal because that comes with that cost, it comes with extended docking time in some cases," said Sorvisto. "So for most of the installations where we have a two-pipe system, there is no need for tail shaft removal provided that the piping system fulfills a certain criteria. That is a clear benefit."

In addition to eased installation requiring less time (and money) in drydock, another advantage is that the new two pipe system has less auxiliary systems compared to previous generations.

"This is, again, an important topic, especially when we talk about the retrofitting of the seals," said Sorvisto. "We are talking about existing vessels, where the engine room is full of all different equipment and auxiliaries. Putting new auxiliaries into the existing engine room is always a challenge. So with this new two-pipe airguard system, we have managed to reduce the number of the auxiliaries," which also comes with benefits, including less time for installation and less required space in the engine compartment. "I think the best way to show what are differences between our conventional Airguard and Two-Pipe Airguard is just to look at the diagrams (below)."

The new Wärtsilä Airguard Two Pipe System offers many CapEx advantages.



The Wärtsilä Airguard two pipe system does not require any pumps or related auxiliaries. Instead it's been designed to reuse the existing lube oil piping and auxiliary system, significantly saving cost of ownership.

TECHNICAL SPECIFICATIONS

Shaft sizes	286-1172mm
Sealed medium	Air, oil
Serviceability	Lip seals serviceable with shaft in situ

MATERIALS OF CONSTRUCTION

AFT seal casing	Manganese bronze
FWD seal casing	Cast iron
AFT liner	Ni-Cr steel
FWD liner	Special cast iron
Seal ring	FR, Bio Seal Ring

FLOW RATE AND SUPPLY PRESSURE

Air flow rate

- Seal size 330-480 (shaft 286-457mm): 25NL/min
- Seal size 500-710 (shaft 458-672mm): 30NL/min
- Seal size 750-1250 (shaft 673-1172mm): 35NL/min
- 0.4~0.7MPa control air (to Air control unit)


Photo: U.S. Navy

OKON

Insights on technology advances with Rear Admiral John Okon, Commander, Naval Meteorology and Oceanography Command

By Greg Trauthwein

Rear Admiral Okon never started out to have a career in Oceanography, rather in Broadcast Meteorology. "At NY Maritime College, I studied both Meteorology and Oceanography and became equally passionate about Oceanography. Thanks to the U.S. Navy, we have a career field in both."

By its very nature, the U.S. Navy operates in one of the most discussed and disected environments on earth, the oceans.

"The ocean is critical to National and Global Security. Back in the early 90's the ocean wasn't contested, the U.S. was the most powerful Navy and we had freedom of movement, anytime, anywhere," said RDML Okon. "Now, while we are still the most powerful Navy in the world, near peer competitors are racing to close that gap. The ocean and undersea domain is center stage. With 70 percent of the world populations living near the ocean, 90 percent of global trade occurring on the Maritime Commons, and over 90 percent of intercontinental communication traveling on undersea cables. The ocean matters more now than ever before."

The Autonomous Path

The navy continues work on the development of autonomous systems across the spectrum, a means to take people out of harms way and to deliver persistence and information from areas where physical surface ships may not be practical. "Over the past two decades, the Navy's employment of unmanned systems (UxS) has experienced tremendous growth and Naval Oceanography remains at the forefront in development and operations of the vehicles.

Naval Oceanography helped lay the groundwork for programs such as the MK18 family of systems," said RDML Okon. "In fact, Naval Oceanography, in cooperation with institutions such as WHOI, SCRIPPS, the University of Washington, and the Office of Naval Research, developed many of the unmanned systems currently in use throughout the Fleet. Additionally, Naval Oceanography

Photo: U.S. Navy

fielded SLOCUM gliders in 2010, and by 2019 was the first organization to successfully deploy and operate over 100 unmanned systems simultaneously from one location, the Naval Oceanographic Office's Glider Operations Center."

In the past 10 years, unmanned systems capabilities have continued to expand, and today RDML Okon counts an inventory approximately 200 unmanned systems, ranging from man portable littoral expeditionary units to the larger 6000M deep ocean systems.

"These systems are force multipliers for us to provide critical environmental knowledge across the globe to the meet the operational needs of the Fleet. Operating unmanned systems are part of everyday life across a number of Naval Oceanography commands to include a fleet of buoyancy gliders, unmanned surface vehicles, and unmanned underwater vehicles that effectively enable mine warfare, special warfare, and safety of navigation. The expanded roles of unmanned systems in environmental intelligence operations means their place in the warfighting tool kit is well entrenched."

The Future is Now

According to RDML Okon, utilization of unmanned systems will continue to expand throughout Navy operations.

"Early successes with the MK18 family of unmanned underwater systems demonstrated that unmanned systems can extend the fleet's reach, direct our talented members to other tough problems, and improve warfighter safety," he said. "As AI, autonomy, and endurance mature and improve our ability to sense the environment and grow the tactical advantage. Coupled with efficiency in data handling, dissemination and onboard processing Naval Oceanography will maintain our advantage in the information age." While unmanned systems come with tremendous promise, hurdles remain to deploy, utilize and recover these systems efficiently and effectively. "People often tout power management as the greatest limitation, but we have been making steady advances in endurance," said RDML Okon. "In reality, true autonomy and extended communications remain the barriers to broad ocean unmanned operations. Marine surface and submerged systems operate in very hostile environments and are challenged daily by that environment. The communications to these systems is never an assured success. UMS systems need to be able to maneuver in that ocean environment, make adjustments according to the challenges that ocean environment presents and most importantly complete the objective or task with very little or often no communications. Energy demand remains a challenge." While technological evolution is central to RDML Okon and his teams' ultimate success, he looks beyond the technology paradigm is assessing the path forward to maximize our efficiencies in the most hostile and corrosive environment on the planet.

"Technology is important and it seems like many folks are chasing the next best thing. In my opinion, it is the commitment from every aspect of our country, from government, to academia to industry, to work together to solve hard problems in the ocean for our economic prosperity and defense of our country," said RDML Okon. "The ocean has no borders, we must work together to develop a culture of connectedness ... in the end our greatest advantage is people and partnerships."

2021 Editorial Calendar

MARITIME REPORTER AND ENGINEERING NEWS

January 2021

The Ship Repair & Conversion Edition

- Hull, Deck and Tank Coatings
- Marine Engine Conversion & Repower
- Water Treatment Systems
- Marine Fuels and Lubricants
- Emission Scrubbers
- European Shipbuilding & Equipment Supply
- www.MaritimeEquipment.com Marine Engine Resource Guide

Event Distribution:

SMM: Feb 2-4, Digital
PVA Maritrends: Feb 6-9, Portland, OR
Green Ship Technology: March, Copenhagen

February 2021

Government Shipbuilding

- Cruise and Ferry Vessels
- Autonomous Ship Systems
- Bridge Technology: Satellite Communications, Navigation & Controls
- Seafarer Training
- Health, Safety & Sanitization
- www.MaritimeEquipment.com Safety & Sanitization Resource Guide

Event Distribution:

Seatrade Cruise Global: Apr12 -15 Miami, FL
Sea-Air-Space: Apr 12-14 National Harbor, MD

March/April 2021

Offshore Wind Energy: Installation, Crew & Supply Vessels

- Dredge Vessel Technology
- Marine Gears & Transmissions
- Fluid Handling Pumps and Filtration
- Fire Suppression Systems
- Heavy Lifters: Deck Machinery & Cranes
- www.MaritimeEquipment.com Marine Hydraulics Resource Guide

Event Distribution:

CMA Shipping: May 2021, Stamford, CT, USA

May 2021

Green Ship Technologies

- LNG / Hybrid Propulsion
- Marine Batteries & Fuel Cells
- Classification Societies
- Marine Coatings
- Marine Electronics
- www.MaritimeEquipment.com Marine Coatings Resource Guide

Event Distribution:

Norshipping: Jun 1-4 , Oslo, Norway
Inland Marine Expo: Jun, St. Louis, MO
ITS 2021: Jun 7-11, Singapore
Cruise Ship Interior Expo: Jun 8-9 Miami, FL
Marine Money Week: Jun 21-23, New York, NY
Seawork: Jun 15-17, Southampton, UK

June/July 2021

USCG Fleet Modernization Annual

- Fast Attack and Patrol Craft Builders
- Ride Stabilization: Pitch and Roll Control Solutions
- Water Jets, Thrusters & Propellers
- Communication Electronics
- www.MaritimeEquipment.com Waterjet and Thruster Resource Guide

Event Distribution:

MACC: Jul 2021, Baltimore, MD

August 2021

The Shipyard Annual

- Bearings, Seals and Couplings
- Innovative Ferry Designs
- Pipes, Pumps & Valves
- Ballast Water
- Welding & Cutting Equipment
- www.MaritimeEquipment.com Shipyard Resource Guide

Event Distribution:

Interferry: Oct 2-6 Santander, Spain

September/October 2021

The Marine Design Edition

- Spotlight: The Top 25 Naval Architecture/Marine Engineering Firms
- Dredging: Port expansion and deepening
- Container and Material Handling Equipment
- Marine Lighting
- Bonus Insert: Shipping & Port Annual
- www.MaritimeEquipment.com Maritime Services Resource Guide

Event Distribution:

Europort: Nov 2-5 Rotterdam, Netherlands
SNAME Expo: Oct 2021, Houston, TX

November 2021

The Workboat Edition

- Autonomous Workboats
- Workboat Propulsion
- Deck Equipment: Winches & Cranes
- Emissions: Exhaust Systems and Scrubbers
- Training and Simulation
- www.MaritimeEquipment.com Deck Machinery Resource Guide

Event Distribution:

Int'l Workboat Show: Dec 2021, New Orleans, LA

December 2021

Great Ships of 2021 Edition

- Desalination & Reverse Osmosis
- Fluid Filtration and Separation
- Safety Equipment
- Navigation: Radar, ECDIS, Collision Avoidance
- HVAC, Compressors & Ventilation
- www.MaritimeEquipment.com Water Treatment Resource Guide

Event Distribution:

Surface Navy Association January 2022
Crystal City, MD

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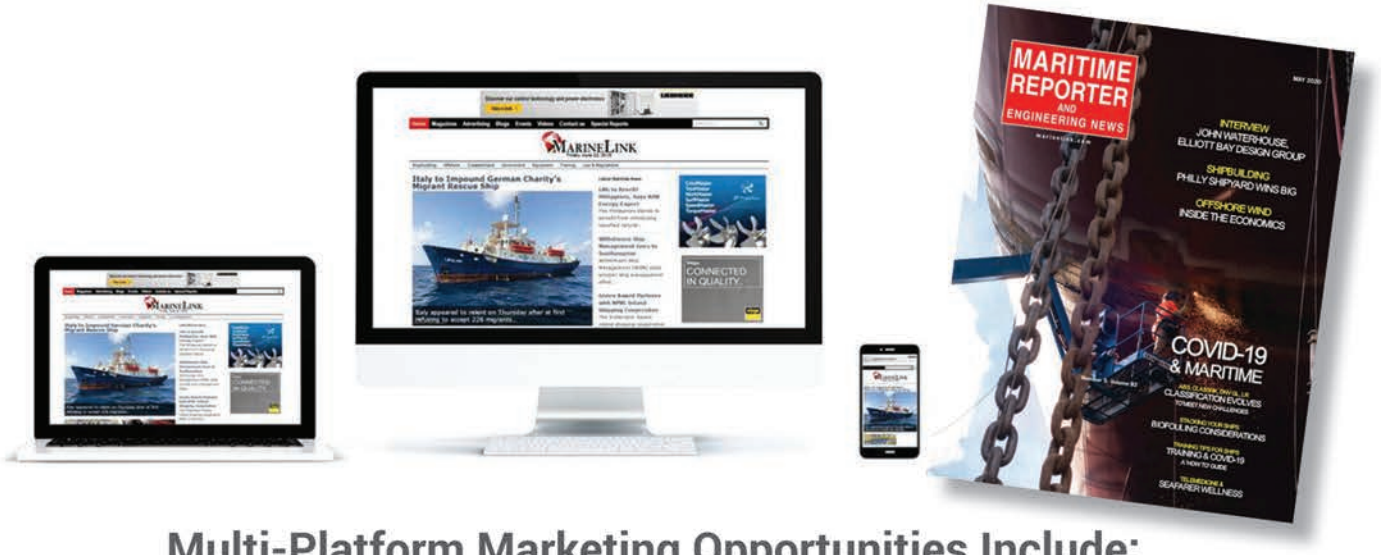

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- Maritime Reporter Webinars
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- Email Direct Marketing
- Native Advertising
- Maritime Reporter E-Magazine

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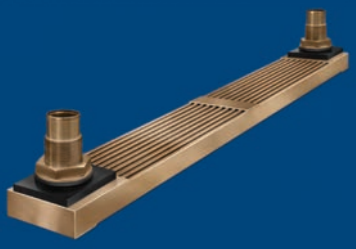

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