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MARITIME REPORTER AND ENGINEERING NEWS

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February 2018

THE NEW CRUISE TRAILBLAZERS

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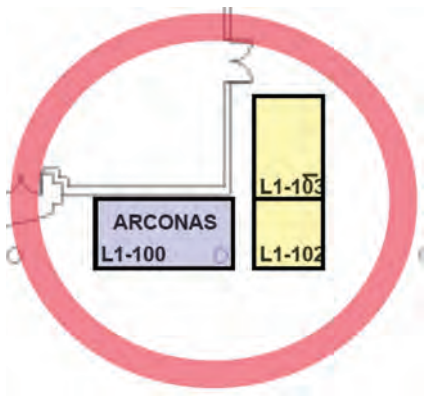

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At the Helm

Sunstone

32 Adventure Bound

Niels-Erik Lund is driving Sunstone Ships to new heights.

By Greg Trauthwein

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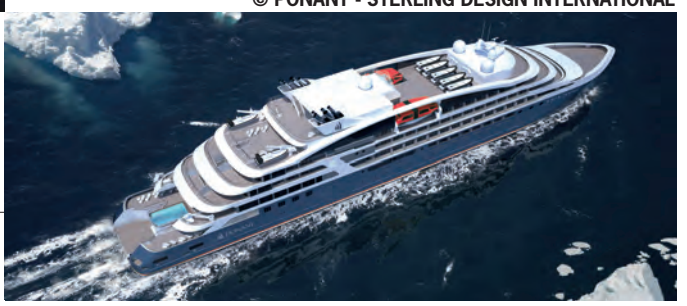
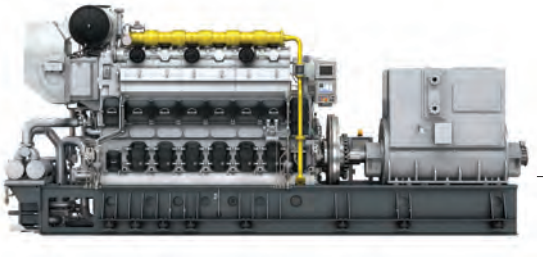


38 French Connection

PONANT is raising the bar in the luxury adventure sector.

By Greg Trauthwein



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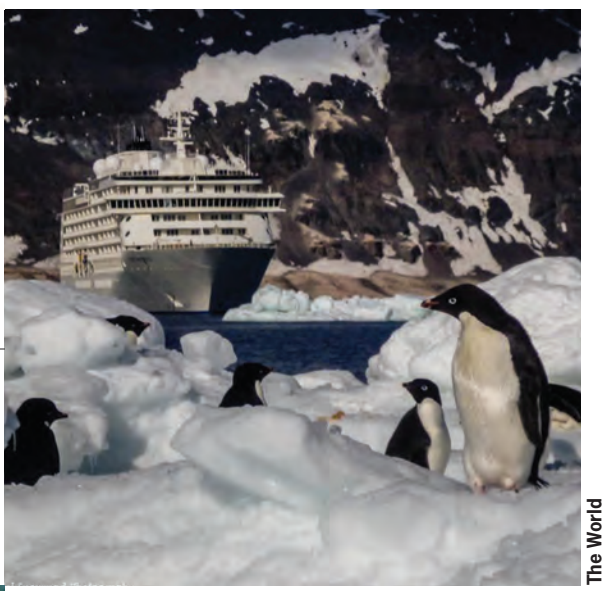

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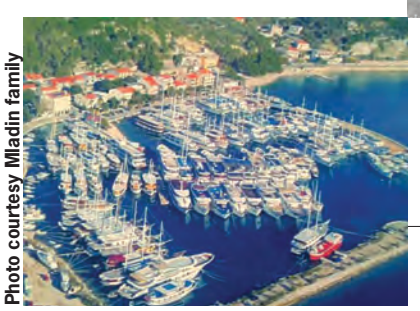

Photo courtesy Mladin family

60 Village of Cruisers

In Krilo Jesenice, Croatia, a cruise business blossoms.

By Alan Haig-Brown

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THE COVER

The French Connection
Ponant is agressively growing its fleet of luxury yacht/adventure cruise vessels, with five vessels on order and more to come. For the inside scoop we speak with Edie Rodriquez, PONANT Americas Brand Chairman, PONANT Yacht Cruises and Expeditions, starting on page 38.

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Murray Goldberg
CEO, Marine Learning Systems

By Greg Trauthwein

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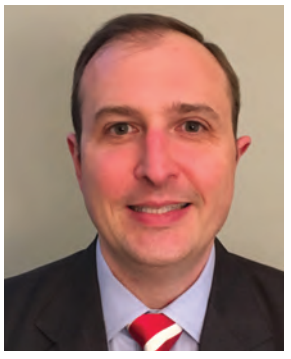

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Growth in the global cruise sector is hardly news, first and foremost because the industry cheerleader, the Cruise Lines International Association (CLIA), is arguably the best association in the industry at regularly communicating on and about the industry. But I guess when you have had continuous growth since the industry's inception, there's always something good to talk about.

This being our Cruise Annual in step with the Cruise Shipping show in Fort Lauderdale, I am particularly pleased to take a look inside a relatively new but rapidly growing sector of the global cruise industry, that being the luxury yacht/adventure cruise sector.

The business of operating high specification ships to take small numbers of wealthier clients into some of the world's more remote and exotic locations is not news, either. The business of designing and building a new fleet of yacht-style vessels is news.

To date the smaller vessel sector has been the province of older vessels that have been refurbished, but the tide is changing quickly, as a number of owners have invested mightily in a fleet of vessels – and the requisite amenities and toys – to deliver the small but growing sector of cruisers to new destinations.

Niels-Erik Lund, president and CEO of Sunstone Ships, offers and unfettered view of the market in our story starting on page 32. To be honest Lund probably has the most hands-on experience, a nearly 50-year marine industry veteran who has been involved in the smaller vessel niche since its inception. Lund notes that, generally, the market is being fueled by a global population that is retiring younger and wealthier, a population of older people that is far more active than generations past. Sunstone is building new, for the first time, with it's newest vessel being built in China for delivery in 2019.

Another familiar cruise executive face in this edition is **Edie Rodriguez**, the America's brand chairman for PONANT Yacht Cruises and Expeditions. While Rodriguez' name is familiar, perhaps the PONANT name is not … for now. Rodriguez was brought on board to expand this French luxury brand in the Americas, and in her tool kit will be a fleet of five new vessels – four of which are in the Explorer class featured on this month's cover – that will be built and ready for action starting next year through 2021. The fleet of newbuilds will feature several 'world firsts', notably the Blue Eye underwater lounge on the Explorer class vessels; and the world's first Hybrid/LNG-fueled ice-breaking cruise vessel, destined to deliver cruises to, among other places, the North Pole. In style, of course. The story of PONANT's ascension starts on page 38.

The cruise stories don't stop there, though, as **Kira Coley** reports, starting on page 44, of the ECO Trends in the cruise industry, as sailing anywhere – particularly to and through new and pristine areas that have been lightly traversed by man – are being guided by a raft of new regulations that dictate what operators can and cannot put into the air and water. Finally our "Cruise Ship Tech" section starting on page 54 focuses on 3D FLS, a technology that operators of The World (and PONANT) are finding to be of tremendous value to operate safely and efficiently in new, uncharted waters.

A related feature from friend and colleague **Alan Haig-Brown** is arguably one of the most fascinating stories I've seen in some time. Haig-Brown was in Split, Croatia recently to cover the InterFerry Conferene for Maritime Reporter, and as a follow up he stumbled upon a small, unique and growing passenger/cruise sector in Krilo Jesenice. *"The Village of Cruisers"* article starts on page 60.

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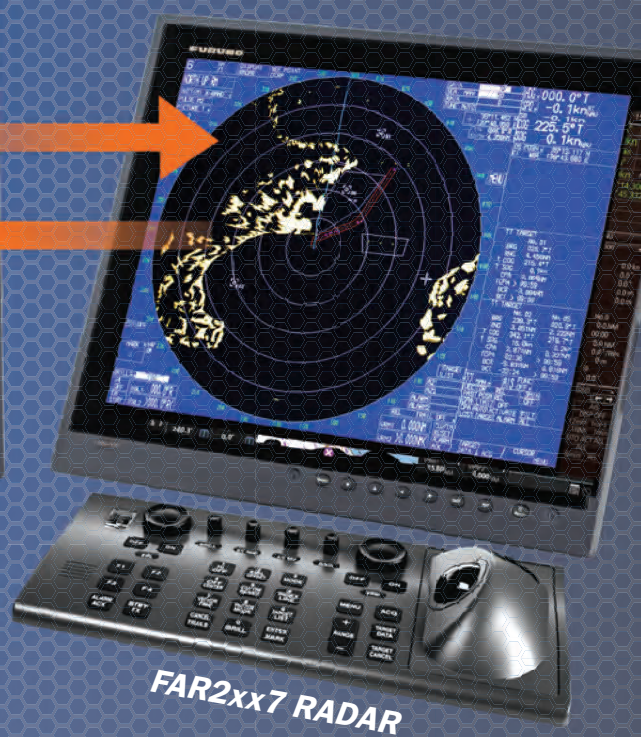

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U.S. Navy photo by Jessica Bidwell

Guilty Plea in 'Fat Leonard' Scandal

In what has become the largest corruption scandal in U.S. Navy history, former U.S. Navy commander Troy Amundson pleaded guilty on Tuesday to conspiracy to commit bribery, admitting that he conspired with foreign defense contractor Leonard Glenn Francis, a.k.a. "Fat Leonard," and his Singapore-based company, Glenn Defense Marine Asia (GDMA), to take bribes such as entertainment expenses and the services of prostitutes in exchange for sending business to the GDMA.

https://www.marinelink.com/news/commander-leonard-scandal433538

Cmdr. Troy Amundson (right) in 2010.

NASA, Navy Practice Recovery @ Sea

A joint team of NASA and U.S. Navy personnel are testing new equipment and practicing procedures for recovering astronauts that have splashed down in the Pacific upon returning from space travel. NASA's deep space exploration systems will send a crew through space at 25,000 miles per hour, travelling some 40,000 miles beyond the Moon before coming back home. When returning to Earth, the Orion spacecraft will slow to a mere 300 mph as it passes through the Earth's atmosphere, eventually slowing to 20 mph before it safely splashing down in the ocean.

https://www.marinelink.com/news/spacecraft-practice433269

U.S. Navy photo by Abe McNatt

$3B Vessel in the Works

Allseas is planning to build a vessel big enough to be able to remove the world's largest oil and gas platforms when they reach the end of their production lives. To be called Amazing Grace, it would be a bigger version of Allseas' existing Pioneering Spirit ship, and would cost about $3 billion.

https://www.marinelink.com/news/construction-largest433744

Photo: Allseas

MAN 45/60CR

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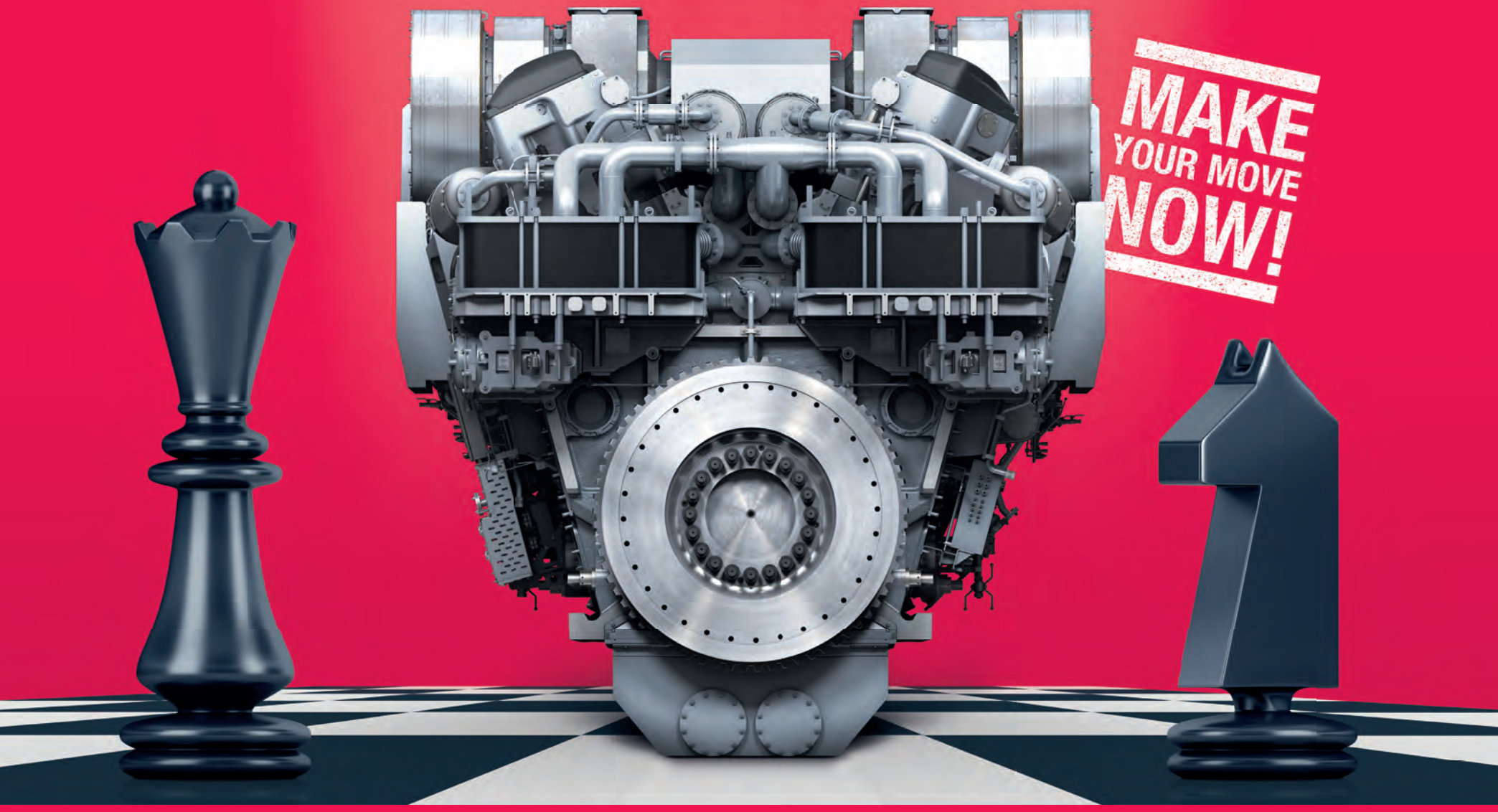

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Photo: SolstadFarstad / Harald M. Valderhaug

Offshore construction vessel Normand Maximus is one of SolstadFarstad's largest and most advanced vessels. It is currently on contract with Saipem, the Italian oil and gas industry contractor.

TM Master Suite for 150 0ffshore Vessels

Tero Marine Wins SolstadFarstad Deal

While bad news has ruled the day in the offshore sector, news from Norway provides a significant spark of life. Tero Marine won a contract for delivery of fleet management software to Norwegian shipping giant SolstadFarstad. The Bergen-based tech company is now preparing to install its TM Master suite on almost 150 offshore vessels.

SolstadFarstad and Tero Marine have already started a pilot project on a selected number of vessels. When this is completed, the plan is to start roll-out of TM Master on the entire fleet.

"SolstadFarstad have been very clear on how they want to integrate TM Master in their fleet operations, which provides us with exciting implementation and development challenges," said Jarle Holmelid, CEO Tero Marine. "This is the biggest delivery in Tero Marine's 32-year history, and sets a new standard for our company. Our product and organization have proven that it can meet the demands from the biggest companies in the business."The merger of Solstad Offshore, Farstad Shipping, Deep Sea Supply and REM Offshore has created the world's biggest owner of large vessels in the supply, anchor handling and construction support segments.

The merger left the company with four planned maintenance systems throughout the fleet, and the goal today is to create a streamlined operation consolidating these four systems into one future-proof system.

"We have been through a very extensive process of evaluating different providers, and have concluded that Tero Marine has the best overall solution – in terms of cost and functionality – for maintenance, procurement and IT," said says Tor Inge Dale, COO in SolstadFarstad. "Their development roadmap is also in line with our ambitions for a more efficient planned maintenance and procurement system." He also underlines the importance of the extensive TM Docking module, an integrated part of TM Master; a high level of control with dry-docking operations – from early planning to execution and reporting – is crucial. "The TM software fits our specific workflow, with seamless information flow between the different work areas and locations. We are convinced that TM Master will play an important role in optimising our operations," said Tor Inge Dale. he TM Master software suite is onelicensed to more than 2000 ships worldwide.

MAN Diesle & Turbo

Clean Marine Fuel & Emissions

The LPG Dual-Fuel Engine

To say that marine fuel and emissions is a top agenda topic is a vast understatemtn, as operator large and small mull the best options to meet looming international fuel rules coming in 2020. Keeping ahead of the curve is MAN Diesel & Turbo, which recently signed a Memorandum of Understanding (MoU) with Hyundai Heavy Industries Engine & Machinery Division (HHI-EMD) regarding the development and production of MAN B&W ME-LGIP dual-fuel engines. Upon completion, HHI-EMD will be able to deliver liquefied petroleum gas (LPG) –fuelled, two-stroke-propulsion engines. Bjarne Foldager, VP Sales & Promotion, Two-Stroke Business at MAN Diesel & Turbo said the the LPG as fuel movement "is a general tendency that is growing. LPG holds great potential as a fuel since it contains no sulphur, is widely available, and easy to bunker."

Photo: Pekka Leino

Autonomous Operations

Rolls-Royce Opens Research Center

Appetite for autonomy in the commercial maritime space is picking up momentum, driven by a handful of tech giants that have the breadth and resources to think comprehensive and act global. Rolls-Royce is obviously one of those players, and it recenlty opened its new research facility, officially dubbed Research & Development Center for Autonomous Ships, in Turku, Finland, providing a space for the company and its partners to develop technologies that will help shape the future of an increasingly more autonomous global shipping industry.

Aegir-Marine

Investment in Service

AEGIR-Marine: Propulsion Workshop Approved

As the marine industry navigates a historic downturn, investment is coming from long-term quality players. AEGIR-Marine received an Approved Workshop statement from DNV-GL, making it the first brand-independent service provider in The Netherlands with an approved workshop for repair and maintenance of propulsion systems. With its new repair shop AEGIR-Marine joins the ranks of the major players in this field. The newly opened workshop allows the overhaul of ship components up to 50 tons. The height under the new crane is a whopping 12.5 meters. The new building is 15 meters high in total. Additionally, AEGIR-Marine is able to perform spin tests at this new location. This means running and simulating propeller and thruster speeds in real time.

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Strict Liability Criminal Statutes

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There are a number of federal and state statutes that intentionally and justifiably impose strict criminal liability. Persons who manufacture hazardous explosives and those who keep dangerous animals create serious risks to public safety. Clearly placing the burden of potential criminal liability, even in the absence of criminal negligence or intent, on those persons and entities is appropriate.

There are other statutes, though, that fail to disclose whether the authors intended for the criminal penalties included for noncompliance to be strictly applied or whether criminal liability requires proof of criminal negligence or specific intent. Two such statutes of interest to the maritime community are the Refuse Act of 1899 and the Migratory Bird Treaty Act (MBTA).

The Refuse Act was adopted to address the problem of intentional dumping of trash, waste, and refuse into the navigable waters of the United States, which was reaching serious proportions during that era. The Refuse Act does not address scienter. The early court decisions relating to the act followed the judicial concept that statutes should be interpreted as being consistent with the common law unless otherwise clearly indicated. These courts held that scienter was a necessary, albeit unstated, element of the offense when criminal sanctions were to be applied. Only later did courts begin interpreting the statute literally, allowing convictions when there was no proof of intent. Now, such prosecutions and convictions have become commonplace in those cases where prosecutors fail to exercise discretion in their charging.

The MBTA was enacted in order to implement the Migratory Bird Treaty between the United States and Great Britain (on behalf of Canada). This was during an era when birds were being slaughtered at a tremendous rate and had already resulted in the extinction of the passenger pigeon and various other species. The goal of the treaty and the statute was to protect migratory birds, which includes almost every bird in North America, from unauthorized hunting and hunting methods. The statute provides, in pertinent part, that it is a criminal offense to improperly take or kill any migratory bird. Unfortunately, like the Refuse Act, the MBTA does not address scienter. Early cases were confined to prosecutions for improper hunting, so criminal intent was not litigated. Later, though, aggressive prosecutors began utilizing the MBTA, like the Refuse Act, to go after individuals other than hunters and entities that unintentionally killed migratory birds.

On 22 December 2017, the Department of the Interior Office of Solicitor issued a memorandum stating that it is now the Department's policy that the MBTA does not prohibit the incidental taking of migratory birds. Henceforth, the Department will only pursue cases involving affirmative actions that have as their purpose the taking or killing of migratory birds. Some may argue with the analysis in the memorandum or with its rather sweeping policy change. A bigger problem is that it only impacts the policy of one federal department, which has limited authority in the enforcement of the MBTA.

It has been the policy of the Department of Justice, in action if not in writing, to pursue prosecutions under the Refuse Act and the MBTA whenever the federal prosecutor (at the Department Headquarters or at a local Office of the US Attorney thought that it was appropriate. There seems to be no detailed guidance to control that discretion. The Refuse Act was first used to prosecute a company for the accidental release of oil into the water during the 1930s. The MBTA was first used in such a manner following the 1989 grounding and oil spill of the Exxon Valdez. Subsequently, the Refuse Act and/or the MBTA routinely appear in charges brought following an oil spill.

In the late 1990s, the maritime community championed an attempt to insert scienter provisions in both statutes. That was met by a vigorous pushback from the Department of Justice. Senior prosecutors from the Environment and Natural Resources Division assured the maritime bar on several occasions that there

would never be a prosecution where the only charge was for violation of either the Refuse Act or the MBTA. Such offenses were only charged to increase bargaining leverage in seeking a plea agreement from the defendant for other offenses that included a scienter requirement. The maritime community backed off, given such assertions.

On 6 December 2004, the bulk carrier Selendang Ayu was en route from Seattle, Washington to Xiamen, China carrying 66,000 tons of soybeans. It also had approximately 340,000 gallons of bunkers and other petroleum products (lubricants, etc.) on board. During a winter storm in the Bering Sea, the ship suffered a major engine casualty. Despite the best efforts of the engineering crew, the engine could not be restarted. The bulker eventually grounded off the north shore of Unalaska Island and broke its back in the fierce winter storm, spilling its entire cargo of soybeans as well as its bunkers and other oils. Several thousand seabirds died as a result of the oil spill. The owners of Selendang Ayu spent millions on the environmental response effort and then millions more on the removal of wreck from the isolated shore (full removal was insisted upon by the State of Alaska, which had previously allowed wrecks in similar locations to deteriorate in place). Millions were also paid in natural resource damage claims. None of these expenditures were wholly inappropriate. The US Department of Justice, though, decided that criminal prosecution of the owners was necessary. After opening the case, it could find insufficient evidence of either intentional or negligent criminal conduct. Not deterred, DOJ filed charges against the owners for violation of the Refuse Act (for discharging soybeans in navigable waters of the United States) and for violation of the MBTA (for "taking" migratory seabirds that had ingested the spilled oil). The owners were not able to argue that they did not intend the grounding to occur; nor could they argue that they were not negligent with regard to the grounding. Neither argument constitutes a defense to a strict liability offense. Left with no choice, the owners entered a plea of guilty and paid a criminal fine of $9 million. This marks the first time in modern history that the Department of Justice has charged a shipowner solely for violation of strict liability crimes. When asked about this litigation, the prosecutor in the US Attorneys' Office in Alaska stated that the attorneys in the Environment and Natural Resources Division insisted on this course of action. When asked, the prosecutors in the Environment and Natural Resources Division insisted that the US Attorneys' Office in Alaska had done the insisting.

Ship owners and operators are left in an untenable position. If oil is spilled through no fault of the crew, will the prosecutor be aggressive and pursue all possible charges, including the no-fault ones or, assuming the ship meets all of its civil obligations, will matters end there? Such outcomes, in criminal matters, should not turn on the roll of the dice. Congress created this mess by not including in the Refuse Act and the Migratory Bird Treaty Act scienter provisions. It is time for Congress to step up to the plate. In the meantime, courts when handling such prosecutions where there is no showing of criminal negligence or intent, should interpret these statutes conservatively and in accord with the common law by requiring evidence of scienter.

PVA in Savannah, Georgia

A Ferry Good Show

The recent PVA Annual Convention brought together an enthusiastic group of passenger vessel and ferry stakeholders. The robust turnout bodes well for this sector, and the broader OEM and service providers who keep it humming along.

With this year's PVA Annual Convention at Maritrends now in the rearview mirror, this is a good time to look back and reflect on the event – and the sector that makes it possible. Underpinned by a red hot ferry and passenger vessel building boom, I expected a well attended event and the Passenger Vessel Association did not disappoint. An increase in both exhibitors and foot traffic was evident in the exhibition hall, and numerous, well-designed technical presentations provided ample reason to make the trip to Savannah. If you didn't make it this year, well, you missed a good one.

The PVA convention is quickly becoming one of my favorite industry events, and I go to a TON of them annually. The reasons why are easy to see. First off, this group and sector tends to be enormously collaborative and PVA gives them the ideal vehicle to share best practices.

Secondly, it is just about the friendliest event I go to in a given year. Just about the right size, it is big enough to justify the trip and small enough to give me the opportunity to have substantial conversations with a wide array of stakeholders.

Finally and where some trade show presentations have evolved into thinly disguised infomercials, the PVA slate is short of self-promotion and long on the transfer of technical knowledge. In fact, if I had any complaints – and I really don't – it would be that the sessions were jam-packed to the point of standing room only. All of them.

Kicking Off Right

PVA always begins with the presentation of their two most important annual awards, the Roger Murphy National Marine Safety Award and the Captain Beth Elizabeth Gedney Passenger Vessel Safety Award. Heavily invested in safety, this organization places enormous emphasis in the importance of safety as a base tenet for their members. This year, the Roger Murphy National Safety Award was presented to Past PVA President is Michael Borgstrom from Wendella Sightseeing Boats. Immediately following that award, the Captain Elizabeth Gedney Passenger Vessel Safety Award was presented to the crew of the passenger vessel American Empress. Those individuals heroically mitigated a catastrophic marine engine failure that could have easily resulted in injury or death.

With the 'feel-good' part of the program nicely navigated, U.S. Coast Guard RADM John Nadeau, Assistant Commandant for Prevention Policy, gave the opening session keynote speech. A native of Maine and in his current billet since July of 2017, he also revealed that he is

About the Author

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Image: Greg Trauthwein

a rabid Patriots fan. This was met by his rapt audience with a decidedly mixed reaction, and a good laugh was had by all.

USCG: Three Things

As far as this talk was concerned, RADM Nadeau said it came down to three things: Partnerships, El Faro and, importantly, 'third parties.'

Nadeau wisely led off by highlighting the now 22 year partnership between the Coast Guard and PVA. With stated goals of "improving communications and developing a working relationship," it was a good place to start. According to Nadeau, that relationship is alive and well and the agreement represents "two decades of healthy, vibrant activity." He then touched upon several areas of common concern, including but not limited to the joint effort to combat illegal charters – a constant headache for compliant PVA operators who sometimes find their members competing against undocumented operators. The ever-growing and worrisome cyber threat was also mentioned. The Coast Guard's involvement with the investigation of the tragic El Faro sinking came next. According to Nadeau, there has never been a more transparent effort in the history of the U.S. Coast Guard. That's a mouthful, but Nadeau insists, "There has never been a more transparent investigation. Everything we have is on the internet; every hearing was broadcast live." And, he said, the Coast Guard report was made available to general public with a 30-day comment period before Final Action Memo.

That investigation produced a 200-page report with numerous (36) recommendations delivered exactly two years after the casualty. The bottom line; according to Nadeau? The tragedy was not an issue of standards and in the USCG's opinion, more regulations were not the answer. The most significant failure, he said, was the decision process (that sent the vessel into harm's way in the first place).

Listing four central causations, he also stated flatly that the Coast Guard had failed in its oversight, especially where it came to third party involvement in the equation. "We are the final element in the safety framework – it is our job to make sure the parties working on our behalf are doing their job," he said, adding quickly, "Just because we delegate to third parties doesn't mean we give away responsibility."

From that discussion, the Coast Guard's top prevention leader told PVA stakeholders that his top priority looking forward was "third party oversight;" with subchapter M in particular as a focus. As the long-awaiting so-called subM towboat rules barrel towards implementation for as many as 5,500 towing vessels, Nadeau freely admitted that the Coast Guard was pushing the program towards third parties. That practice, beginning with the well-known ACP program in 1995, has only gotten more prevalent over time. Indeed, since then, he said, "We've doubled down, time and time again. We need to get this right." That kind of talk tends to get passenger vessel stakeholders nervous, so he immediately followed that advice by reassuring the audience that direct U.S. Coast Guard oversight of so-called sub chapter T & K passenger vessels, as well as barges, would continue. "I don't see that changing," he said.

Because ferries are 'local,' it is that much easier to have local relationships personal knowledge, explained Nadeau. Bigger vessels and offshore assets tend to go from place to place – far distances – unlike ferries and barges which tend to stay local on fixed routes.

Bottom Line

Nadeau wrapped up his talk [before taking a barrage of questions] by saying that today's Coast Guard needs many things. Among them, the nation's fifth uniformed service needs capacity – and that translates into headcount. It also needs training and it needs expertise. More importantly, he said, "We need to better manage all of this information and hold people accountable." You got the distinct impression that he meant what he said. There was something for everyone this past week in Savannah. This lovely southern port city provided the perfect backdrop for the serious work to be done here. As an aside: It wasn't always this way. I shipped in and out of Savannah on a tanker every two weeks for a few years in the mid-1980's, and the transformation of this beautiful, bustling town since then is nothing short of remarkable. Before departing, I made a mental note to return on a future pleasure trip. Next year's PVA Annual Convention will take place in New Orleans, starting on January 17. It is already on my calendar. – *MLPro*

Tackling the Threat of Shipborne Legionella

Legionella can plague marine vessels but an effective Water Safety Plan can help to mitigate the risk, says John Chillingworth, senior marine principal at Lucion Marine.

About the Author

John Chillingworth is a former chief engineer on Cunard Line's QE2 liner and marine technical manager. He is currently a senior marine principal at Lucion Marine.

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Initial symptoms of Legionella usually include flu-like symptoms such as headaches, muscle pain and fever, with symptoms of pneumonia once bacteria begin to infect the lungs. There are different degrees of Legionella: the worst can cause death but there is a lesser known form called Pontiac, which can often be misdiagnosed as flu and can only be accurately verified by having a urine test. While the Pontiac strain is like a severe five-day flu for fit people, it can be worse for older people or those with breathing difficulties.

The disease, which isn't contagious and can't be spread directly from person-to-person, is usually caught by breathing-in small droplets of contaminated water, usually in showers - it's transmitted by an air-borne mist and can develop in still water between 20°C and 50°C. It can also lie dormant in otherwise 'safe' water systems for years, protecting itself in other matter available in the water system biofilm. It is therefore important that water supplies are kept below 20°C for cold water and 50°C for the hot supply.

Over the years there have been a number of high profile cases that have hit the headlines highlighting the risk of the disease in the marine environment, particularly among cruise ship passengers. Showers that have not been used for several days or weeks, along with poorly managed whirlpools, jacuzzis, spray from decorative fountains or water features, can all be sources for contracting Legionella-related illnesses. There have also been cases of shipyard fitters dying from Legionella after stripping down equipment such as pumps and being exposed to contaminated water.

However, all types of ships are at risk including off-shore accommodation vessels, which are known to have had several cases of the disease after being laid up and re-commissioned without the proper attention to potable (drinking) water safety.

Container vessels have large potable storage tanks that are used infrequently, while skin tanks may prevent a ship's water system from maintaining the cold-water temperature below 25°C.

Although there is far more awareness today of the risks of onboard Legionella and its effects, there's a perceived lack of knowledge at both vessel management and crew level. There's also a significant

Image: © byandyhumbert/Adobe Stock

> ***There have also been cases of shipyard fitters dying from Legionella*** *after stripping down equipment such as pumps and being exposed to contaminated water.*

corporate risk with the potential damage to reputation, and operator integrity on the line, for anyone whose vessel is affected by the disease.

This all reinforces the need for a thorough Legionella risk assessment to be included as part of a preventative ship repair and maintenance programme and yards should be alerted to any potential risks before a vessel arrives in dock. A proper Water Safety Plan (WSP), as recommended by WHO Water Safety Guidelines, should be implemented and based on an individual vessel risk assessment, and not, as is usually the case, a generic set of broad guidelines. This must also be 'owned' by the vessel's management.

For further effect, it's also important that the WSP includes elements proposed by the WHO Guide to Ship Sanitation. This covers system assessments which describe the water supply system up to the point of consumption and operational monitoring (including identification and monitoring of the control measures applied onboard). Verification and programmes to manage people and processes should also be covered under the management and communication elements.

Despite its unpredictability, it may be possible to design-out the risk of Legionella from vessels and better manage the risk. Regular and effective reviews of critical piping systems and components can help while checking procedures and proactive advice on the most suitable WSP can contribute to all round improvements and contribute to the risk management process. Critically, any plan must be effectively managed by a competent ships' team*, which is responsible for various aspects of the water safety plan and updates risk assessments on a regular basis.

All ship owners should protect themselves from any potential Legionella exposure claims from passengers or crew by verifying that they have a correct water management controls and records in place by having an independent audit by a reputable marine specialist.

We also need to see more public, scientific and medical awareness around the causes and symptoms of Legionella infection to improve reporting and compile accurate statistics. In addition, marine regulators must make operators responsible for Legionella control. For example, UK legislation dictates that establishments such as hotels require a Legionella risk assessment and that other relevant documents are in place and reviewed regularly and/or when significant system changes are made.

Clearly, similar requirements should be in place for the global maritime industry. The EU has established and funded the development of SHIPSAN with the objective of implementing pan-European ship health and hygiene common standards. The development and implementation of WSPs is an integral part of the best practice guidance within the SHIPSAN manual. The EU are setting up additional training for port health inspectors to carry out more ship inspections to check water management on ships.

It is very likely that other major port health authorities such as USA, Brazil, Australia and Canada will adopt similar requirements for water safety plans in the near future. It is also understood that the Chinese authority responsible for port health is already considering the adaptation and implementation of the SHIPSAN guidance.

Ballast Water Compliance

About the Author
Dr Brian Phillips, is Managing Director, Chelsea Technologies Group

After more than a decade of discussion and consideration, the 71st session of the Marine Environment Protection Committee (MEPC 71) in July and the entry into force of the Ballast Water Convention (BWC) have provided ship owners with a firm timeline regarding requirements to manage their ballast water, and the installation of an approved ballast water treatment system (BWTS)

The BWC came into force on 8 September 2017, yet the decision to extend the deadline for the retrofitting of existing vessels with BWTS has provided some ship owners with the opportunity to delay compliance with the regulations and avoid the Capex requirement until further down the line. Those intending to defer investment risk not only prolonged damage to the environment, but also significant reputational harm which can negatively impact commercial opportunities and reduce the potential market.

The revised BWC introduces two standards for the handling of discharged ballast water to halt the spread of invasive aquatic species. D-1 addresses the ballast water exchange standard and D-2 details the ballast water performance standard using an approved BWTS.

With the number of approved BWTS on the market quickly growing, ship owners and operators are becoming spoiled for choice. Treatments include: mechanical treatment methods such as filtration and separation; physical treatment methods such as sterilisation by ozone, ultra-violet light, electric currents and heat treatment; chemical treatment methods such as adding biocides to the ballast water to kill organisms; or various combinations of the above.

The D-1 standard requires ships to ensure that ballast water is exchanged far away from the coast where coastal organisms will not survive due to different temperatures and salinity. This can be achieved by several means: emptying the ballast tank and refilling with replacement ballast water equating to at least 95% volumetric exchange; pumping replacement ballast water into a ballast tank and allowing the existing ballast to escape by overflow where at least three times the tank volume is to be pumped through; or filling new ballast water from the top of the tank with simultaneous discharge from the bottom.

Image: Chelsea Technologies Group

The D-2 standard requires that only ballast water with a concentration of less than 10 viable organisms per cubic metre (greater than or equal to 50 micrometres in dimension), or less than 10 viable organisms per millilitre (less than 50 micrometres in dimension) can be discharged in ports and coastal waters.

The Convention applies to all vessels, existing and new build, though the timeline for compliance with the BWC varies from vessel to vessel. Ships under construction whose keel was laid on or after 8 September 2017 must conduct ballast water management that at least meets the D-2 standard from the date they are put into service. For existing ships, the date for compliance with the D-2 standard is linked with the renewal of the ship's International Oil Pollution Prevention Certificate after September 2019.

To date, 66 states have ratified the BWC, representing nearly 75% of the world's merchant fleet tonnage. Some states are already moving ahead of the regulators, driving enforcement of the BWC ahead of the IMO timeline. Since 21 June 2012, the United States Coast Guard (USCG) ballast water regulations have required vessels that discharge ballast in U.S. waters to either install a treatment system or manage their ballast water in another approved way. In September, the California State Lands Commission issued a letter to clarify the new requirements for vessels arriving

at the country's ports on or after 1 October 2017, making clear its position on compliance with the Convention. In August 2017, the USCG issued a US$5,000 fine to the operator of a vessel for unauthorised ballast water discharge into the Willamette River in Portland. There is a strong likelihood that the level of fines will increase and will vary from state to state, with many anticipating that fines in the tens of thousands of dollars will be more likely.

Saudi Arabia is another leading global maritime nation that is moving ahead with enforcement of ballast water regulations. This is reinforced by the recent announcement by the world's largest oil producer, Saudi Aramco, that all vessels calling at its ports will be required to provide a ballast water sample and report. Saudi Aramco is among the highest receivers of ballast water from ships with over 180 million tonnes of ballast water discharged during cargo operations.

Vessel operators and owners must therefore carefully consider both the form and scope of current and future vessel operations to determine how the Convention applies to them and how they can ensure compliance with minimal impact on operations and profitability. Training of personnel to operate a BWTS and interpret the compliance data also must not be overlooked.

A further consideration is the reliability of BWTS. At a recent conference in China, one representative reported unsatisfactory performance based on experience with the BWTS fitted on 36% of its fleet. At the same conference, another speaker noted problems across five main areas – TRO sensors, systems valves, control units, filters and flow meters. This has caused crews to lose confidence in the treatment systems and has induced a fear of additional commercial risk amongst shipowners.

Chelsea Technologies Group (CTG) has direct experience of ballast water management and compliance with the high standards demanded by regulators. CTG's FastBallast Compliance Monitoring System was identified by Saudi Aramco's in-house marine biology experts as the most accurate solution in the market for the sampling and testing of ballast water, and will be used to conduct spot checks undertaken by third-party sampling companies.

FastBallast is able to accurately determine the phytoplankton cell density of ballast water to IMO D2 & USCG Discharge Standards (10-50 µm range). It is the only technology that can provide a high degree of accuracy as both an integrated flow through system and as a portable compliance tool, providing the port state control officer the same level of confidence in the results as with laboratory analysis, in-situ and in a much-reduced timeframe. FastBallast's straightforward sampling and analysis techniques are being successfully applied to negate disputes and reduce the risk of non-compliance worldwide. Additionally, Global Strategic Alliance Saudi Arabia (GSA), CTG's agent for Saudi Arabia and Bahrain, is working closely with the Saudi Arabian authorities to set FastBallast as the national benchmark for accurate and reliable ballast water sampling.

Saudi Aramco and the U.S. Coast Guard have set high standards in environmental sustainability, and are proactively driving change ahead of regulations. It is clear that ballast water monitoring and the issue of compliance is here to stay, and vessel owners and operators should take steps now - both to maintain the asset value of their vessels, and to future-proof their operations and maintain and indeed grow their market share.

Ship owners and crews must have confidence in the integrity of the BWTS they have invested in, and the crew should have the training to give them the knowledge and expertise to spot any issues with the compliance data. Failure to do so will prolong damage to the environment and will impact brand and reputation. For ship owners, this will lower profitability and reduce the available share of the market.

To comply to new EU MRV Regulation

Cloud Software

The EU MRV (Monitoring, Reporting and Verification) regulation came into force on January 1, 2018, and it will see the EU collect data for over 12,000 vessels calling at EU ports to load or unload cargo and passengers, and make it publicly available.

The MRV regulation applies to all vessels with more than 5000 Gross Tonnage (GT). The aim is to quantify and reduce CO2 emissions from shipping and the regulation will create a new kind of benchmarking system in Europe.

Dealing with the increasing amount of regulation is an ongoing challenge for shipping companies and it's becoming crucial for companies to anticipate, prepare and plan ahead.

Whilst MRV is currently a regional regulation, there is scope for the International Maritime Organisation (IMO) to implement it globally in the near future, especially since shipping is responsible for around 3% of global carbon emission.

To meet MRV requirements, companies must capture and report on a range of data, including the origin and destination information; the amount and emission factors for each type of fuel consumed in total; the CO2 emitted; the distance travelled; the time spent at sea; the cargo that was carried and transport work.

This data will be published by the European Commission by 30th June 2019 and every year from then on. The enforcement process for MRV is going to be left up to each EU member state, and under UK Regulations a company could be made criminally liable if they are found to be non-compliant .

How many ships will be affected? Estimates suggest that relevant ships account for 55% of all ships calling into EU ports and 90% of related emissions . Only certain vessels, such as warships, naval auxiliaries and a number of very specialised ships are exempt

Ensuring Compliance

Shipping companies are increasingly turning to technology to implement smarter, faster and more effective processes. Technology is now providing the solution to achieving MRV compliance easily and with minimal effort.

For example, we launched a new Cloud MRV module last year within our Cloud Fleet Manager (CFM) solution that simplifies the process of data monitoring, capture and reporting by offering a single app, into which data can be entered from the ship. This data is aggregated, synchronised and transmitted to relevant parties quickly and seamlessly.

Cloud Fleet Manager offers a technology platform for companies to manage their entire fleet and for all information to be centralised, processed and accessed in real time using apps and mobile devices.

The software portfolio comprises more than 20 different business apps, with the MRV software being one of the most recent additions.

Using Cloud Ship Manager (CSM), the application for use at sea, all data can be captured offline on board and synchronised to the cloud as soon as there is an internet connection available. As the data is stored in the cloud all that is required is internet access to inspect data from all vessels any time or in any location. Data is transmitted from the vessels easily by e-mail and can be accessed immediately by relevant parties who can inspect reports about their entire fleet using their web browser.

As with our other applications, we placed great emphasis on intuitive usability and clarity in the design of our module. The user interface on board is reduced to the most relevant elements and enables the crew to work directly in a productive way – as usual for the Cloud Fleet Manager, this can be accomplished without training.

Why use Cloud MRV?

The fact that all data is managed in one system and further calculations are carried out automatically within the system makes collating the data extremely straightforward.

All the data is automatically aggregated, and the results are prepared in a format ready for companies to submit to a member of the International Association of Classification Societies (IACS) who have been approved as verifiers of the data.

Another benefit for companies is they don't need to install any software in the office. CSM can be used productively as an offline application - so companies can enter all their data without internet access and later the data is synchronised to the cloud as soon as the ship has a connection.

Companies that want to monitor and sustainably improve the overall performance of their fleet also have the option to upgrade to the full-featured Event Reporting within the company's Cloud Fleet Manager (CFM) platform.

With Cloud Event Reporting, there are a variety of additional key figures available such as times of anchorage and docking, machine-related data or bunker analyses, with the MRV module included.

About the Author

Alexander Buchmann founded Hanseaticsoft in 2009 to develop software solutions for shipping companies. Since March 2017, Lloyd's Register holds a share in the company.

To Conclude

To ensure compliance and avoid any penalties companies should acquire a MRV solution to monitor the KPIs requested by the EU. This is the first step towards real performance management.

Cloud MRV is making compliance simple, painless and cost-effective. The core benefit is its simplicity. All data is stored in the cloud, all that is needed is an internet connection to access the data from all vessels. The MRV solution fulfils all criteria of the MRV regulation and can be expanded for companies who want to focus on performance management.

Companies that upgrade to Cloud Event Reporting can gather a lot more information than the MRV regulation demands, plus they will also be able to conduct a real analysis of data – enabling them to monitor and increase their overall performance sustainably.

Shipping companies need a robust system in place to collect the MRV data and Cloud MRV could be just the solution for those not yet fully prepared.

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Tanker Ballast Water Treatment Retrofit in Steering Gear Room

"In 95% of our surveys [more than 150 ships], we have considered the Steering Gear Room (SGR) as an optimal space for installation, but up until the *Aleskey Kosygin* retrofit it has never been chosen by the shipowner," said Argo Navis Marine Consulting & Engineer co-owner Andreas Zontanos

The *Aleksey Kosygin* is a 163,545 DWT crude oil tanker built in 2007 with an ice class rating. SCF Management Services (Dubai) Ltd. approached Argo Navis to do a 3D scan and ship survey in preparation for its upcoming ballast water treatment system (BWTS) retrofit.

"The benefits of a treatment system installation in the SGR are obvious – savings in installation and maintenance costs, and a reduction in cabling and piping, but the greatest benefit was the elimination of building a deckhouse for the treatment system. The ease and compared success of this installation was one of the most important factors of this project," said Zontanos.

INSTALLATION DETAILS

The Ecochlor Treatment system was installed within a new dedicated space at the port side of the SGR, separated from the rest of the SGR by a new bulkhead. The chemical filling and ventilation station were located above the SGR on the Upper Deck. The filtration system consisted of two filter units mounted vertically and installed inside the cargo pump room (CPR). A third filter unit for aft peak tank (APT) treatment was put in the engine room.

PRE-DRY DOCK

The first day boarding the vessel, prior to dry dock, the Ecochlor team met with representatives of the Santierul Naval Constanta shipyard, Argo Navis, SCF project manager and the crew. Daily group meetings were scheduled for each morning to discuss the goals of the day. Reports and photos of each day's progress, were to be provided by Ecochlor and Argo Navis to stakeholders that were not present at the shipyard.

"The importance of communication among the team is a critical factor for the success of the project. Any consequence of mistakes, poor design or planning can by eliminated when communication is effective," explained Zontanos.

During the pre-dry dock period, the shipyard started the Pump Room Hatch and SGR opening preparations and new bulkhead, cut and opened the APT deck areas, set up scaffolding, and constructed the chemical tank and ClO_2 generator foundations. BWTS equipment had been delivered to the shipyard and the Ecochlor team immediately started on the inventory.

DRY DOCK PERIOD

Once in dry dock, the work moved quickly. The foundations of the treatment system and aft peak filter were lowered down into their respective locations. Welding started for the chemical storage tank containments and foundations for the filters and the treatment system.

Two weeks later, the new bulkhead construction had been inspected and approved by the Class Surveyor, piping and cabling were in progress and the treatment system and filters were now in place.

The Ecochlor team leader brought the ship crew on a training tour around the vessel to the various installation points of the BWTS, (i.e. engine room, steering gear room, pump room) to familiarize them with the system components. Further hands-on training took place with the start-up of the system and commissioning.

During the final days of the dry dock the Ecochlor commissioning team started electrical testing, aft peak tank filter equipment checks and ballast pipe pressure testing. The results of the tests were presented to the Class Surveyor and the commissioning was successfully completed.

CONCLUSION

"We believe that it is vital that during the retrofit that our experienced installation team is working at the dry dock alongside the shipyard, superintendent, engineering integrator and crew to ensure that the ballast water treatment system is installed properly and operating effectively at commissioning. Our company philosophy is that the sale and installation of an Ecochlor System initiates a relationship with the shipowner and operator that will last for the life of the vessel and this cooperative relationship begins at the installation!" said Tom Perlich, founder and president of Ecochlor.

If Data is the New "Oil"

Then Satellites are the Pipeline

About the Author

Stephen Conley is a Maritime Market Segment Lead, SES Networks, responsible for developing and maintaining an in depth understanding of the maritime market and ship owner and operator's connectivity requirements.

As the shipping industry embraces digitalization, it's time for a new era of fresh thinking that recognizes the potential of satellite communications in delivering financial, environmental and safety improvements.

If shipping awarded a 'word of the year' in 2017, digitalization would have been a clear contender. The term has become a mainstay of commentary in maritime media and a key topic of debate at our industry's conferences and exhibitions.

But the reality is that digitalization is more than just a word or catchphrase that's captured shipping's attention. The work being done in its name is set to transform the sector.

The risks and rewards associated with digitalization are plentiful. Shell, for example, has fitted its fleet of LNG carriers and tankers with more than 500 data points and connections to shore, creating a flow of information between vessels, ports and terminals that is enabling an efficiency of operations that would have been unthinkable in the analog age. Equally, Maersk experienced first-hand the risks associated with digitalization during a widely publicized cyber attack on its IT systems in 2017. And despite the scars of footing a $200-$300m bill for the incident, Maersk remains a staunch supporter of digitalization, calling it a 'key part of its future' on its webpage dedicated to the topic.

Exponential Growth

As notable as the risks and rewards of digitalization is the speed at which it's being deployed. While its true potential for the industry remains unknown, what is clear is the exponential growth of digitalization and the solutions that it enables, not least in the ability for companies to manage vast flows of data. For example, according to satellite consultancy COMSYS, the number of active maritime VSAT installations, which send and receive data at broadband speeds on board vessels, has quadrupled from 2008 (6,001) to 2014 (21,922), and it is predicted to exceed 40,000 this year. Moreover, according to DNV GL, the Maritime VSAT network has nearly doubled in the last two years from 8.7 Gbps (Gigabits per second) to 16.5 Gbps. If this trend continues – and there's no reason to think it won't – this capacity will reach 217 Gbps by 2025. Unprecedented growth that reveals the industry's eagerness to exploit the opportunity that digitalised satellite communication brings.

*Shell, for example, has **fitted its fleet of LNG carriers and tankers with more than 500 data points** and connections to shore, creating a flow of information between vessels, ports and terminals that is enabling an efficiency of operations that would have been unthinkable in the analog age.*

You don't need to understand the intricate working of VSAT to appreciate that exponential growth in capacity requires the support of reliable, high performing and scalable satellite infrastructure to transmit and receive data. This is essential to enable a plethora of connectivity solutions including supervisory control and data acquisition (SCADA), the Internet of things (IoT), remote sensing and capturing data from remote locations to input into big data solutions. Indeed, today almost every form of communications worldwide travels via satellite for part of its journey.

New Mindset

While the rampant grow of data in shipping is well acknowledged, the satellite infrastructure required to enable data flows has lagged behind, with under-developed, fragmented and unreliable systems leaving ship owners and operators with low expectations -- until now. SES Networks believes this needs to change so that ship owners and operators adopt a new mind set where service consistency becomes the norm, not the exception.

The power and effect of data in shaping the shipping industry is huge. With more, and more accurate, data, businesses are discovering that it is essential to stay abreast of developments in order to make better informed commercial decisions, and in so doing, remain competitive in an increasingly challenging and commoditised marketplace. Faster data can also improve vessel and fleet performance through 'real time' data transmission between vessel and onshore; including fuel consumption, routing and navigation, engine, hull and propeller optimisation.

Beyond the fleet, data can enable predictive analysis such as, for example, regional economic demand variation, ship type demand forecasts, or predicting new commodity markets that are spawned a decade from now. Currently, the industry seldom collects satellite data to use for this purpose.

However, SES Networks believes forging new partnerships between satellite communications providers, ship owners and operators and navigational, security data providers, and blockchain

According to COMSYS, the number of active maritime VSAT installations, which send and receive data at broadband speeds on board vessels, has quadrupled from 2008 (6,001) to 2014 (21,922), ***and it is predicted to exceed 40,000 this year.***

and AI ventures, could unlock unlimited new possibilities for the application of satellite data to predict performance. We also believe a manageable and robust platform such as Maritime+ is key in enabling the shipping industry to access these services.

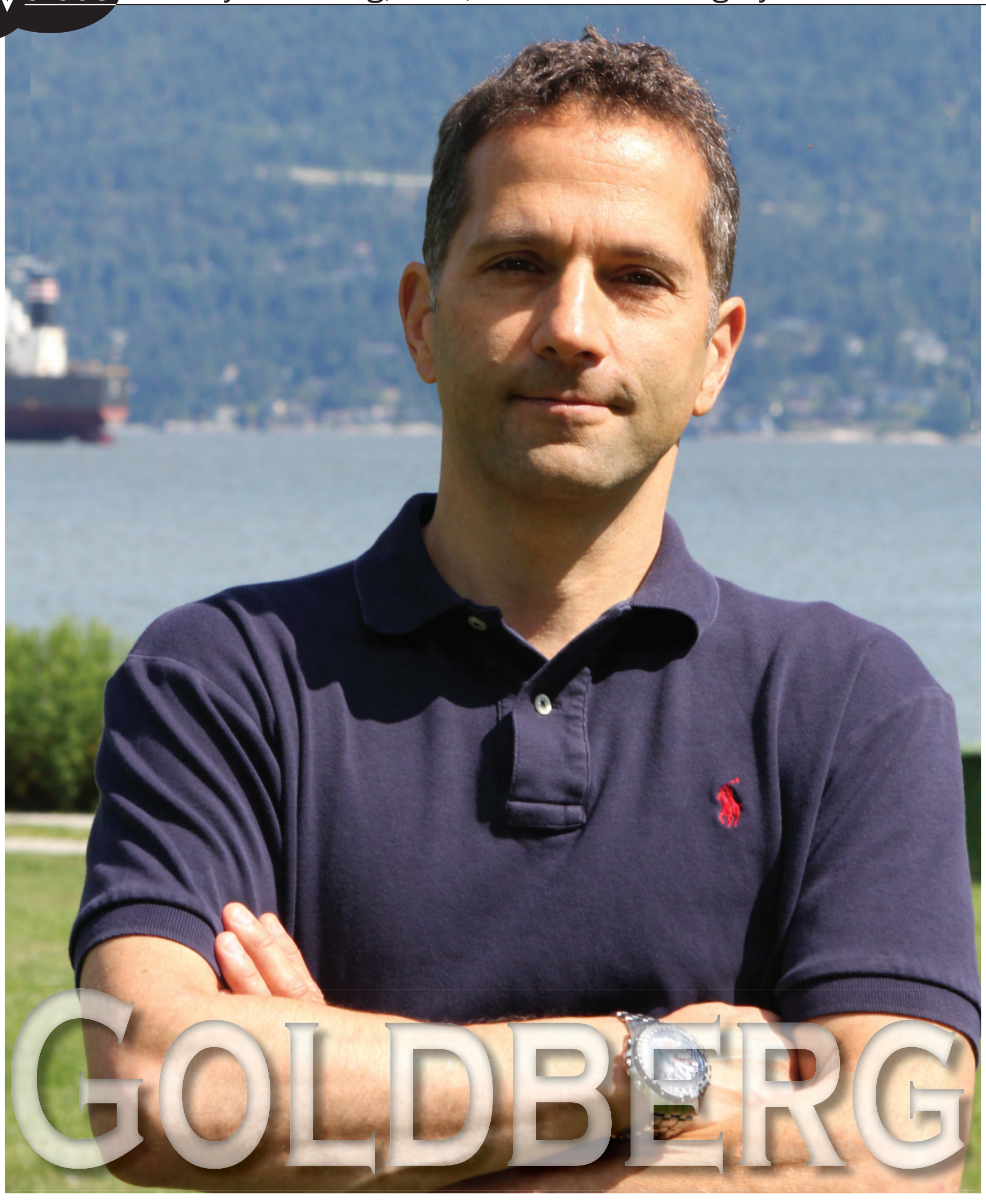
In 2018 alone SES will launch six new high-throughput satellites. SES-12 will provide spot beams of Ku-band over Asia and the Middle East and SES-14 will deliver broadband over the Atlantic Ocean and the Caribbean Sea, as well as four O3b satellites that will provide low latency connectivity globally. Through continuing innovation and subsequent launches of our fleet, we will be able to ramp up the maritime platform services to deliver large scale managed data solutions which are optimised for ships; therefore injecting true value for end users.

Enabling Digitalization

Ship owners and operators continue to experience unprecedented challenges, encompassing weak demand, higher costs, increased regulation, and a lack of credit and capital liquidity in the market. Amid these market conditions the exponential growth of digitalization should present an opportunity, not a concern. If data is the new oil, then reliable, available and high performing satellites are the modern day oil pipeline; with an essential role in facilitating the effective use of more, and more accurate, data in shipping.

Voices

Murray Goldberg, CEO, Marine Learning Systems



Murray Goldberg is CEO of Marine Learning Systems, maker of MarineLMS. A researcher and developer of learning management systems, his software has been used by millions of people and companies worldwide.

BY GREG TRAUTHWEIN

What is Marine Learning Systems?

As a company we are here to support the move in the maritime industry to "blended learning" –modern, sophisticated training and assessment techniques. The world has moved from more traditional training methods to a combination of e-learning and face-to-face training which has proven to be superior to traditional models. So Marine Learning Systems does two things: it provides an enterprise platform to deliver online training, online assessments and leading indicators of success. In addition, MLS has a "services" arm around that; our Director of Learning has a PhD in Education.

Put in perspective where maritime is at on the curve of companies adopting your type of solution versus a more traditional model

It is a great question, because I would say four years ago we were at the point where the vast majority in the maritime industry didn't even know what e-learning or blended learning was, certainly not what "blended learning". We have existed for four or five years as a company, and it was very slow for the first couple years. Now, the industry is at a point where I think we have hit that inflection point where. MLS is doubling year over year in terms of our customer base. I think the more sophisticated players, particularly those focused on safety and, to a degree, performance, understand (the power and potential of) blended learning. So we are not there yet, but we have hit a point where it is growing very quickly. We are at the beginning of a huge adoption phase.

While the Marine Learning System name is relatively new to the marine space, you are not new to the learning area – or the software area. So I think it would be instructive if you give a bit of background of where you came from, your career history, and how that has shaped the offering that is Marine Learning Systems today.

Absolutely. I'm an old guy so I've been around for a while. I was a Computer Science faculty member at a large research university. We are based in Vancouver on the west coast of Canada. We

What happened to BC Ferries was that over this 10 year period they found that their ***accidents dropped 60 to 70%****, their insurance claims costs dropped from about $4 million dollars a year to under $1 million dollars a year, and overall it was a much safer operation.* ***Interestingly on-time performance went up, too.***

have an office in Europe, as well, but most of us are in Vancouver, and that's where I was a computer science professor. My research area was actually online learning, web-based learning, blended learning, looking at outcomes: looking at student retention, student experience, knowledge gained in the various modes of learning effectively. And this was before there really was much in the way of blended learning. That research that we were doing ended up resulting – because we're computer scientists, of course – in the creation of some software to support online learning and online assessment. That sucked me out of the university because, not just based on our research, but really based on what was going on in the world in regards to e-learning. I took the software that we built for our research and started a company around it called "Web CT" to provide the e-learning infrastructure commonly known as a Learning Management System, or an LMS. I started that company in 1997 and it grew in just a few years to about 4,000 universities in 80 countries using the software; overall about 14 million users.

So how did you find your way into the maritime industry?

I sold that company and got involved in the maritime industry in 2006. BC Ferries had an incident that year that caused them to look at all of their operations, especially with respect to training. They wanted to be a world-class training organization. So they had me in as a consultant to help formulate a pilot. The pilot went well, and so they said, "We want to deploy this across our whole organization." Well, what we quickly found was that there were no learning management systems – no enterprise software – that could support the operational and training context in the maritime industry. So I built them something specific for them in 2007. They've been using it since and now they are 10 years down the road and they have fantastic results.

Word spread, and about five years ago I started getting requests from other vessel operators to provide the same kind of infrastructure and the same kind of software and the same kind of services. That's when Marine Learning Systems was born.

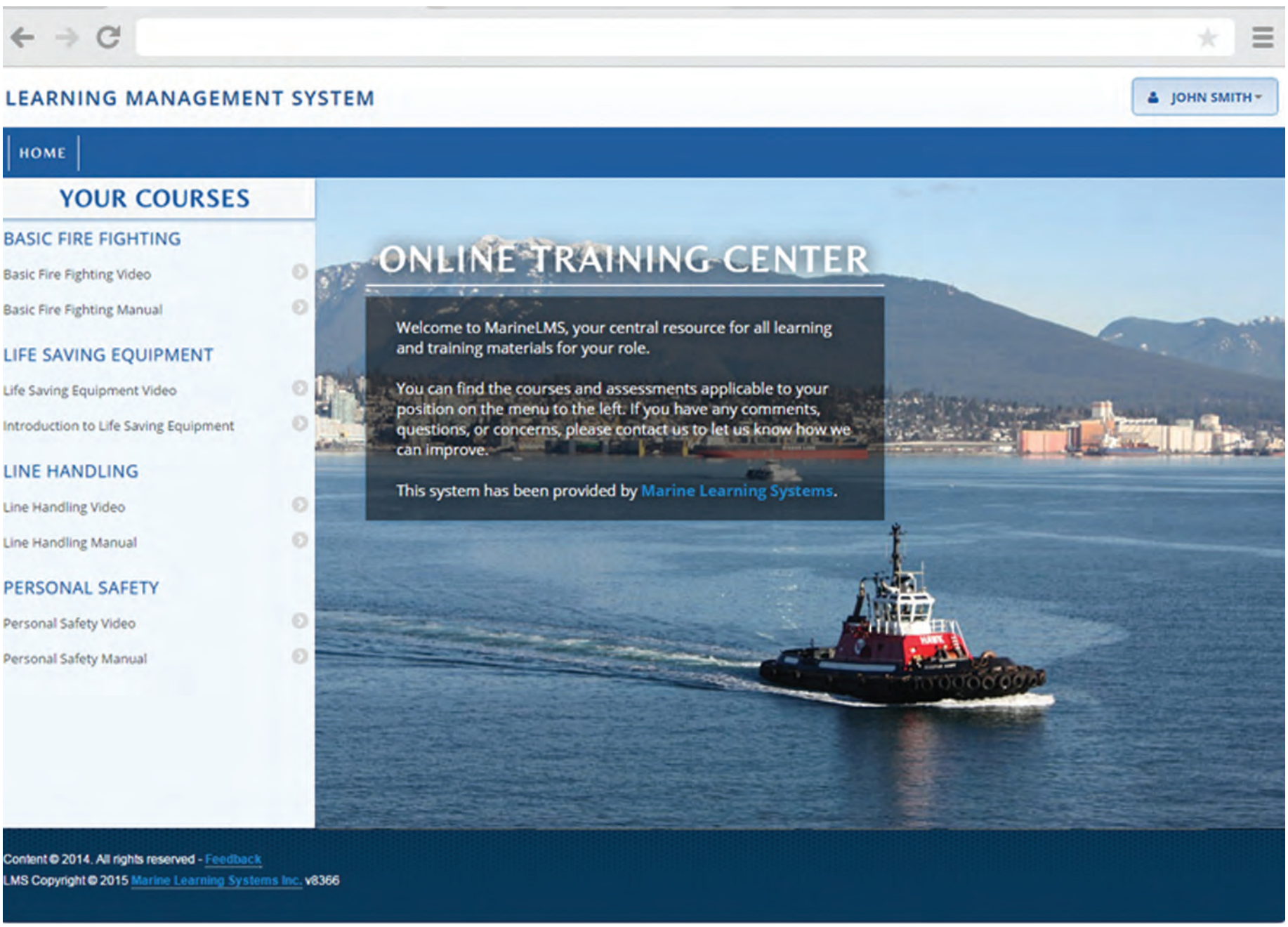


Image: Marine Learning Systems

So "fantastic results." Can you please put a little meat on the bones as to what kind of results BC Ferries has gotten with the system you built.

Absolutely, and in fact, I'm presenting about this here (at the Work Boat exhibition in New Orleans) with a good friend and customer from Moran Towing, Kelly Curtin. We are co-presenting on blended learning, Moran's approach, as well as what happened at BC Ferries. What happened to BC Ferries was that over this 10 year period they found that their accidents dropped 60 to 70 percent, their insurance claims costs dropped from about $4 million dollars a year to under $1 million dollars a year, and overall it was a much safer operation. Interestingly on-time performance went up, too. Really, safe operations and efficient performance are inextricable; you can't really do one without achieving the other in some sense. So it was a really positive story, and it continues to be a very positive story. BC Ferries is one of the greatest ferry systems in the world and they really care about safety, and they're a real leader in this respect.

I know from working with you for many years that you have some very other high profile maritime clients. Can you discuss another that you see as a true trendsetter?

We are fortunate in that we get to work with those organizations who think about safety at the forefront of their processes. And so every one of our customers is phenomenal in terms of being engaged, innovative and enthusiastic. I could talk about any of them but let's just pick one: Carnival.

The Carnival Group are really driving the work that they do through their innovative thoughts. Just as one example: recently Carnival had an idea about how they assess real-time performance. I think in the maritime industry we don't actually assess real-time performance, except maybe in retrospect like "did we have any accidents last year?" "How efficient were we last year?"

So Carnival wanted to be able to say during a fire drill, during a lifeboat drill, during a simulation on a bridge, "how can we really assess the team and how can we assess the individual's contribution to the team, in real-time so we can get deep metrics, so that we can improve (in terms of safety and performance So they had us build a bit of a prototype which, together with some other organizations as well, allows real-time assessment. First it was built for the simulation environments because they are actively involved in bridge and engine room simulation. The system allows an assessor to be a part of that simulation to record observations Let's say it's a collision scenario: Did somebody call (up) the event? Yes. Was the voice loud and clear? Yes, the voice was loud and clear. And so on. At the end you get a deep analysis on on how this team performed as a whole, noting shortcomings and strengths, recording how each person contributed to the overall team performance, noting individual strengths and gaps, as well. This is a piece of technology that we are building with them right now.

How Much is Your *$uperyacht* Worth?

Sam Tucker Will Tell You

There's a new name in Superyacht valuation, and the name is *VesselsValue.com*. We spoke with VesselsValue.com's Sam Tucker for insights on its new Superyachts report.

BY GREG TRAUTHWEIN

Many of our readers know VesselsValue, but for those who do not, please provide a brief description of the organization and its offering.

Launched in 2011 by Richard Rivlin, a ship broker with 40 years of buying and selling experience, VesselsValue provides daily and automated Market, Demolition and Discounted Cash Flow Valuations for each vessel based on its individual specifications and the daily market movements. VesselsValue covers bulkers, tankers, containers, gas vessels, the offshore fleet and now Superyachts, totaling 60,000 vessels.

Today VV has 4 offices – London, Isle of Wight, Stoke and Singapore, employing more than 120 people in roles ranging from collecting and processing individual vessel specifications, building up the GIS infrastructure on VV@ as well as a team of analysts monitoring the daily market valuations. VV is used by the world's leading commercial and investment banks, private equity, funds, ship owners and operators, lawyers, accountants and brokers.

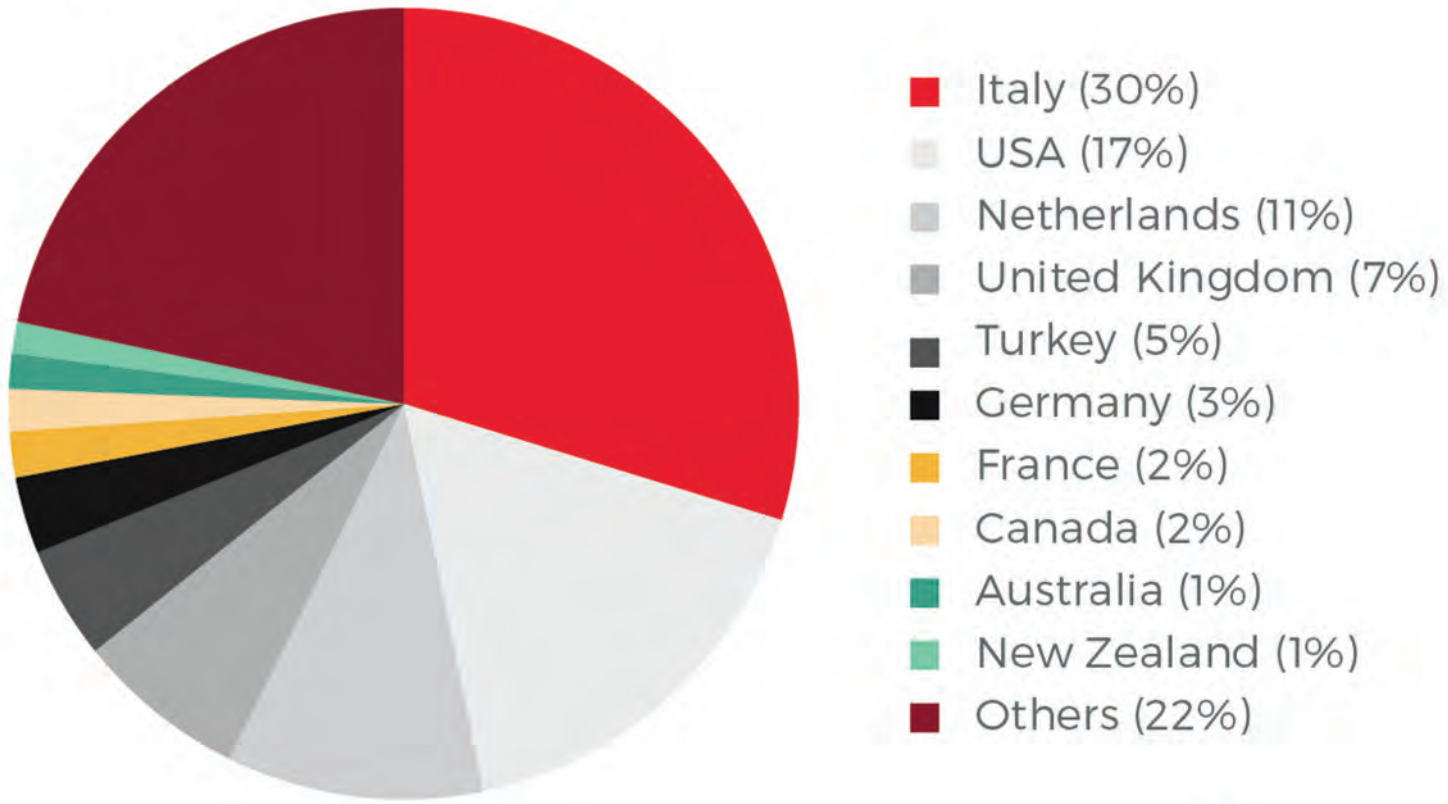
So what exactly is VV Superyachts?

VV Superyachts is an extension of our basic services into this luxury vessel segment. We've applied our three core modules to this sector, which includes automated valuation, searchable database, and satellite tracking. The ultimate

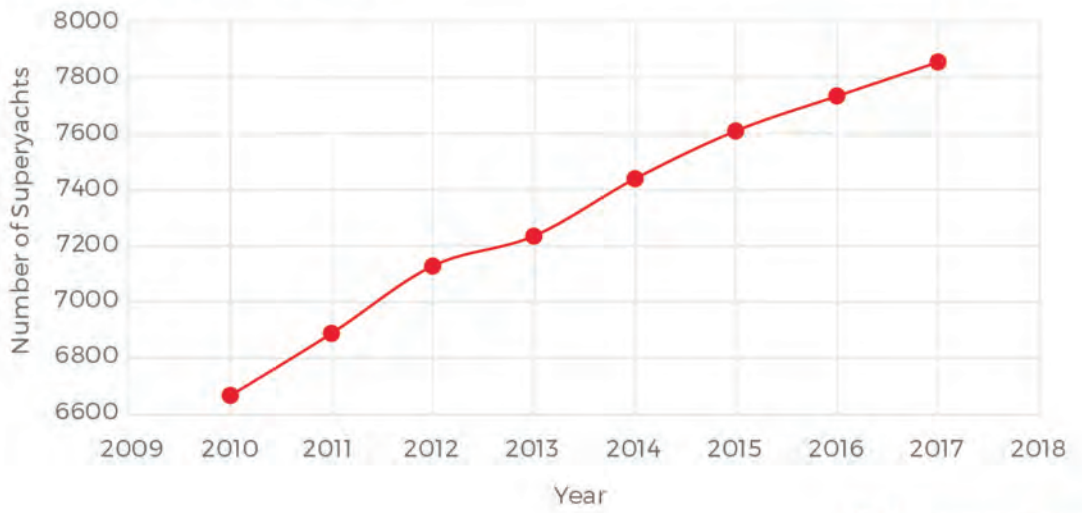
© Rich/AdobeStock

*In total, VV has data on **8,235 Superyachts** (more than 24m) which is broken down to 19% sailing yachts, 81% motor yachts. Roughly 5% of these have not been delivered yet. **From 2010, the fleet size has been growing quite consistently** at stable 3% per year.*

LIVE SUPERYACHT FLEET BREAKDOWN
BY BUILDER COUNTRY



HISTORICAL SUPERYACHT FLEET DEVELOPMENT



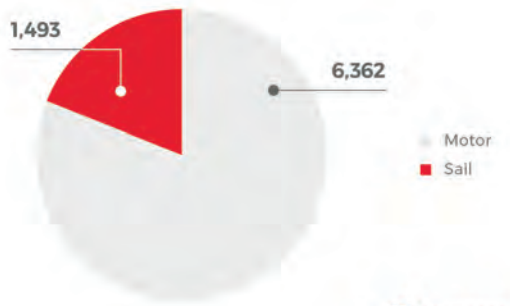
VesselsValue

FLEET SIZE BY COUNT

Status	Count
Live	7,855
On Order	360
Launched	20

VesselsValue

LIVE FLEET OF SUPERYACHTS



VesselsValue

goal is to provide a transparent assessment of how much a vessel is worth, and in doing so facilitate transactions, which ultimately increases market activity.

What was the impetus to launch VV Superyachts now?

VV works closely with ship owners, many of whom also own private yachts. Their familiarity with VV data led them to ask for the same high quality assessment of value to be applied to Superyachts that is currently being used for their commercial ships. Previously all assessments of luxury vessels were provided on a case-by-case basis by brokers who may or may not be involved with the sale or purchase of a Superyacht. The project began at the start of 2017, and was soft launched in Monaco September of last year.

Can you provide a statistical picture of the Superyacht market today,

In total, VV has data on 8,235 Superyachts (more than 24m) which is broken down to 19% sailing yachts, 81% motor yachts. Roughly 5% of these have not been delivered yet. From 2010, the fleet size has been growing quite consistently at stable 3% per year. Save for the global financial crisis of 2007/08, this industry appears to be immune from cyclical patterns and volatility. While the northern European countries build the largest vessels, the Italians top the list as the largest producer of Superyachts by number. They are followed by the USA.

There are many factors pertinent to accurate Superyacht valuation. From your position, what are the top three?

Similar to commercial vessels the top three variables are the size (LOA & GT), age and yard of build. Other factors are considered in the valuation process including, features, hull material, propulsion, etc.

The Superyacht market is exclusive … and private. Can you discuss the challenge of collecting reliable dataa and information as compared to say the bulker market?

All vessel transaction data from small bulk carriers to large VLCCs is kept private and is difficult to track. VV has more than 60 researchers and analysts committed to tracking these opaque markets and has access to private data sources. The extension into Superyachts plays to this existing ability.

In the Superyacht sphere "Asking Prices" are circulated around and are widespread. There is typically a 10-20% difference between this price and the achieved price. This reduction is typically a function of the time a yacht has spent on the market, how many previous price reductions have happened and the broker/vessel details.

Ownership information is particularly difficult to obtain since most owners prefer to remain private and discreet. This doesn't stop rumors, gossip and grapevine news traveling around the industry. There isn't one key source of information, but our very large research team use many different channels.

Ultimately, who is the target market for VV Superyacht data?

We believe that there is something for everyone in VV. Typically banks and financiers use us to monitor their LTV ratios and monitoring the portfolio of their loan books. Insurers like to see their exposure to certain assets. Indeed, owners and brokers use us to keep an eye on the market and for purchase enquiries. In short, everyone who is involved with Superyacht transactions or who has a stake in the market.

Cruise Adventure &

Image Courtesy: Sunstone Ships Inc.

Luxury Yacht Market

Niels-Erik Lund *began his passenger ship career in 1969 as a trainee in a Danish passenger shipping company, DFDS. In the nearly 50 years since, the passenger and cruise shipping industry has changed many times over, with consistent growth being the only similarity between then an now. Today Lund, President & CEO of* **Sunstone Ships, Inc.**, *has an unfettered view of the Expedition Cruise sector that he helped to create. With the* **Expedition & Luxury Cruise** *segments set for fast growth, Maritime Reporter spoke to Lund to help put the market in better perspective.*

BY GREG TRAUTHWEIN

I've covered the maritime industry since 1992, your tenure extends even further. When you look at the cruise industry today, from your perspective please give a 'State of the Market'.

The cruise industry as we know it today started in the late 1960's with Knut Kloster and Ted Arison forming Norwegian Cruise Lines. Since then, there has not been one year in the industry where the number of passengers have dropped. Cruising has become a mass market vacation, an amazing value for money. Based on this I do not foresee any reduction in capacity or occupancy in the years to come.

I understand that you have more than four decades experience in this sector. How did it all start?

I began my passenger ship career as a trainee in a Danish passenger shipping company, DFDS, Copenhagen which was formed in 1866 mainly operating ferries, but also had a few cruise operations. When I started in 1969, it was a quite large company with approximately one hundred vessels, 52 subsidiaries worldwide and operating both cargo and passenger services.

DFDS formed a cruise company in Miami, Scandinavian World Cruises, which began operating in 1982. Unfortunately the company was not very successful, and as Director Finance in Copenhagen, I was asked to go to Miami as President of the company, and to either turn it around or close it down. We managed to turn the company around and three years later it was sold. In 1988 I founded International Shipping Partners as a passengership management company.

ISP grew from having one ship on management, to becoming one of the largest passenger ship managers in the 1990's with more than 20 ships. In 2004 the company changed strategy to concentrate on the expedition market, not only as technical managers, but also hotel managers, and to become involved in the acquisition of vessels for investors, and take on the commercial management of the ships, being responsible for purchasing, chartering and selling the fleet.

In 2012 the technical and hotel management segments of ISP were sold to a German private equity firm, Waterland, and only the "owned" fleet and the commercial management were retained and moved into the existing company, SunStone Ships, Miami.

SunStone Ships is a pure commercial manager with the responsibility of buying, chartering and selling of the 11 ships in the fleet.

In 2015 the owners of the SunStone fleet repurchased the technical management operation from Waterland and formed the passengership management company, Cruise Management International (CMI), as well as the hotel management company, changing the name to CMI Leisure (CMIL). The technical, hotel and commercial management companies were back in a group of associated companies, all operating out of the same facilities in Miami.

Looking at the industry since you started to today, how has it changed most?

The industry in which SunStone operates is concentrated within the expedition market which has developed quite a lot since the company acquired its first ship in 2004. At that time there were approximately 45 vessels in the segment we describe as the expedition cruise market, which are fully ocean-going SOLAS approved vessels with a capacity between 50-250 passengers based on double occupancy. The fleet was then very old, very fragmented with no large owners, operators or managers.

The number of vessels have decreased since a number of ships have been scrapped; some have been replaced by the conversion of secondhand vessels, themselves old ships, so the worldwide fleet today has an average age in excess of 25 years.

The expedition market has expanded drastically over the last five years, and quite a number of owners and operators have ordered new tonnage which will come into place from 2019 forward, with newbuildings being ordered from Norway, Germany, Spain, Croatia and China.

From a historic point of view, there has never been so many newbuildings on order for the expedition segment. However, it is not expected that any more secondhand vessels will be converted into expedition ships, and the worldwide

3D renderings of the *Greg Mortimer*, the first new building.

Image Courtesy: Sunstone Ships Inc.

fleet is very old on average and should be scrapped within the next 10-12 years. Newbuildings are clearly needed as the market is expanding.

We can read the description online, but for the uninitiated, please give a concise description SunStone.

SunStone Ships is a pure commercial management company, managing passenger ships only, and mostly smaller vessels (100-250 passengers). SunStone's associated companies have the technical management of the fleet as well as the hotel management of most of the SunStone ships. Based on this SunStone can provide the tonnage to the travel/cruise companies with all operational aspects included. For the expedition market SunStone is a one-stop-shop. With the existing fleet SunStone is the largest tonnage provider to the expedition market. The Miami office is a total of 55 employees, and there are more than 1000 officers and crew.

A decade ago the 'cruise' story was mammoth ships … one bigger than the other, packed with modern and increasingly complex entertainment options. But the small oceangoing luxury expedition vessel sector has enjoyed a strong growth. Why?

We are quite positive about the market for small luxury expedition vessels, as we see this segment continue to grow. There are a number of reasons. If you look at the existing cruise markets such as the U.S. and Europe, more people are retiring younger, with more available time and money. Older people are more active than they were years ago.

Also, people who have done all the 'normal' cruising such as the Caribbean, Mediterranean, Baltic and the Far East, now want to see the more remote areas of the world, which is where the small expedition ships come into play. People are very interested in the Polar Regions such as Far East Russia, Arctic Canada, Greenland, Iceland, Spitsbergen and Antarctica, and we also see more travelers wanting to go on warm water expeditions in areas such as Australia, Borneo, Polynesia, Philippines, Galapagos, Amazon River, etc.

In addition to the older cruise demographics, there are completely new segments, the largest being the Chinese

Sunstone Rebuilds Expedition Fleet

In May 2017 **Sunstone Ships** and **China Merchants Industry Holdings (CMIH)** signed a Framework Agreement for the construction of four expedition vessels with options for six more.

CMIH entered into an agreement with **Ulstein Design & Solutions**, which will supply the vessel's design and equipment package,and construction supervision. **Mäkinen**, Finland, will establish a cabin assembly plant and interior workshop at the shipyard's facilities. The hotel design of our new fleet will be done by T**omas Tillberg Design International**. The project was brought together by **Tillberg & Reyes Group Co. Ltd.**, who acted as broker.

Main Particulars:

Passenger cabins	80 – 95
Length	104m
Width	18.2m
Draft	5.1m
Speed	15 knots
Class	Ice Classed 1A
Polar Code	PC 6
Classification Society	Bureau Veritas
Flag	Bahamas

passengers, where five years ago, there were basically no Chinese passengers onboard our ships; today it is the second largest nationality. The Chinese market is expanding dramatically in all aspects of cruising. Culturally the Chinese like to travel in large groups and therefore they often charter the entire vessel with 100-250 passengers. We expect to see this market grow even further, as well as the emergence of new nationalities, for example India, into this market segment.

Do you have any plans to revamp your fleet?

For a number of years SunStone has been working on a newbuilding program to replace the existing fleet of 10 expedition vessels, as well as to expand the capacity. For years work was done on 'Projected Unlimited,' where a 200-passenger vessel was designed for both cold and warm water cruising. However, mainly for pricing reasons, the project was reworked into a slightly smaller vessel and more specifically suited for either cold or warm water operation, even if it could still do both. This design is now called the INFINITY series of ships, with the first vessel now under construction in China with a delivery in September 2019. The first vessel has been chartered out to Aurora Cruises, Australia, and has been named the M/V Greg Mortimer.

Technically speaking, what is special about the new vessels?

The new vessels have quite a number of features not existing on the current expedition fleet. First, the design is primarily focused on safety, comfort and green operation. From a safety point of view, INFINITY has Safe Return to Port, Polar Code 6, Ice Class 1A, and fulfill all the newest SOLAS regulations as well as all known SOLAS regulations coming into effect in the future. From a comfort point of view, the vessels have zero speed stabilizers, X-bow and dynamic positioning, and is an all-balcony suite ship, with much more public space per passenger than most of the existing expedition fleet.

The vessels will be equipped with a diesel/electric system with Tier III engines, the most environmentally friendly engines in today's market, as long the vessels are operating on Marine Gas Oil. In our opinion, based on the very remote areas of operation, as well as the need for long-range, from a practical point of view, there are no alternatives than the best possible diesel engines.

There are some owners talking about having battery-powered ships with the ability to operate 10-20 minutes on batteries; however, in our opinion, this is still too short a period of time to make any difference and do not believe that the battery power is fully developed enough at this time to be practical for expedition vessels.

Looking at the actual ship/maritime operations, what technology/technologies do you see as the most influential in helping you to grow your business.

The expedition market is mainly about destinations; getting to very remote destinations in a safe and comfortable way. In today's market there are no other ways than with small cruise vessels, and we do not foresee this changing in the next 10 to 12 years. These remote areas will be protected from mass tourism as well as from infrastructure building, therefore small, environmentally friendly vessels with small Zodiacs or other landing crafts will be the way of the future to see these parts of the Antarctic, the Arctic, or small uninhabited islands in Polynesia, Micronesia or many of the reefs and islands worldwide.

Looking at the business today, what do you consider to be the biggest challenges to running a profitable, efficient cruise operation today?

From a cost point of view, some of the challenges in operating small ships are the need for a fleet of vessels to have an efficient operation. Having one or two ships makes it almost impossible to have an in-house operation as the cost of the shore-based organization, insurances, lack of purchasing power, and the inability to find officers and crew, makes for a complicated and costly operation. There will also be challenges in the future to find officers with qualification to sail in these regions, as in many areas, an Ice Master is required, or officers with separate pilot licenses; and with the expanded fleet, and more companies coming into this market segment, there will be a need for the constant education and training of new officers to operate in these remote areas. It is also becoming a challenge to provide a high quality hotel product, as this requires having large storage capabilities onboard, as there are cruises of up to 20 days where provisioning is impossible. Companies have to be very creative with menus and a good hotel crew to minimize waste and that even with a small ship with reduced storage and galley spaces, a five-star product can still be delivered.

Image Courtesy: Sunstone Ships Inc.

A CRUISE SHIP THAT MOVES THOUSANDS OF PASSENGERS

And a large-scale project where we were on board from the beginning

Why does the world-renowned Meyer Werft shipyard team up with Viega time and again for numerous projects of this scale? In addition to the extremely reliable piping systems made from copper, copper alloys or plastic materials, Viega also supplies the know-how to go with them. **Viega. Connected in quality.**

Meyer Werft shipyard, Papenburg, Germany

viega.us/About-us

viega

The French Connection

Edie Rodriguez, the Americas Brand Chairman for PONANT Yacht Cruises and Expeditions, has spent a life and built a career centered on travel, cruise and branding in a most luxurious manner. She was a natural to discuss the booming luxury expedition sector, the next big frontier in the global cruise industry.

BY GREG TRAUTHWEIN

It is natural, in the U.S., to pronounce PONANT as "po nant," but the French have a different style and the company name is pronounced "po non," dropping the 't.' But Edie Rodriquez, charged with spreading the PONANT name in North America, does not get hung up on diction in this case. "You say 'po-tay –toe' ... 'I say po-ta-toh' … as long as you book with us, call us what you like!"

For those of you not in the know, PONANT is the only French-owned cruise line, small but growing fast and a world leader in luxury expeditions. The company was created by Jean-Emmanuel Sauvée and a dozen officers of the French Navy, and as it prepares to celebrate its 30th birthday in 2018 it has on order five ships that will essentially double its capacity by 2021, a burgeoning fleet that will include the world's first LNG-fuelled icebreaking luxury cruise ship. (See story on page 42)

"PONANT has approximately 1,000 employees worldwide and growing," said Rodriguez. "Today, as we speak, Ponant has five vessels accommodating approximately just over 1,000 guests in total. But as you know we are building four new Explorer ships; the first two are coming in the summer of 2018; the next two are coming in the summer of 2019."

But the story of PONANT and Rodriguez's decision to join the brand transcends ships and itineraries.

All four of the Explorer ships are identical in size and outfit, each differentiated with interior colors and décor. All four of those ships will host 92 suites/184 guests. In addition the company is building the world's first ever luxury icebreaker to take PONANT guests to the North Pole. All five new ships in the fleet by 2021 equals an additional 900 guests.

"Jean-Emmanuel Sauvée is a very passionate founder; a true sailor and sea captain, and the genesis of Ponant," said Rodriguez. "Ponant is owned by Groupe Artemis, which is also the parent company of Christie's (auction house) and Kering (which owns a number of luxury brands including Yves St. Laurent and Gucci, to name a few).

So, in short, Ponant has a well-funded, passionate owner with deep roots and ties to the global luxury brands. "It's just a winning combination. At Ponant, we are not selling a product, we are selling experiences – vacations of a lifetime that deliver memories of a lifetime," said Rodriguez.

Cruise Growth

The global cruise market has been embarked on a steady growth trajectory for a generation, more recently enjoying a serious and more substantial growth spurt. According to the 2018 State of the Cruise Industry Outlook from the Cruise Lines International Association (CLIA), more than 27 million passengers are expected to set sail in 2018, following an estimated 25.8 million passengers in 2017 and 24.7 million passengers in 2016, an increase of 20.5 percent over five years from 2011-2016. In 2018 alone CLIA Cruise Lines are scheduled to debut 27 new ocean, river and specialty ships. In total, CLIA reports in 2016 that the industry cumulatively generated expenditures of more than $126 billion in total output worldwide, supporting more than one million full-time equivalent employees who earned $41 billion in income.

"I am very bullish on the global cruise industry," said Rodriguez. "It is a robust market, and we haven't yet tapped its full potential. Even with the rapid growth, it doesn't even scratch the surface of the potential. What excites me most, and where I see the most opportunity, particularly for the U.S. market is the growth of the entire luxury yacht expedition world."

In evaluating the potential for the luxury yacht expedition

Luxury Yacht Market

© PONANT - STIRLING DESIGN INTERNATIONAL

PONANT has on order four Explorer class vessels outfitted a "World First": an underwater lounge called the Blue Eye (below & right).

© PONANT - JACQUES ROUGERIE ARCHITECTE

Photo: PONANT

cruise market, Rodriguez looks back to the evolution of the river cruise market.

"In 2001, for example, Americans were not very familiar with the river cruise industry in Europe. Fast forward 17 years and this industry is a very important segment of the total cruise industry today," said Rodriguez.

Hallmarks of the luxury yacht expedition segment are:

- **Smaller vessels:** Typically 250 passengers or less
- **Exotic Locales:** From the North Pole to Antarctica and every point in between. Locations that the larger mass-market vessels simply cannot navigate.
- **Exclusivity:** From small ports of entry to upscale amenities.

"The world is getting wealthier, and they want new, incredible experiences, they want to travel with their peer groups and they want it easy. It's that simple."

The more things change

Much has changed in the cruise industry over the last 20 years, particularly with the expansion of brands across different market segments.

"Simply put there are more choices. Anyone, from a first-time cruiser with a small budget to a luxury consumer who typically owns or charters their own yacht, can have a plethora of options within the whole cruise segment," said Rodriguez. As the industry expands, the new fleet of vessels, from the large to the small, opens new worlds of opportunity for ports of call and land-side opportunities. "Honestly, the whole world is hot! Cuba is hot, Iceland is hot. People want perpetually new and different The more remote and exotic a location is, that's what today's luxury traveler is looking for," said Rodriguez. "The really great thing about having smaller, luxury yacht expedition vessels is that we can get into more of these exotic locations in an easier, sexier manner."

While much remains the same, Rodriguez says that technology – particularly the wide availability of strong WiFi, cell phone and email connection, is paramount to success in today's plugged-in world.

"People will not cruise unless they have strong WiFi, cell phones and email available 24/7 anywhere in the world. This technology allows the cruise industry to remove barriers. People can go on fabulous vacations, they can see multiple countries, without having to pack and unpack, while staying fully connected."

With the new ships, the exotic locales, the onboard amenities and technologies, it could be easy for some to lose focus on the most important aspect of running a leisure travel business: people. "In general, running a cruise brand is all about the people," said Rodriguez. "Your team is the biggest factor, as your team spreads across every touch point with the customer. At the end of the day, it is all about your team: your onboard crew, your shore side crew, your company. If you take care of your employees, the business will take care of itself."

Survitec for Safety

Photo: Survitec

Survitec won the contract to provide rescue boats and safety equipment for a number of new Ponant cruise vessels set to be delivered in 2018. The 10,000-gt expedition ships are designed and built by VARD. Survitec will deliver eight Survitec Zodiac RIBO 600 SOLAS boats for passenger safety. RIBO 600s are equipped with self-righting systems and carry USCG and EC approval certificates. As part of the Survitec package, breathing apparatus and fire extinguishers will also be supplied to each new vessel.

Edie Rodriquez

PONANT Americas Brand Chairman, Corporate Special Advisor, PONANT Yacht Cruises and Expeditions, on:

The prospect for more ship orders

"Beyond the five (new builds) that we have announced so far ... suffice it to say that I am a betting woman and ***I am going to bet that we are going to have some even more exciting announcements coming in 2018*** *and beyond for the continued growth of Ponant, the world's most luxurious yacht expedition company."*

The importance of SATCOM in the cruise sector

*"****People will not cruise unless they have strong WiFi, cell phones and email available 24/7 anywhere in the world.*** *This technology allows the cruise industry to remove barriers. People can go on fabulous vacations, they can see multiple countries, without having to pack and unpack, while staying fully connected."*

The project to build a hybrid electric LNG-powered icebreaking cruise ship

"Right now ***the only way to get to the North Pole is on a helicopter or on a working Russian icebreaker*** *– not the most luxurious accommodations. People who can afford that sort of wanderlust want to do it in style."*

PONANT to the North Pole:

World First Ice-Breaking Hybrid Cruise Vessel

The quest to deliver a world-first is always a challenge, particularly when the 'first' entails taking well-heeled clientele deep within one of the most hostile and unforgiving climates on the planet. That alone makes Ponant's quest to deliver the world's first LNG/dual-fuelled icebreaking cruise vessel interesting, a vessel that will be the first of its kind to make the trek to the North Pole.

"I see this as important project for many reasons," said Edie Rodriguez, the Americas Brand Chairman for PONANT Yacht Cruises and Expeditions.

"First and foremost, it's new and different. Right now the only way to get to the North Pole is on a helicopter or a working Russian icebreaker – not the most luxurious accommodations. People who can afford that sort of wanderlust want to do it in style."

As expected on a project of this magnitude, PONANT has sought counsel and partnership with some of the foremost authorities on the subject, developing the luxury cruise vessel in close cooperation with Aker Arctic and Stirling Design International, a project to be built by Fincantieri subsidiary Vard Holdings Limited, who secured the approximately $320m shipbuilding contract.

The hull will be built at Vard Tulcea in Romania, with delivery from Vard Søviknes in Norway scheduled for the second quarter of 2021.

Aker Arctic has used its long-term experience as an icebreaker designer in developing this world's first luxury icebreaker cruise vessel with Polar Class 2 (PC 2) ice class, as the Ponant Icebreaker intends to take passengers to never explored polar destinations, such as true geographic North Pole, the Weddell Sea, the Ross Sea and Peter I Island.

The 150 x 28m vessel will be approximately 30,000 gross tons and will have a cruise speed of 15 knots in open water. The vessel can accommodate 270 passengers in 135 staterooms, in addition to a crew of 180.

It will also be equipped with two helicopters in in-house hangars.

This newbuilding, in addition to the four identical Explorer class vessels already on order, are an obvious source of investment for PONANT. But Rodriguez contends that the investment does not stop there.

"We invest in our future everyday to better ourselves, whether that is an investment in infrastructure for the corporation, in new software and management systems; we invest in our people with training.

Beyond the five that we have announced so far … suffice it to say that I'm a betting woman and I'm going to bet that we are going to have some even more exciting announcements coming in 2018 and beyond for the continued growth of Ponant, the world's most luxurious yacht expedition company."

Ship owner	Ponant
Ship designer(s)	Stirling Design International
	Aker Arctic
	VARD
Ship builder	Fincantieri subsidiary
	Vard Holdings Limited
	Vard Tulcea in Romania
	Vard Søviknes in Norway
Main engines	Wärtsilä
Classification	Bureau Veritas
LNG fuel storage	GTT
Propulsion	ABB Azipod
Crew/Payroll Software	Adonis AS (Adonis)
Length	150 m
Breadth	28 m
Draft	10 m
Ice Class	PC 2
Propulsion	LNG & Hybrid electric
Flag	French
Cabins and suites with balcony	135
Including suites with patio doors and a private balcony	68
Crew members	187
Panoramic restaurants	2
Grill restaurant	1
Spa & Wellness	1
Onboard expedition Zodiac dinghies	16
Onboard helicopters	2

Eco Trends in Cruise Energy Transition

Around 360 cruise vessels are operating on the world's waterways today, transporting more than 25 million passengers to new and established locations globally. The recent cruise boom has driven growth, with 93 new vessels now under construction. But the rising popularity of remote and adventurous routes such as the Polar Regions and UNESCO heritage sights have raised concerns about the fleet's impact on marine environments and coastlines. Several cruise leaders are working ahead of legislation to incorporate latest technologies and green strategies. Here, we take a brief look at some of the most promising technology available.

Image Courtesy Hurtigruten

BY KIRA COLEY

With the push to reduce local impacts from increased traffic and vessel emissions, dozens of potential solutions are being developed including alternative fuels. But, new fuels often require expensive changes to on-board systems and machinery. Furthermore, considerations need to be made around local and global availability, production techniques, and safety concerns.

The holy grail for the shipping industry would be an easily accessible fuel, that can be introduced without significant increase in costs or modifications to facilities onboard the cruise vessel. With no such fuel in sight, the industry looks to develop alternative options available today or in the foreseeable future such as liquefied natural gas (LNG) and biofuels.

Alternative Fuels

Liquefied Natural Gas (LNG) is a clear, odorless, and non-toxic liquid, formed when natural gas cooled to -162C (-260F). It is considered the world's cleanest-burning fossil fuel today and as such, LNG has received the largest share of attention in forms of investment and development since the trade first began in 1960's.

"In the past, many engineers have been tasked to design the aerodynamics of the funnel on a cruise vessel so that the particles that leave the stack do not fall onto the deck and unsuspecting passengers.

Hurtigruten Hybrids

LNG would solve this problem instantly. Beyond the fact it is more environmentally friendly, it is also a fuel type that is becoming more available, and it simply has some practical benefits for the cruise industry which makes it very attractive. Regarding the maritime energy transition, LNG fuel is something we think will be accelerated both in the cruise industry and in general," said Kjartan Ross, MAN Diesel & Turbo and chairman of Green Ship of the Future.

In 2000, the first LNG-powered vessel was launched and today, there are around 75 LNG-powered ships in operation and another 80 under construction. The growth in LNG-powered ships is expected to accelerate further over the next decade due to the recent Tier III NOx emission standards in North America and forthcoming 0.5% sulfur limits in European waters from 2020.

The world's largest cruise brand, Carnival Corporation, is expanding its LNG capabilities to supply LNG. At a ceremony in Hamburg in September 2017, Carnival officially marked the start of construction for the first seven next-generation cruise ships that will be fully-powered by LNG. By the end of 2018, they will be the first cruise company to use LNG on the open sea and in port.

While LNG has stolen the spotlight for alternative fuels, there are many other options that show great potential as a substitute for oil in dual-fuel engines. Biofuels and methanol are of particular interest because they also offer significant reductions in emissions of NOx and particulate matter (PM).

Ross said, “An increasing number of companies are specializing in the production of biofuels from sustainable sources. It’s quite interesting because this is a fuel solution that you can apply to any vessel, but the challenges are within costs as it is significantly more expensive - around 70-80% - compared to standard fuel prices. And of course, this is an important consideration for many ship owners. But as with all innovation and new techniques, at some point suppliers will find a way to deliver the product at reduced costs. The question is which alternative fuel will get there first? It is a race where Fuel availability and pricing will ultimately decision what solution gets adopted widely.”

As well as the price of the fuel itself, the cost of building or retrofitting dual fuel ships, the size of fuel tanks, and concerns about safety, are also factors in need of consideration.

Electric Power

The environmental benefits for embracing electric power are fairly obvious and include reductions in noise and vibration, and decreased emissions such as NOX, SOX, and PM. “This is particularly important in ports, populated coastal areas and environmentally delegate destinations. Norway is an exciting place to follow right now as it offers a glimpse into what the future will bring for cruise and ferry vessels in terms of electric. They already have fully electric ferries in places like the Norwegian Fjords. Various hybrid solutions, such as LNG hybrids with batteries, or maybe partially diesel-electric propulsion could also be a scenario which I can see coming in the near future. You could say that the technology is already here,” said Ross.

The issue with today’s battery technology is the energy density, impacting the size of batteries packs onboard and the cruising range of electric ships. Today’s technology will allow smaller battery-hybrid vessels to switch to zero emission, electric propulsion near coastal towns and in environmentally sensitive regions, and while travelling into ports. However, for ocean-going cruise vessels, battery packs are currently too big to have as the main power supply for a large cruise ship travelling long distances. Nevertheless, the technology is advancing at pace and perhaps in another 10 years’ time, batteries will play a more prominent role.

Battery powered propulsion systems are already being engineered for smaller ships and engine manufacturers such as MAN Diesel & Turbo are preparing hybrid electric solutions for vessels of all sizes. Exploration cruise operator, Hurtigruten, will also be launching two next generation explorer ships within the next two years, set to be the world’s first battery hybrid powered vessels. Rune Thomas Ege, Hurtigruten’s VP Global Communications, firmly believes that the future of the cruise industry is electric, saying, “We have seen the Tesla Revolution on shore, and I think that the Tesla Revolution is coming to the Seas. When it does, we are confident that we will be in front when that happens.”

Fuel Cells

The use of fuel cells as an eco-friendly ship propulsion has also received a lot of attention from organizations such as Carnival and Royal Caribbean. The technology represents another dramatic step forward for the maritime industry in green innovation.

Fuel cells produce energy using an electrochemical reaction, rather than combustion. The process converts fuel directly to electricity and heat, increasing operational efficiency. Water is the only waste product, so they cause less pollution and eliminate emissions.

According to a study by DNV GL commission by the European Maritime Safety Agency (EMSA) the industry is dozens of projects, evaluating seven different fuel cell technologies. These projects include the alkaline fuel cell (AFC), the proton exchange membrane fuel cell (PEMFC), high temperature PEMFC (HT-PEMFC), direct methanol fuel cell (DMFC), phosphoric acid fuel cell (PAFC), molten carbonate fuel cell

The 12V51/60DF from MAN Diesel & Turbo

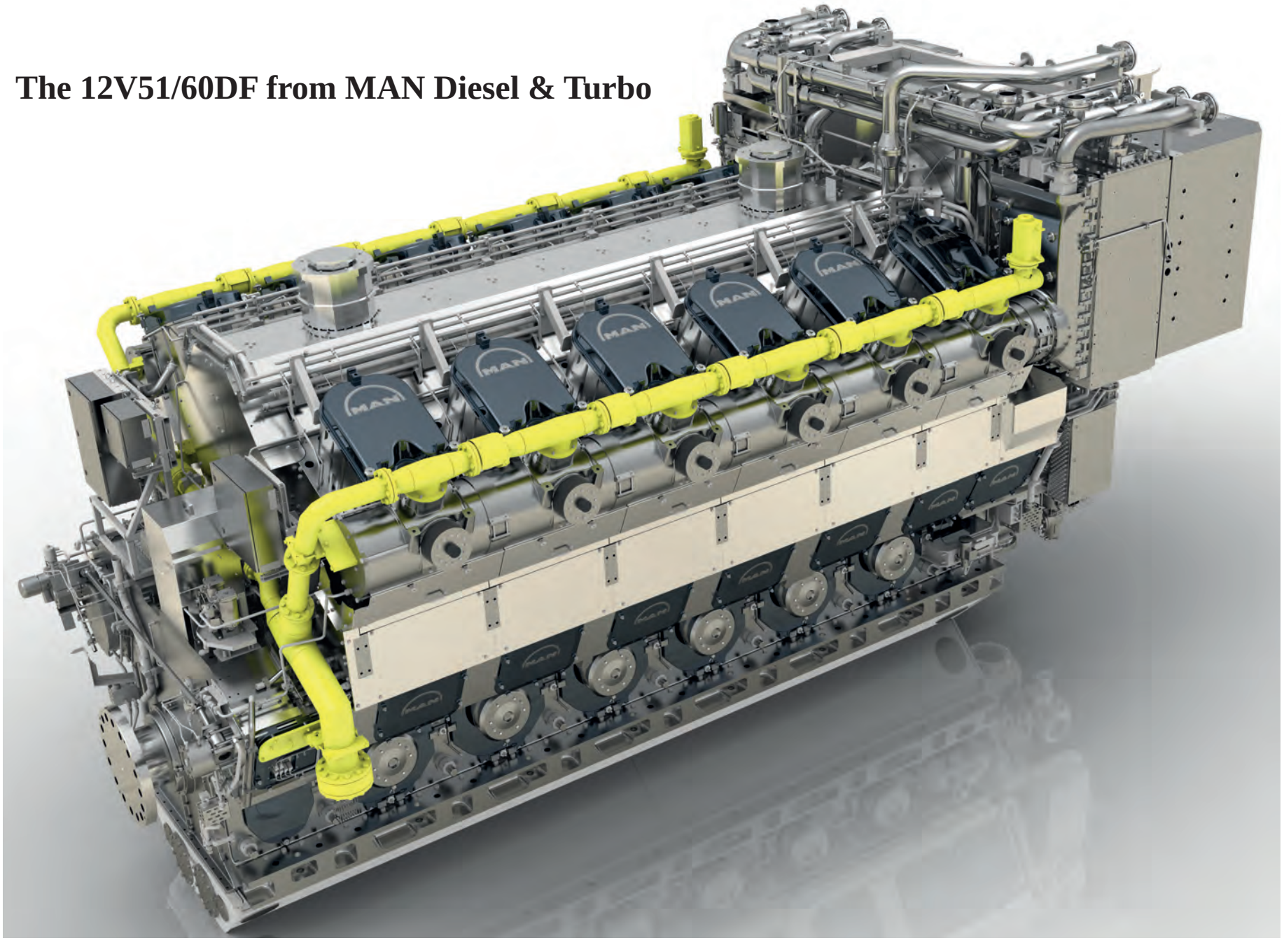


Image Courtesy MAN Diesel & Turbo

(MCFC) and the solid oxide fuel cell (SOFC).

Ross said, “Fuel cells are a really exciting technology. The challenge from my perspective is finding ways to scale up the size of fuel cell plants on cruise ships to act as propulsion energy solutions for larger vessels. But it is quite interesting because if you consider battery hybrid cruise vessels, such a solution could also be there for fuel cells running on methane for example. There have been experiments with some fuel cells, testing different kinds of fuel cell technologies - some working better than others. Another big challenge is in improving the technologies efficiency, but it is a technology that will be very interesting to follow.”

As fuel cells becomes cheaper and more efficient, this solution will become more viable in a significant way to power the cruise ship’s hotel functions.

Royal Caribbean Cruises (RCL) has announced that fuel cell technology will play a role on its Icon-class ships being built by Meyer Turku for delivery in 2022 and 2024. In 2017, ABB piloted the cruise industry’s first-ever fuel cell system on a RCL Oasis-class ship, testing its ability to provide energy efficiently ahead of the line installing the technology on upcoming Icon-class vessels. The Icon ships are expected to run primarily on LNG but will also have distillate fuel which they can run on when calling on ports lacking LNG infrastructure.

Carnival are also investing in fuel cell research and development. The cruise line believes that fuel cells will have a place and role to play in the cruise industries green transition, the question asked by SVP Maritime Affairs Tom Strong is “where does the technology sit in the grand scheme?”

Exhaust Cleaning

One of the technologies that are already available today is exhaust gas cleaning systems. There has been a strong focus on reducing sulfur oxide (SOx) emissions from maritime vessels for some time now due to the harmful impacts on the environment and human health. This is where exhaust gas cleaning system benefit the industry and is also one of the techniques that vessels are using to stay Tier III compliant, especially as it has no limitations to the size of vessel that can benefit from it.

This is also another solution where organizations such as Wärtsilä and Carnival are investing heavily because of its ability to remove major pollutants from exhaust gases at sea, during maneuvering, and in port. With plans to invest as much as $400 million, Carnival are in the process of designing, building and installing exhaust gas cleaning technology on more than 70 vessels.

Ross explains, “The challenge right now is that no one really knows when and what the legislation will be in the future. Vessels built now will have to operate in stricter environmental legislation and control, so it will be in shipbuilder’s best interest to build a vessel in such a way that it can be easily be upgraded to comply with future legislation. As an industry, manufacturers would also very much like to know what the demand for our equipment will be so that we will know what we should move our research and development efforts. This is a major challenge, not only for the cruise industry but also for the entire shipping world.”

Global Sulfur Cap

The Time to Prepare is Now

BY JAMES BOND

With less than two years until a global sulfur cap on marine fuels comes into effect, shipowners are facing some very tough decisions.

For those considering exhaust scrubbers or conversion to gas or hybrid propulsion systems to comply with IMO Marpol Annex VI regulation by 2020, there are complex questions about retrofitting technology; for those considering low-sulfur distillates (below the IMO-mandated 0.5% cap), availability of fuel will be a key concern.

Whichever route to compliance is chosen, it will involve considerable capital expense and have long-term fleet implica¬tions at a time when the form of future environmental regulation is uncertain, and getting it wrong could signifi¬cantly disrupt operations.

But decisions must be made: the IMO has recently reiterated that the 2020 deadline is firm. While it is not the role of shipping's governing body to ensure that adequate low-sulfur fuel stocks will be available, it appears confident that suppliers will meet demand, and that fines for non-compliance will be consistently levied across the globe.

The IMO's Subcommittee on Pollution Prevention and Response will this month (subs: February) consider an industry proposal to ban the carriage of high-sulfur fuel oils (HSFO) from the January 1, 2020 deadline. The ban is proposed for ships not equipped with an "approved equivalent compliance method", such as exhaust scrubbers.

Some oil majors have warned that efforts to create low-sulfur fuel by blending HSFO with distillates may lead to incompatibility between fuels sourced from different bunker suppliers, resulting in issues such as fuel instability in the tanks and/or engine problems caused by high levels of catalytic 'fines'.

For its part, the International Standards Organization has said an update to its bunker fuel standard (ISO 8217) that would help to set an industry benchmark for the composition of low-sulfur fuels will not be ready by the deadline.

Whether an owner/operator opts for low-sulfur fuels, LNG/LPG as fuel or exhaust scrubbers, thorough fleet-specific evaluations of the technical options and economics of each will take resources and time.

Approximately 100 vessels with LNG-fuelled propulsion systems are on order at global shipyards; another 100 are already in operation. According to the latest estimates from Clarksons, 240 ships have been fitted with scrubber systems, those vessels will spend much of their time operating in emissions control areas (ECA) such as the Baltic Sea and across

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the coastal North America where fuel-sulfur limits have been set to 0.10%.

The type of scrubber (wet, dry, or hybrid) that best suites a specific ship will largely depend on the marine and regulatory environments in its selected area of operations.

For example, if the ship has an operating profile with minimum transit times through ECAs, or where there are no restrictions on the discharge water by local or regional authorities, an open loop scrubber may suffice. If it has long port stays with an appreciable time in ECAs, a hybrid or closed-loop scrubber system may be the best option.

The cost of scrubber systems includes the price of the scrubber, installation expenses, any additional miscellaneous auxiliary equipment, off hire, ship modifications, any fuel consump¬tion required to operate the system and the cost of consumables (for example, cleaners such as sodium hydroxide). These elements are used to form a cost-comparison against the expense operating the ship's fuel combustion units on low-sulfur fuel, for example.

For ships under construction that intend to operate inside an ECA, an already complex situation is compounded by the requirements of the IMO's Tier III NOx emissions regulation. A main engine that is Tier-III compliant (e.g., some engines operating in gas mode) will be needed, or the vessels' propulsion units will need to be designed with NOx abatement tech¬nology such as exhaust gas recirculation or selective catalytic reduction systems.

While the proportion of new ships being ordered with scrubbers is on the rise (from roughly 1% through 2012-15 to about 5% last year), present uptake levels combined with the number of ordered and existing gas-fuelled ships appears to indicate that most of the estimated 70,000 ships subject to the global cap will opt for low-sulfur fuel by the deadline. With so many technical variables – and so much information available – it is important for owners to take a structured approach to the decision-making process.

ABS believes that one of the keys to a cost-effective transition to low-sulfur shipping is an evaluation process that examines the available technology, its appropriateness for the intended theatre of operations and economic considerations such as life-cycle costs, comparative savings against other products and solutions, payback period and rate of return on investment.

The ABS Techno-Economic Evaluation considers ship design, equipment details, trading routes, fuel cost trends and fleet analysis to establish a base trading case and alternative technology and fuel scenarios. This information supports meaningful comparisons between options and arrival at a preferred solution for retrofitting or new construction projects.

The evaluation's life-cycle approach provides a clear evaluation of the cost differentials by using a comprehensive inventory of projects and operational costs in terms of present value. Newbuild and retrofit technology decisions can be simulated for a single vessel or a series of vessels using a range of scenarios that investigate compliance requirements.

Beyond techno-economic modelling, ABS has published guidance for the steps owners should take to install exhaust-gas scrubbers, as well as an advisory to highlight what owner/operators need to know about the 2020 sulfur cap.

For those owners intent on ordering vessels but hoping for more clarity on issues such as fuel supply and quality standards before choosing their fleet's path to com¬pliance, ABS has 'LNG or Scrubber ready' notations, which allows them to prepare vessels for implementing LNG or scrubber options at a later date. A sulfur cap on marine fuels is now less than two years away and the industry's response will define the shape of cleaner ships for the near term. The path to compliance may become clearer in the coming months for each ship, but it is a journey the international shipping community has to take.

About the Author

Based in Houston, Texas, James Bond is a Senior Technical Advisor for the American Bureau of Shipping's Global Engineering and Technology group. James has worked in the marine and offshore industries for 30+ years.

Zero Emission Shipping Meets High-Level Sports

MARIN's research work in Wind (Assisted) Ship Propulsion and our mission to make ships cleaner, safer and smarter is all coming into play as they assist team AkzoNobel with their Volvo Ocean Race challenge.

BY ROGIER EGGERS

Image Courtesy MARIN

MARIN's research work in Wind (Assisted) Ship Propulsion and our mission to make ships cleaner, safer and smarter is all coming into play as they assist team AkzoNobel with their Volvo Ocean Race challenge.

Over the years MARIN has had some very successful involvement with racing sailing yachts. One example was the support for the Australia II team that was the first non-US team to win the Americas Cup. Another more recent example is the ABN AMRO team winning the Volvo Ocean Race when canting keel boats were first introduced. Now the AkzoNobel team, skippered by Simeon Tienpont, has approached MARIN to support them as they enter the Volvo Ocean Race. This time, the research fits in a different context and involves our work in Wind (Assisted) Ship Propulsion (WASP). It supports our long-term objective for "cleaner" ships and the development of zero- emission shipping, not only for sailing yachts but for merchant ships as well.

A specific field of research that receives relatively little attention, both in wind-assisted cargo ships and sailing yachts, is the impact of real operational conditions in wind and waves. Therefore, we decided to focus our research and added value for Simeon's team on determining the performance of his yacht in real operational conditions.

Wind propelled model

For this purpose a set-up was developed to model wind propelled vessels in MARIN's Seakeeping and Manoeuvring Basin to perform a short validation, model test programme. This was followed by a more extensive calculations' programme supported by the validation data. In this way we provided valuable input to the sailors, while the set-up, calculation methodologies and the lessons learned are applicable for wind-assisted cargo ships as well.

It should also be noted that the Volvo Ocean 65 is a 'one-design boat'. The team receives the boat from the race organisation and is not allowed to make changes. This means that the predictions cannot be used for design changes, so you may well ask what the predictions are for? First of all, the crew still has many different ways to sail the boat in the fastest possible manner. And because training days are limited, they will not encounter all the conditions they will face during the race to check and optimise their performance in practice. This is precisely why the predictions are used - to have a benchmark, or starting point for the best setting for each condition. Furthermore, besides sailing fast, you should sail the best route. The work MARIN is conducting will give insight into the performance in waves, which should lead to better routing decisions.

To this end, the following work is carried out:

- ReFRESCO Computational Fluid Dynamics simulations (RANS) in calm water, to have calculations with the best possible accuracy. At the same time, these calculations are too costly and time consuming to span all operational parameters.
- PANSHIP potential flow simulations in calm water to extend the parameter space covered by the ReFRESCO simulations (after a comparison with the ReFRESCO results)
- Scale model tests in waves to determine the performance, and in particular the added resistance in waves (RAW). Again, due to cost this is only done for a small number of conditions.
- PANSHIP simulations in waves to extend the parameter space as covered by the model tests.
- Onboard monitoring to validate the simulations and determine if and where corrections need to be made to the laboratory" experiments.
- Additionally, work is planned to calculate the actual wave conditions based on the measured motions on board. This will help the crew decide on which added resistance (and associated performance) is applicable at that moment. Furthermore, the actual conditions may be used to benchmark the metocean forecasts to further optimize the routing.

The team itself complemented the above with performance analysis of all the training, preparatory races and crew monitoring.

Added value in 'raw' resistance

In this project MARIN pushed the boundaries through extensive seakeeping tests and simulations, which also account for added resistance. A dedicated test set-up and carbon model was built to achieve a low weight of 90 kg with a length of just under 4 m, while having the (approximate) correct stability, righting moment and inertia at the same time. During the tests the canting keel could be set to various angles and the rudders were actively controlled by an autopilot. A moveable horizontal beam was fitted on the two masts to change the connection point of the winch set-up. In this way the aerodynamic centre of effort could be varied in a large range of longitudinal and vertical locations.

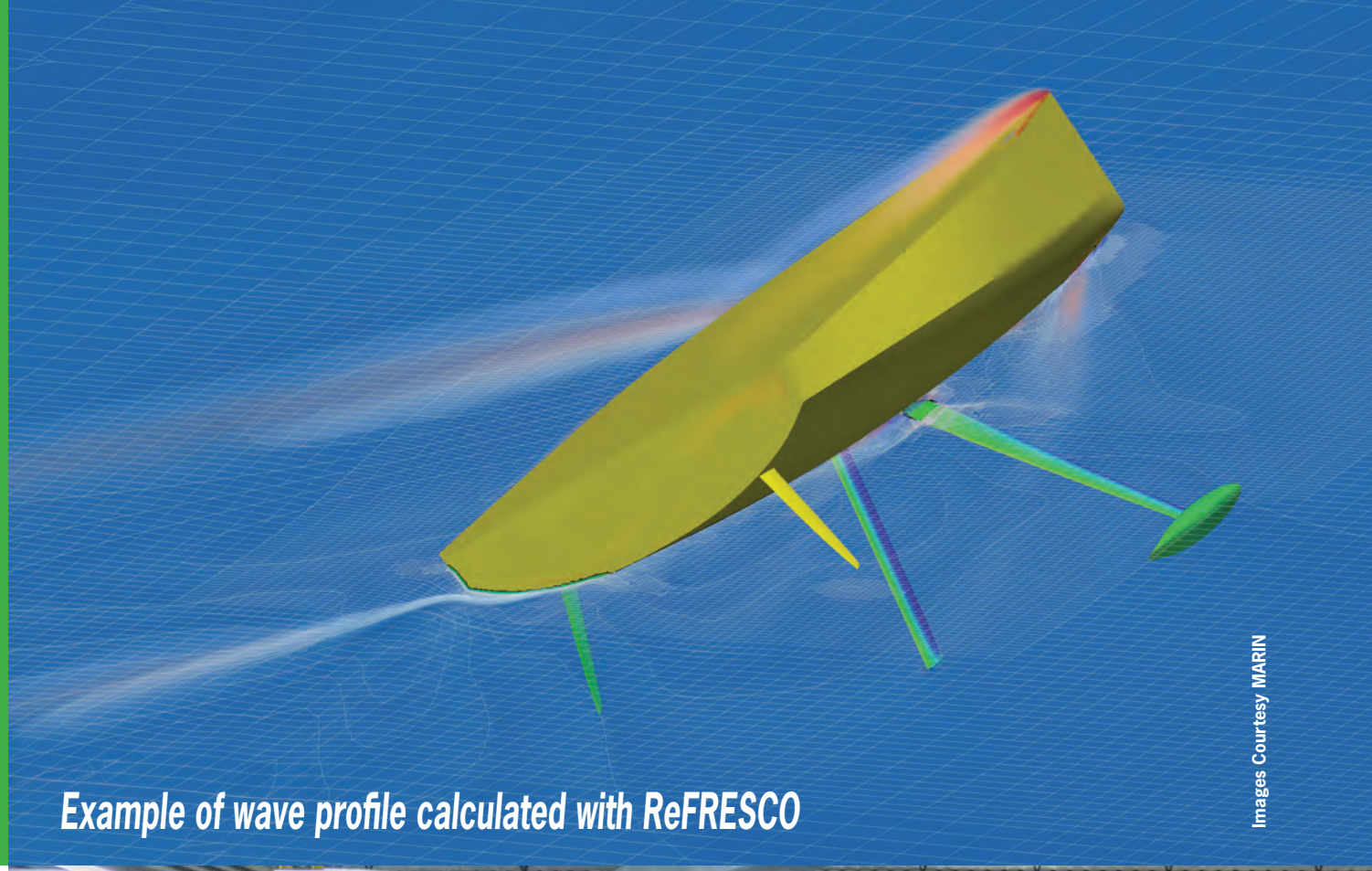
In the winch set-up lines were used to apply the aerodynamic loads from the sails. The required driving force was recalculated each time-step, accounting for the following instantaneous values:

- Apparent wind angle over deck
- Apparent wind speed over deck
- Heel
- Roll velocity (estimate for roll damping)

The winches were controlled based on the required driving force. By using two winches, the force vector can move in any direction between them. This accounts for diversions in course, speed and unexpected heel angles. As far as we know this set-up is unique in the world.

Applications for wind-assisted ships in

Rogier Eggers is senior project manager at the business unit Ships at MARIN, the Maritime Research Institute Netherlands.



Example of wave profile calculated with ReFRESCO

Images Courtesy MARIN

this same test set-up could be:

- The combined (steady) heel and (dynamic) roll and the influence of sails in this
- The course keeping ability in stern quartering wind and waves (probably with very little propeller flow over the rudders and large roll and yaw wave excitation)
- The possibility to meet zig-zag IMO requirements.

After a little tuning, the PANSHIP simulations corresponded very well with the test results. The overall calculations matrix yielded the added resistance as a function of wave height, relative direction, period, ship speed, heel angle and various boat settings. This is a much more detailed description compared to the typical empirical calculation with only two or so parameters. The variations within the more extensive parameter space can in fact be very relevant as shown in Figure 2. Although specific numbers will be shared only after the race, it can clearly be seen that the added resistance varies significantly with heading (green versus red line).

MARIN was able to provide valuable information to team AkzoNobel to calibrate their performance in calm water and to make better routing decisions to allow for the performance degradation in seas. At the same time, the project has yielded spin-offs with lessons learnt and an improved test set-up that can also be used for wind-assisted vessels.

ECO Ships

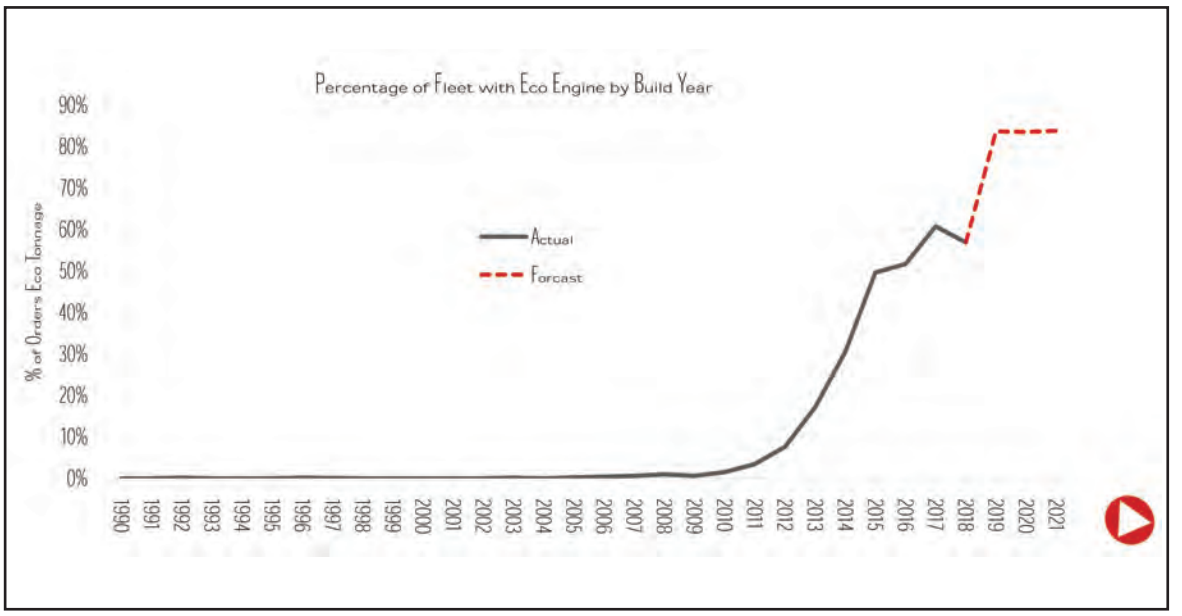
The New Norm for Top Tier Ships

BY COURT SMITH

The high average cost of bunker fuel over the past decade led to increased interest in fuel efficiency. Shipowners have a difficult time demanding higher rates in response to cost increases. This makes any savings they can realize on operational and fuel costs critical. Fuel costs account for about 70 to 85 percent of the cost of running a ship, so savings realized in consumption go to their bottom line.

Ships which travel at a higher speed, such as gas carriers and container vessels, see the highest percentage adaptation. This is due to the fact that the speed/consumption curve grows steeper the faster a ship travels. It does not take much energy to move a ship from stationary to 2kts, but it takes a large additional amount of power to push it from 15kts to 17kts.

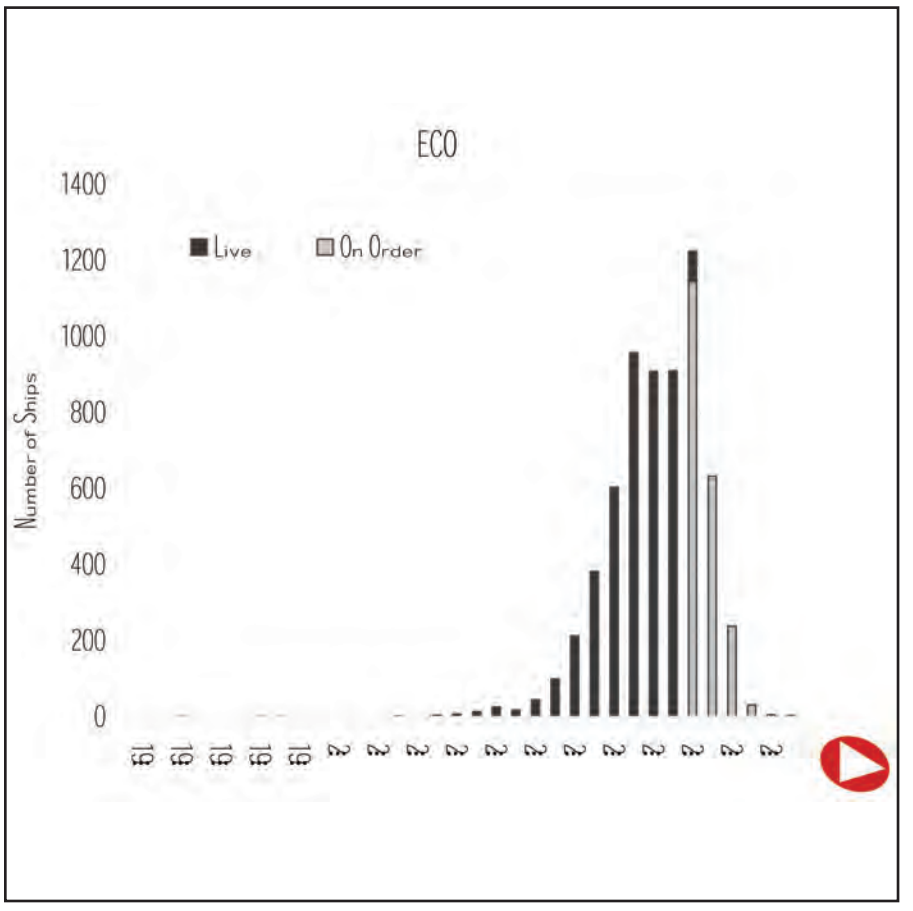
The trend is not limited to the swifter vessels though. Beginning in 2016 over half of all ships ordered were for Eco specs, and it now stands at 80+% of outstanding orders. Ship builders responded to owner's desires for cost savings by offering better engines, hull forms, and propellers as



Source: VesselsValue.com

Type of Ship	Non-Eco	Eco	% of Total Fleet
SPECIALIZED CARGO	891	61	6%
VEHICLE CARRIER	771	94	11%
SMALL DRY	8964	90	1%
TANKER	10332	1793	15%
REEFER	787	4	1%
OCV	1015	4	0%
OSV	8072	28	0%
OCV OTHER	971	2	0%
BULKER	8675	2466	22%
MODU	982	0	0%
LPG	1254	274	18%
PASSENGER	366	41	10%
LNG	278	307	52%
CONTAINER	4079	1118	22%
FLOATER WET	284	2	1%
FLOATER GAS	21	21	50%
COMBO	13	1	7%

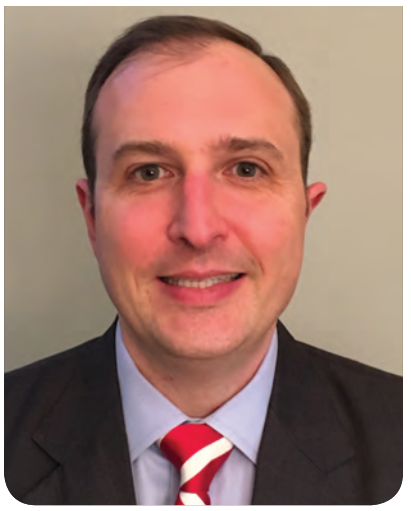
Source: VesselsValue.com



well as other marginal improvements in design to reduce fuel consumption. The trend in owner adaptation of Eco ships can be seen in the charts below.

Oil prices have been softer in the past two years, but remain a significant drain on owner's coffers. Demand from charterers for faster delivery of oil has not been an issue for a while now, and they seemed to have accepted a structurally slower fleet. This is increasing preference by all parties for more efficient ships, even if they lack the high top end speeds that many wanted during the commodity super cycle in the 2000's. These ships may or may not demand a higher time charter rate, but as bunker prices increase the likelihood is that the earnings they could potentially command will increase.

Newer Jones Act tankers have been built with Korean yard designs, including Eco engines. However, the depressed market returns make future orders on the basis of fuel consumption alone unlikely. Any new order that is placed in a US shipyard would almost certainly opt for the most efficient engine due to the small incremental cost of improving the engine when compared to the $100mn + price tag already incurred for building at the high cost yards. Currently 23% of the US tanker fleet and 19% of the container ships are run with Eco type engines. The premium for Eco type ships can run to about 5% of the total value depending on the overall price of the asset. This makes it a valuable specification, and one that may become even more precious after the fuel transition in 2020. The ability to save tons of fuel per day can add up to hundreds of thousands of dollars per year, and translates directly into higher TCE returns for the ships. Survival in the shipping markets can often rest on razor thin margins during periods of weak returns. Since most markets are in a depressed state, the value of Eco type ships can mean the difference between living to the next bull market or liquidating assets at the bottom of the cycle.



About the Author

Court is providing market insights and reports for Vessels Value. He was head of research for MJLF and Poten & Partners, and has written for Argus Media and Lloyd's List.

3D FLS & Navigating the "New Norm"

As more cruise vessels traverse the waters near the poles, we look at the tech designed to navigate safely.

BY MARIANNE MOLCHAN, PRESIDENT MOLCHAN MARINE SCIENCES

NASA scientists call the accelerated melting of polar sea ice the "new normal," an ice melt that has created an unprecedented increase in unexplored and uncharted waters. January 2017 satellite imagery revealed the lowest number of square miles of sea ice measured in the previous 38 years of record, and 100,000 square miles less than 2016. National Oceanic and Atmospheric Administration (NOAA) scientists estimate that within the next two decades the Arctic Ocean will be free of multi-year ice in the summer. As the ice retreats the vessel traffic in the uncharted areas increases, and simultaneously there is a growing number of purpose-built expedition cruise ships in the fleet.

Image Courtesy: The World

Mitigating a Risky Business

Alianz Global Safety and Shipping Review 2016 noted, while total losses at sea continue to drop the number of maritime incidents in the Arctic jumped nearly 30% to 71 in 2015, the highest level in a decade. Polar vessel accidents typically include hull breaches due to ice or unexpected groundings. Mariners expect published charts to have the latest information on soundings and aids to navigation, accurate shoreline depiction and reliable tide and current predictions. Charts for polar regions come up short in each of these areas. Ice bergs, bergy bits, growlers and ice flows all move and change in size based on changes in temperature, wind and currents. Shorelines change annually due to storms and ice movement.

Operators of polar vessels are well aware of the marine safety concerns navigating in these waters. With an increase in polar storms and anomalous magnetic effects, ship captains have to be vigilant and focus on safety equipment redundancy. One technology that is relevant to navigation safety in polar regions is a Three Dimensional Forward Looking Sonar (3D FLS). This article provides information about the value 3D FLS of from the perspective of a cruise ship Marine Operations Manager who has facilitated the installation of the technology and a vessel captain who was an early adopter of the 3D FLS.

The Rules

The International Code for Ships Operating in Polar Waters (Polar Code) requires operators to "address any limitations of the hydrographic, meteorological and navigational information."

Operators are coming to find that 3D FLS adds an additional layer of safety by providing a forward look capability oft bottom contours and potential floating and submerged hazards and obstructions.

There are a small number of 3D FLS manufacturers, but here we focus on the 3D FLS from FarSounder, which uses a phased array in its hardware package. FarSounder sonar generates a real-time 3D image with a single ping. The largest private residential ship on earth, The World, purchased its first FarSounder 3D FLS in 2007 and have continued to upgrade since. In 2012 The World, made news as the largest passenger vessel to complete an "unassisted" voyage through the Northwest Passage.

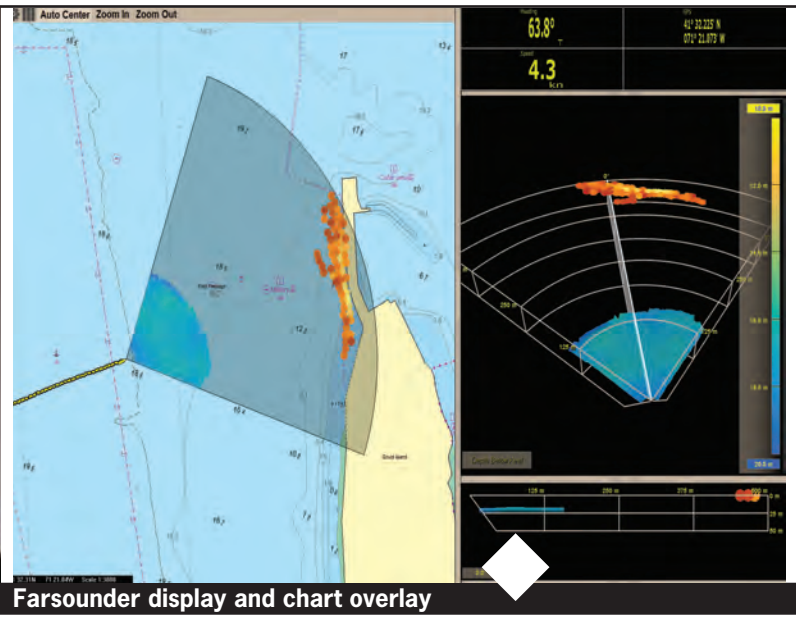
John Schneider, a vessel manager for Wilhelmsen, formerly holding technical management positions at Royal Caribbean Cruise Lines and Celebrity Cruises, managed the technical aspects of The World when it upgraded FarSounder's 3D FLS hardware and software. In assessing the pros and cons of changing out hardware and software for FarSounder's 3D FLS, he was impressed that sonar transducer was able to be changed while the ship was in the water, facilitated by a robust wet-mateable connector. It is clear to Schneider that each ship captain has their favorite navigation hardware. One captain he worked with on The World, Captain Dag Saevik, was keen on FarSounder 3D FLS and its features. Captain Saevik appreciated redundant nature of FarSounder and its unique capability designed specifically for navigation safety. In 2012, with the assistance of FarSounder, he safely navigated The World through the Canadian Arctic passage (Northwest Passage). In 2017, The World set sail to the southern limits of the Ross Ice Shelf, the largest ice shelf off Antarctica. Captain Saevik explains why he was an early adopter of the FarSounder sonar.

"When it became apparent to me how poorly charted parts of the world are coupled with the increased demand from our residents to go to these exotic places, I made it clear to the owners that we needed equipment to transit these areas in a safe way," said Captain Saevik. "We looked at several types of sonars and finally selected FarSounder due to the 3D capability that would make it easier to decipher what you see ahead of the ship."

According to Captain Saevik, when using the sonar "it is important to use it also in well-charted areas in order to see how the seabed looks on the sonar screen when you know the bottom contour. You can then better understand the images you see in poorly charted areas. In polar waters, we mainly use it for what you have already described above. When in poorly charted areas we go slow in order to be able to stop in case there are obstructions ahead. We also often use the sonar together with sending one of our rescue boats ahead equipped with depth sounder with live feed to the ships bridge and side-scan sonar. We use FarSounder in ice and bad visibility so we can see growlers and small icebergs ahead that might not be so easy to detect on radar. You will also get a good picture of the extent of large icebergs under water."

But when traversing some of the most inhospitable waters on the planet, it is advisable to have back-up,

John Schneider, Wilhelmsen



Farsounder display and chart overlay

Captain Dag Saevik

too. “We are also using a crowd-sourcing software called Olex, which is primarily used by fishing boats but is now also used by many of the Expedition ships,” said Captain Saevik. “By having all of these tools available and used in connection with each other, we provide as safe a passage as possible.”

But Captain Saevik is a firm believer in the 3D FLS tech, and recently upgraded with FarSounder’s Local History Mapping software upgrade.

“We are finding it useful especially when you are going into a poorly charted anchorage and the safest way out of a tricky anchorage is always to follow the same track out that you came in on. Local History Mapping helps a great deal with that.”

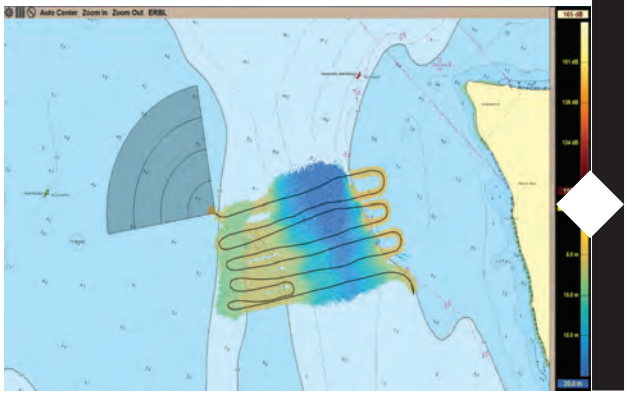
Local History Mapping

In 2017, FarSounder released software, which creates real-time sonar imagery in 3D while the vessel is underway. Filling in the hydrographic blanks with current sounding and bottom contours is addressing the hydrographic limitation mentioned in the Polar Code. The Local History Mapping software updates soundings instantaneously and displays them in a color-coded overlay on top of the existing electronic chart. (See image right), a necessity when navigating in an area of limited and unverified soundings. In the image above FarSounder’s chart overlay shows sonar images of the seafloor and in-water targets. The upper right hand side of the image in yellow reveals the heading of the vessel at 63.8 degrees, the speed at 4.3 knots and the GPS position of the vessel. Below that is the swath of coverage out to 500 meters showing the obstructions ahead of the vessel. The left hand side of the image is the chart overlay of the obstructions detected by the FLS.

The 3D FLS standard user interface software includes automated alarms, GPS compass, depth sounder display and vector-based chart plotting capabilities. A FarSounder 1000 model allows users 3D forward-looking navigation information out to 0.5 mile (1000m) ahead of the vessel. Other adopters of FarSounder 3D FLS include Hapag Lloyd who is outfitting both of its two new expedition cruise ships with this technology.

Recognizing the risk-reducing value of having FarSounder 3D FLS on Le Soléal and three other ships from their current series of vessels, PONANT is adding a FarSounder to the navigation suite of each of its four new 131 meter long Ice Class 1C Certified Expedition Cruise Ships. The newly built Royal Polar Research Ship RRS Sir David Attenborough, a state of the art National Environment Research Counsel vessel, is also installing the 3D Forward Looking Sonar for use in both their navigation and oceanographic work.

Safely navigating polar waters requires a multitude of safety considerations. One way to mitigate the risk is to make a “sound” investment in navigation equipment. The ability to see and preserve a 3D image of the bottom contour ahead of the vessel while underway might just be “The New Norm.”



Local History Mapping

case study

Courtesy: ALMACO

ALMACO v. Irma

ALMACO delivered 32 new cabins and four suites with adjacent corridors, elevator lobbies and stairs onboard Carnival Elation despite major disruption from Hurrican Irma.

As ALMACO has been a force in custom marine cabin and facilities manufacturing for two decades, the project to supply 32 new cabins and 4 suites for Carnival Elation started innocuously enough, with the requisite meeting between ALMACO's modernization team and Carnival Cruise Line to decide the best road forward.

Since the area to be outfitted was in a completely new cabin block, including seven sub-blocks, extensive coordination was needed with other contractors and Grand Bahama Shipyard (GBS). From the start the project was proceeding to plan, and for its part the ALMACO modular cabins were ready on schedule, as ALMACO had built them during the three weeks prior in its innovative Mobile Cabin Factory concept at a nearby warehouse.

But on October 4, 2017, only a few days after starting the work at GBS, the project came to a halt as the Category 5 Hurricane Irma targeted the Caribbean with the thread of winds up to 185 mph.

"For the first time in ALMACO's history, a project that initially involved building, lifting and installing modular cabins on board a ship, now required for the same modular cabins to be offloaded from the vessel," said Hervé Touzard, ALMACO's VP, Marine After Sales. "This was obviously not part of the original plan! ALMACO's project management team had to adapt to this new situation, removing the cabins from the Carnival Elation, and securing them back at the Mobile Cabin Factory."

After securing all lose materials and preparing the vessel for sailing, ALMACO and the rest of the teams working on the project at GBS embarked on a 7-day journey of undocking, cruising at the furthest possible distance from Irma's path, and docking again to restart the work. Due to the extreme weather, conditions onboard the ship were challenging, but the team continued working as best possible.

With the storm passed and the ship back at the yard, ALMACO delivered the cabins and completed area courtesy of seven additional dry dock days and ongoing work during the first couple of cruises.

Marcus Högblom

Alf Kåre Ådnanes

Images Courtesy: ABB

For the Rise of the Chinese-Built Cruise Ship

ABB is Prepared

With a system, product and service portfolio including power, automation and propulsion, ABB has a long history serving the cruise shipping sector. Amidst the current cruise 'boom' ABB reports it is well prepared for the emergence of Chinese-built cruise ships. The first of two 4,980-passenger-capacity Chinese-built cruise ships for Carnival Corp, to be built by the Fincantieri China State Shipbuilding Corp (CSSC) joint venture, serve notice of a potential shift in the cruise shipbuilding industry that to date has been dominated by Europe. The mammoth new ships will be delivered under a new Carnival brand specifically for the Chinese market from a new Shanghai Waigaoqiao yard cruise shipbuilding zone. "Chinese shipbuilding is one of the most significant markets for ABB's power and automation systems, Azipod propulsion units and turbochargers," said **Alf Kåre Ådnanes**, head of ABB's Marine and Ports business in China. "Chinese shipyards are diversifying their portfolios and ABB's long history in the icebreaking and cruise sectors is particularly relevant to China's ship builders. We are part of the existing shipping cluster and can support Chinese shipyards in their strategy to build cruise vessels for China and for global customers."

Ådnanes suggests ABB is in a unique position. "As well as being the leading supplier of electrical propulsion systems for passenger vessels, we have made deliveries for over 200 vessels to yards in China, many of which are highly advanced - such as research vessels, icebreakers and offshore vessels. We also have production up and running in China that supplies generators, motors and switchboards – many of the key components that are already being used by the European yards."

While the cruise ship building business in China is in its infancy, ABB's experience in the country is mature. ABB – as a group – has been present in China for more than 110 years, with its immersion taking in R&D activities, manufacturing, sales and services across 80 cities.

ABB Turbocharging has been in China for decades, establishing relationships and a joint venture in 2006 between ABB China and CSIC-Chongqing Jiangjin Turbo & Charger Machinery Co., Ltd. The Center of Excellence for production of ABB turbochargers, plus six turbocharger service stations and three service points across the country contribute to ABB's position in the Chinese marine sector. ABB recently won contracts to supply electrical power generation and distribution solutions, Azipod propulsion system and turbochargers for the new Viking Line cruise ferry to be built in China. The 13-deck, 2,800-passenger, 63,000-gt vessel is being built at Xiamen Shipbuilding Industry and is scheduled to deliver in 2020. There is an option for a second cruise ferry, too.

From ABB's perspective this contract is particularly notable as it is the first specification of Azipod propulsion in a cruise-ferry application, with the Azipod units delivered from Helsinki. Classed by DNV-GL, the ship will feature Azipod XO units designed to match the ship's ice class 1A Super notation. The newly developed two-stage turbocharging Power2 800-M will also be applied on this vessel.

"The Viking cruise ferry is a very advanced project," said **Marcus Högblom**, Vice President of Global Sales, Passenger vessels and Azipod propulsion. "Although the ship will have a car deck, it will be as technologically advanced as a cruise ship, if not more. We are applying the very same standards as we would to a European-built cruise ship in terms of the complete power and electrical distribution systems, and the propulsion plant."

Globally, ABB Turbocharging has a strong position in the cruise ship market that is highly relevant to the emergent Chinese luxury vessel market, said **Paolo Tremuli**, Senior Application Manager, ABB Turbocharging. Power density and engine efficiency are key demands for cruise vessels, he explains, and these are applications that contribute to new generation engine technology. To support these developments, the ABB turbocharger portfolio has been extended, through competitive one-stage and two-stage solutions. The A100-M and the Power2 800-M series, respectively, are examples of such solutions applied in this market segment.

"Keeping cruise ships at high occupancy and operating on tight schedules, will remain the number one requirement for cruise ship owners and operators," Tremuli said. Central to the effort is the ongoing development within ABB of new and evolving lifecycle solutions, an effort which includes harnessing the rapidly evolving layers of digital technologies. "For our turbocharging solutions, this means no compromise on safety and reliability while maintaining uptime and performance in operations."

Images Courtesy: SPS

New Tech to Solve Steel Renewal Problem

The number of cruise passengers worldwide according to the CLIA has grown from 17.8m in 2008 to 25.8m in 2017, a staggering 42% increase. With such expansion, order books were buoyant in 2017 with $6.8b being invested in new river, ocean and speciality vessels. However, with global cruise travel continuing to grow at a steady pace, pressure on cruise operators to maintain their existing inventory of vessels is equally as important as fleet expansion. Disruption to scheduled sailings and additional dry dockings would be an almost unforgiveable costly inconvenience making those responsible for vessel maintenance and integrity look to new solutions for old problems. On board Carnival UK's flagship, the Queen Mary 2, a permanent steel repair was required to a tweendeck area, situated above a restaurant and stairwell. Conventional steel renewal would have called for insulation, decorative panelling and pipework removal and areas of the vessel to be out of service; none of which were palatable. A temporary repair had been installed but had reached the end of its service life so to meet Lloyd's Register class guidelines a permanent solution was required.

It was decided to use SPS (Sandwich Plate Sytem), a steel-elastomer-steel, permanent class approved composite material with which to make the repair. The repair was undertaken during a return voyage to Southampton from New York. A crew of seven steel workers from SRC Group SA, were brought onboard along with an elastomer injection engineer. Using a small steel vacuum blasting unit, the coatings, areas of corrosion and the temporary repair were removed and the steel surface was prepared to SA2.5 for SPS requirements. 80cm of head height meant conditions for the team were confined. To avoid unsociable noise for 2,695 paying passengers on-board, blasting could not take place during meal times.

The existing steel plating was used as one side of the new composite solution. A low heat solution was used to fix the perimeter bars in place. These perimeter bars, with a new steel top plate form the cavities into which the SPS elastomer core is injected to fully reinstate the steel structure. For the Queen Mary 2 repair, bars were welded to adjacent structural members and in some instances, a structural adhesive was used, so to avoid heating deck plating and potentially damaging below deck services etc. The new steel top plates were then welded to the bars to form air-tight cavities into which the elastomer core was pumped using a mini injection unit. The repair was completed in 11 days, two days ahead of schedule. Lloyd's Register inspected and approved the repair on both sides of the Atlantic. A normal service operated at all times. "The team was able to complete the repair under challenging circumstances while the vessel was in service," said Andrew Menzies, Deck & Safety SME, Carnival UK. "In order not to impact on our guests' cruise experience, restrictions were placed on when works could be undertaken which the team worked around, delivering the project on time with minimal disruption."

SKF S-type retractable Fin Stabilizer &

Underwater Stabilizer Fin Replacement

In the luxury cruise sector, the phrase 'time is money' is perhaps more apt than in any other sector. Generally this growing segment attracts a wealthier clientele, a group that collectively is not accustomed to being put on hold.

Recently SKF and Trident Group completed the first replacement of an SKF S-type retractable Fin Stabilizer on a floating vessel, helping to keep a luxury cruise vessel on schedule.

Cruise is enjoying an unprecedented growth wave in nearly all sectors, from large oceangoing to inland river and luxurious yacht/adventure. While much of the focus understandably falls on the hotel and amenity side of the business, technologies that are below deck and under the water are similarly important, playing a critical role in ensuring that the ride is smooth and the schedule is kept.

Beneath the waterline, most modern cruise vessels are equipped with a pair of hydraulically-controlled stabilizer fins which can be deployed to counteract the effect of rough sea conditions on the motion of the vessel. When not required they can be folded away into the hull, minimizing drag and enabling maneuvering in ports.

In 2014, scheduled inspection of a cruise vessel revealed damage to the port stabilizer fin, most likely to have been caused by a collision with underwater debris. To avoid further damage, the decision was taken to take the stabilizer out of use until the ship's next scheduled overhaul.

In March 2017 the vessel entered drydock in Germany for a five-day scheduled overhaul. A team of engineers from SKF in Hamburg was dispatched to the site to dismount and repair the unit. When the team had removed the stabilizer from the vessel, however, inspection revealed that the damage was more serious than anticipated. The impact had bent or broken several critical parts in the stabilizer mechanism. Fixing them would require full disassembly, extensive machining operations and the replacement of a number of major components.

The work was not unduly difficult from a technical standpoint, but in this case time was tight. The team calculated that the work required would take at least 150 hours. Even with round the clock operation, it was impossible to complete during the dry-dock time available. And with the vessel scheduled to pick up a full complement of passengers immediately after leaving the dry dock, the overhaul period could not be extended.

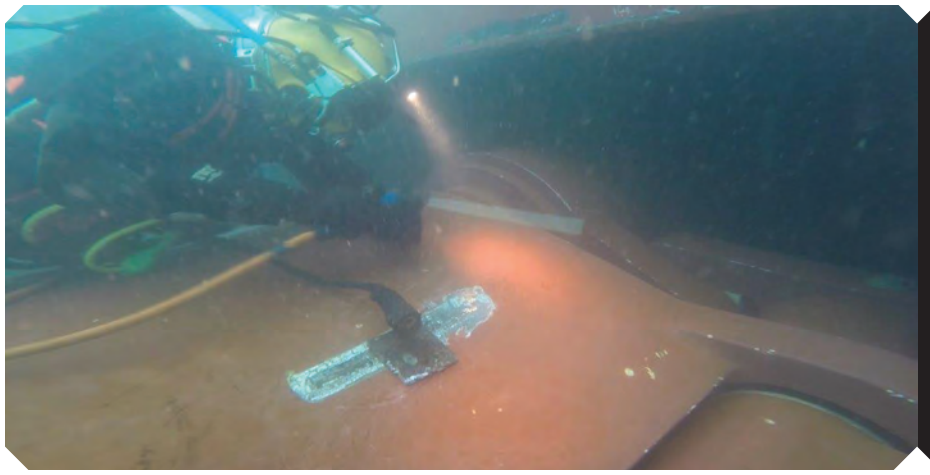
To complete the job, SKF and the vessel's owners decided on a radical course of action: underwater replacement. Two steel plates were mounted over the fin box opening to seal the hull and the vessel was returned to service. Meanwhile SKF transported the stabilizer to Hamburg to complete the necessary repairs.

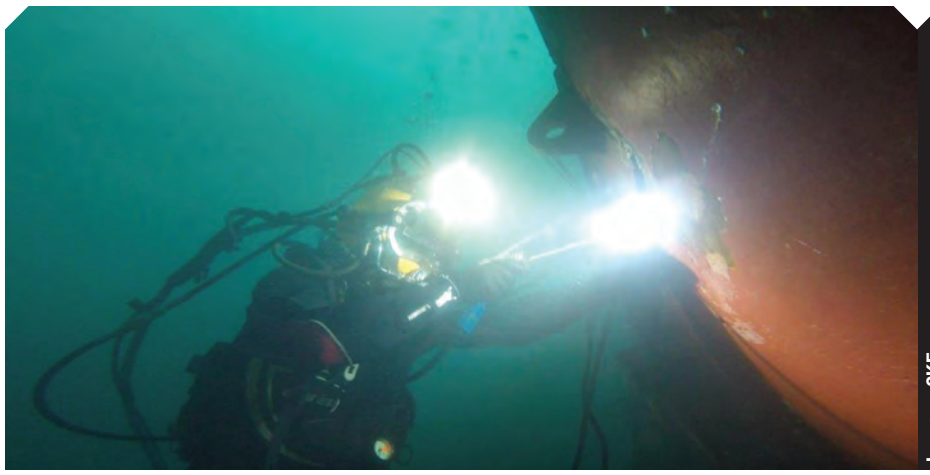
Once the unit was reassembled and tested, SKF shipped the main body of the stabilizer in a container to a port in the Canary Islands. The control systems and other small parts were loaded onto the vessel in Europe and travelled with it on its journey to the Canary Islands where it was scheduled to pick up the first passengers of its winter season.

In the Canary Islands, a team from Trident Group prepared the stabilizer for underwater installation, \a process that involved protecting and waterproofing all the parts of the mechanisms that are normally not exposed to sea water.

At the beginning of November 2017, the vessel arrived on schedule for a 58 hour layover in port and the Trident team went immediately to work. They installed a waterproof dome around the fin box inside the hull, allowing divers to safely remove the steel plates that had previously sealed the opening. The stabilizer fin was then lowered into position next the hull using a crane and the dive team maneuvered it into position and mounted it in place. With the fin box now watertight and secure, they were then able to remove the temporary dome.

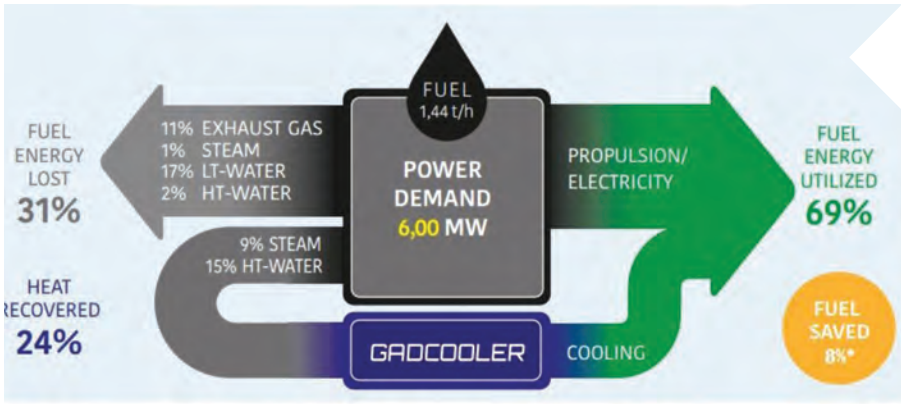
Once the basic installation work was completed on schedule, engineers from SKF sailed with the vessel on its journey to the Caribbean. Over the first day of that voyage, they were able to complete the installation process, connecting the stabilizer control systems and testing the operation of the unit.





Images: SKF

Meet the "GadCooler"



Gadcooler is a new ship cooling tech that is designed to save energy. Targeting the ferry and cruise ship sectors to start, the company recently announced its first installation success onboard Eckerö Line's cruise ferry m/s Finlandia. An example of a passenger ship running a 4-stroke medium speed 10 MW engine on part load - with Gadcooler. The system can recover up to 24% of the heat loss from the engines high-temp water and steam. The ships AC-cooling is produced from waste heat instead of electricity thus reducing engine power demand.

Ship cooling technology has a new name. Eminating from Finland, Gadcooler is a new ship cooling tech that is designed to save energy. Targeting the ferry and cruise ship sectors to start, the company recently announced its first installation success onboard Eckerö Line's cruise ferry m/s Finlandia over a period of two years.

To help save fuel the system uses existing onboard excess waste heat sources to provide chilled cooling water for the vessel's air-conditioning needs, replacing the need to run onboard cooling compressors.

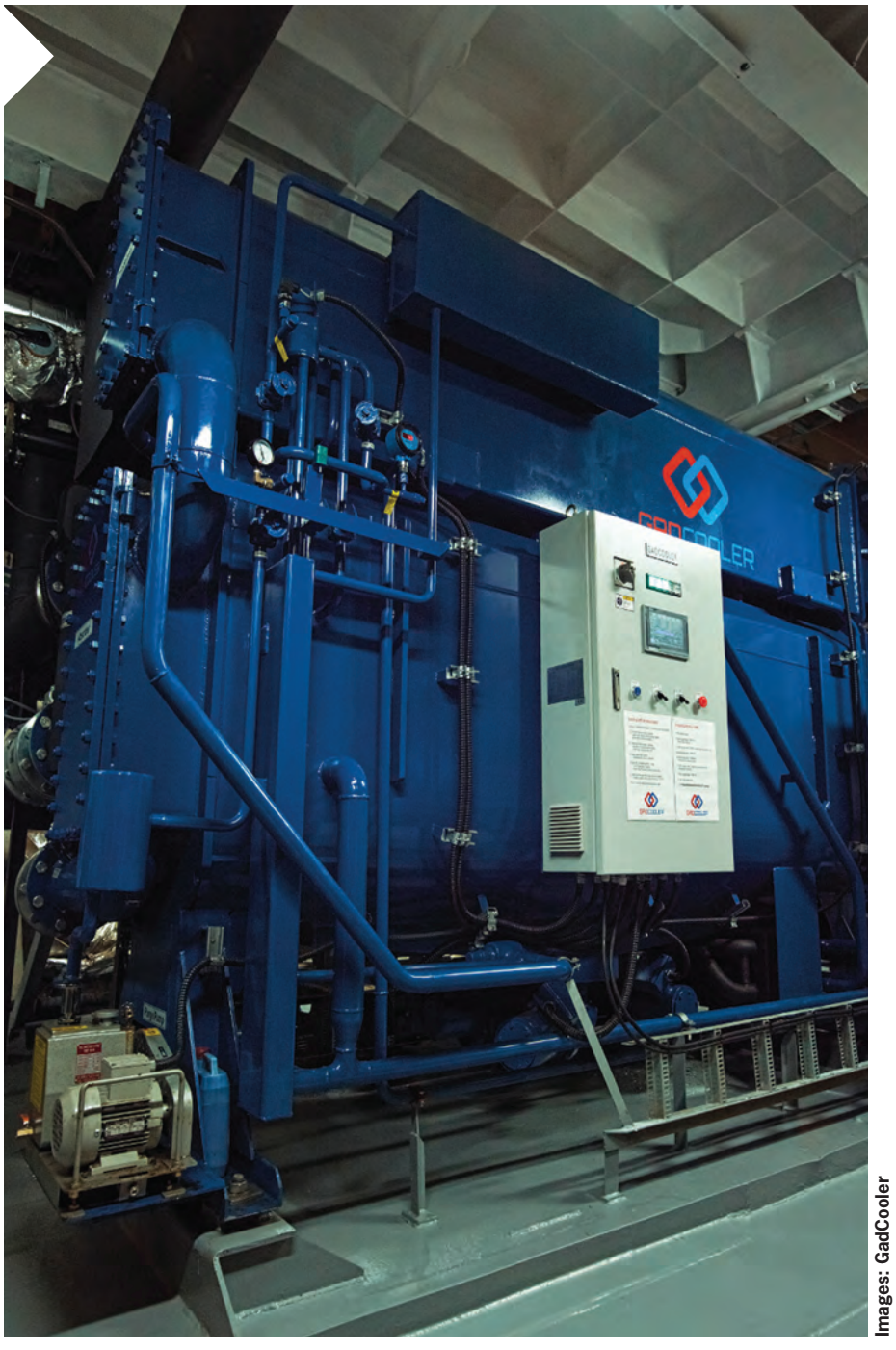
Although the need for cooling onboard passenger ferries in the Baltic is restricted to a few summer months, which even were comparatively very cold the last two years, the new cooling system installed has proven its good efficiency, saving, according to Eckerö Line, 140 tons in fuel and reducing emissions, such as carbon dioxide, sulphur dioxide, and nitrogen oxides. Carbon dioxides have been reduced by 430 tons. Rederi Ab Eckerö, the owner of m/s Finlandia, operates the ferry between Helsinki and Tallinn with up to 2,000 passengers and 650 vehicles onboard.

The Gadcooler Tech

In summertime and in tropical regions, cooling is typically a major onboard consumer of fuel. On big cruise ships operating in tropical conditions cooling can consume as much as 10 MW of power. Normally cooling is provided by using fuel consuming cooling compressors.

Gadcooler uses existing excess heat sources, such as rest heat from the engine cooling water or heat from boilers, to provide chilled cooling water in a non-toxic absorption process, resembling the operational principles of gas refrigerators.

In the cooling process a non-toxic medium, lithium bromide, is used as medium. The Gadcooler is designed to be practically maintenance-free and it is fitted with a smart control system which optimizes the cooling efficiency. The Gadcooler has been developed by Gadlab Engineering with patent pending. Gadlab Engineering provides the complete system including designing the connections with the existing onboard systems.The Gadcooler Chiller units are provided with DNVGL type approval certification.



Images: GadCooler

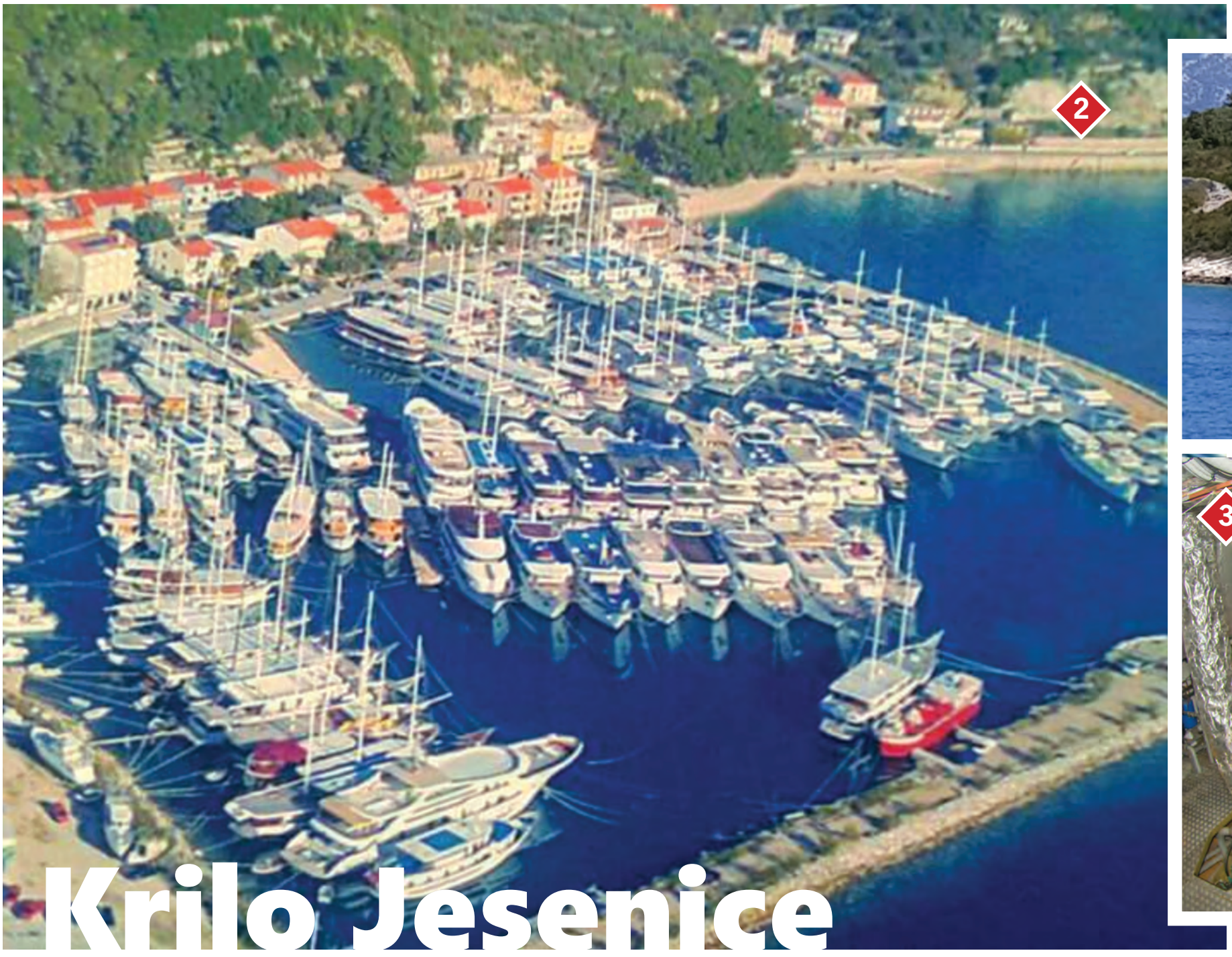


Photo courtesy Mladin family.

Krilo Jesenice
The Village of the Cruisers

Driving south on the coastal highway from the ancient city of Split in Croatia in late October, one is amazed to come on a forest of masts. These are not your usual sailboat masts lined in orderly rows in a marina, they are masts of all shapes and they are supported by a range of what at first appear to be spectacularly well maintained mega-yachts. A few are classic, bright finished wood but bold, white, steel-hulled ships with cruise ship style raked bows predominate.

On the shore, two rows of houses cluster at the base of a mountain making the sea of ships filling the harbor all the more dramatic. This is Krilo Jesenice, long the home of mariners noted for their fleet of sand hauling vessels, but in recent decades, home to an ever-expanding fleet of coastal cruising ships for the burgeoning Croatian tourist industry.

There is no shortage of rock along the coast of Croatia but fine sand for concrete and mortar has long been a valuable commodity. A prime source was the Cetina River, about 10 kilometers down the coast from Krilo Jesenice. But hauling sand was incredibly hard work and it didn't pay well. About 30 years ago, Duje Mladin's grandfather added a few simple cabins to his sand boat and took some tourists for a boat ride. The next year they brought friends.

Soon, Duje's father, Ivan Mladin, got a larger wooden boat on which he could accommodate a dozen people in cabins and make longer voyages along the coast. Others were doing the same and, by the early 2000s the Croatian tourist industry was growing rapidly and the families of Krilo Jesenice were growing with it. As business expanded, the families enlarged their fleet with larger more modern vessels

Croatian regulations limit the total number of passengers on this type of coastal cruisers to 36 and boats with 18 double berth cabins became the standard. In the early 1980s, Duje's father, although still a teenager, began working on the sand boats, but soon he bought a fishing trawler and worked that for several years. Seeing the growth of tourism in the 1990s he bought a 16-meter boat that could haul up to six passengers. His first group of tourists spread the word and more came the next year. He supplemented this by hauling newspapers to the islands. Soon he moved up to a 22-meter wooden boat with 14 cabins for 28 passengers. A then he traded up again to a 36-passenger wooden boat. It was these two boats that Duje recalls spending his childhood summers on.

Finally, in 2015, the Mladin family made the move to a modern steel hulled twin-engine luxury cruiser.

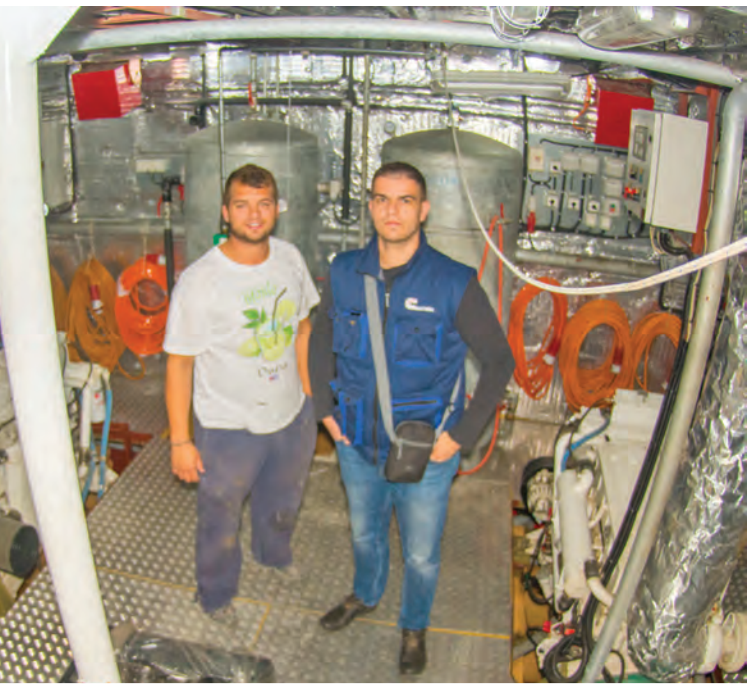
This 43 by 8.5-m boat would be as up-to-date as any on the coast. As do most of the families in the village, they had the shipyard build only the bare hull and superstructure and deliver it to their village port with only the engines installed. Then, in the winter months they hired all the subcontractors to complete the inte-

Photo courtesy Mladin family.

Photos

(starting left and proceeding counter-clockwise):

1. **The Mladin family's 2016-built ship Admiral.**
2. **An aerial view of the village fleet rafted up at Krilo Jesenice.**
3. **Capt. Duje Mladin with Cummins Adriatic's Vlado Segvic with a pair of QSM11 main engines onboard the 2017-built Aquamarine.**
4. **Capt. Duje Mladin on the bridge of the Admiral.**



Photos above and right courtesy of Haig-Brown.

By Alan Haig-Brown

riors to a very high level. The result is of a quality comparable to a luxury yacht. In addition to the 18 double-occupancy cabins, there is accommodation for eight crew including two chefs, two waiters, two sailors, a maid and the captain.

Working with a naval architect, the family brought all of their years of experience on the Adriatic to design a hull with a good solid 2.3-m draft and a hull shape suited for the vessel's function. At the same time they gave it shape from the beautifully raked bow to the deak decked swim grid aft. The quality of the wood joinery is exceptional and brings all the warmth and tradition of the wooden vessels while providing the longevity and finely faired finish of a steel hull.

Careful thought also went into the selection of the engines that form the heart of the vessel. For main engines, they selected a pair of Cummins QSM11 marine diesels each rated for 355 hp each at 1800 rpm. The provides ample and economical power to give the big vessel a maximum speed of 11.5 knots and a comfortable cruising speed of 9.5 knots while burning, including the genset, about 60 liters per hour. The engines turn propellers through Dong gears with 4:1 reduction.

As tourist boats, the week-long voyages do almost all travel by day and then moor in various ports along the way. A good many ports have shore power but in the event that they do not, or when anchored in an isolated bay, the hotel needs of the vessels are met by a pair of Cummins ONAN MDKDU 27kW generator sets. While underway 35 kW shaft generators provide electrical power for the vessel. On the Aquamarine an additional 90 kW generator provides power for the anchor winch and a 50 kW bow thruster.

The combination of owner input in the design and build process earned the Admiral complete satisfaction from both guests and operators. When a second vessel, the Aquamarine, was started in 2016, they made it an exact sister ship. From bow to stern and wheelhouse to engine room there were virtually no changes.

After commissioning in June of 2017 the Aquamarine, with Duje as captain, put in a productive and profitable summer season alongside the Admiral.

Bookings for the ships are handled by agencies and they are already full for the 2018 season. If a single group takes the whole ship, they can customize the voyage schedule with the captain. Guests are picked up in Split on a Saturday morning and the voyage can go north toward Zadar or south toward Dubrovnik.

Over the winter of 2017-18 there are reportedly more than 15 additional boats being added to the Croatian fleet including at least one in Krilo Jesencie. In most cases, as with the Admiral and the Aquamarine, owners who had the courage to convert work boats to tourist boats, will continue to do all of the finishing alongside in their increasingly crowded home port. Among maritime success stories this ranks with the best.

1: New Shuttle Tanker Design for

A new shuttle tanker concept developed by Teekay will offer a new level of innovation, according to Wärtsilä, whose smart technology solutions will be featured on the new vessels. To date, Teekay has ordered four of these 'next generation' ships, each to be built at the Samsung Heavy Industries (SHI) yard in South Korea. In addition to operating on liquefied natural gas (LNG) as the primary fuel, the dual-fuel engines will also be able to run on a mixture of LNG and recovered volatile organic compounds (VOC) – the gas evaporating from the oil cargo tanks during loading.

2: Antoine de Saint Exupery

CMA CGM has taken delivery of its new flagship CMA CGM Antoine de Saint Exupery, the biggest containership flying the French flag, and the first of three 400 x 59 meter, 20,600 TEU-containerships. Advanced tech onboard includes:

• a Becker Twisted Fin to improve the propeller's performance, helping to reduce the energy expenditure for a 4% reduction in CO2 emissions;

• a new-generation engine that reduces oil consumption (-25%) and fuel consumption for a 3% average reduction of CO2 emissions; and

• a system for the treatment of ballast water by filters and UV lamps.

3. LCS Manchester

The seventh Independence-variant Littoral Combat Ship (LCS) built by Austal, Manchester (LCS 14), completed acceptance trials late last year. LCS 14 will be the second Independence-variant LCS Austal delivers to the Navy in less than six months. The LCS program is at full rate production and is continuing its momentum at Austal USA with seven ships currently under construction. Tulsa (LCS 16), Charleston (LCS 18) and Cincinnati (LCS 20) are preparing for trials. Final assembly is well underway on Kansas City (LCS 22) and Oakland (LCS 24) and the first aluminum was cut on the future USS Mobile (LCS 26) on December 12. Austal also recently received new construction contracts for LCS 28 and LCS 30 – two of the three LCS awarded in FY 2017.

4. WSF Christens Suquamish

The Washington State Department of Transportation (WSDOT) christened Suquamish, its fourth Olympic Class auto/passenger ferry, to serve passengers on the Mukilteo/Clinton route beginning in 2019. The christening ceremony was held at Vigor's Harbor Island Shipyard in Seattle, where the new 144-car ferry has entered the final stages of construction and preparation ahead of sea trials starting in mid-2018.

Suquamish is the fourth funded Olympic Class vessel, built to replace the aging, midcentury-era Evergreen State Class vessels. The vessel's name honors the Suquamish people, a tribe that has inhabited the central Puget Sound for approximately 10,000 years. The Suquamish name translates into the "people of the clear salt water" in Southern Salish Lushootseed language.

5. Crystal Endeavor Build Starts

MV WERFTEN last month celebrated the commencement of the construction on Crystal's new luxury expedition

CMA CGM

yacht, Crystal Endeavor, with the cutting of the first piece of steel at their Stralsund site.

6 . Lucky 13

The final vessel has been named in a series of 13 chemical and product tankers ordered by Stena Bulk at the Guangzhou Shipbuilding International (GSI) shipyard. The 50,000 dwt MR tanker Stena Impero was named on recent in Guangzhou, China, completing a series of newbuilds ordered at Chinese shipyard GSI in 2012 for $508 million. The 183m Stena Impero was scheduled to be delivered to owner Stena Bulk on February 7, after which the vessel will make its maiden voyage carrying a cargo of vegetable oils from Asia to Europe and joining its 12 delivered sister vessels in the transport of refined petroleum products, chemicals and vegetable oils.

7. Modutech 's Work Boat Medium

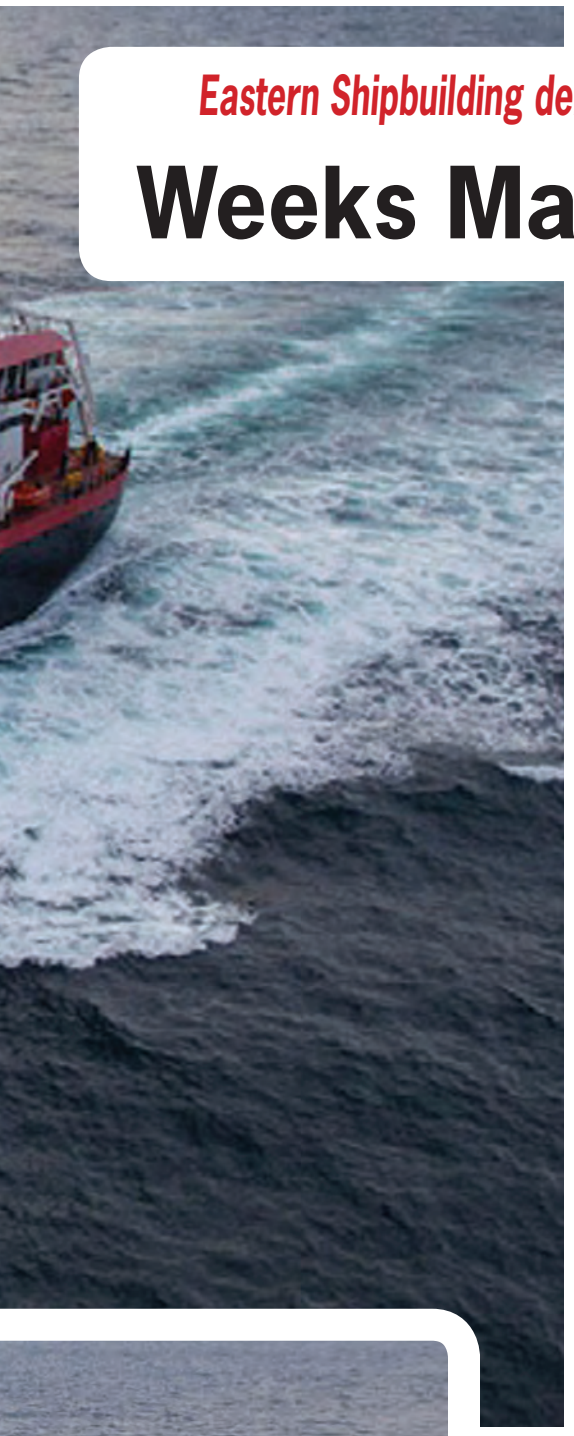
The United States Navy requires efficient and handy boats to support the fleet. John Myers of the naval architect firm Hockema & Whalen and Associates have developed a 30 by 15-foot tug with a 5.5-ft. draft. Currently the Navy has 24 of these tugs, designated Work Boat Medium, on order from Modutech Marine Inc. of Tacoma, Wash.. The first was delivered in December of 2017 with the others to follow in regular deliveries through to December 2019. Power for the boats is courtesy of a pair of Cummins QSL 9 diesels each delivering 285 HP continuous duty. The engines will turn nozzled 39- by 36-inch propellers through ZF W325 gears with 3:1 reduction. Triple shutter-type rudders are mounted behind each prop. The combined 570 HP will give the 30-foot tugs a 17,500-pound bollard pull.

Photo: © MV WERFTEN

Photos: Weeks Marine

Magdalen Main Particulars

Designer	Royal IHC
Builder	Eastern Shipbuilding Group
Dimensions (o.a.)	356 x 79.5 x 27.25 ft.
Propulsion Horsepower	(2) 5,682 BHP
Main Engines	(2) GE 16V250
Main Shaft Generators	(2) 3,400kW
Auxiliary Generator	(1) GE 6L250 (1,423kW)
Emergency Generator	(1) Caterpillar C18 (425kW)
Classification	Lloyd's Register
Flag & Regulatory	USA, USCG
Hopper Capacity	8,550 yd^3
Booster Pump Power	(2) @ 1,600kW
Dredge Pump Power	(1) @ 1,600kW
Jet Pump Power	(2) @ 445kW
Bow Thruster	(1) 730kW VFD Fixed Pitch Tunnel Unit



Eastern Shipbuilding delivers

Weeks Marine's Hopper Dredge Magdalen

"The single largest investment in Weeks' 99-year history"
Richard S. Weeks, President

Weeks Marine's new self-propelled hopper dredge, Magdalen, was delivered by Eastern Shipbuilding on December 22 following sea trials and regulatory inspections. The newbuild is one of the two newest, and among the largest hopper dredges in the U.S., and will bring formidable pumping power to offload beach quality sand or other materials for land reclamation.

On December 28, the new dredger sailed from Eastern's Allanton facility in Panama City, Fla. on her maiden voyage to the East Coast.

"The Magdalen arrived [January 2] in Southport, N.C., and is bringing on supplies and crew before going to work on one of the State's most critical projects: the protection of Highway 12 in the Buxton area on North Carolina's Outer Banks," said Weeks' Senior Vice President, Dredging Division, J. Stephen Chatry.

"As the single largest investment in Weeks' 99-year history, I am pleased that the Magdalen's first project will be finishing up a vital project to North Carolina and to visitors from around the world," said Weeks' President, Richard S. Weeks.

The Jones Act dredge Magdalen is dedicated to the domestic marketplace and was designed specifically for the conditions found in the U.S

"Weeks works hard to identify and understand growing markets in the U.S. and is constantly evaluating new opportunities to meet new demand," said Eric Ellefsen, Weeks' Executive Vice President. "We are particularly attentive to the U.S. Army Corps of Engineers' program, and have been pleased by the strong growth in our second home, Louisiana, as the State fights coastal erosion and the loss of valuable wildlife habitat."

Weeks said the introduction of Magdalen effectively doubles its hopper dredging capacity, joining the company's workhorse hopper dredges RN Weeks and BE Lindholm, whose combined hopper capacity is less than that of the new dredge.

Magdalen will be crewed by members of the International Union of Masters, Mates and Pilots (34 permanent seafaring jobs).

Photos: Weeks Marine

Fuel Monitoring Matters

Whether you choose distillates, LNG or scrubbers to meet the new IMO fuel regs in 2020, it will be ever more critical to regularly monitor the condition of vital equipment to ensure there is no adverse affect on operational efficiency.

About the Author

Larry Rumbol is the Marine Condition Monitoring Manager at Parker Kittiwake.

Industry opinion ahead of the implementation of the 2020 global sulphur cap remains fragmented to say the least. With only a relatively short timeframe remaining before ship owners will be facing the reality of compliance, there is no real consensus as to the spread of the three main compliance solutions.

A recent survey by IBIA found that, while the majority of respondents advocate distillates as the compliance solution of choice, the majority was slim with 42% favoring LNG, and the remaining 8% favoring emissions abatement technology such as scrubbers. However many still believe that, given the higher cost of distillates over Heavy Fuel Oil (HFO), the industry will turn to scrubbers ahead of 2020. A recent statement by Foreship announced that it expected a third of global shipping to have installed scrubbers by 2020, with less than 500 vessels using LNG as an alternative marine fuel. However this could all change as fuel prices alter and newbuild vessels come online in coming years.

Whatever the jigsaw of compliance solutions the shipping industry creates, it is inevitable that there will be an impact on the future fuels market, and this will certainly have a knock-on effect on vessel operations and efficiency. Operators will find themselves facing a number of challenges including increased cat fines, and differing parameters regarding viscosity, flash point, and pour points, which will impact stability and compatibility, all leading to unexpected and costly machinery damage. Moving into 2020 it will become ever more critical to regularly monitor the condition of vital equipment to ensure there is no adverse affect on operational efficiency.

Understanding the physical characteristics of fuel, hydraulic and lubricating oil, coupled with an awareness of sampling and testing systems and processes, and the significance of test results, will become vital for engineers and operators. With the industry disjointed on how best to achieve compliance, it's difficult to predict what the multi-fuel market of the future will look like. Indeed it is likely to comprise a whole range of options, chosen to suit a host of factors including vessel type, size, and operating pattern – all of which will be influenced by fuel price.

What will remain constant is the need for real-time information on equipment performance and "smart" maintenance of onboard systems. And this is because effectively understanding and harnessing the power of condition monitoring data yields tangible efficiencies for ship owners and operators. Data covering the performance of every vessel function or equipment installation can be transferred to shore and continuously monitored. Smart condition monitoring can improve operational uptime and reduce vessel maintenance bills, lowering the overall total cost of ownership. Furthermore, it can create customer confidence that the operator values and embraces modern technology and efficient practices.

Condition monitoring has moved on in the last decade. At one point the only way to see abnormal wear was in a laboratory report, then that became possible on board, and now equipment is continuously monitoring a variety of equipment and parameters.

Reagentless testing is the next evolution in condition monitoring, and it's here today. This new form of condition monitoring best practice has the capability to measure a variety of parameters and equipment, bringing a sophisticated monitoring capability onboard. This gives operators the insight they need into the operating conditions within vital equipment, without the need for extensive additional training, without the costs and hazards associated with transporting and storing reagents, and without the need for numerous test kits and sensors.

Frequent oil testing is essential to understanding the operating conditions onboard and in real time, allowing engineers to prevent unnecessary damage to critical and expensive engine components. Until now, operators have required a suite of condition monitoring tools to determine the operational integrity of the system, testing for each potentially damaging element separately. This increases cost, the time needed to carry out the testing, and the amount of equipment required.

The recently launched Parker Kittiwake ATR oil analyser allows operators to combine all of these tests and measure seven key parameters simultaneously using a single, onboard test kit. Through measuring multiple parameters in one test, operators spend significantly less time conducting testing and monitoring, allowing them more time to conduct other vital maintenance work, thereby maximising both uptime and operational efficiency. Without the need for reagents, the ATR has no requirement to ship the required chemicals to the vessels throughout the lifetime of the testing device, negating costs associated with purchasing the chemicals, as well as freight, and the required time and resource to raise purchase orders. As reagentless testing also requires no mixing of chemicals by onboard engineers, test results are more accurate and repeatable.

Condition monitoring tools and techniques need to stay ahead of the game to ensure that ship owners and operators are able to protect operational efficiency and profitability, regardless of industry trends and market conditions. Reagentless testing is key to preparations for the 2020 global sulphur cap and its impact on the future fuels market. Given the plethora of challenges faced by ship owners, undertaking proactive condition monitoring should be as simple and cost effective as possible. Engineers should have easy access to the tools they need, as this is the best way to ensure they have the information required to effectively manage the operational efficiency of the vessel – whatever the fuel of choice.

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6-7 sept	**MS&D, international conference on maritime security and defence**
7 sept	**Maritime Career Market**

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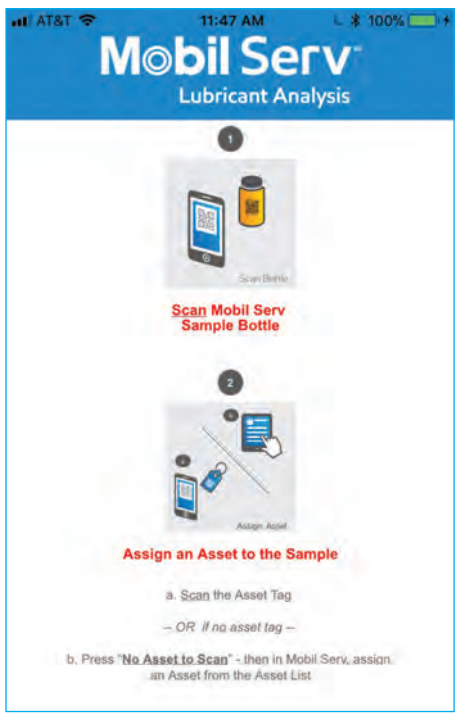
MobilServ Lube Oil Analysis



Submitting a lube oil sample is as easy as "1, 2, 3" via the MobilServ app.

© yanlev/Adobe Stock

As vessel owners aggressively seek to manage total cost of ownership of their most valuable assets – their vessels and the machinery that keeps them moving – ExxonMobil delivers MobilServ Lubricant Analysis, a modern interpretation of the age old practice of having a vessel's lube oil tested for quality and other machinery related diagnostics.

The new MobilServ service harnesses the power of big data and internet connectivity to deliver lube oil analysis when and where the user needs it. Using a smartphone App, vessel operators have the capability to seamless take a sample, scan a QR code, enter a few bits of data and drop the package in the mail. J.R. Hand, Marine Field Engineer with ExxonMobil for more than 16 years, and an industry veteran of more than 35 years, explains.

"It's all about making it easy," said Hand. "MobilServ is 'scan and go,' designed to be more user friendly, a cloud based service allowing the user to see results how and where they want to see them, even on their mobile device."

Hand admits that many of the large, global shipping companies have already bought into the procedure to work digitally, but his target is the Americas inland waterways, a group that is arguably more set in its ways regarding machinery monitoring and maintenance, adhering to traditional hour-based maintenance versus condition-based monitoring and maintenance.

"Oil analysis has been around for a long time. But today, closely monitoring the quality and life in your lube oil can have significant (monetary) benefits," Hand said, including:

- Extended oil drain intervals
- Reduced lube oil usage
- Reduced cost of waste oil disposal
- Condition-based monitoring of critical equipment that can either extend overhaul times or help avoid catastrophic failures.

As the new service creates an electronic record of maintenance, it could be extrapolated that for the inland industry this could be an additional level of security and record keeping in step with Subchapter M compliance. But Hand concludes that the new service comes down to a fairly simple premise.

"Everyone is looking to reduce the cost of ownership," and with MobilServ analytics, ExxonMobil can work with companies to provide a yearly fleetwide analysis, with insights on specific engine makes and models, as well as highlights of individual vessels or crews that deviate substantially from the norm.

https://mobilserv.mobil.com

DNV GL: New JDP to Test Biodegradable Lubricants

DNV GL has launched a new joint development project (JDP) in cooperation with marine insurers The Swedish Club, Norwegian Hull Club, Gard and Skuld to test the potential influence of Environmentally Acceptable Lubricants (EALs) on failures in stern tube bearings. DNV GL will oversee detailed laboratory testing of EALs by Leonardo Testing Services Ltd. at the University of Sheffield (UoS), UK.

The JDP has been prompted by an increase in stern tube bearing failures over the last few years. This coincides with the increased uptake of EALs after the introduction of regulations requiring their use in commercial vessels trading in U.S. waters in 2013, but also with the introduction of new propulsion system designs, such as single stern tube bearing installations and larger and heavier propellers operating at lower RPM.

"Very few studies have been conducted to compare the lubrication performance of EALs with that of traditional mineral oils in stern tube applications," said Øystein Åsheim Alnes, Principal engineer at DNV GL. "With this new study we hope to gain a better understanding of factors influencing the lubrication performance of EALs."

The test program will investigate such aspects as hydrodynamic oil film formation, oil film thickness under varying loads and temperatures, and potential shear thinning effects at high shear rates. State-of-the-art non-invasive ultrasonic techniques developed by UoS will be utilized to examine lubricant film behaviour in real-time.

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Said


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Jason Marine Group
J. Foo Chew Tuck

New Shipyard CEO at ODC

Oman Drydock Company (ODC) appointed **Said bin Homoud Al Mawali** as Chief Executive Officer replacing Stephan Aumann who announced earlier last year by the ASYAD (formerly Oman Global Logistic Group) board of directors in Duqm/Oman. Prior to his role at ODC, Said was providing leadership and governance for the Executive Management of OTTCO since February 2014.

Foss Names Sumner CFO

Bryceon Sumner has joined Foss Maritime as chief financial officer, hired to oversee all aspects of the organization's financial function and performance. Prior to joining Foss, Sumner served as COO and CFO for public and private companies, family offices and as a senior financial officer of a $60 billion government banking insurance fund.

ZIM Appoints a Chief Digital Officer

ZIM announced today that it has appointed **Liav Geffen** as Chief Digital Officer (CDO) This new position, part of ZIM's Sales & Customer Service directorate headed by VP Sales and Customer Service, Saar Dotan, will enhance ZIM's strategy to become a digital leader in the shipping industry.

NAVTOR Hires Holme as CTO

E-navigation specialist NAVTOR appointed **Anders Holme** for the role of Chief Technology Officer. Holme will manage teams that work across offices in Egersund, Norway, Singapore, Japan, Sweden, Russia, the U.S. and U.K. NAVTOR's main software development takes place at the company's head office in Egersund and its dedicated base in St Petersburg.

Fotland Named COO at Odfjell

Odfjell SE appointed **Harald Fotland** as chief operations officer (COO), effective January 5, 2018. he Norwegian tanker shipping firm said it is introducing a COO function to ensure full integration between ship management and commercial operations. Fotland joined Odfjell as chief of staff in 2010, and in 2015 was appointed senior vice president of Odfjell Tankers. He has also held the position as intermediate senior vice president of Odfjell's Ship Management since January 2017. In addition, Odfjell appointed **Geirmund Drivenes** as global head of ship management and **Bjørn Hammer** as global head of tanker trading. Both positions will report to the COO.

Mobley Scoops Young Designer Prize

Philanthropic design proved the key to success at this year's annual Superyacht UK Young Designer Competition 2018, in partnership with Pendennis Shipyard and Olesinski, as **Christopher Mobley**, a transport design student from Staffordshire University, was crowned the winner at the London Boat Show. Mobley received the prize of a four-week internship at world leading custom superyacht builder and refit specialists and event sponsor, Pendennis Shipyard. Featuring innovative ideas such as the launching system of the submersible vessel at the aft end and the extending beach club from the mid ships, Mobley's superyacht design was voted the most imaginative for the client.

Jason Marine Names New CEO

Joseph Foo Chew Tuck will take over as chief executive officer at Singapore based marine electronics systems integrator Jason Marine Group, following the retirement of long-serving CEO **Ronald Tan Lian Huat**.

Marlink Expands in Japan

Satellite communication provider Marlink said its Tokyo office has relocated to new, larger premises as the company grows its Japan team to meet the needs of an expanding VSAT customer-base in the region.

Marlink's Japan office, which was first established in 1978, provides proximity to Japanese ship owners and is a key player in the region's growing use of satcom services.

As part of Marlink's global network of more than 20 first-party facilities, Marlink Japan supports shipping companies to deliver more effective and available connectivity to crew members using services such as Marlink Sealink VSAT and Inmarsat Fleet Xpress.

Campbell Migrates to Fleet Xpress

Inmarsat has reached an agreement with Nassau, The Bahamas-headquartered Campbell Shipping to migrate its fleet of dry bulk carriers to Fleet Xpress.

The commitment will involve a migration and upgrade from Inmarsat's XpressLink services to Fleet Xpress, in a move to ensure ships managed by Campbell ships will continue to have the best satellite connectivity service available on the market, according to Capt. Anindya Dasgupta, VP Human Capital, Campbell Shipping.

"This upgrade will mean our ships will benefit from faster connections to the Internet, available through a single cost-effective package," said Capt. Dasgupta. "It will enable us to accelerate improvements in other areas of vessel IT infrastructure, allowing more activities and functions to be supported and carried out on board. Fleet Xpress will help us to stay ahead of the game."

"Our success is directly attributed to the company's philosophy of building better lives for the people we employ," said Capt. Dasgupta. "Although we are in the business of moving cargo, we never forget our commitment to our team members. Today's seafarers want to stay in touch with their families and remain connected to the rest of the world. Reliable connectivity is therefore crucial. Faster on-board Internet and low-cost calling options will result in improved morale, contributing to productivity and the retention of talent in the company.

"We expect the additional bandwidth provided by Fleet Xpress will also facilitate closer monitoring of day-to-day vessel operation, which, over the longer term, will lead to gains in operational efficiency and cost savings."

Inmarsat

Shipbuilding: $13.3m Awarded for R&D Projects

The National Shipbuilding Research Program's (NSRP) Executive Control Board has selected a new round of research and development (R&D) projects aiming to spur technology advancements in order to reduce costs associated with shipbuilding and ship repair in the U.S.

The seven projects – valued at over $13.3 million, including cost share – were selected from those proposed in response to research announcement issued in July 2017, and are outlined below.

Integration of Scanning & Laser Peening Activity

Hepburn & Sons, LSP Technologies, Mentoring Solutions, Siemens, NSWC Carderock Industry Investment: $986,000 | NSRP Investment: $1.23 million

SMART: Shipyard Mobile Applications in Real Time

Bollinger Shipyards Lockport, GD Electric Boat, GD Bath Iron Works, Sparkhound Inc., D'Angelo Technologies, Hepinstall Consulting Group
Industry Investment: $755,000 | NSRP Investment: $770,000

Computer Aided Robotics for Welding (CAR-W) Support for Multipass Welding & Extension of CAD System Support

Wolf Robotics, HII Newport News Shipbuilding, GD Electric Boat, Siemens PLM Industry Investment: $1.43 million | NSRP Investment: $1.44 million

Integration of Outfitting and Structural Details on Swaged Bulkheads

GD NASSCO, San Diego State Univ.
Industry Investment: $253,000 | NSRP Investment: $362,000

LiftShip

SSI Ship Constructor Software, Austal USA, Conrad Shipyards, Bollinger Shipyards, VT Halter Marine, Ship Architects, Altair Engineering, ATA Engineering
Industry Investment: $1.53 million | NSRP Investment: $1.11 million

Knowledge Provisioning to Improve First Time Quality of Ship Design

Conrad Shipyard, Bollinger Shipyards, Fincantieri Marinette Marine, GD Bath Iron Works, SSI Ship Constructor Software, Auros Knowledge Systems, Vicky Dlugokecki, Hepinstall Consulting Group
Industry Investment: $1.34 million | NSRP Investment: $1.2 million.

Land Based Case Study of Insulated Bus Pipe (IBP) for Ship Design

Hepburn & Sons, Tefelen, Florida State University Center for Advanced Power Systems (FSU CAPS), GD Bath Iron Works
Industry Investment: $455,000 | NSRP Investment: $455,000

For full details:
www.marinelink.com/news/shipbuilding-projects432588

MARITIME REPORTER AND ENGINEERING NEWS

EDITORIAL CALENDAR

JANUARY

Ad Close: Dec 21

Ship Repair & Conversion

MARKET: Ferries & Riverboats
TECHNICAL: Maritime Propulsion Guide
DESIGN: U.S. Navy: Fleet of the Future
PRODUCT: Ship Repair Tools
SPECIAL REPORT: Bunker Fuel

BONUS DISTRIBUTION
PVA Maritrends: Jan 28-31, Savannah, GA

FEBRUARY

Ad Close: Jan 22

Cruise Ship Annual

MARKET: Clean Water Technologies
TECHNICAL: Satellite Communications: (IOT)
DESIGN: Emission Technologies: An Eye on 2020
PRODUCT: Green Marine Fuels & Lubricants
SPECIAL REPORT: Cruise Ports

BONUS DISTRIBUTION
Seatrade Cruise Global: Mar 5-8, Ft. Lauderdale, FL
CMA Shipping 2018: Mar 12-14, Stamford, CT
Asia Pacific Maritime: Mar 14-16, Singapore
Green Ship Tech: Mar 21-23, Copenhagen, DK

MARCH

Ad Close: Feb 21

Annual World Yearbook

MARKET: Maritime Simulation
TECHNICAL: Dredging
DESIGN: Cranes, Davits & Hoists
PRODUCT: Marine Coatings & Corrosion Control
SPECIAL REPORT: Marine Medicine

BONUS DISTRIBUTION
Sea Japan: Apr 11-13, Tokyo, Japan
Sea-Air-Space: Apr 9-11, National Harbor, MD
Clean Waterways: Apr 4-5, St. Louis, MO
NACE Corrosion: Apr 15-19, Phoenix, AZ

APRIL

Ad Close: Mar 21

Offshore Energy Annual

MARKET: Offshore Wind Power
Technological: Cyber Security
DESIGN: RIB & Patrol Boat Report
PRODUCT: Marine Rope and Cable
SPECIAL REPORT: The Autonomous Ship

BONUS DISTRIBUTION
OTC: Apr 30- May 3, Houston, TX
AUVSI Xponential: Apr 30- May 3, Denver, CO
Danish Maritime Days: May 2-4, Copenhagen, DK

MAY

Ad Close: Apr 20

Marine Propulsion Edition

MARKET: Mediterranean Cruise & Ferry
TECHNICAL: Fuels, Lubricants & Additives
DESIGN: Workboat Design & Construction
PRODUCT: Navigation: Marine Electronics, Radar & ECDIS
SPECIAL REPORT: U.S. Coast Guard Annual

BONUS DISTRIBUTION
Inland Marine Expo: May 21-23, Saint Louis, MO
Posidonia 2018: Jun 4-8, Athens, Greece
Marine Money Week: Jun 18-20, New York, NY
ITS 2018: Jun 25-29, Marseille, France
Seawork: Jul 3-5 Southampton, UK

JUNE

Ad Close: May 21

Green Marine Technology

MARKET: U.S. Navy Report
TECHNICAL: Hybrid propulsion systems
DESIGN: Fire Safety Systems
PRODUCT: Pumps, Valves, Pipes & Insulation
SPECIAL REPORT: Energy Efficiency Systems

BONUS DISTRIBUTION
Electric & Hybrid Marine World Expo:
Jun 27-29, Amsterdam, NL

All information may be subject to change

MARITIME REPORTER AND ENGINEERING NEWS

EDITORIAL CALENDAR

JULY

Ad Close: Jun 21

Marine Communications Edition

MARKET: Tugboat, Towboat & Barge
TECHNICAL: Oil Spill Response & Recovery
DESIGN: Offshore Accommodation
PRODUCT: Maritime Software Solutions
SPECIAL REPORT: Maritime Robotics & Drones

"MR White Papers: Edition 1"
Special Content Electronic-Only Version Edition

AUGUST

Ad Close: Jul 20

The Shipyard Edition

MARKET: Heavy Lifting Solutions: Maritime Cranes, Winches, Windlasses & Capstan
TECHNICAL: Big Data
DESIGN: Icebreakers
PRODUCT: Ballast Water Technologies
SPECIAL REPORT: SMM Technology Preview

BONUS DISTRIBUTION
SMM 2018: Sep 4-7, Hamburg, Germany
GasTech 2018: Sep 17-20, Barcelona, Spain

SEPTEMBER

Ad Close: Aug 21

Maritime Port & Ship Security

MARKET: Controls & Bridge Automation
TECHNICAL: Marine Firefighting, Safety & Salvage
DESIGN: Interior Design: Onboard Amenities
PRODUCT: Welding & Cutting Equipment
SPECIAL REPORT: U.S. Navy Report

BONUS DISTRIBUTION
SHIPPINGInsight: Oct 10-12, Stamford, CT
Commerical Marine Expo: Oct 17-18, Providence, RI

OCTOBER

Ad Close: Sep 21

Marine Design Annual

MARKET: Ship Classification Societies
TECHNICAL: Deck, Hull and Tank Coatings
DESIGN: Naval Architecture & Marine Engineering
PRODUCT: Software Solutions: CAD/CAM
SPECIAL REPORT: Propulsion, Thrusters & Gears

BONUS DISTRIBUTION
SNAME: Oct 23-27, Providence, RI
EURONAVAL 2018: Oct 23-26 Paris, France
Seatrade Middle East: Oct 29-30 Dubai, UAE

NOVEMBER

Ad Close: Oct 22

Workboat Edition

MARKET: Alternative Marine Fuels
TECHNICAL: Clean Water Technologies
DESIGN: Offshore Wind Power
PRODUCT: Multi Mission Boats; Patrol, Escort, Fire and Search & Rescue

BONUS DISTRIBUTION
Workboat Show: Nov 28-30, New Orleans, LA
MAST: Nov 28-30 New Delhi, India
World Maritime Technology Conference:
Dec 4-7, Shanghai, China
Clean Gulf: Dec 4-6, Houston, TX
INMEX China: Dec 5-7, Guangzhou, China

DECEMBER

Ad Close: Nov 21

Great Ships of 2018

MARKET: U.S. Navy Report
TECHNICAL: The Autonomous Ship
DESIGN: Marine Engine Guide
PRODUCT: Deck Machinery PRODUCT Guide

"MR White Papers: Edition 2"
Special Content Electronic-Only Version Edition
Submission Deadline: Nov 15

All information may be subject to change

BUYER'S DIRECTORY

This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR assumes no responsibility for errors. If you are interested in having your company listed in this Buyer's Directory Section, contact Mark O'Malley at momalley@marinelink.com

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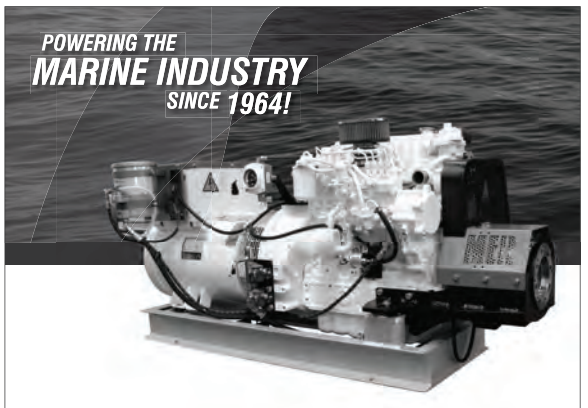

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