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MARITIME REPORTER AND ENGINEERING NEWS

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August 2018

Shipbuilding

Clean emissions drive newbuild & repair

Thought Leadership
Heads of class weigh in on tech trends

Voices: Art Regan, Genco
Personification of the 'new' shipping exec

Ballast Water Tech
The BWT boom has arrived (really)

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THE COVER

Emission Regs Drive Shipbuilding & Repair
A wave of regulation, from emissions to ballast water technology, will drive shipbuilding and repair for years. Pictured is Crowley's new LNG-fueled ConRo, El Coqui, built and recently delivered from VT Halter of Pascagoula, Miss.

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Thought Leadership

CLASS

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Top execs at **ABS, DNV GL, ClassNK** *and* **BV** *discuss the tech drivers that will define the next maritime generation.*

By Greg Trauthwein

In this Edition

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All Roads Lead to Hamburg

As this is now my 14th SMM in Hamburg, Germany, I think it fair to say that in my 28th year in this chair I have passed "seasoned" and am heading fast toward "ripe." I will always have a soft spot for the Hamburg exhibition as it was my first exhibition attended for this company, literally jumping on a plane from New York a month after getting a job with Maritime Reporter & Engineering News and heading to Germany, landing in Hamburg and traveling first to Kiel to visit with MaK for the introduction of its MaK20 diesel engine.

That trip was significant for a number of reasons, the least of not which is the fact that my ride never showed up at the airport and I had to find my way from Hamburg to Kiel as a novice international traveler, before mobile phones, email and internet connectivity. It was also memorable as I was literally the only journalist in Kiel for the event, an add-on to a special event for shipowners. While many of the names and faces escape me now, spending a couple of days with a group of 20 shipowners taught me more about the industry in 48 hours that I could hope to learn in a year.

As we gear up for another full week in Hamburg, much has changed, but much remains the same. What's the same from 28 years ago? First and foremost, SMM is hands-down the largest, best and most influential maritime exhibition in the world. In markets up and down, there is a strong draw of shipowners, builders, equipment suppliers and now, increasingly, high-tech digital solution companies to Hamburg for a week of conference, exhibition and socializing. And despite being in the midst of the 'fourth industrial revolution', the age of data, shipping remains the best, most economical and environmentally benign means to move cargo globally, an irreplaceable link in the world's logistic chain.

Everything else has changed.

Today we are navigating through one of this industry's historic low cycles, though by all accounts there is a light growing brighter at the end of the tunnel. Shipyards are naturally a bellwether of the industry health in general, and while yards today are not popping the champagne, they are preparing the ice buckets. New rules regarding ship emissions – from ballast water to greenhouse gases – are set to inject an unprecedented level of business to and through shipyards around the world. Our 25-page shipbuilding report starts on page 34, and through interviews with more than 20 yards from all points around the world, it is clear to see that most are banking on the long-debated, oft-berated rules surrounding ballast water management systems to finally kick in and drive a significant amount of business to the yards, as well as engineering companies and supporting services. We have discussed the BWMS matter in these pages and those of our print and electronic brethren countless times since it was intruded in the early 2000s, but a common theme is that the process of fitting a BWMS onboard an existing ship transcend simply fitting a product, it is an engineered solution, unique to each ship, that involves space, power and piping. We have a 12-page BWMS section starting on page 78, including a tech report form Tom Mulligan, our Science & Technology writer based in Europe.

The impact of new emission regulations continues to be debated. As our cover this month attests, with the delivery of a new LNG/dual-fuel ConRo from VT Halter for Crowley, the push to minimize greenhouse gas emissions from ships is real and active, with the new IMO fuel rules looming large in the porthole come 2020. The area of uncertainty centers on exactly what action industry will take: scrapping older, less-clean ships, or retrofitting new technology and utilizing new fuels to comply. Regardless, of the solution, the era of prioritizing the environment above, in and below the world's waterways is upon us, and this will dictate maritime design and technology for the next generation.

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Let's Make a Deal

Offshore Heavy Transport

Heavy Lifters for Offshore Renewables

Offshore Heavy Transport (OHT) will enter the offshore renewables and installation market with a new heavy lift transport and installation vessel, a customized Ulstein Alfa Lift design developed by Ulstein Design & Solutions BV (UDSBV) and OHT.

There is one firm order with three options to build the ship at China Merchant Heavy Industry (CMHI), ready for action in 2021. The dynamically-positioned, 48,000 DWT vessel is designed to perform heavy lift crane operations with the main deck submerged, a patent-pending design combining the benefits of a semi-submersible transport vessel with a large, 3,000 mt lifting capacity main crane from Liebherr. The vessel is designed to match the future requirements of the offshore wind industry, allowing it to transport and install up to 10 x 1,500t ultra-large jacket foundations or 11 x 2,000t XXL monopiles plus transition pieces for the largest anticipated Wind Turbine Generators.

"When we approached Ulstein with our intended strategy to enter the offshore renewables market and the idea of adding crane capacity to a semi-submersible heavy lift transport vessel, UDSBV presented their Alfa Lift solution on the spot," said Torgeir E. Ramstad, CEO at OHT. "That was a direct 'hit', as it allows us to enter the installation market, at the same time expanding on our capabilities in OHT's core market.'"

Vessel Dimensions

Length, o.a.	216.3 m
Length, bpp	204.3 m
Beam (molded)	56 m
Depth (main deck)	12.6 m
Draft (design)	8 m
Draft (submerged max.)	27.6 m
Service speed	13 knots
Installed power	4 x 6,875 kW
Propulsion thrusters	3 x 5,500 kW
Retractable thruster	1 x 3,000 kW
Tunnel thrusters (fwd)	3 x 3,000 kW
Positioning system	DP 2
Class	DNV-GL
Deck strength	30 t/m2

Photo of the Week : Heavy Lifter

Heavy lift vessel Maple Lotta with cargo at open sea.

Herbert Boettcher worked out the photo on a heavy lift vessel during his trip through Europe, the Asian part of Turkey and his passing the Suez Canal. He flew back home from Egypt. Today, this vessel sails with the Name Maple Lotta. Boettcher started with his worldwide long-time project Seamotion in 2004.

Boettcher is a German professional photographer working worldwide for shipping companies to create photos of merchant ships with his unique visual language. He has been working as a graduate designer for more than 20 years and has already received numerous awards for his applied and free photographic work.

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Government Reorganization

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On June 22, 2018, the Office of Management and Budget (OMB) issued a federal government reorganization proposal entitled "Delivering Government Solutions in the 21st Century." The 132-page document is subtitled 'Reform Plan and Reorganization Recommendations.' I have not read the entire report, but I have examined those portions that relate to maritime issues. *I find those portions to be uniformly ill-advised.*

Associate Justice Oliver Wendell Holmes, Jr. once wrote: "A page of history is worth a volume of logic." The authors of this proposal should brush up on their history. For example, the Lighthouse Service was merged into the U.S. Coast Guard due to their mutuality. Both were maritime services, operating large and small vessels. On numerous occasions, personnel of the Lighthouse Service rescued individ-uals in distress or assisted in those rescues. Also on numerous occasions, personnel of the Coast Guard assisted in the maintenance of maritime aids to navigation. There is an underlying rationale behind the current government organization and the burden for reorganization should be heavy.

In the introduction, the proposal laments that the organizational structure of the federal government has not kept pace with America's needs. It points to a 20-year long decline in the public's trust of government and then leaps to the conclusion that reorganizing the Executive Branch will result in a return of that trust.

The proposal identifies the following benefits of reorganization:

(1) Refocus structures around missions and customers;

(2) Enhance management accountability;

(3) Prioritize limited resources and eliminate unnecessary activities; and

(4) Improve communications and coordination.

Costs of the proposal are not enumerated.

I cannot meaningfully comment on the entire Executive Branch, but I can say that the maritime elements of the government are doing quite well. This article will attempt to address the impacted maritime elements in the order with which they are presented in the proposal.

- **The proposal would move the U.S. Army Corps of Engineers (USACE) Civil Works out of the Department of Defense (DOD) and into the Department of Transportation (DOT) and the De-partment of the Interior (DOI)** to consolidate and align USACE civil works missions with those agencies. The commercial navigation function would be transferred to DOT, with the remaining functions going to DOI. The commercial navigation function consists primarily of dredging, but also includes construction and operation of locks and dams. Dams, though, also invoke the flood and storm damage reduction function, which the proposal would move to DOI. The pro-posal is silent about how to address how this infant will be divided.
- **The proposal would merge the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) with the Fish and Wildlife Service (FWS) of the Department of the Interior (DOI).** Justification for this merger is that currently the two agencies could reach different conclusions on how to address potential impacts of a proposed dam system. The problem is that the merger would not eliminate the possibility of reaching differing conclusions. That occurs all the time and is why decision-makers get involved in balancing costs and benefits. Reorganization may change who makes the balancing decision, but it will not eliminate the need for decision-makers.
- **The proposal would reorganize the Department of Transportation (DOT)** to better align the agency's core missions and programmatic responsibilities, reduce transportation fragmentation across the government, and improve outcomes. The proposal would spin off the Saint Lawrence Seaway Development Corporation (SLSDC) and integrate into DOT certain coastal and inland waterways commercial navigation activities. The proposal states that DOT "operates a lock on the Saint Lawrence Seaway." Actually, there are seven locks on the Seaway, of which two are operated by the SLSDC. The SLSDC is charged with operating and maintaining that portion of the Seaway within the territorial limits of the United States, including the navi-gable channels. It is unclear how spinning off this small agency will result in any benefit, but at least we should be clear about what is being done.

As previously stated, the proposal would transfer certain functions of the USACE to DOT. The proposal notes that DOT has a very limited role in the nation's commercial maritime systems. In the next paragraph, it states that DOT already has some limited expertise in the port and inland waterways sectors. These two statements are in opposition and can't be used to justify the proposed transfer of various USACE functions.

In addition, it is proposed to transfer current U.S. Coast Guard responsibilities for permitting alterations to bridges and aids to coastal navigation to DOT to better align those functions with similar functions already carried out by DOT. The U.S. Coast Guard does not, to any significant extent, permit aids to coastal navigation. Rather, it establishes and maintains the vast majority of those aids. It does so with a workforce that consists largely of active duty military personnel and with numerous buoy tenders, boats, bases, and related infrastructure. The buoy tenders are multi-mission vessels, engaging in pollution response, law enforcement, ice breaking, maritime security, and other Coast Guard missions as needed. In support of national defense, buoy tenders are deployed to combat zones worldwide to establish and maintain maritime aids to navigation as requested by the Department of Defense. The active duty military personnel who crew the buoy tenders are trained and experienced in multiple USCG missions and rotate regularly between different Coast Guard units. The aids to maritime navigation mission could not be transferred from the Coast Guard to DOT without also transferring the equipment and personnel. If that is done, though, the multi-mission efficiencies of the current organization would be forfeited. In addition, the military personnel involved would be a small cadre in an otherwise civilian organization.

Toward the end of this long document, there is a vague proposal to identify efficiencies and budgetary savings to be achieved by eliminating unnecessary duplication between U.S. Customs and Border Pro-tection (CBP) and U.S. Coast Guard air and maritime programs. This could include facility consolidation, standardized data, enhanced domain awareness and coordination, and common future capability requirements. This proposal is lacks sufficient detail on which to meaningfully comment.

Like many reorganization proposals, this effort looks like an exercise of putting old wine in new bottles. Reorganization for the sake of being seen as doing something is counterproductive. The proposal identifies no inefficiencies that it would resolve. Rather, it attempts to consolidate missions within an artificial construct that bears little relation to facts on the ground (or water). I would dismiss this proposal as just another useless paperwork exercise, except that a bill (S. 3137) has been introduced in the Senate that, if enacted into law, would give the Administration almost unfettered authority to put the proposal into action. Thus, the proposal requires more attention than it deserves on the merits.

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Big Lift

The Devil is in the Details: The Importance of the JH143 Builder's Risk Surveys

About the Author
Captain Andrew Kinsey, Senior Marine Risk Consultant, Allianz Global Corporate & Specialty

The importance of a JH143 Builder's risk survey has been well documented. Since the Joint Hull Committee created JH 143 – Shipyard Risk Assessment form was brought into effect in November 2003, it has become a valuable tool that insurers can use to evaluate risks and exposures. The conducting of a JH 143 is now commonplace; however this survey continues to be especially important as shipyards incorporate new production methodologies into their operations, including modular construction and block transportation.

In our dealing with shipyards and reviewing of JH143 Builders risk surveys at Allianz Global Corporate & Specialty, we have observed that there are still lessons that can be learned and areas where improvements can be made.

These can be broken down into several key areas:

- Management of sub-contractors
- Hot Work Procedures
- Fire Prevention & Fire Fighting
- Upper Level Management buy-in.

The use of sub-contractors is essential for shipyard operations. This is especially true when we are looking at Heavy Lift Operations either during construction or launching evolutions. It is critical that effective subcontractor management is in place. This should include thorough vetting and supervision of sub-contractors by yard staff. It is critical that sub-contractors receive adequate emergency and safety training and adhere to the yards procedures and safety regulations. Key issues that we have witnessed with sub-contractor lifting equipment include not having valid certificates, lack of adequate maintenance, and inadequate safety gear. For these reasons, it's important that sub-contractors who are involved in key evolutions -- including heavy lifts -- are identified early in the project. This allows the MWS to arrange surveyors and to identify any issues early, so as not to delay any critical lifts or a launching.

The need to properly monitor hot work and ensuring that hot work procedures are properly followed cannot be overstated. Root Cause analyses of past losses highlight the need for fully documented and realistic hot work safety procedures to be fully integrated into a yards production methodology. As with any procedure, outlined responses must be realistic and reflect actual working condition if they are to be effective and actively followed. It is critical that the hot work permit system is followed by sub-contractors as well. We often find that sub-contractors attempt to short staff projects, especially the fire watch during hot work. Welding equipment needs to be properly maintained and gas freeing requirements followed.

Fire prevention and firefighting go hand in hand with good industrial housekeeping and cleanliness. It is also important to fully evaluate fire protection as a yard undergoes changes. With new heavy lift solutions available to shipyards, including the use of SPMT's, we are seeing yards adapt and modify utilization of space. If an area that was previously used as a laydown area is now being utilized for production, ensure that firefighting equipment can provide adequate coverage. In addition firefighting plans need to be updated. This is a case where a fresh set of eyes conducting a third-party inspection can assist in offering a new perspective to help identify new risks. In order to properly prepare for an actual fire emergency, fire drills need to include participation of both sub-contractors and local fire departments.

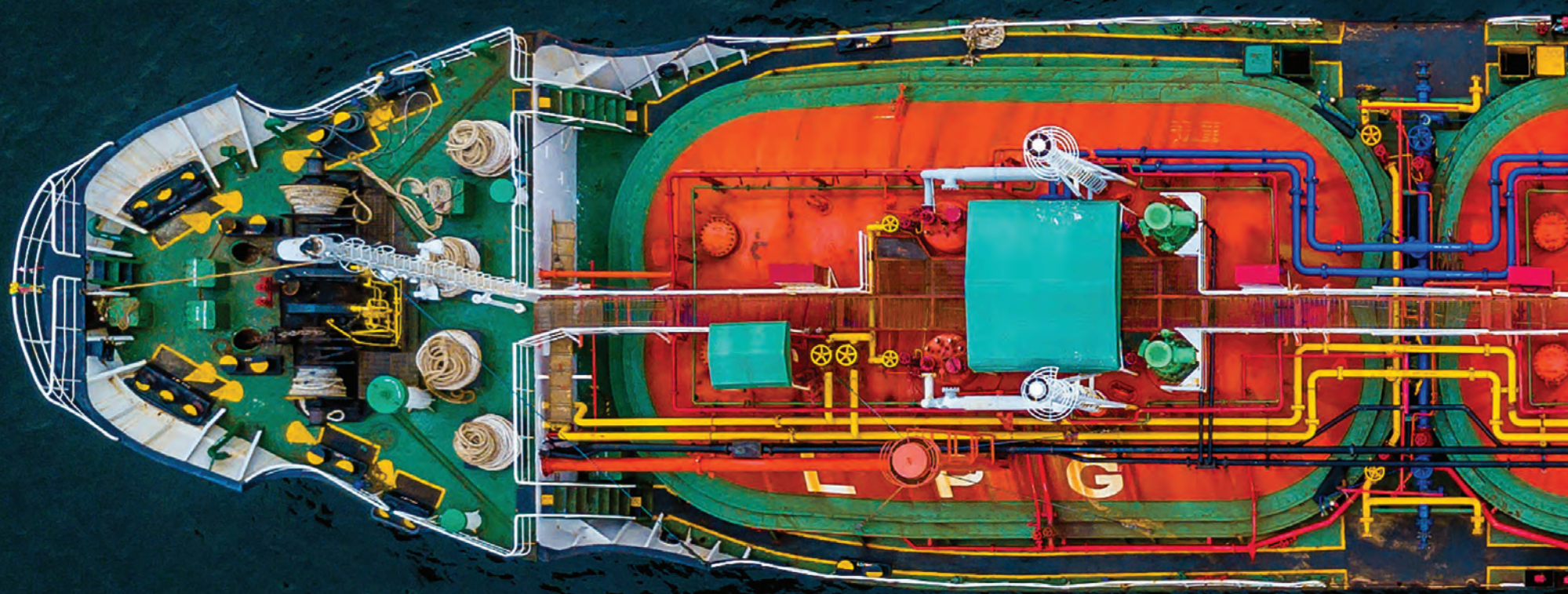
It is well documented that support of upper-level shipyard management is critical to establishing and maintaining a successful safety culture. A successful safety culture is a keystone in obtaining and maintaining commercial efficiency. It is also important for upper management to engage the production workforce and ensure that development and review of safety procedures is a true give and take.

By effectively involving the workforce that will be actively engaged in heavy lift operations, and utilizing their input in developing procedures, several important goals are achieved. First – by engaging in an active discussion and development of new or modified safety procedures, upper management conveys to the active workforce that they are concerned with their wellbeing. Second – the best procedures are those that actively reflect real world conditions, so obtaining input from personnel who will actually be performing the work helps achieve this. Third – by engaging the workers who will need to follow these procedures in their development, it fosters pride of ownership. A worker is more likely to follow a procedure that they helped write, rather than one sent down from the safety director with no worker involvement.

Two critical components to a successful project that we witness regularly are the importance of effective communications that includes all parties involved and the benefits of continuity within the project teams. An inclusive kick-off meeting that identifies and brings together all interested parties is one of the most important steps in ensuring a project gets off to a smooth start and helps to set the course for a successful venture. Costly delays and complications can be prevented by introducing all key players early in the process.

On the topic of continuity, identifying the Marine Warranty Surveyor (MWS) and having that MWS involved in early meetings and planning provides an opportunity to help ensure a successful vessel project. Risks must be identified in order for effective solutions to be formulated. In many cases, additional third-party experts will be required to help fully evaluate conditions and identify risks. The yard risks, as well as those that the vessel under construction is exposed to, need to be reviewed with a critical eye. This allows levels of complexities to be identified as well as a thorough risk profile for the project to be developed.

In today economy, shipyards are looking to incorporate new efficiencies and updated construction techniques, including heavy lift capabilities, in order to maximize their competitive advantages. During times like this, it is important to understand that Insurers are valuable partners who can help identify new and emerging risk as well as develop solutions.



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Advanced electronic component reliability is allowing for better configuration and higher performance of marine horsepower engines.

About the Author

Patrice Flot is chief technical officer at CMR Group.

Temperature monitoring at critical engine locations provides important information on running behaviour, safety margins and the need for maintenance on critical components like cylinder liners, exhaust valve seats and bearings. Even mobile parts of the gear train can be monitored for temperature thanks to wireless technology. Excessive temperature values and gradients could be an early indicator of imminent component failure.

So, it follows that temperature sensors are usually the most costly and numerous sensor type, often found at several locations and circuits on the same engine, measuring a range of parameters including oils, fuels, water, gases and exhaust. The three established sensor technologies of thermocouples, resistance temperature detectors (RTD) and thermistors are often combined on the same engine, each with their own advantages and drawbacks.

Thermocouples have a high temperature capability ideal for measuring exhaust gases, cylinder head outlet, and turbocharger temperatures. They can also be used on fluids and engine components such as bearings, liners or exhaust valve seats when short response time is of interest and unobtrusive design is required.

Thermocouples give the shortest response times due to a small thermal inertia. They also offer the smallest size intrusion and are very robust against vibrations and thermal shocks. The drawback however is with accuracy as the relationship between temperature and voltage is not linear and depends on material quality and purity. This can be kept under control thanks to standards like CEI 60584-1.

Another disadvantage is related to installation cost. Thermocouples are required to compensate for the 'cold junction' by using a compensation cable, made of cheaper materials than the thermocouples themselves, so that no parasitic Peltier effect occurs at any cold junction connections along the wires. Compensation is sometimes managed by using additional temperature measurement in the junction box. Other drawbacks are found in the electronics as the lower voltage needs to be amplified to a few volts to allow reading on standard human-machine interfaces (HMI).

Instrumentation manufacturers are working with engine OEMs to develop solutions to meet the reliability and lifetime challenges for industrial engine sensors.

RTDs mostly employ platinum elements and are used either at PT100 or PT1000, but seldom as PT200. In this designation, the number following letters 'PT' indicates the ohms value at 0°C. These are electronic resistances that show resistance value depending on their temperature according to a linear curve; higher temperature goes with higher resistance.

They are also low cost and accurate, typically adhering to CEI-6075 standard. Also, extension cables for connection to the HMI use low cost copper lines. PT100 continues to be popular for fluid temperature measurement, but needs to be connected by three or four wires to get the required accuracy. However, PT1000 sensors are becoming increasingly prominent as connection line resistance is comparatively negligible and does not affect accuracy.

Sturdy sensor housing and installation for RTDs are highly important as the platinum element can be sensitive to vibrations. RTD sensors are mainly used for fluids, compressed air and bearings as high temperature capability in the region of 600°C is limited and response times can slow due to thermal inertia.

While their lead-wire resistance does not affect sensor accuracy, thermistors are sensitive to temperature, typically having much higher nominal resistance values than RTDs. These low cost 'ready for use' electronics are often used in automotive applications. However, not all automotive sensors can be used on industrial engines, which use much larger pipes and tubing than automotive engines, and which requires much higher lifetimes.

For example, marine engines with 4,000 hours of operation represents only around nine months of running. However, 4,000 hours of running for a car will bring them close to the end of their life cycle. With time between major overhauls for industrial engines varying from 30,000 to 50,000 hours, it is a challenge for fragile sensors to last this long with heavy day-to-day use.

Develop Solutions

Instrumentation manufacturers are working with engine OEMs to develop solutions to meet the reliability and lifetime challenges for industrial engine sensors, while trying to minimise engine delivery cost.

The evolution of engine technology makes the importance of reliability and long lifetime for exhaust gas temperature sensors increasingly critical. As reliable sensors are now mandatory for today's common rail and electronic gas engines, any sensor failure, even for a few milliseconds, is unacceptable - failure of exhaust gas temperature sensors can lead to the immediate shut down of the engine.

Exhaust gas temperature sensors are now mandatory for smaller engines with electronic injection, offering considerable business opportunities to a few instrumentation makers that can produce sensors with excellent reliability. This situation will not last forever. New alternatives have been developed since 2010 to overcome the weaknesses of low cost PT1000 sensors by incorporating sought after features such as fast response time, long lifetime, vibration resistance, high temperature reliability, small diameter and low wiring and integration costs.

These solutions use miniaturised electronic convertors attached to each sensor, transforming analogue signals to digital 'CAN' protocol, conforming to ISO 11898 and SAE J1939 standards. Also, a simpler measurement harness, reduced to 4 wires instead of dozens, can be directly connected to the HMI using only one standardised port dedicated to digital input, relegating the need for an HMI acquisition box.

Builders of advanced digital protocol engines with electronically injected fuels can embrace the latest digital technology and will benefit from cost advantages and the reliability gained through rigorous testing and qualification programs. Engine builders for commercial applications are recognising the flexible advantage of digital technology that allows fast implementation of additional sensors, without any physical change in input/output ports of the Engine Control Unit (ECU), allowing additional reserves of sensors imbedded in the ECU. The complexity of harness design is also reduced as any additional sensors simply require an additional harness connector, without an increase in harness size or additional wiring.

ShipSure 2.0

Big Data ... Bigger Benefits

About the Author
Stephen Macfarlane is Chief Information Officer (CIO), V.Group

Ship owners can derive imperative business and operational insights from integrated, real-time data which is readily accessible via a single platform, especially if it can be taken away with you, writes V.Group CIO Stephen Macfarlane

For the maritime industry, these are exciting and momentous times, with digitalization as an emphatic and decisive pivot point in operational, business and environmental sustainability. The potential is now incontestable for businesses along the entire length of the supply chain to effect the requisite changes and witness substantial digital advantages – or, conversely, to run on the spot and be rendered uncompetitive and irrelevant by degrees, eventually and inevitably being left for dead. To put the industry's future prospects in the most bluntly realistic terms, maritime companies across the board are effectively poised to stand or fall depending upon how prepared they are to engage with the ongoing digital transformation which is already revolutionizing every aspect – from vessel design, shipbuilding, operational and navigational duties right through to port communications, financial transactions and the myriad responsibilities which constitute ship management.

If there has been a tacit reluctance in certain quarters to abandon dyed-in-the-wool, tried-and-tested manual working practices, one of the most frequently cited concerns revolves around information sharing; the hot-button topics of a highly competitive market and of course cyber security. Fears pertaining to the perceived vulnerability of sensitive, business-critical data (and the conceivably harmful knock-on effects of a data breach) are understandable – but secure data encryption is an ever-evolving and increasingly sophisticated science, with appropriate protocols in place to rapidly contain damage and, as far as possible, eradicate threat.

A related concern for traditional ship owners who might be unwilling to pass their business operations on to ship management firms in the digital realm is an anxiety that they may appear to be ceding control and compromising transparency. Ship owners with such an entrenched mindset would obviously require verifiable reassurance that they would be able to visibly control and oversee operations at every level and every stage, were they to be convinced into taking the digital plunge with partner organizations. It shouldn't need pointing out that shipping is now part of a far broader and more extensive supply chain; and the consequent need for ship owners to actively address this evolutionary development is pressing.

Digital Management

Arguably, the most persuasive element in driving late adopters to consider a properly-integrated digital strategy will be the significant difference it can make to the bottom line. In a jittery and fickle marketplace where the pips are being squeezed from every direction, ship owners will benefit by seeking the services of ship management providers who can radically cut costs and increase efficiency with a portfolio of digital so-

ShipSure 2.0: App for Transparency, Control

V. Ships Chairman Dag Christoffersen was in New York City to help promote the roll-out of ShipSure 2.0, a fully integrated platform – an app – which covers all of the ship management functions, including finance, maintenance, crewing, onboard systems and office-based systems and more, fully integrated with full transparency among the stakeholders.

Designed and developed by V. Ships, Christoffersen calls ShipSure 2.0 "revolutionary" as it is a "platform that can be downloaded on your mobile phone or tablet, with full transparency and accessibility."

Designed to be intuitive and easy to use, the system is complete as it seamlessly melds financial and technical (expenditures, from the ship management side) information, providing a readily accessible, comprehensive and transparent financial reporting tool.

The app, which was designed and developed in house by V. Ships and is available for free as an added benefit to V. Ships customers, can be customized to the needs of a specific ship owner. "We have about 300 clients (representing about 1000 ships) for whom we manage ships and crew, and they all have different requirements," said Christoffersen, noting that there are some large clients where the company manages 50-60 ships, but the average is 3 to 5 ships. In addition, many are publicly listed companies in New York, London and Oslo with tight deadlines for reporting, "and with ShipSure 2.0 they can send out reports real-time, allowing them to deliver financial details on how the ships are reporting in real time. "This an is extremely important point."

The V. Group crew was out in force at Marine Money New York City in June. (L to R): Dag Christoffersen, Chairman, V. Ships Norway; Peter Mellis, VP – Strategic Relationships & Business Development, V. Group; and Sharn Samra, Head of Marketing, V. Group.

lutions built upon the smart leveraging of "big data". With a fully-functioning ship management system in place, the long-term value of obtaining detailed, real-time financial information about vessels, fleets and business dealings – invoices, transactions, etc. – is incalculable. Digital management systems can also streamline major HR tasks such as crew sourcing, crew recruitment and assigning roles – while also keeping crew member themselves in the loop with apps designed for their use. In addition, the deployment of a completely integrated digital management tool means that business performance can be closely monitored, goods and services transactions controlled and ratified, and regulatory compliance managed. The latter aspect is of increasing pertinence in a climate, literally, wherein environmental laws are of necessity becoming more numerous and more stringent.

The Digital Advantage

It stands to reason that having all of these capabilities integrated within the same platform, with a common taxonomy, confers innumerable practical, logistical and operational advantages, with a view to business growth and sustainability. To this end, V.Ships (the maritime arm of V.Group) took an early lead in the marketplace with ShipSure, a bespoke, fully-integrated information management system, and are now looking to consolidate this lead with the open cloud-based ShipSure 2.0 platform, with an app version providing a mobile interface. Available on Windows PCs, Android and iOS tablets and smartphones, ShipSure 2.0 has been developed to provide users with secure access to data from their vessels, fleets and commercial affairs. The service is based upon four pillars – finance, crewing, procurement and marine operations – and the implicit advantage of having mobile access to the platform is the ability to obtain data-derived insights for informed decision making at one's fingertips, from anywhere and at any time.

Suitably equipped with a comprehensive digital management system of this nature on their smartphones, users are able to oversee their assets with a flexibility that would have been scarcely imaginable even in recent years. Business-critical decisions can be assisted and carried out in real-time while travelling; while the ability to clearly and consistently take an overview of areas in which appropriate performance improvements could be made provides an invaluable aid to enhancing operational safety – and, of course, increasing profit margins. Where ShipSure 2.0 is concerned, a digital competitive edge is added by the fact that V.Ships owns the technology and the IT stack, meaning that the platform represents a one-stop-shop as a digital solution, with well over 100 apps serving real-time data to V.Group clients This circumvents the inconvenience and likely technological pitfalls of having to source various, different off-the-shelf systems, then praying that these can be successfully integrated.

Another obvious benefit for ship management providers equipped with a tool such as ShipSure 2.0 is the ability to pass economies of scale, and a comprehensive, joined-up view, onto ship owners who would hitherto have had to chase up several separate teams – operations, procurement, finance, etc – but who would now be able to access all of the same resources from the one convenient and secure platform, even when out of the office.

Christopher J. WIERNICKI,

Chairman, President & CEO, ABS

Photo:ABS

The maritime industry has been challenged, to say the least. Today, where do you see challenge? Where do you see opportunity?

It's clear our business environment continues to change and we have a new definition of what normal means: nothing is normal. We are in era of rapid, disruptive and impactful change.

The coming years will bring further turbulence, shaking out our industry and setting the course for the next 20 years and beyond. Market cycles will continue to evolve and will be impacted differently than they are today.

For example, in the past, market cycles have been shaped by globalization and emerging economies. In the future, shipping market cycles will be impacted by technology and regulations.

The four biggest challenges facing shipping today are digitization and connectivity; cyber security; emissions reduction and efficiency improvements in operational performance.

In order to navigate through these challenges and succeed, leadership must:

1. *Understand the role of technology and the importance of assessing technology risk in the commercial risk decision making process;*
2. *Maintain a healthy balance between innovation and pragmatism especially when it comes to digital technology; and*
3. *Recognize there are three levers to pull to achieve competitive performance: Identify and develop talent; Manage and rationalize technology; Choose the right operating model that allows for greater horizontal thinking.*

How has ABS 'weathered the storm?' Specifically, how is the ABS of 2018 most different from the ABS of 2013? How is it still the same?

ABS has adapted to the changing business environment by more closely aligning our operations and right-sizing with industry demands.

As technology and regulations move the industry to risk-based, data-centric, cyber-influenced decision making, our team today looks different. We are reshaping our workforce balancing traditional and non-traditional skill sets from professionals who are able to make the right data-driven, techno-economic and risk-based decisions while embracing disruptive technologies.

Our team is now delivering a range of work not possible in 2013, including industry-leading projects with shipowners, regulators, equipment manufacturers, governments, academia and others on topics such as wearable technology, drones and unmanned systems, data strategy validation, condition-based health monitoring, structural digital twin development and predictive analytics.

Our digital journey is a key part of our FutureClass strategy to transform the traditional survey process, and continues program developments already underway. Key foundational building blocks, such as the ABS Freedom survey workflow system, ABS e-Certificates and our industry-leading ABS Cyber Safety program, have built a solid foundation from which we are continuing to develop game-changing products and services.

Amidst all the changes, ABS's mission – the same since its inception in 1862 – continues to guide everything we do; we serve the public interest as well as the needs of members and clients by pro-

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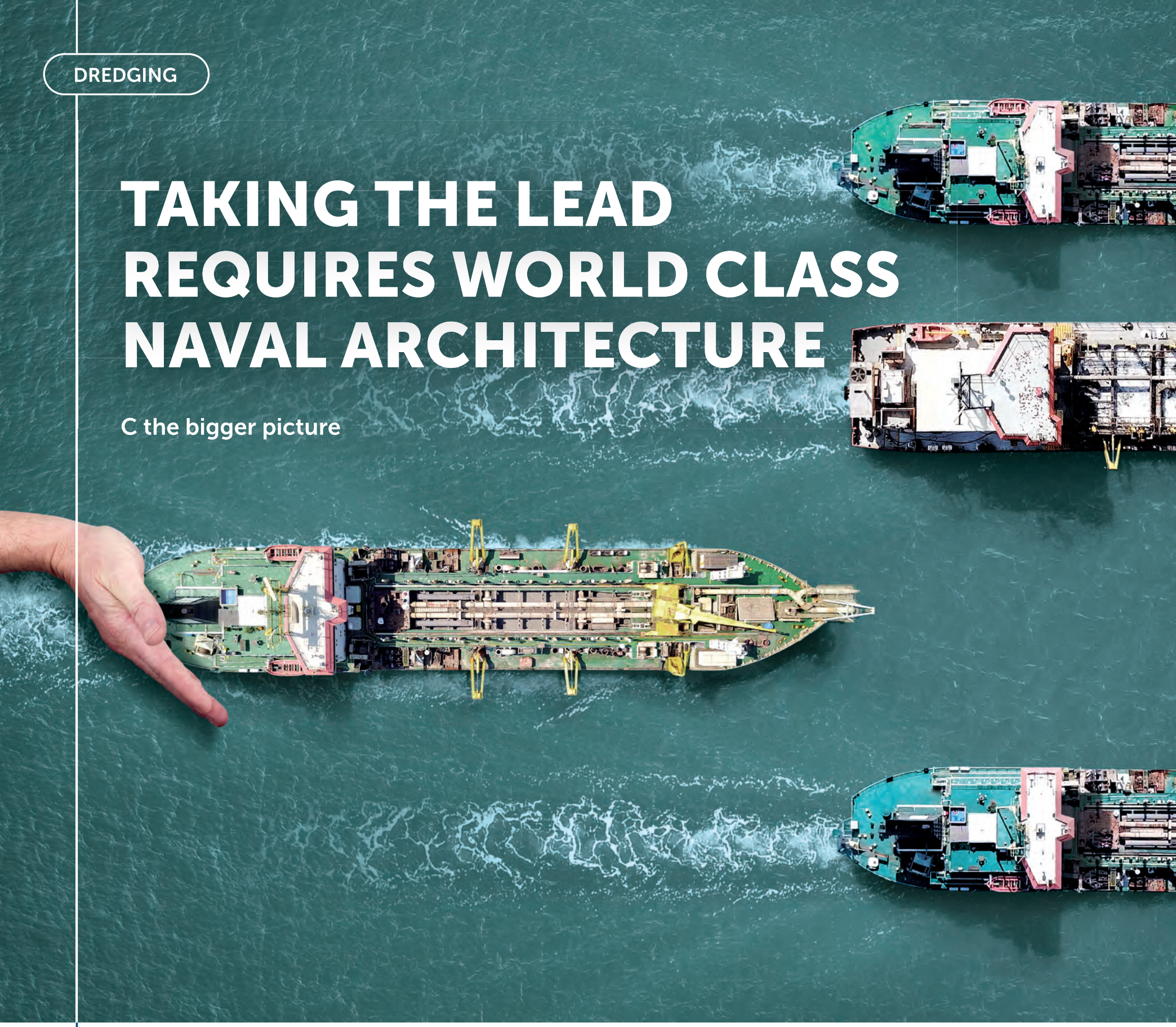

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Thought Leadership

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"The fusion of technologies in cyber-enabled business is blurring the lines between physical, digital and biological spheres – connecting people, systems and data. Digitization and connectivity will transform the marine and offshore industries through sensors, as well as data and autonomous systems, improving both performance and compliance.

moting the security of life and property and preserving the natural environment. ABS has always been and remains committed to setting standards for safety and excellence. Every day we work alongside our industry partners tackling the most pressing technical, operational and regulatory challenges so the marine and offshore industries can operate with enhanced levels of safety, security and responsibility. That will never change.

In many respects this is a transcendent time in maritime history. If you had to pick the single trend that you feel will have the biggest impact on transport at sea in for the coming generation, what would that one trend be and why?

Performance improvements going forward will most likely be driven primarily by digital technology emphasizing data collection and analytics, not by traditional technology.

The foundation for this has been in place for some time, such as on-board sensors that already stream an ever-increasing amount of data about engine performance, hull structure response for tail shaft and bearing wear, oil temperature and condition machinery operation, vibration and the functioning of all control systems.

What is new, is our industry's growing ability to drive insights from the data. Our new normal going forward will be more data-intensive, focusing on better asset management decision making, not just better equipment or better application of physics.

Increased sensors and monitoring, coupled with data analytics and machine learning, will drive a new generation of predictive and preventive maintenance practices. This could, combined with improved robustness and reliability of systems as well as additive manufacturing (e.g., 3-D printing) offer a step-change in how ships are operated and maintained.

The reliance on automation, data and connectivity will require robust cyber security to be incorporated from design to operations. Cyber and software will become the third leg of the safety stool, joining structure and machinery, and adding a new dimension to a vessel's safety system, recognizing that software is the safety system no one sees.

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Thought Leadership

Photo:ABS

In looking at digitalization we obviously focus on the ships, the fleets and fleet operation. But looking at this through the ABS lens, how is the 'digital revolution' impacting how ABS conducts its own business, in the field, in the office?

Within ABS, we are well into our digital progression as we transform our survey process from connected to data-driven to predictive surveys.

Today, the connected surveyor is empowered through mobility with applications that enable both surveyors and clients to better manage the survey process.

Through a consolidated data model and a cloud infrastructure, clients have access to an expanded client portal and mobile applications to access to e-certificates, vessel information and the status updates to streamline the survey process.

Advanced inspection technologies such as drones, robotics and wearable technology offer additional efficiencies for our clients and reduce risk for surveyors.

Using these tools, our surveyors may collaborate in real time with remote engineering experts onshore.

The application of sensors for remote monitoring facilitates condition-based inspections.

Looking to the near future, as more and more data continues to be collected, we will move towards a data-driven survey. Data analytics will be applied to inspection results and vessel data (structure and equipment) to assess the condition of the asset prior to attendance.

Mobility will be expanded to the entire ABS ecosystem, so all stakeholders have secure and relevant access to data to manage design review and survey before and after construction. The remote centers of excellence onshore will be expanding to include – not just experts in engineering – but also data scientists.

Inspections of high risk areas will be transferred to robotics and our clients will experience less inspection-related down time as surveys move from calendar-based reviews to an annual assessment.

Ultimately, the survey process will become more predictive and less intrusive. Fueled by data, surveys will be driven by predictive analytics, only focused on those areas that require attention. The vast network of data feeds that are entering a vessel survey are enormous and includes increased and multiple sensors, artificial intelligence and machine learning development. To continue progressing and moving forward, we must be able to correlate and assess all the data and vessel conditions, and be able to analyze large amounts of data in real time and make predictive decisions rather than calendar-based decisions.

How will "class" look, act and evolve in the coming decade?

The fusion of technologies in cyber-enabled business is blurring the lines between physical, digital and biological spheres – connecting people, systems and data. Digitization and connectivity will transform the marine and offshore industries through sensors, as well as data and autonomous systems, improving both performance and compliance.

Data and digital technologies will inform the surveyor in new and as yet undreamt-of ways, but these will never take the place of a surveyor's judgment or authority. They will, however, enhance the surveyor's job through a new team effort, in which a qualified data scientist will be in the background, providing a risk-based advisory assessments that will assist the fulfillment of the surveyor's mission. This, in turn, will bring a new era of collaboration on safety between class and industry.

The digitally-informed survey of the future will involve a new kind of teamwork. Remote data scientists will be part of local survey teams, developing risk-based vessel advisories and digital models for surveyors. Further, there will be a new era of collaboration on safety between Class; and the industry. Clients are sharing an unprecedented amount of operational and maintenance data, making digital models possible. Class, having a truly comprehensive view of vessel risks, will then be able to help operators make better-informed decisions about their assets through an independent lens.

Ultimately, the world fleet will be in better physical condition and operate at better efficiency overall.

How is ABS investing today to prepare for its tomorrow?

We are investing in people, systems and technologies; however, it is important to understand that no matter how advanced our technology becomes, how fast it evolves and how fast we adopt it, digitization is an enabler to our industry and is merely a tool for transparency. It certainly has the potential to create great value, innovation and disruptive thinking, but it will always lack institutional knowledge, social skills and common sense.

Our new norm is ultimately about people – people are the engines that drive our company and talent is the energy source or fuel that makes it happen.

Analog talent is quite different from digital talent. New technology is redefining our talent needs relating to new types of skills such as data-driven decision making, predictive data analytics, systems and design thinking, integration of engineering and cyber awareness and impact.

ABS launched its strategic ABS FutureClass plan in 2017 to accelerate its digital evolution and chart its journey towards the future as a data-driven, innovation-inspired, agile technology company dedicated to sustaining and strengthening its leadership role.

The ABS FutureClass plan expands our ability to fulfill the ABS Safety Mission, providing new tools that inform classification services and enable us to work collaboratively with our clients to align asset maintenance practices with class requirements.

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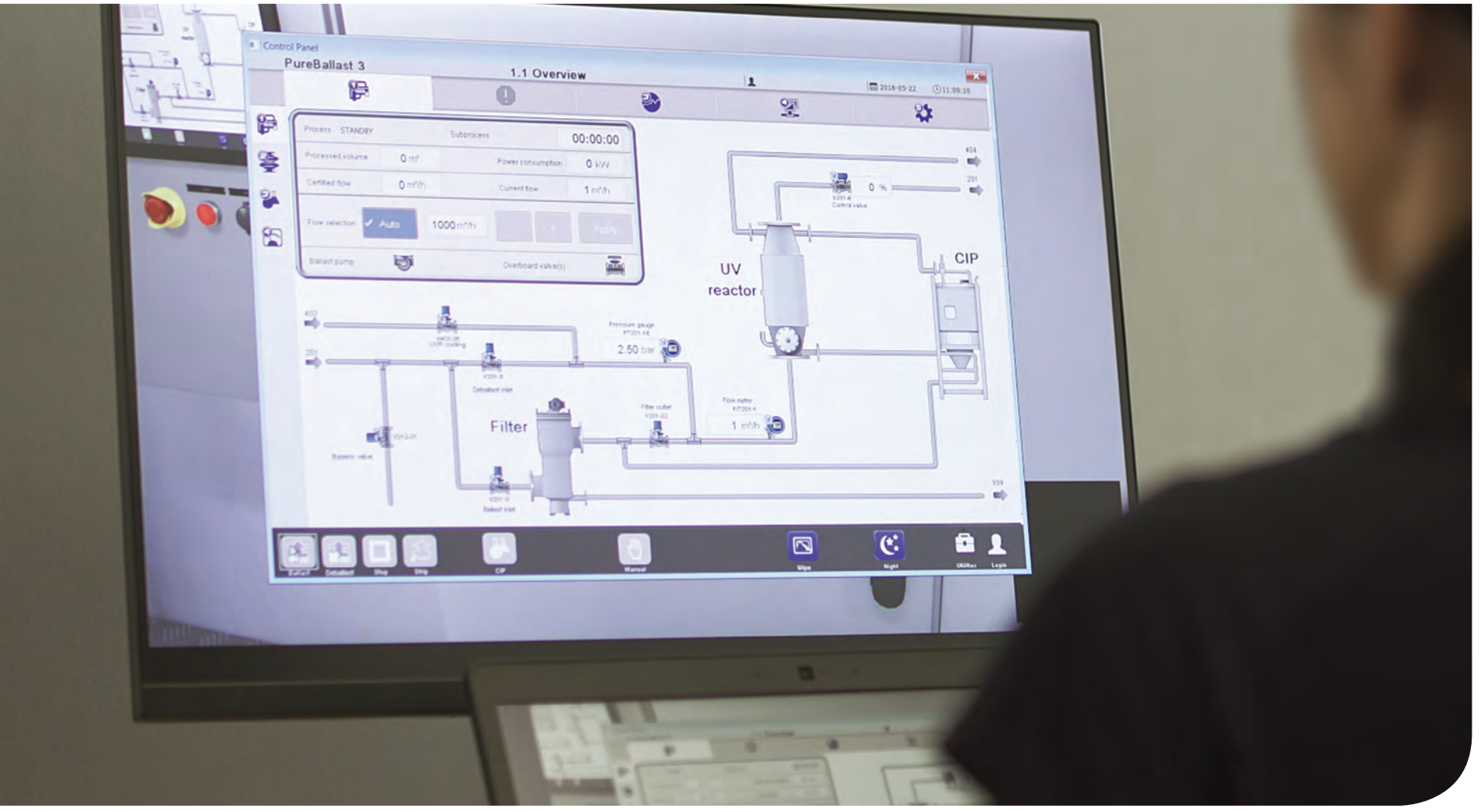

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Remi ERIKSEN

Group President & CEO, DNV GL

Remi Eriksen, Group President and CEO of DNV GL, has been on the job for nearly three years, taking over at arguably one of the more challenging and pivotal times in maritime history. We met with Eriksen recently in Athens, Greece, for his insights on the markets and DNV GL's position going forward.

Photo:DNV GL

By Greg Trauthwein

While Remi Eriksen's tenure at the top of DNV GL has coincided almost perfectly with one of the maritime industry's deepest and longest slumps, he said that there is the proverbial light at the end of the tunnel, with a small pick up in shipbuilding year-on-year since 2016. "We have been through challenging markets for the last three years, particularly the newbuilding market which is very important for class," said Ericksen. "But it was needed because there were too many ships chasing too little work. It was needed, but it also means that shipbuilding activity has been at a historic low. The upturn is coming, but it will be nothing like the super cycle we saw from 2005 to 2015."

As the collective maritime market digests a challenging market, shipowners must also invest in the face of many new regulatory demands. "From the sulfur cap in 2020 to the ballast water management technology, to the CO2 road map that IMO has decided on, there are many things happening on the regulatory side, along with a challenging market," said Eriksen.

As many leading organizations have been forced to do, DNV GL has take the opportunity to "adjust during the downturn," said Eriksen. "One area we have been investing in is digitalization and our own digital journey, but also to help our customers make the transition to the digital world."

"Our purpose is the same, safeguarding life, property and the environment. Our core markets are the same: maritime (the biggest); oil and gas, and energy. The main difference now is we are leaner, more agile, more responsive and for sure more digital than we were 3 years ago.

The Digitalization "Perfect Storm"

When looking at DNV GL and the future of class, there is no doubt that future is digital. "The digital world offers some opportunities, and it also introduces some risk, such as cyber risk (or cyber-attacks)," said Eriksen. Sharing data raises many trust issues, and to Eriksen this makes class an even more important partner moving forward. "Trust has been important in the past, and I think class can provide trust in the digital world too. I think moving forward the industry is even more complex, and class will be more important than ever, particularly as being an enabler in helping to take advantage of data and driving data into the

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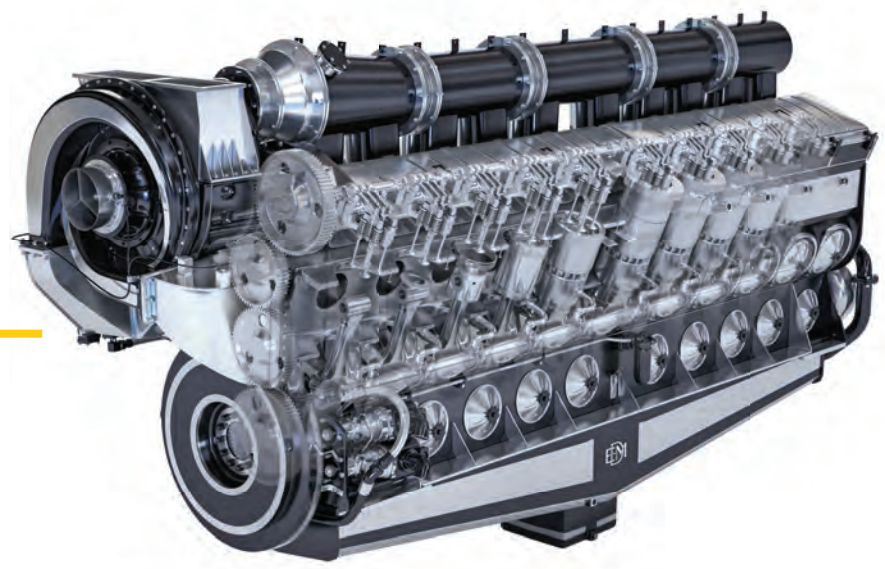

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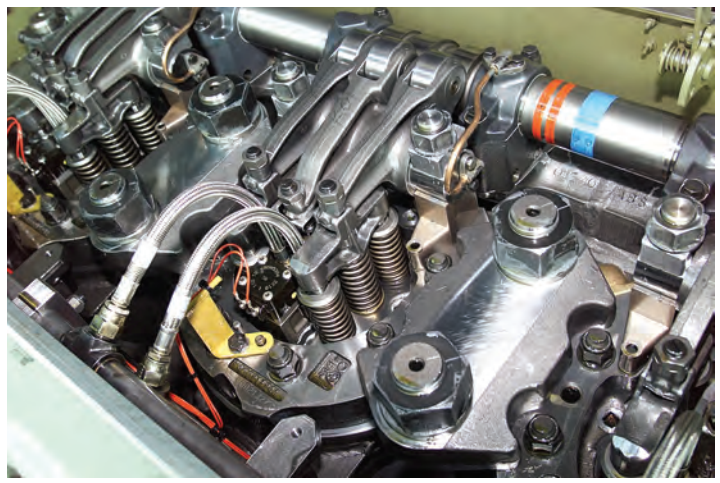

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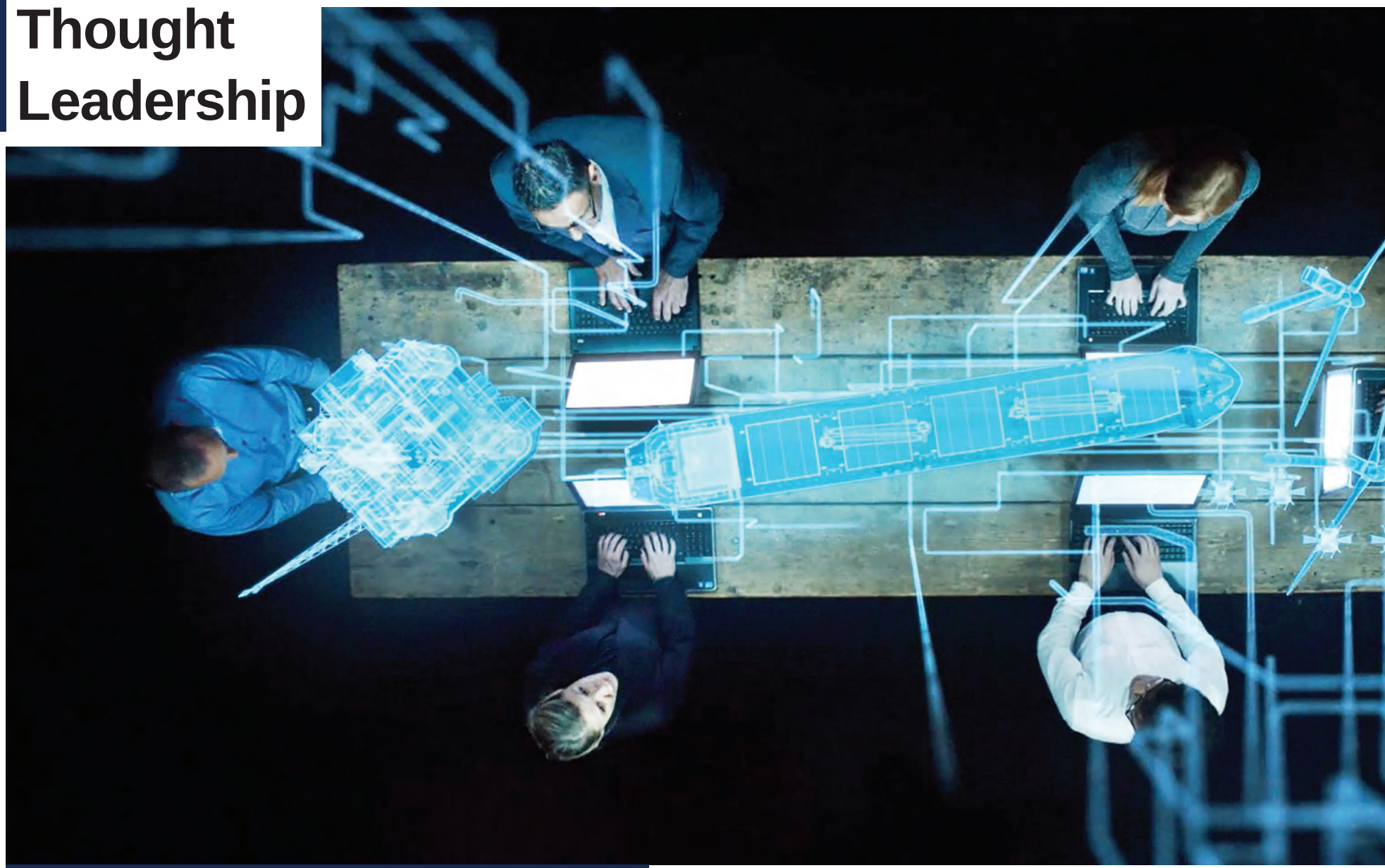

> *"We are introducing an Open Simulation Platform where different players, different equipment suppliers can simulate the interaction between different pieces of equipment, you can actually 'test' the interaction and the interfaces before you start building. We're now running a joint industry project (JIP) … we have the technology to enable the open simulation platform, but now we need to engage the different players in the right way to start using the platform. It is in the early phase, but should be ready in a year or so.*

decision-making process."

While DNV GL talks a good digital game, it backs the talk with action, as near 60% of DNV GL's Research & Development today is spent on digitalization. "The speed of change (in the digital world) is exponential. Just looking at ourselves, we are much more agile and efficient," he said. In fact, he notes four factors that have created a digitalization 'perfect storm.'

- Sensor technology
- Connectivity
- Computing Power
- Algorithms and Methods on top of it all to take advantage of all of the data

"If you look at the methods that have been present in academia since I went to school in the 1980s, we talked about neural networks, we talked about artificial intelligence and machine learning, but we didn't have the sensor part, we didn't have the connectivity part, we didn't have the computing power and the storage," said Eriksen. "Now we have high capacity at good prices, creating this 'perfect storm' … the methods have been there for quite some time, so now we can actually put them to good use in real life, and that is helping to cause the speed of change."

While 'speed of change' and 'maritime' can sometimes be an oxymoron, the digital trend in maritime is real and manifesting itself in many ways. Looking at it through the DNV GL lens, "a lot of this goes into sensor and control systems, and this will be relevant for all types of shipping," said Eriksen.

"This can help elevate situational awareness and ultimately autonomous shipping. Sensor and sensor fusion is one end, decision making is another." One project worth watching is the Yara Birkland, which will be operational in 2019. "The remote ops will be the first step, then you need to have the correct sensor and sensor fusion so that you have the correct situational understanding – so you know what's going on. The other part is on the decision making, the logic." The next step is not doing the decision making remotely, rather on the vessels by computers, "A lot of research is going into that," Eriksen said.

A cornerstone of the DNV GL digitalization path its Veracity platform, an open industry, secure platform for digital innovation and industry collaboration. The platform includes a marketplace where users can access all DNV GL's digital services and applications, as well

Photo:DNV GL

as services from third parties. Veracity also includes a community for developers to make it easier to develop new applications and analytics. Finally, the platform facilitates secure and easy data management and data sharing.

"It (Veracity) is gaining traction, today with almost 130,000 users representing 1,500 companies, with close to 1 million service subscriptions meaning each user is subscribing to more than seven services in average. We have seen this scaling up rapidly," said Eriksen.

Digitalization and cyber security go hand-in-hand, and to this end DNV GL recently was the first to offer a new cyber secure notation. "Cyber Security is on everyone's mind right now and (the creation of the new "Cyber secure" notation) is partly a push by us, and partly a pull by our customers," said Eriksen. "We are doing a lot internally, both with our own people and with partnerships with the likes of Microsoft, leveraging the security developments they are building into their products and services. We have a good set up there, to take the best of their research and technology and add to this our own systems around it. A very competent IT organization and external partnerships are key to good cyber security, but this is a very fast developing market, and it's something that you must always stay on top of and think ahead."

DNV GL takes the Cyber Security issue a step further, offering 'ethical hacking' as a service, both internally and to its clients, to expose weaknesses. "That is the paranoia that you need to have all of the time. Nothing is 100% secure."

$3.1 Trillion/Year

When Big Data is Bad Data

While much focus is on 'big data', not much has been reported on the cost of 'bad data.' Remi Eriksen put the matter in perspective during a presentation in Greece, citing estimates from IBM that in 2016, in the U.S. alone, $3.1 trillion* was the estimate of the yearly cost of poor quality data.

This is a stunning figure, particularly when you consider that research firm IDC estimates that the size of the big data market globally in 2016 was a mere $136 billion.

**(Source: Bad Data Costs the U.S. $3 Trillion Per Year, by Thomas C. Redman, Harvard Business Review; https://hbr.org/2016/09/bad-data-costs-the-u-s-3-trillion-per-year)*

Koichi FUJIWARA

Chariman, ClassNK

ClassNK is one of the world's leading classification societies with 9,104 ships representing 250 million gt under register, as of June 2018. We spoke with Koichi Fujiwara, Chairman, ClassNK, earlier this year in Tokyo for his overview of the market today, and the path forward on technological trends.

Photo: Class NK

By Greg Trauthwein

While Koichi Fujiwara, like many of his colleagues, sees challenging times in the maritime market, he does note that conditions are improving; albeit slowly.

"At the beginning of this year I was asked about the market, and my answer was that 2018 would be another 2017," said Fujiwara.

"We experienced the worst market situation in 2016; in 2017 (it was a bit better as) the dry markets recovered. My view is that perhaps the turning point will come in 2019." Specifically Fujiwara sees looming IMO regulations which dramatically reduce the amount of sulfur emissions from ships coming into force in 2020 as a driver. "Ship owners and shipping companies will have to make a decision on how to deal with the new emission regulations: scrubbers, alternative fuel or even the scrapping of older vessels. So this year can be summed up as 'not very bad, but not very good'."

Investing in the Future

The lifeblood of class is new construction, and with the global lull in newbuilding all classification societies struggle with right-sizing the organization to contend with current market conditions. This market downturn is unique from swoon's past, as the pace of technological change in the maritime sector mandates a consistent investment in new technological expertise by class to keep pace. To that end, Fujiwara said that "ClassNK made a medium-term management plan including technology development in 2017 to run through 2021. One of the most important issues today is a thorough review of existing class rules to make sure that they are in step with the rapid pace of technological evolution on the ships."

He continued, "The next issue is looking at the evolution of technology as it applies to ship survey. This is our business. The shipping world is changing rapidly with digitalization, and the question is 'how class will evolve' in the future."

As digitalization continues to beat a path toward smaller crews and eventually fully autonomous operations, "the question then turns to how all of this will affect class and specifically ship survey," said Fujiwara.

Survey methods have to change in the future. With fewer seafarers (onboard ships) and more shore-control, condition monitoring of the ship will be pushed to sensors and automation, and the physical

Photo: Class NK

"There are many ideas on how to use AI in classification and in shipping. It is important to keep in perspective though that only 30 years we could not imagine the iPhone of today; 30 years ago this was a dream." For the shipping industry, the trick will be getting AI systems commonly accepted and in use across the industry, integrated and communicative with other ships.

visit of a surveyor to a specific ship may not be as necessary."

Enter Artificial Intelligence

While ClassNK continues to study the various technical points, such as sensing technology, communication technology and analysis technology, Fujiwara is clear that the future will be pave with Artificial Intelligence (AI).

"Many jobs that are currently carried out by humans will be replaced with AI. In the classification business, AI is very useful to conduct some class-related jobs, but as AI gets better and better, we must discover new ways that AI can be useful in the classification business."

While the path is clear, the time-table to arrive is a bit fuzzy.

"It is very easy to dream!," said Fujiwara. "There are many ideas on how to use AI in classification and in shipping. It is important to keep in perspective though that only 30 years we could not imagine the iPhone of today; 30 years ago this was a dream."

For the shipping industry, the trick will be getting AI systems commonly accepted and in use across the industry, integrated and communicative with other ships.

While many insiders and outsiders alike term the shipping industry 'conservative regarding technology uptake, Fujiwara said, given its size, it should come as little surprise that it is a slower process in shipping.

"The shipping market is not so big, and the speed of technology really depends on the size of the market," he said. "The Facebooks and the Googles of the world have grown up very quickly because their market is huge. But shipping is not so big, and the lifetime of a ship is very long. So in the shipping world it will be gradual change as fleets are renewed."

New Rules = New Ships?

The maritime industry is in a transcendent period, with an avalanche of new emissions rules that promise to significantly alter the maritime landscape, and potentially trigger a spate of new construction as older ships prove too costly to convert.

When asked his thoughts on the new rules triggering a new ship order spree, Fujiwara was succinct: "I hope so! As the CEO of ClassNK, I think I should be a little pessimistic about that. At the moment ClassNK is very stable, and we have the ability to invest in new technology. I see the market turning up in 2020-21, but I will take the pessimistic view in case not.

He agrees that new rules surrounding Greenhouse Gas Emissions are the biggest change at the moment, particularly the recent decision taken by IMO MEPC to cut emissions 50% by 2050. "Using fossil fuels will only go so far in saving GHG, new concepts are necessary," said Fujiwara.

Through R&D ClassNK plans to maintain its leadership mantle in this regard, taking a deep dive into the digitalization and data and it is central to meeting ever more strict performance and environmental mandates.

"We are trying to make some rules regarding big data exchange, and we are certainly not alone in this regard, it's the same type of issue faced by the other tech giants … who owns the data, and how can this data be used. It's a big issue," said Fujiwara.

"So we've built up some market rules and set up a common platform with rules to govern the collection, storage and use of data. We are starting this year on a trial basis, and many shipowners and shipbuilders are joining. If it's successful, we will spread it to the rest of the world."

Matthieu DE TUGNY

COO, Bureau Veritas

As the cruise industry continues to boom, so too does Bureau Veritas' (BV) marine division, which has a long history and promising future in the sector. Maritime Reporter & Engineering News *met with Matthieu de Tugny, COO, BV to discuss recent activity and future prospects in cruise and beyond.*

By Greg Trauthwein

Photo: Class NK

Bureau Veritas has a long history in the cruise sector, dating back to when France's Chantiers de l'Atlantique was a formidable power in the cruise ship building sector, but also based on strong and long relationships with cruise ship owners in the U.S., France and Europe. "Today, we have diversity of clients within the cruise industry, with companies such as MSC where we classify about 90% of its fleet," said Matthieu de Tugny, COO, BV.

But the relationship does not stop with the big ships, and BV is actively involved in the fast-growing expedition class ships, counting French Ponant and the U.S.' SunStone among its clients. In fact in SunStone BV is involved in the first cruise ship orders in China, as featured in the June 2018 edition of *Maritime Reporter & Engineering News* ("Cruise Ship Construction: China Rising; https://www.marinelink.com/news/cruise-ship-construction-china-rising-438788)

But with opportunity comes challenge, particularly the quest to build cruise ships in China. "It is a challenge for them and it's a challenge for us because we have to educate the shipyard," said de Tugny. "As you know, building a passenger vessel is not like building a bulk carrier or a tanker; there are so many things to assemble, and so many things to manage with European equipment suppliers." de Tugny said that assembly is the biggest challenge, "as you are pulling many pieces from European countries to be connected at the yard. From a structure point of view, they know how to do it. They have been building ships for many years now." While it is hard to put a dollar amount on the additional investment of money and resources to build effectively in China, de Tugny said BV started by educating its own surveyors (in China) relying on European staff to train them. "We have to work very closely with them and the yards to make sure that they adapt and adopt new passenger vessel construction criteria," said de Tugny. But it's also a ship owner story, too. "They (ship owners) need a very strong supervision team locally to ensure that the ship specs are met. It's a partnership."

Today BV has 400 marine personnel in China, and 10,000 personnel in China across the entire BV group. "It is our biggest area of operation. China is an area of real strength." With its experience in the cruise sector BV is a rich source of information, but as de Tugny points out, "classification is a certification body, it is not our role to advise." As the maritime

Photo: BV

industry as a whole digests myriad regulation changes from the IMO, IACS and class, classification itself has evolved, delivering its expertise under different branding. “Because of the potential conflict of interest we cannot advise and certify from under the same BV banner,” said de Tugny. This speaks to a larger shift in the role of classification itself. “Today I think that class rules are moving from a more prescriptive approach to more of a risk-based approach,” said de Tugny. “Look at the cruise industry and LNG as fuel; LNG as fuel in the cruise sector is new, and with that you have to perform a risk analysis. Based on the recommendation of the risk analysis, the ship owner and ship builder makes a solution decision based on this risk analysis. You see this is a consultative approach, not a prescriptive approach. That’s the evolution you can see today. That’s a change of spirit.”

Looking at the issue of fueling ships, with the IMO Sulfur rules coming in 2020 and the recent mandate to cut emissions by 50% by 2050, de Tugny thinks that the debate over meeting the new regulations is the biggest topic du jour, and will be for some time to come. But whether the choice is LNG or another alternative fuel, scrubbers or some other option, it all comes down to money and the financial impact on the shipping companies.

Late last year when French shipping giant CMA CGM ordered a series of 22,000 TEU containerships with an LNG fuel option, de Tugny said “I think that was a milestone in the shipping industry …” the company took the risk and now “the train is leaving the station” on LNG as fuel in maritime.

While financials will top the marine fuel debate, not far behind is logistics. “It’s an interesting discussion, as it depends on the trading of the ships,” said de Tugny. “It’s a case-by-case basis, and it will depend on the evolution of the bunkering system. It’s still too early to confirm an actual trend.”

> *“In the 1970s was when we developed the first automation notations for unmanned machinery spaces, the first issue we had was with the trade unions, as it was removing people from the machinery spaces. It’s a flag state issue, it’s a port state issue … to be honest before we talk about autonomous ships we should talk about smart ships, connected ships … there are so many barriers between us.”*

N/S Savannah

Embracing the Nuclear Option

Worth seeing, worth saving – and, worth every penny spent to do both.

As the editor of both *Maritime Logistics Professional* and *MarineNews* magazines, I flatter myself that I have – perhaps like no one else covering maritime business – a unique lens into the vast diversity that exists from one end of this fascinating business to the other. Drilling down a bit, and on the domestic waterfront, there's arguably no bigger contrast in coverage assignments than, say, attending the exciting MACC Show at Curtis Bay, MD on one day, and then stepping aboard the nation's first and only entry into the world of nuclear powered merchant shipping on the next. But, that's exactly what I did in late July, on two successive days.

On Wednesday and Thursday, I was zipping along and being treated to tight corners at 50 MPH on the nation's most advanced littoral, patrol and special mission craft. It's not for the faint of heart. Friday brought a more sedate, yet equally interesting assignment, as I boarded the now idle nuclear ship Savannah, moored quietly and obscurely along the Baltimore waterfront. I simply love to tour the old ships. My gracious hosts at Marad made sure the trip was worth the wait.

CREDIT: Rodney McNany, Marad

That's a lot of talent gathered on the port wing of the NS Savannah. L to R: Joseph Keefe, MarineNews and Maritime Logistics Professional Editor; Marad Program Manager Erhard Koehler; and Robert Murphy, former Director, Office of Resource Management, U S Naval Nuclear Propulsion Program.

'Savannah' on my mind

It ain't easy to find. And once off the freeway on the Baltimore waterfront, well, it isn't the best neighborhood. Beyond this, you need to make a few random turns past and through some dry cargo docks, navigate the detour, and along the way, slap the GPS a time or two when it gets confused. Harkening back to my days as a cargo surveyor I remembered that any trip to perform a draft survey typically involved the requisite flat tire after you'd run over about six million nails and assorted dunnage on the way to that assignment. Not to worry; no flat tires this time and we arrived on the pier on time and just as we crawled down the pier towards the remarkable vessel, a worried Rodney McNany was ringing up my cell phone to inquire as to where we were. I told him to look out the porthole.

At my side in an unofficial, but helpful role was Robert Murphy, the former Director, Office of Resource Management, for the US Naval Nuclear Propulsion Program. As a matter of full disclosure, he's also my brother-in-law. When I told him, some weeks prior, what I was intending to do, he readily agreed to come along for this trip down memory lane.

Our guide, Marad's Erhard Koehler, was the perfect host and perhaps the guy who knows more about the N.S. Savannah than anyone else on the planet. At the same time, I could also ask for no more knowledgeable nuclear energy SME than long time [now retired] SES USN executive Bob Murphy. And in places where I maybe found one piece of minutia just a little dull, he instead asked the right questions and showed me what was important, and why. Sandwiched in between Koehler and Murphy for this two hour tour, with the watchful and helpful Marad PAO [Rodney McNany] in tow, I got a real sense of just how important this piece of history is, and why it should be preserved.

Still NRC-controlled to this very day, the Savannah has few peers when it comes to her fine, sleek lines and pleasing naval architecture. Contrasting sharply to today's floating bathtub-shaped cargo ships, it is easy to spend 20 minutes on the pier just admiring her lines. And, that's just what we did, once having disembarked after the tour. Even lacking a recent paint job, Savannah is a handsome addition to the gritty Baltimore waterfront.

Savannah Stem to Stern

Bob, of course, wanted to see the engine room. Ever the deckie, I wanted to see the bridge and wander around on deck. Eventually we did both. But first, we mustered in a nicely appointed and restored reception area just inboard of the main gangway area, where Erhard Koehler, the U.S. Maritime Administration's Manager, N.S. Savannah Program, brought us up to speed with a safety lecture and then some general fun facts about the grand old boat.

It was right about then that my brother-in-law mentioned to Koehler that, as a young boy growing up in Rhode Island, he had toured the Savannah when she had called at Providence. As he spoke, Koehler nodded vigorously and then led us around to the other side of the vessel to show us an exhibit that contained a photo capturing the vessel's transit through Narragansett Bay on that very day, so long ago. For his part, Murphy was noncommittal as to whether the experience had prodded him on his way to a distinguished, 40-year career in the U.S. Navy and the U.S. Department of Energy, where he worked for Admiral Rickover for much of that time. We'll never know. It was nice, nostalgic moment. Also right about then, I was suddenly glad that I had brought him along.

The décor was intended to be uniquely American; Koehler describes it as "mid-century modern." Let's go with that. That comes complete with gallons of lead paint and excellently coated asbestos. Some of this has been removed, and some, apparently, is better left encased and otherwise undisturbed. As we toured the vessel, Koehler pointed out that a great deal of restoration had taken place already, most of which had clearly and carefully been executed with an eye toward preserving the original motif. If so, they have done a nice job. For example, some ornamental tiles on the decks and stairwells are exact replicas of the old asbestos tiles.

A trip through the crew's quarters revealed no surprises and the better preserved rooms would be familiar to any American merchant mariner, right down to that ubiquitous, institutional green paint slapped on the bulkheads. During this part of the tour, I admit to experiencing a serious and depressing flashback to my days at sea, but I recovered quickly and rebounded nicely once out on deck.

As far as the nuclear plant was concerned, Koehler explained that there was relatively little risk in the vessel's operation. A collision barrier – far more robust than most would have thought – in the vicinity of the reactor and dome, saw to that. The vessel stopped carrying passengers in 1965. Originally, it was fitted to accommodate as many as 190 people, including 65 crew. Ultimately, the vessel's service ended in 1970, mostly due to budget issues.

The vessel's navigation bridge and engine control room were, of course, two of the tour's highlights. And having sailed on my fair share of U.S. flag, 40-year old rust buckets (and that in no way describes Savannah), I was right at home in the vessel's Spartan wheelhouse. The bridge had a "Scram" button, something which basically was the shutdown for the reactor in times of emergency. But for the deckies – and apparently this was

a point of some discord – the button only allowed them to alert the ER – not actually activate it. In the engine control space, a light would come on, alerting the engineer on watch, who would actually do the heavy lifting. As a former deck officer, I think that this was probably (very) good policy.

There are a lot of myths and sea stories about the boat, some of which are at best exaggerations and most, simply not true. Koehler did his best to sort them all out as we made our way on this journey through U.S. maritime history.

In the Radar

In the beginning, it was U.S. President Dwight Eisenhower's vision that brought the ship to life in the first place. "Atoms for Peace," he called it. It was, in his way of thinking, the perfect way to demonstrate to the general public the possibilities of nuclear capabilities for the greater good. In its purest form, the vessel allowed the United States to explore the possible introduction of nuclear propulsion into commercial shipping, and helped discern the rules of flag states and the bilateral agreements that might evolve. It was never intended to be a big moneymaker, and it that regard, it did not disappoint. That's because, in part, the vessel's overriding mission displaced space that otherwise would have been used for cargo carriage. That said; Koehler insists, it made more money than some thought it would. Labor trouble dogged the vessel during its lifespan, so in that regard, it (arguably) stayed true to its heritage as an American merchant ship. Pure and simple, the ultimate goal of MarAd for Savannah is donation. Koehler told us firmly, "We're not a museum operator." Under the control of the Nuclear Regulatory Commission since 1965, the vessel has long had its fuel removed. Eventually, Marad's plans are to decommission it and terminate the NRC license. A $131 million decommissioning project is now fully funded, says Koehler. The decommissioning phase, which began on October 1, 2017, will reportedly last for seven years. Next up on the calendar, a three to four month drydock period is planned for next year.

Today, the boat doesn't host a lot of events, but occasional functions, most notably some National Maritime Day celebrations and other similar, educational events have been held on board. In fact, as many as 45,000 people have visited it one day on previous occasions. Our late July tour was a special treat, one which should be a 'must-see' for any ex-mariner, if Marad has its way for this vessel's ultimate destination.

August 21 will be the 59th anniversary of the Savannah's launching, and there is excitement in the air on board as that day approaches. On July 20, Erhard Koehler was the right host for our tour – a veritable encyclopedia of all things Savannah. An apt manager, he is also the perfect ambassador for Marad in his current role. They're lucky to have this Fort Schuyler graduate on board. Today, the N.S. Savannah is the perfect candidate for what hopefully will be its next life as an appropriate guardian of American maritime history. Whatever entity eventually takes possession of her will be similarly fortunate.

There are more famous and high-profile maritime candidates for renovation and preservation in the news today. Notably, and just up the I-95 Freeway, another famous merchant ship and its stakeholders are vying for the exact same thing. But, Savannah is unique in its compact scale, its possibilities and the ultimately minor cost that will bring it to life as a museum. And unlike the other Philadelphia-based icon, the U.S. Maritime Administration has already done most of the hard work necessary for its next owner to take the next step. Here's hoping that's something that will happen very soon.

“We had shipbuilding for dinner ...”

The Duclos family is iconic in boatbuilding circles, as the Somerset, Mass.-based ***Gladding-Hearn, Duclos Corporation,*** *has built a strong heritage in the pilot boat and fast ferry sectors, and in total more than 425 vessels have been delivered since it was founded in 1955. Today a trio of second-generation siblings run the yard, brothers and co-presidents John and Peter Duclos with sister Carol Hegarty serving as CFO. Maritime Reporter & Engineering News visited the yard recently and found the yard bustling with newbuild activity.*

BY GREG TRAUTHWEIN

Photo: Greg Trauthwein

Siblings Peter Duclos, Carol Hegarty & John Duclos

Meet the Family

It is said that you can't pick your family but you can pick your friends. While the axiom likely holds true for a majority of the population, it appears that the shipyard sibling trio of John, Peter and Carol have gotten the best of both worlds, sharing a business connection and strong personal bond. The trio and their families all live in Westport, Mass., on Buzzards Bay, the fifth generation of family living in the town. "The biggest lesson our parents taught us (to succeed in this business) is you have to get along," said John, the oldest of the siblings and in charge of production, a graduate of the U.S. Merchant Marine Academy with a degree in marine engineering and a Masters in Naval Architecture and Marine Engineering from the University of Michigan. "If you get along, you can solve problems. We're close as a family, we're together outside of the shipyard, but we try not to talk shop outside of the yard."

"My parents have an interesting relationship that I admire," said Peter, "My parents rely on each other, they help each other, they are one unit. My father in his prime was amazing to watch, he had so much enthusiasm and charisma, and that's all he had when he took over the company … plus years of experience." Peter is the Director of Business Development with a degree in Mechanical Engineering from UMass Dartmouth and a "Masters in Catamaran" courtesy of his world tour of shipyards when the company started building high-speed passenger catamarans as an Incat Designs licensee in 1987; a tour to find 'best practices' and bring them home to the shipyard for the fledgling business line. "When I graduated from college I got delivered with the first high speed ferry that we ever built in 1987, the Mackinaw Express."

Carol is the CFO but she, as do here brothers, wears many hats, juggling finances with human resources and regulatory compliance, too. She has a Masters in Finance and worked in the banking industry for nearly a decade before she got the call from her mother, who was slowing down and needed her daughter and her financial acumen inside the family business. "My mother was amazing, and one of many things I've taken from her is the personal connection she made with people, whether it was an employee, a vendor or a customer. I try to do that, too, because I saw the loyalty that it created."

The personal connections at Gladding-Hearn are only a part of the story, but a critical base to understand how this small Northeast U.S. boat builder has flourished while others have failed; an essential ingredient that extends beyond the Duclos clan to their employees and customers alike.

It started in 1955 when George Duclos, chairman, at age 22 co-founded the yard with Pret Gladding and Richard Hearn. Nearly 30 years later in 1983 George bought out his partners, but before he pulled the trigger on the deal he called his eldest son John, who was working at Bath Iron Works.

"My father called and said that the partners wanted to retire, and that he was trying to make a deal for the shipyard," said John. "He said 'if we do that, you'll have to come home.'" The call was expected as they had talked for years about the opportunity to run their own business, and according to John "the stars aligned and it worked out." Peter and Carol were still in school at the time, so in 1983 John joined his parents at the shipyard, located on seven acres on the deepwater Taunton River in Somerset, Mass.

While each of the siblings had their own path back to the family business, all started at the shipyard in their high school and college years part-time, and all started with the same humbling task: "We all cleaned the office," said Carol.

Today they form a formidable shipbuilding management team, well-educated and experienced with individual skill sets that mesh well, rooted in humble beginnings that guide business and relationships as they serve a cadre of loyal repeat customers while always scouting new opportunities.

The Business

Since 1955, Gladding-Hearn has been synonymous with pilot boats, having built more launches operating in the U.S. than any other shipyard. Along the way, the company has consistently invested in technology, facilities and partnerships,

Located on seven acres on the deepwater Taunton River in Somerset, Mass., Gladding-Hearn makes the most of its space for both newbuild (above) & repair (below).

Photo: Greg Trauthwein

an investment strategy that has armed the yard with an enviable technology base and skill set that is often found only in much larger yards. Key developments in its history include:

- In 1977, the shipyard delivered America's first Z-drive tractor tug.
- In 1978, it joined forces with designer C. Raymond Hunt to build the first launch with a deep-V hull, now an industry standard.
- It became an Incat Crowther licensee in 1987, becoming the second shipyard in the country to build high-speed passenger catamarans.

"Today we build in steel and aluminum, and 30 to 165 ft. is our practical range," said Peter. "Typically we don't build anything with outboard engines, but as those boats are getting bigger and bigger, we may."

To date the company has built 88 pilot boats – and in 2014 it built the first pilot boat application of Volvo Penta's IPS drives in the U.S. – as well as 42 high-speed catamaran ferries since it started building them 30 years ago. The portfolio is rounded out with tugboats, research vessels and a long list of patrol and pilot boat projects for various international customers, including Bermuda, the Bahamas and the Colombian navy. "We don't say no to anything, we'll consider just about anything," said Peter.

Eying new opportunities falls under Peter's guise, and today he sees potential in offshore wind. "We've been looking at the offshore wind service vessel sector, and while we don't have an industry yet, it will happen," said Peter. "If it happens in the way that the Department of Energy wants it to happen, it will be huge and there will be enough work for many yards."

In some respects, the process of running an efficient boatbuilding business remains the same as it did in 1955. "Mr. Gladding wrote 'Appreciation of a Small Shipyard,' – a SNAME Paper – in the early '60s, and some of the principles and business systems that they developed when they started this company in 1955 are still in place today. There are different tools, but the philosophies remain the same," said John.

But in other respects, the business is completely different.

"The expectations of the customer, of the industry in general, are so much higher," said Peter. "The vessels and the level of detail are so much more complex." And while the advent of technology, particularly CAD and 3D modeling, has advanced the design process, the boats that Gladding-Hearn build are still an engineered product which require skilled and experienced designers and trades. "We live in a time that you can buy anything you want on your phone, but we're not selling a product, we're selling a custom-engineered solution," said Peter. "No matter how many phones or computers you have, you can only think so fast. There is no 'catamaran' button or 'pilot boat' button on my computer, it has to be designed. You still have to think; you still have to get information on what the customer wants, and you have to understand what the customer needs."

While computerized tools and 30 years of experience certainly help, there are no exacts in boatbuilding, which remains both an art and a science, as Peter admits "There are some projects that you'll get midway and say 'why did we take this one?' But our philosophy is to stick it out, deliver the boat and hope to keep a customer. Some of our worst projects have become our best customers," said Peter, noting that nearly 90% of the boatyard's work comes from repeat customers.

Yard Investment

Investing any boatbuilding enterprise is a 24/7/365 endeavor, as keeping the plant in shape and adding new technologies is a valuable tool in maintaining efficiency and profitability.

"First, you have to have good, devoted people, that's where it starts," said John. "But you have to keep the plant healthy, and that is a continuous investment and a challenge."

"About 10 years ago we got in on the ground floor of small shipyard grants from the Maritime Administration, we got lucky and we qualified, allowing us to invest in infrastructure," said Carol. Investment in fresh infrastructure is

abundant and readily visible across the facility, with new piers, cranes, forklifts, welding machines and plasma cutting machines, as well as the behind-the-scene items such as new electrical service and the latest CAD design tools. "That MarAd program has been very helpful for many yards to improve infrastructure," said John, and while Gladding-Hearn did not apply this year, they have some plans for 2019.

Investment doesn't stop with hardware, and the trio agrees that keeping and maintaining a loyal and competent workforce is the number one challenge. "Training, at all levels is a big challenge: from safety, to environmental compliance, to skills training," said Carol. To that end the company recently embarked on a two-year program seeded by funds from a Massachusetts workforce training grant "that will touch everyone in this company, including us," said Carol, who recently took courses with her brothers on LEAN Management and Six Sigma. For the program Gladding-Hearn partnered with Bristol Community College, who co-wrote the grant and provide the professors and trainers on-site at Gladding-Hearn.

Despite the myriad challenges, John, Peter and Carol find their work rewarding, providing a steady presence in the community for more than 60 years and gainful employment for an extended family of about 110 current employees. "If you want to make $1 million dollars in boatbuilding start with $2 million!," said Peter, laughing. "It's a hard business. The key is getting and keeping the right team, and keeping that team moving in the right direction. Coordination, timing, cooperation and communication are all key. We're in the communications business." Ultimately, the Gladding-Hearn trio falls back on the lessons learned from generations before: "There's always opportunities to build boats and make customers happy, and that will never go out of style," said John. "That's how this company was founded; that's how it's run today."

2018 Deliveries

- **The Alabama Pilot, Inc.** in Mobile, Ala., received a new Chesapeake Class pilot boat from Gladding-Hearn Shipbuilding, Duclos Corporation. The boat measures 53.5 x 17.6 with a 4.75 ft. draft. The all-aluminum pilot boat features the signature C. Raymond Hunt-designed Deep-V hull and is powered by twin Caterpillar C-18 diesel engines, each delivering 671Bhp at 2100 rpm and a top speed of 27 knots. A Humphree interceptor trim-tab control system was installed at the transom. Diesel capacity is 800 gallons, which shipyard officials say, provides a range of at least 400 miles at an economical speed of about 20 knots. The engines turn 5-blade Ni-BrAl propellers via Twin Disc MGX-5135A Quickshift gears. The launch is equipped with a 9kW Northern Lights EPA Tier 3-compliant genset.
- Glory, the second Incat Crowther designed 27m catamaran ferry built by Gladding Hearn for **MBTA of Boston** has been delivered following on from sister ship Champion. When Champion was launched late last year, she was the 500th Incat Crowther designed vessel to enter service; Glory takes that number to 529. The design is optimized for bow loading, with double-width gates and doors. The bow design integrates with existing shore based infrastructure and the wheelhouse is designed to meet strict visibility requirements, allowing the captain to clearly see the foredeck. Among the challenges of a modern commuter operation is the ever-increasing demand for passenger amenities. Champion and Glory deliver in this area with full disability regulation ADA compliance (including 4 wheelchair spaces and accessible bathroom), concession stand, luggage racks, bicycle storage for 10, a ticket counter, the requisite trash receptacles and of course, WiFi. Glory's entire superstructure is isolated by resilient mounts, to reduce noise and vibration in the cabin, allowing the vessel to exceed the contractual requirements. Glory is powered by a pair of Caterpillar C32 Acert engines, driving Hamilton HM571 water jets, for a service speed of 26 knots and a top speed of 30 knots.

Gladding-Hearn has delivered 42 high-speed catamaran ferries since it started building them 30 years ago

Photo: Greg Trauthwein

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

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At Oman Drydock, there's a plan to **Triple Revenue by 2021**

Said bin Homoud Al Maawali, CEO, Oman Drydock Company (ODC) means business when he aims to triple revenue by 2021, *but it's anything but business-as-usual at ODC. A neophyte to the shipyard world, he is a veteran business man with a long resume in multiple industries, a turnaround specialist. He sees potential at ODC, but bigger picture, he sees the shipyard as a means to help Oman broaden its business and revenues outside of the traditional energy industry.*

BY GREG TRAUTHWEIN

As the global shipbuilding community shakes off a historic slump, new thinking is creeping into a space steeped in tradition. Oman Drydock's new CEO has not only been on the job for just five months, he's been in a shipyard for five months. But he is the face of a new generation of leaders that are intent on dispatching with the business-as-usual model.

He comes to the job with little shipyard experience, but a wealth of business and leadership experience, having led companies or served on the board of a broad swath of companies, from oil and gas to manufacturing to mining to finance.

"It is a big challenge (to turn around Oman Drydock) but I (and the shareholders) think there is a lot of potential here," he said during a recent interview in Athens. His goal to triple the shipyard's revenue in just three years is bold, but his logic is sound as his priority is to broaden the company from three revenue streams to 11. Along the way he is intent on modernizing business and production practices; making the company lean with a reduction of direct employees and an increase in expert contractors and subcontractors; and building global alliances with organizations that can help it attain its strategic goals. Perhaps most significantly, ODC will enter the new ship construction market. "Our shipyard has the capability and capacity to deliver small units such as OSVs, tugs and barges to the worldwide ship building market. We have a plan and the demand is there," he said. The plan is to start small and grow with investment and strategic alliances, catching the industry's next upswing. "Anyone out there that would like to come and work with us to help start our newbuild program, contact us," he said.

Prioritizing

To turn around any yard there are multiple layers simultaneously in motion, but to Said the top task is broadening ODC's revenue streams. "You need to be absolutely sure of what you want to do – there are many things to do in this business." Said bin Homoud Al Maawali said that it was more than six years ago since the shipyard conducted a proper market study, so a new one was recently commissioned to help Oman Drydock target markets and investment. With repair and conversion serving as cornerstones, in various stages it will look to penetrate these additional revenue streams:

- New Ship Construction
- Onshore Oil & Gas
- FSRUs
- RIGS & Platforms – newbuilds, refurbishment, storage, decommissioning
- Supplies for ships
- Floating Crane supply
- Salvage
- Scrubbers: (already have signed two agreements, looking for three more alliances)
- Ballast Water Treatment Systems: (already have signed one agreement, looking for four more alliances)

"We have about 11 different revenue streams that we can have at Oman Drydock; Today we have three out of 11 in action," Said commented. "We need to focus on the new revenue streams, and we will start with work on the fabrication for the onshore oil and gas fields. We have a lot of capabilities in the yard, and we've underestimated the ability to market there. There is about $3B to be made in fabrication in Oman a year. There are 30 different oil fields in a radius 300 km from the yard."

Investment in Facilities

ODC's facility is located in Duqm, on Oman's Indian Ocean coastline, and the yard covers an area of more than 2.4 million square meters. Today it has two ULCC size graving docks (410m x 95m and 410m x 80m), five quays, with a total of 2,800m of alongside berthage with water depths of between 9 and 10 meters, and 14 jib cranes with lifting capacities of between 40 and 100 ton. Its five workshops cover outfitting, electrical works, machinery, hulls, blasting and painting, and a cryogenics clean room for LNG tanker repair work.

There is an 80,000 DWT floating dock in the plans, pending a funding approval expected in September. Funding or not, however, Al Maawali said that it is a top priority, and "by hook or crook we're doing it this year."

Additional areas of investment are familiar to any shipyard, and on the plan are additional lifting capacity courtesy of a 3,000 ton floating crane; a winch system to make the drydocks safer and more efficient; hydro-blasting equipment to add to the yard's repertoire of blasting and painting work; and an investment in the overall processes of the yard, helping to get ships in and out more efficiently.

But the investment being made that transcends cash is the investment in partnerships and alliances with major OEMs and expert partners, as he wants to attract the ABB's and the Wärtsilä's of the

> *I'm looking for go-getters.* **I'm looking (for the types of people) from the 'wild west' bars, the kind that kick the doors open with their boots and get to work.**

Said bin Homoud Al Maawali,
CEO, Oman Drydock Company (ODC)

Photo: Oman Drydock

maritime world to come to Duqm to set up shop, all a part of the master plan to broaden revenue streams while streamlining the internal ODC team. With room to spare, Al Maawali said the yard will even look to act as landlord, allowing outside companies to come in and set-up shop to complete jobs.

The ODC plan is indicative of growth in the region, specifically the growth of Duqm, Oman, an area that is going to have a new refinery, a new oil tank farm, a new desalination and power plant, three combined projects worth $8.5 billion, as well as a new gas-to-liquid plant and a new chemical plant representing another $4 billion in investment.

But the investment doesn't stop in heavy machinery and industrial operations, as there is simultaneous investments in hotels, entertainment and a variety of life-style projects, all geared to ensure that ship owners, seafarers and related personnel are comfortable in Duqm for the duration of a project.

New Faces, New Places

The mantra from the top of ODC is efficiency of operation and maximizing the value of its assets. To enact the plan Said has installed a new executive and management team, tapping executives with vast shipyard and business skills from around the globe.

"I'm looking for go-getters. I am not looking for people who are busy managing office politics. I'm looking (for the types of people) from the 'wild west' bars, the kind that kick the doors open with their boots and get to work."

He has created a 'transformation department' which is designed to exist for three years to help plan and act. Apart from investment in physical facilities, ODC is on the path toward adopting LEAN manufacturing processes. And 'lean' is the keyword when it comes to personnel, as well. Today total ODC employment is a 70/30 split among own-employees/contractors. The plan for 2021 is to flip that to a 40/60 split. " We have to bring in experts, and we have to stay lean as an organization," he said.

While Said bin Homoud Al Maawali and his management team have plenty of work ahead, he see's the success of ODC as bigger than simply creating a healthy balance sheet. "This is an industry that will help the country wean itself from its dependence on oil. Personally, I believe in it a lot. It's an industry that needs a lot of good energy," which he and his team are planning to deliver.

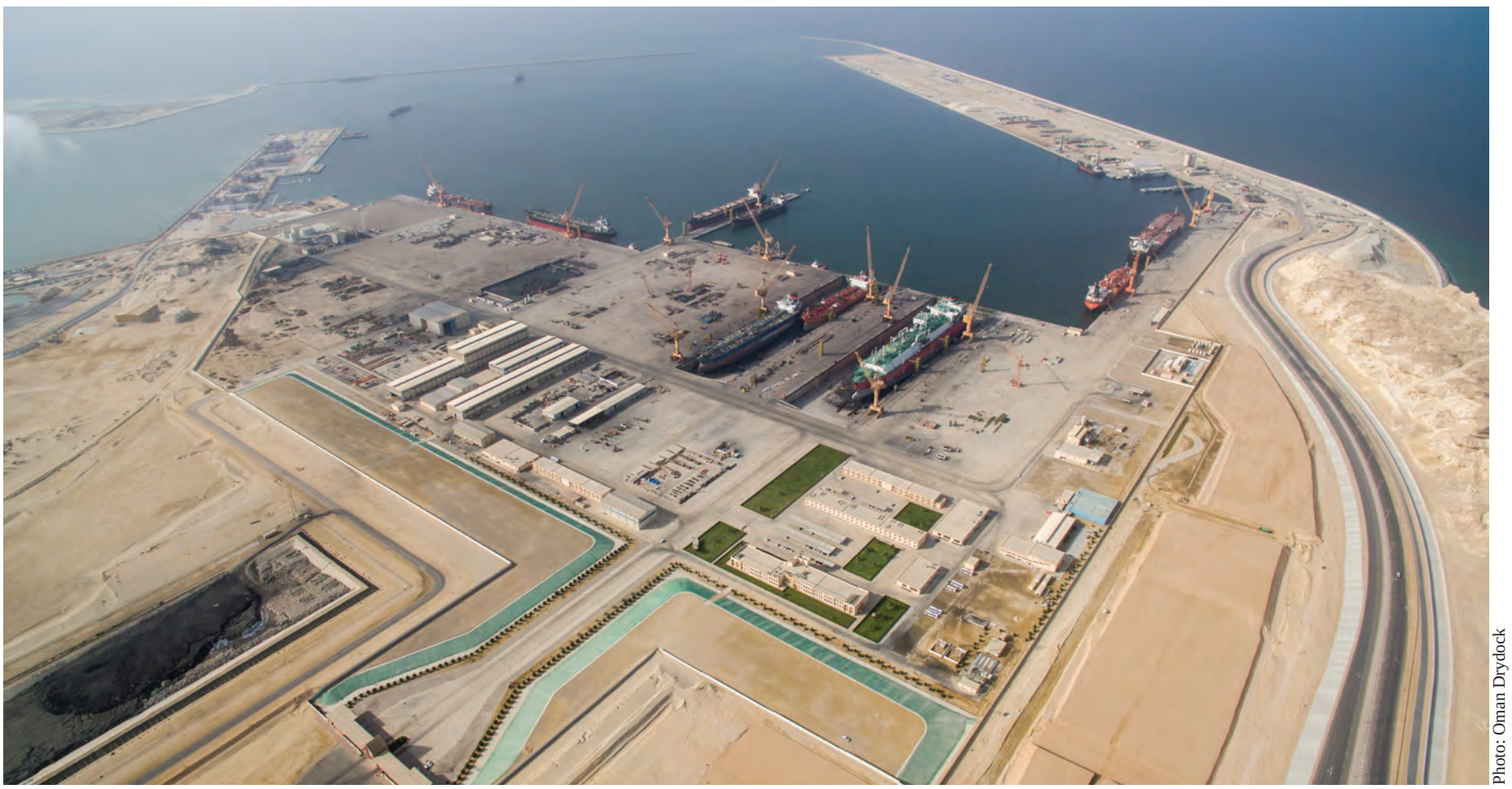


Photo: Oman Drydock

Shipbuilder in Focus: **Damen**

Image: Damen

Damen is currently building a first-of-its-kind marine aggregate dredger for CEMEX UK.

With nearly three dozen shipyards spread across the globe, Damen Shipyards Group based in the Netherlands is one of the world's most active shipbuilders. *Maritime Reporter & Engineering News* examines the flurry of activity perpetuated by the shipbuilding and repair conglomerate.

The Damen Shipyards Group reported a turnover of €2 billion in 2017, a year in which it delivered 165 newbuilds, including 64 tugs and workboats, five offshore vessels, 40 high-speed craft and ferries, 12 pontoons and barges, 23 dredging and specialty vessels, 16 vessels for defense and security and five yachts. The shipbuilder has not slowed down in 2018, continuing its fast-paced delivery schedule while beginning on a number of new vessels and refit projects.

Dredger Innovation

Among the group's most innovative new build projects currently underway is a first-of-its-kind next-generation marine aggregate dredger, which is being built at Damen Shipyards Galati in Romania for Cemex UK. Damen cut first steel for the vessel late last year and recently started building its innovative dredging system, which is designed to extract sand and gravel from the seabed at depths of up to 55 meters, including in the challenging conditions of the North Sea. The innovative design offers greater efficiency, environmental credentials and the ability to transport approximately 15 percent more load when compared to CEMEX's current dredger, according to Lloyd's Register, which is providing classification for the 103-meter-long, 4,975 gross tonnage dredger slated to be delivered at the end of 2019.

New Fast Crew Suppliers Debut

In July, the shipbuilder unveiled a pair of new fast crew supply vessel designs: the FCS 2710 and FCS 1204 FRP. The first FCS 2710, owned by High Speed Transfers Ltd, is based on the builder's popular FCS 2610, which has sold more than 40 vessels over the past seven years. The FCS 2710 retains the twin hull, axe bow design but is one meter longer and higher than its predecessor. That, plus a complete redesign of the interior, allows it to carry twice the number of passengers as its predecessor and enables it to deliver more flexibility, more tank capacity, greater deck space, increased comfort and more accommodation. The extra meter above the water also allows the vessel to operate in wave heights of above two meters, substantially increasing the range of weather conditions in which the vessel can be at sea.

The new 12-meter FCS 1204 FRP (fiber reinforced plastic) replaces a previous version of the same name to become the smallest model in the Damen FCS range. The new FCS 1204 is designed to be built using modular techniques and substitutes tough, lightweight FRP to replace the old aluminum hull. Capable of carrying up to 28 personnel at up to 30 knots, it has a range of 200 nm at top speed – a substantial boost in performance and capacity over its predecessor. Damen said it will keep hulls plus a full range of wheelhouse and accommodation options permanently in stock, enabling buyers to select the interior/exterior configuration they want, choose between shaft, waterjet and Z-drive propulsion options and receive their vessel 10 weeks later.

Pioneer LNG Conversion

In recent months, Damen has also begun a number of high-profile repair and conversion projects. It announced in May that Damen Shiprepair Dunkerque has started an EU-backed project to convert GIE Dragages-Ports' trailing suction hopper dredger (TSHD) Samuel de Champlain from diesel-electric propulsion to dual-fuel capability combining marine gasoil (MGO) and liquefied natural gas (LNG), a first-of-its-kind project for a European shipyard. The vessel is expected to be operational by December 2018.

Large and Growing Larger

Marking another milestone for Damen in 2018, the group completed a transaction with Daewoo Shipbuilding & Marine Engineering (DSME) to take over the Daewoo Mangalia Heavy Industries (DMHI) shipyard on the Black Sea Coast. The yard will be renamed Damen Shipyards Mangalia, and operated as a joint venture with the Romanian Government, with Damen assuming operational control. The yard has a total area of approximately 1 million square meters, making it the largest in the Damen Shipyards Group. It has three drydocks with a total length of 982 meters and 1.6 kilometers of berthing space. Its 48- and 60-meter-wide docks give Damen the ability to perform construction and conversion of larger, high-end and complex vessels.

Cruise & Ice bring shipbuilding in Finland to the Fore

Maritime Reporter & Engineering News' correspondent in Helsinki, recently visited several shipyards in Finland and found vibrant new construction activity and investment.

BY HENRIK SEGERCRANTZ

After the previous yard owner of the Turku Shipyard, South Korean STX, ran into financial difficulties the shipyard was acquired in 2014 by the Meyer Group of companies. The Finnish Government remained a minority shareholder until May 2015. The German Meyer Group is a family owned company operating three shipyards:

- Meyer Werft in Papenburg, Germany, employing 3,200 people,
- Meyer Turku in Southwestern Finland with 1,900 employees, and
- Neptun Werft in Rostock, Germany with 500 employees.

The cruise ship boom has resulted in the demand for ever bigger cruise ships and the River Ems which feeds the Meyer Werft yard in Papenburg has restricted the size of ships possible to be constructed there, so the yard in Turku was strategic as it allows for bigger ships to be built. Whereas the two big shipyards mainly concentrate on building cruise ships, the Neptun Werft focuses on river cruise vessels, and lately the yard has supplied Meyer Werft with ship sections. The first engine room sections also for Meyer Turku will be built this year, for the Costa Cruises newbuilding to be delivered next year.

Shipbuilding in the Turku facility dates back to 1737, and while shipbuilding has remained a staple, the technologies and technique have changed dramatically.

"Earlier most of the ship equipment and systems were built at the yard; today we have a network of up to 800 sub-contractors supplying and working for each single ship," said Said Tapani Mylly, Communications Manager at Meyer Turku. "The shipbilding process today is heavily dependent on the work of network companies from Finland and from around the world."

The Meyer family has been running its shipbuilding company for seven generations now, since 1795. Today Jan Meyer is heading Meyer Turku, which includes a cabin module factory Piikkiö Works.

Investment in any shipyard is the price of staying in business, and Meyer Turku is no exception, as it is in the midst of a $234m investment program stretching to early 2020. Investment includes building a new cabin module factory, a new automated facility for pre-treatment of steel plates and a fully automated steel storage is being built.

"We want a system that works such that whenever the steel halls need a steel plate of a certain type, size and thickness, one can basically just press a button an the automation will bring the needed material," Mylly said. Currently, new panel lines, welding lines and plasma cutting lines are also being built. "All of the halls will look quite different in two or three years. The investments go through all of the phases of building, starting with the bottle necks seen, such as with the crane capacity and cabin installation, fitting of the blocks. Now that is being fixed with a new gantry crane, followed by added automation in the production."

The new 1,200-ton gantry crane from Kone Cranes, almost ready to enter service at the writing of this article, complements the existing 600t crane and will allow for building bigger blocks with more pre-outfitting. An increasing amount of work is directed towards the earlier phases of production where the work can be done more as industrial processes. "The goal is to build the most efficient shipyard in the world."

"The physical construction of a new cruise ship today takes 1.5 to two years, with the whole project taking some three years," said Mylly. Of the total value of the cruise ship, the steel represents about 10 percent, with the remaining 90 percent coming from the machinery, equipment and designing and outfitting of the ship. Ultimately, all of the investment in equipment and procedure is designed to help speed along the process of building large, quality cruise ships. "Today we are building (delivering) approximately one and a half ships per year. We used to build one ship per year. Eventually, we will build a large ship every eight months," Mylly said.

Cruise Boom Continues

The cruise ship building market is booming, with approximately 100 cruise ship currently on order. According to Royal Caribbean International, 27M passengers are set to cruise in 2018 with 25 newbuilds to enter service in 2018. The last decade saw a 51% growth with 310 cruise ships. The cruise ship market is growing steadily with a current lower berth annual growth of some 6-7%. The growth is steady providing for an excellent prospective for the Finnish shipyard. Meyer Turku and Meyer Werft in Germany have together a market share of some 40%.

The Viking Grace ferry, sailing between Finland and Sweden was delivered in January 2013. This 2,800 passenger vessel was the first liquefied natural gas (LNG) fueled (dual-fuel) passenger ferry, with the fuel tanks place outside on the aft deck. In January 2017 the yard delivered the 2,850 passenger Tallink Megastar ferry. This vessel is also dual-fueled but the LNG tanks were placed inside of the hull. These vessel were good references for the coming cruise ship newbuildings, most of which are now running on LNG as fuel.

Between 2014 and 2017 Meyer Turku built, for German TUI Cruises, the 99,800-gt cruise ships Mein Schiff 3, 4, 5 and 6, and recently, the 20m longer 111,500-gt New Mein Shiff 1 was delivered, fitted with scrubbers and catalysators. The current record size orderbook of Meyer Turku stretches until 2024. The cruise vessel New Mein Schiff 2 will be delivered early 2019.

Having earlier built a large number of cruise ships in Finland, the Carnival group is now back, with a large series of 180,000-gt cruise ships ordered for its Costa and Carnival brands, all fitted with dual-fuel LNG machinery. Costa Smeralda is to be delivered later in 2019, followed by a cruise ship for Carnival Cruise Lines in 2020 and a second ship for Costa Cruises in 2021, with another 180,000-gt LNG cruise vessel for the Carnival brand to follow.

Also in the works is the first of two Icon-class vessels for Royal Caribbean International, a series of 200,000-gt vessel that also uses LNG and MGO as fuel and will be fitted with fuel cells to handle parts of the hotel power consumption. TUI Cruises has booked a slot for Mein Schiff 7, a diesel-electric sistership to New Mein Schiff 1 and 2, for delivery in 2023, and the second Icon cruise ship for Royal Caribbean is to be delivered in 2024.

"The current orderbook is the best this yard has ever had, and it is also the longest industrial orderbook in Finland," said Mylly. The production volume will

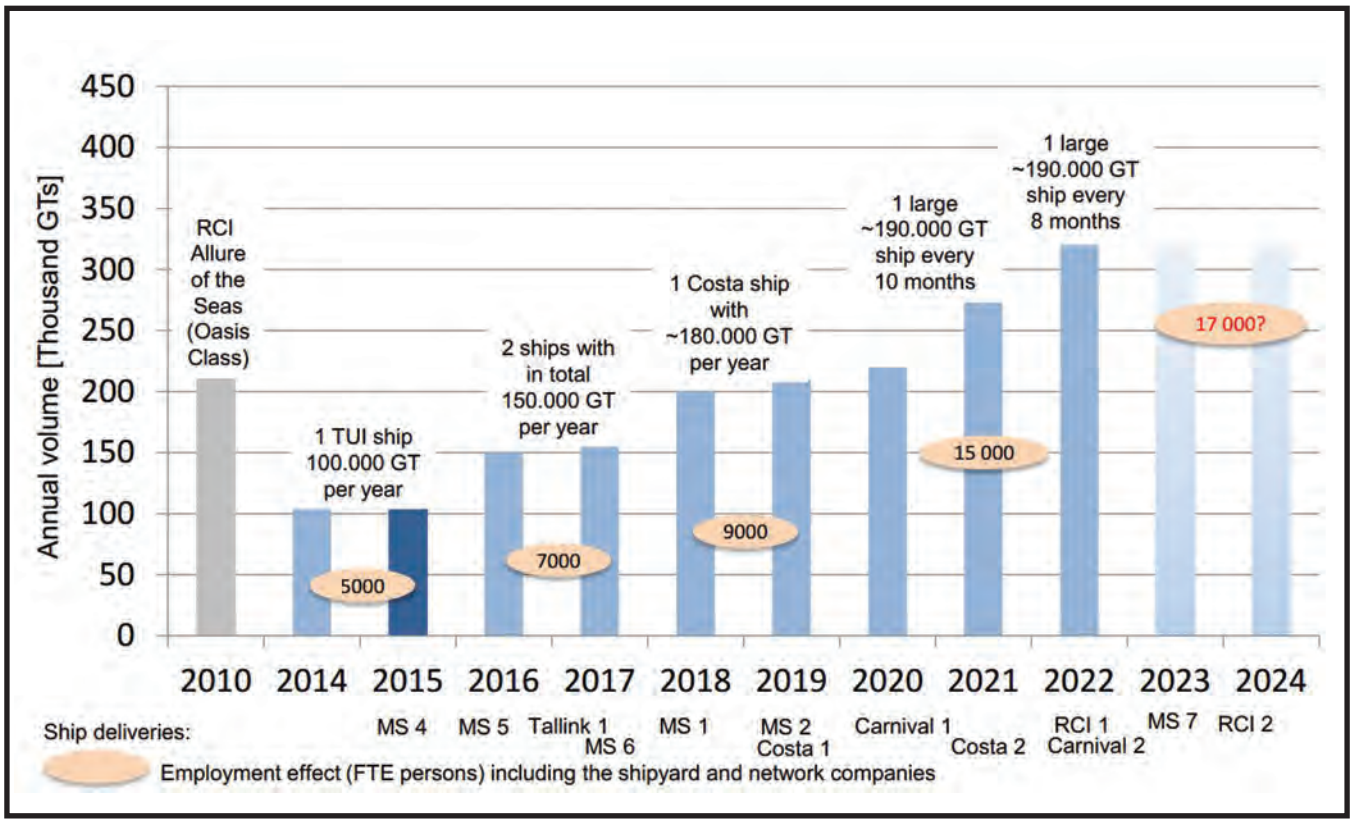
Above: Meyer Turku Shipyard, one of the world's largest builders of cruise ships. The new huge 1,200t gantry crane is about to be taken into use. The outfitting now takes place in all areas onboard. The yard area covers 144 hectares and the dry dock measures 365m x 80m.

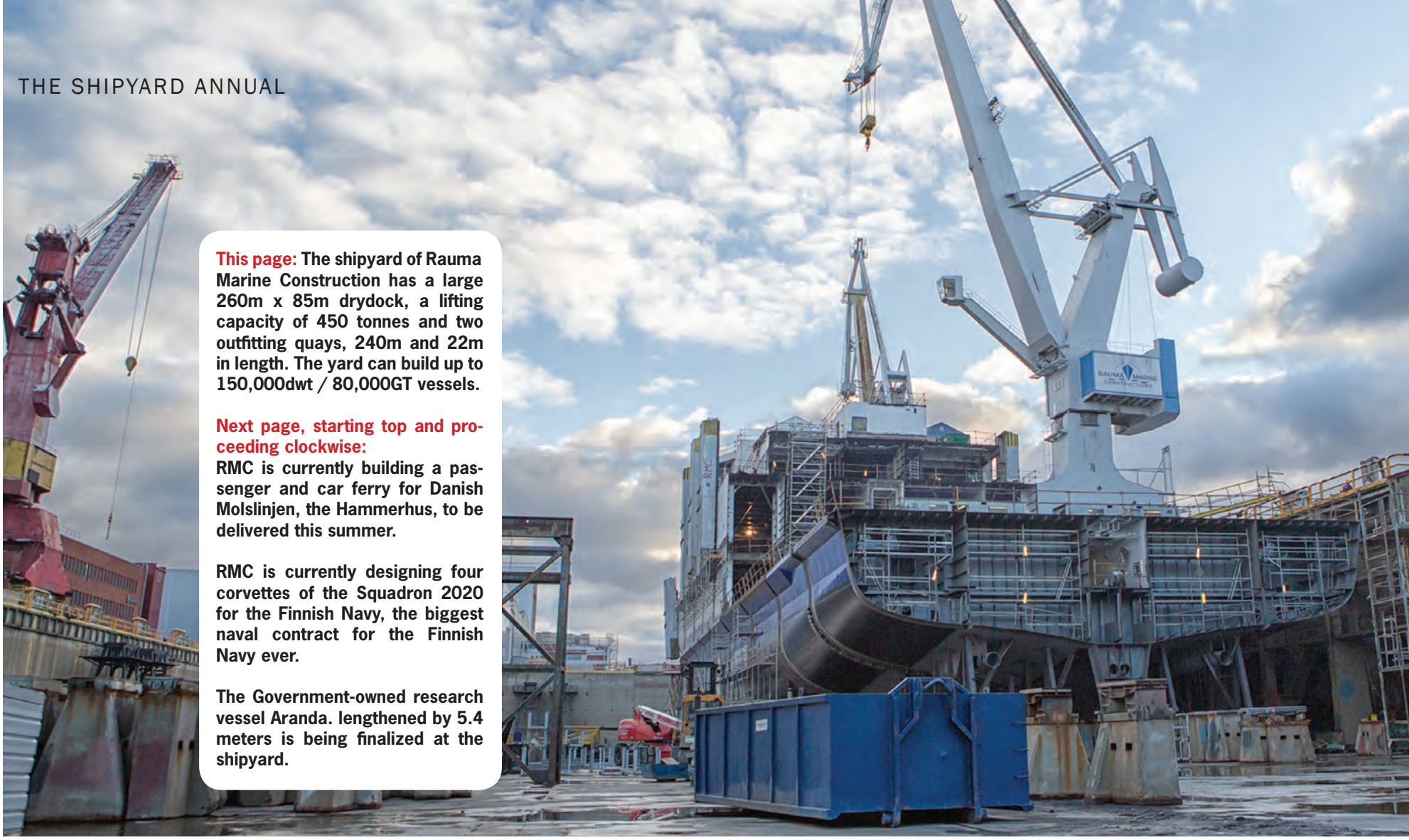
Right: Tapani Mylly, Communications Manager at Meyer Turku Shipyard in front of Mein Schiff 2, about to be floated out from the dry dock.

Below: The current orderbook @ Meyer Turku comprises eight cruise ships for delivery until year 2024. An estimated 15,000 people will work with cruise ship production in 2021.

Images: Meyer Turku

this year reach 200,000GTs per year which was previously reached back in 2010, when Royal Caribbean's Oasis Class Allure of the Seas was delivered. The annual volume will reach some 320,000-ft by 2022, a quite sharp rise from 220,000-gt in 2020. The current amount of own employees plus subcontractors working for the yard is some 8,000 people, with some 4,000 working daily at the yard. Some 50 languages are spoken at the yard, with some 1,000 of the suppliers not Finnish nationals. There are currently 1,900 own employees with the amount to be increased to some 2,300 people. Some 250 people were recruited last year, and the same amount will be recruited this and next year, replacing also those retiring. "All of the remaining growth is to come from external suppliers," Mylly said. "There is a huge demand for growth, not just for the yard but also suppliers, new companies with new people. This is a big challenge for the entire country, I would say."





This page: The shipyard of Rauma Marine Construction has a large 260m x 85m drydock, a lifting capacity of 450 tonnes and two outfitting quays, 240m and 22m in length. The yard can build up to 150,000dwt / 80,000GT vessels.

Next page, starting top and proceeding clockwise:
RMC is currently building a passenger and car ferry for Danish Molslinjen, the Hammerhus, to be delivered this summer.

RMC is currently designing four corvettes of the Squadron 2020 for the Finnish Navy, the biggest naval contract for the Finnish Navy ever.

The Government-owned research vessel Aranda. lengthened by 5.4 meters is being finalized at the shipyard.

Images: Rauma Marine Construction

With all of the investment in equipment, processes and people, Mylly notes that Meyer, with a shipbuilding history spanning nearly 225 years, takes a long-term view of its business. “A very good thing for us is that the company is not looking for profit in one year or quarterly, but is looking at a longer time span, five years, 10 years … even for generations,” Mylly said. “The Meyer family wants to transfer the business to the next generation in a better condition than when they got it.”

RMC is Getting Busy

Rauma Marine Constructions (RMC) is also based in Southwestern corner of Finland, one hour’s drive north of Meyer Turku. This shipyard has also seen many changes, as its predecessor Finnyards was known for its ferry newbuildings. The shipyard has been in operation since summer 2014 with the ownership consisting mainly of private Finnish investors, and government ownership of 20.1%.

Based on the experiences from shipbuilding in the past the shipyard applies a new network-based approach in shipbuilding. RMC focuses on the project management with a number of partner companies handling the various tasks at the shipyard and the logistics. “We try to avoid all the traditional issues when it comes to the shipyards. But the shipyard needs to take the responsibility towards the customer when it comes to signing the contract,” said Jyrki Heinimaa, CEO. A low fixed cost asset base was reached when the City of Rauma acquired the entire shipyard area, when the former troubled owner South Korean STX decided to end the shipbuilding activities in Rauma. Now RMC has a 30-year rental agreement for the area, including facilities, minimizing the risks from fixed costs.

“Everything else is variable costs, that is very important for how flexible we can be.” Shipbuilding now is based on dedicated reliable partners providing subcontracting and partnerships.

RMC focuses on newbuildings and on ship maintenance, focusing here on vessels owned by the government and on passenger ferry customers. While visiting the shipyard in May there were the government-owned research vessel Aranda undergoing a major conversion, having been extended by 5.4 meters, and receiving new research facilities and updated propulsion. The Finnish icebreakers Fennica and Nordica were receiving their regular drydocking maintenance. RMC has a three-year contract for the maintenance services for these multipurpose icebreakers with Arctia Shipping and also of the technically advanced Coast Guard vessel Turva. Regarding newbuildings RMC focuses mainly on icebreakers, car and passenger ferries, research vessels and on vessels for use by the armed forces. The company has retained its expertise in these fields and is also utilizing the know-how and competitiveness of the Finnish marine industry.

“RMC takes the lead of the projects but we have a very lean management,” said Heinimaa. He notes that the structure is being developed through every new contract deal, as operations have still taken place for such a short time. “We have the technology and want to regain the position we have had, especially on the ferry side,” Heinimaa said. RMC currently employs 85 persons and has a very strict approach when it comes to selecting projects in order to guarantee that those are won. Heinimaa believes it is the competitiveness of the clusters that decide which shipyard will win a newbuilding project. In all, there are currently some 350 to 400 people working at the yard.

RMC is currently building a passenger and car ferry for Danish Molslinjen, the Hammerhus. The order of this 18,000-gt 150m long vessel was received in 2016, with delivery scheduled for this summer. “This is a very suitable project for us, to regain the position of the past. The vessel is not too big but not too small either,“ Heinimaa said.

The shipyard in Rauma has a long tradition in building vessels for the Finnish Navy, a tradition that continues today as the yard is now working on the project of four new corvettes of the Squadron 2020. A letter was signed in 2016 and a design contract was signed in 2017. “This is the biggest naval contract for the Finnish Navy ever,” Heinimaa said.

Also coast guard vessels are a point of focus. In 2013, though under the previous ownership, the yard built the Finnish offshore patrol vessel Turva, the first such vessel also using LNG as fuel. The multi-purpose icebreakers Nordica and Fennica were built in Rauma. “This is an area where we have much to give,” Heinimaa said. RMC has now its focus on the renewal project of the Finnish icebreaker fleet which is planned to be realized by 2029.

Two Yards Having Difficulties

Arctech Helsinki Shipyard, currently completely Russian owned, but predominantly managed by Finnish shipbuilders, is struggling with the sanction imposed on Russia, making it hard to receive western orders. The owners are said to be looking for new ownership arrangements for the shipyard.

Due to the weak offshore markets globally, the offshore construction yard on the west coast, Technip Offshore Finland, has run out of oil rig orders. The yard, owned by TechnipFMC, is known for having built many floating oil rigs for the Gulf of Mexico. New ownership arrangements are said to be under negotiation.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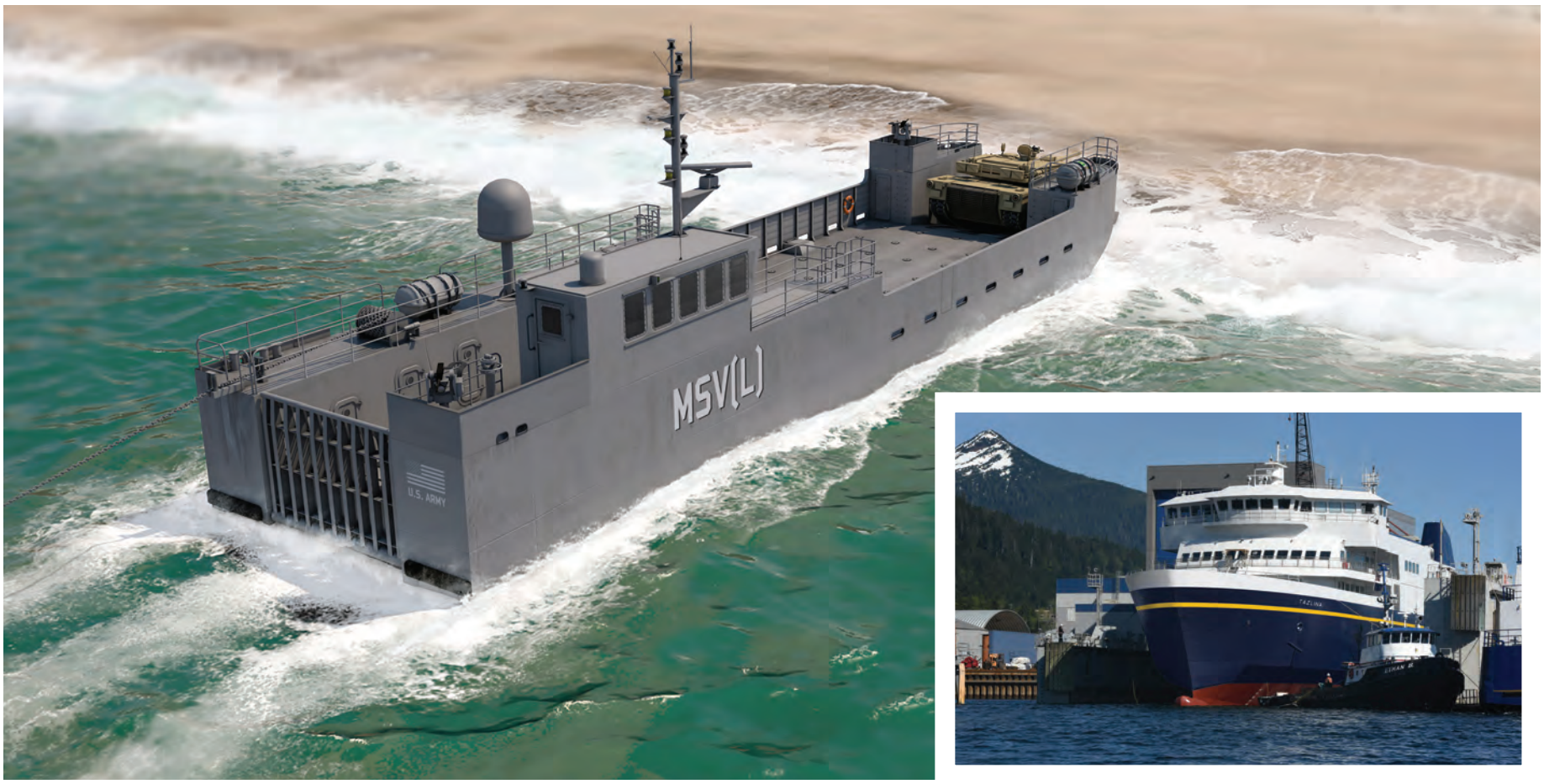
ARANDA
SYKE

Shipbuilder in Focus: **Vigor**



Images: Vigor

At Vigor's Ballard facility, teams are busy with engineering and design refinement on the Maneuver Support Vessel Light (MSV-L) for the U.S. Army.
Inset: Ongoing marine fabrication at Vigor's Ketchikan, Alaska shipyard includes the Tazlina Alaska Class ferry.

The year 2018 is off to good start at Vigor. The Harbor Island facility welcomed a new drydock christened the Evolution. The $20 million Evolution is the third drydock at Vigor's Seattle facility and largest in the Puget Sound region, measuring 640 x 115.5 ft. with a lift capacity of 22,000 LT.

Other investments in Seattle include a buildout of a dedicated aluminum production facility which greatly expands Vigor's fabrication capabilities and capacity for workboats, ferries and high-performance military vessels.

Investments at Vigor's Portland, Oregon facility center around upgrading its comprehensive quality management systems in complex fabrication. Swan Island is now certified through AISC (American Institute of Steel Construction) to build bridges and received AS9100 certification for Aerospace through NQA. In addition, NQA1 certification at the facility is being finalized for Nuclear programs.

Ongoing marine fabrication includes the Tazlina and Hubbard Alaska Class ferries at the Ketchikan, Alaska shipyard. Tazlina will be christened on August 11. The dayboats have a 300-passenger and 53-car capacity and measure 280 ft. in length. Seattle teams delivered its fourth 144-car passenger ferry, Suquamish, to Washington State Ferries in July. The ferry measures 362 x 83-ft. with a draft of 24.5-ft. Also in Seattle, fabrication of the fourth, 400-passenger Hydrus class ferry, Carina, is underway for WETA. The third, Argo, was delivered in May. Both vessels measure 135 x 38-ft. with a draft of 6.75 ft.

They are powered by two MTU 12V4000 M64 diesel engines for a cruising speed of 27 knots.

At Vigor's Ballard facility, teams are busy with engineering and design refinement on the Maneuver Support Vessel Light (MSV-L) for the U.S. Army. Vigor was awarded the contract to build the Army landing craft in 2017 with construction expected to continue over the next 10 years. The facility delivered its fifth Response Boat Medium – C to the New York Police Department in January and has orders for eight 45' Response Boat Mediums (RB-M) for two separate Middle Eastern customers. The Middle Eastern vessels are powered by two MTU 60 series diesel engines with a top speed of 40 knots. Two will be delivered in 2018 and the additional five in 2019. One 30-ft. U.S. Navy Skimmer is also under construction. Another was delivered in February.

In Oregon, fabrication of the Combatant Craft Heavy for the U.S. Navy is underway with expected delivery in 2019. The production line of multiple Combatant Craft Mediums continues. Vigor also unveiled its new design for the Vigor Fast Interceptor at SOFEX in Amman, Jordan this May.

Finally, Vigor Portland is building Ocean Energy's pioneering wave energy conversion buoy prototype. The 826-ton "OE Buoy" measures 125 x 59-ft. with a draft of 31 ft. and has a potential rated capacity of up to 1.25 MW in electrical power production. Each deployed commercial device could reduce CO2 emissions by over 3,600 tons annually. The buoy will be deployed at the U.S. Navy's Wave Energy Test Site in Hawaii. The $12 million project is funded by the U.S. Department of Energy and the Sustainable Energy Authority of Ireland.

Vigor Delivers Ferry to WETA

Vigor recently delivered Argo, the third of four all aluminum, 400 passenger ferries to the Water Emergency Transportation Authority (WETA) in San Francisco. The hull was built at Vigor Ballard and the superstructure in Vigor's new aluminum fabrication bay at its Harbor Island facility. "The new fabrication bay significantly expands Vigor's production capabilities and capacity for our portfolio of aluminum workboats, high performance military craft and state of the art ferries like Argo," said Tim Kolb, Vigor Puget Sound General Manager.

Like its sister ships, Hydrus and Cetus, Argo is a design by Incat Crowther. It has a service speed of 27 knots and a smooth, quiet ride which Vigor Senior Project Manager, Jim Gow attributes to its "floating house," courtesy of a superstructure outfitted with 180 independent mounts. The engines and wheelhouse sit on isolation mounts while the gears are hard mounted.

Argo features a selective catalytic reduction (SCR) after-treatment system developed by Pacific Power Group and is powered by two MTU 12V4000 M64 engines. Argo's engines are able to burn biodiesel B5 and thereby further reduce emission, a high priority for the City of San Francisco.

Sweden's Biggest Shipyard Grows

While shipbuilding and ship repair has largely exited the European stage for Far East locales, shipyards such as Oresund Dry Docks in Landskrona, Sweden, maintain a healthy workload. Magnus Malmström, Oresund Dry Docks' Sales Manager said in a recent interview with Maritime Reporter that Oresund is the largest yard left in Sweden, dedicated to conversion and repair, since 1915. While it was involved in the newbuild business to the 1980s, its business today is dominated by passenger, RoPax and tanker repair and conversion business. Its business has traditionally been regional, but in recent years a concerted effort has been made to venture out to the U.K., Germany and Russia, all the while eying the massive offshore wind parks off of Germany and Denmark as a future lucrative business. Oresund offers the largest graving drydock in Sweden at 195 x 34 m – build in 1915 – and in addition it offers a 165 x 28m floating dock 800m worth of quays and a 180-tonne crane capacity. The total complex measures 100,000 sq. m., with 35,000 sq. m. under cover. "This year has been very good, with full docks," said Malmström. While the yard has looked to expand, he said that local traffic in the area has been the driver this year, and while the yard lost some valuable business during the offshore oil and gas downturn, "there is some light at the end of the tunnel."

Images: Oresund Dry Docks

Like many other yards around the world, Malmström said Oresund is waiting patiently for the inevitable surge in Ballast Water Management System refits, but to date is has seen none. "It is surprising, but they will come."

Like any other yard, investment in facilities is needed constantly, and recently it bought two new cranes for its graving dock. It is currently looking into lengthening its graving dock to accept larger vessels, but this is pending a historical site evaluation, and there is no timeframe for the project.

HH Ferries´ 'Emission-free' Ferries

One of the more significant contract wins came two years ago when Oresund Dry Docks was selected to carry out modernization work surrounding ABB's project to convert two HH Ferries' vessels into the world's largest emission-free ferries. M/F Tycho Brahe and M/F Aurora were both be fitted with 4.16 MW of batteries and the containers with the battery racks. Tycho Brahe was dry docked first, followed by Aurora in October 2017. The new battery solution will help lower total emissions across the fleet by more than 50 percent from the current diesel operated vessels.

FMG: Italian Style in America

Headquartered in Washington DC, Fincantieri Marine Group is the U.S. division of global shipbuilding giant Fincantieri, which around the world has more than 19,000 employees in 20 shipyards, with aa 234-year history of building more than 7,000 ships.

The U.S. group includes three shipbuilding sites: Fincantieri Bay Shipbuilding, specializing in the construction, repair and conversion of commercial vessels; Fincantieri Marinette Marine (pictured), builder of the U.S. Navy Freedom variant of the Littoral Combat Ship; and Fincantieri ACE Marine, builder of the USCG Response Boat-Medium in serial production, builder of coastal patrol boats and of the aluminum superstructures of the Littoral Combat Ship. incantieri Bay Shipbuilding, the largest shipyard on the Great Lakes, is a 63-acre plant with climate-controlled manufacturing facilities. Shipyard drydocking capabilities can accommodate all types of vessels up to 1,000-plus feet in length. In 2018, the company received its third consecutive Excellence in Safety award from the Shipbuilders Council of America, and has received ten additional Safety Awards over the last three years. Fincantieri Bay Shipbuilding has built more Articulated Tug Barge units than any other shipyard over the last 20-years, and the company has a multi-disciplined engineering team and a portfolio of designs including offshore supply vessels, self-unloading vessels, ATBs, ferries and dredges.

Images: Fincantieri Marine Group

Fincantieri Marinette Marine has seven Littoral Combat Ships in various stages of serial production. Inset: New FMG President & CEO Dario Deste.

On the government side of the business, Fincantieri Marine Group is pursuing contracts for the U.S. Navy and the U.S. Coast Guard, mainly through Fincantieri Marinette Marine, a yard with proven capability for serial production of government vessels. In the U.S. Navy's guided missile FFG-X program, the company will submit an entry based on its FREMM design, currently operating in several allied navies. Fincantieri is also the builder for the Lockheed Martin entry based on a variation of the Littoral Combat Ship that has also received initial design funding. Currently, the company is also pursuing contracts for the USCG heavy polar icebreaker (HPIB) as well as foreign military sales. Francesco Valente, Fincantieri Marine Group President and CEO*, said:

"Fincantieri has a long history of delivering quality ships to the U.S. Navy and Coast Guard. We are extremely well-positioned to compete for both of these contracts; we have world-class facilities, world-class designs, and an experienced workforce with a Midwestern work ethic," he said. "Our financial strength and stability, our global reach, our vast regional and national network of suppliers, and our demonstrated ability to produce in serial production are significant discriminators that make us a formidable competitor and a dedicated member of the U.S. industrial base."

** At press time Fincantieri Marine Group announced that **Francesco Valente** announced his intention to step-down from the position to assume another leadership role within the Fincantieri group. As a result, the Board has selected **Dario Deste** to assume the role of President and Chief Executive Officer.*

Tech in Focus: Sayaringo STaGE Ships

Purpose Built to Serve the U.S. to Japan Shale Gas Trade

Images: ABS

The growing global demand for lower carbon forms of energy and more efficient marine transport is driving the construction and conversion of gas carriers in shipyards across Asia and Europe.

Last month, Mitsubishi Heavy Industries' (MHI) yard in Nagasaki delivered the first 'Sayaringo STaGE' gas ship, a next-generation series of hybrid-propulsion LNG carriers that promise greater unit carrying capacity and better fuel efficiency.

Diamond Gas Orchid was delivered to ABS class on July 3 to owners Diamond LNG Shipping, a joint venture between Mitsubishi Corporation and Nippon Yusen Kabushiki Kaisha (NYK).

The Sayaringo cargo containment system design is a modified version of the one used for MHI's 'Sayaendo' (Japanese for 'podded peas') gas carrier. It features a similar lightweight hull and a containment system that utilizes four MOSS-type tanks housed in a continuous steal cover to reduce wind resistance and reduced steel weight.

But MHI has modified the tanks from their traditional stretched spherical shape to forms that more resemble an apple ('ringo' is Japanese for apple), a shape that expands the tanks' capacity and lowers the center of gravity, increasing stability.

Diamond Gas Orchid is designed with a maximum 165,000 cu. m. of storage capacity, or 6.2% more than its typical Sayaendo predecessors. As the design is flexible, MHI says it is possible to achieve a capacity near 180,000 cu. m. without exceeding the ship-size limitations of the Panama Canal's new locks.

The Sayaringo STaGE ships are purpose built to serve the shale gas trade between Japan and the US Gulf and east coast ports and the stringent environmental demands of the areas where those loading ports are situated.

Another innovative upgrade is found in the propulsion systems of the next-generation ships, in which lightweight twin-skeg hulls were designed to house a hybrid 'steam turbine and gas engines', hence the acronym 'STaGE'.

The propulsion plant combines the Sayaendo model's ultra-steam turbine (UST) with a combination of a dual-fuel diesel engines ([DFE] which work on both gas and fuel oil) and a propulsion electric motor (PEM).

The two engines are combined in a way that recovers heat that is typically wasted from the exhaust-gas and jackets of most DFEs; that energy is then used to heat the feedwater for the UST plant, achieving significant improvements in fuel efficiency. The heated feedwater flows to the boiler to generate the steam that drives the turbine.

The electricity generated by the DFEs drives the PEM.

MHI believes the STaGE plant itself emits about 20% less CO2 than conventional turbine plants. The Sayaringo as a whole emits about 40% less CO2 per cargo unit than a conventional 147,000 cu. m. LNG carrier with conventional turbine plants, MHI says.

"Diamond Gas Orchid features the latest in marine innovation with its optimized transport capacity, fuel efficiency and environmental performance," ABS Vice President for Japan, Akira Akiyama said in a release announcing the delivery. "Working closely with all of the stakeholders, we were able to help Diamond LNG Shipping demonstrate the viability of the concept and develop a highly efficient and innovative vessel."

ABS was also selected in July to class a floating storage and regasification unit (FSRU) for BOTAS, Turkey's oil and gas pipeline operator.

To be built at South Korea's Hyundai Heavy Industries shipyard, the ship will have a storage capacity of 170,000m3 and a LNG discharge capacity of 1,000 million standard cubic feet of gas per day. It will be moored to a jetty off the coast of Turkey and operated by Mitsui O.S.K. Lines.

One of the primary drivers of the current FSRU market is the ships' ability to give LNG importers a faster track to regasification capabilities. At about half the cost of compar¬able land-based facilities, they offer the flexibility to be relocated as the need for energy changes.

There is currently strong interest among potential LNG importers for solutions based on the use of FSRUs, with many projects in the development phase.

"As demand for gas has increased over the last decade, the supply chain has had to adapt and figure out new ways of getting gas to expanding markets," ABS Senior Vice-President and Chief Business Development Officer, Jamie Smith said in a release announcing the BOTAS deal. "FSRUs, like this one for Turkey, are providing gas distributors and suppliers an efficient and effective solution for getting their product to consumers."

With the spectre of the IMO's mandatory sulphur cap on marine fuels on an ever-nearer horizon, gas-capable shipyards are also seeing a rise in LNG conversion activity.

In the first quarter next year, Poland's Remontowa Ship Repair Yard in Gdansk will be delivering the second of two converted 18,747GT passenger ferries to owner B.C. Ferries, based in Vancouver, Canada.

The ABS-classed Spirit of Vancouver Island will join its recently delivered sistership, Spirit of British Columbia, back in service after having its propulsion plant converted to dual fuel (natural gas and marine diesel).

B.C. Ferries expects the conversions to reduce each ship's CO2 emissions by about 12,500 tons a year.

The comprehensive refit will include new engines, a new natural gas fuel system and renewal of the propulsion equipment components, including rudders, the steering system, bow thrusters, propellers and gearboxes.

With lower-carbon fuels increasingly in demand, the world's gas-capable yards are likely to see robust business for the next few years, particularly those whose expertise can run the gamut from conversions and LNG fuelling barges to offshore support vessels and next-generation gas ships.

B+V: Cruise Refits Hold Steady

In many cities where industrial activity is pushed to the fringe, Blohm + Voss on the Elbe is an iconic sybmol in the port city of Hamburg, a shipyard steeped in tradition but fully modernized to handle some of the most complex and high-value ship repair jobs in the world: a developed, ultramodern infrastructure and 421,000 sq. m. of yard.

Blohm & Voss has seen it share of market cycles, and following the current long shipping crisis due to low charter rates, the repair backlog for commercial vessels is slowly starting to dissipate and the refits that were previously deferred are starting to be undertaken through standard dockings, according to a yard spokesperson.

With charter rates rising and shipowners facing a bevy of environmental regulations, Blohm + Voss is looking to work surrounding ballast water management system and scrubber installs and upgrades.

Looking further ahead as environmental regulations continue to tighten, "LNG could also be a big topic for discussion due to upcoming regulations which would hopefully involve a boom in the refit market with a high number of possible projects and overhauls up for grabs," according to the yard spokesperson.

Images:Blohm + Voss

While Blohm + Voss is diverse, it is well-known for cruise liner refit, a market that remains steady. "Due to a shortage of new construction capacity at several new build shipyards, refit, lifetime extension and lenghtenings continue to be popular within the passenger vessel market," according to Blohm + Voss. Overhauls of cruise liners every two to three years keep them in optimal condition for the requirements of cruise liner guests whereas the commercial vessels most commonly need to dry dock for maintenance every five years. We expect some further cruise liner refits to be booked in over the winter months as well as a possible increase in the expedition cruiser market for vessels to be able to reach the farther ends of the earth as cruising new exotic locations seems to be a rising trend.

To this end, the yard has had some interesting projects this year, including Hanseatic of the Hapag-Lloyd Cruises fleet in March 2018 for just over two weeks to install a new ducktail to increase the vessel's stability. The project was technically challenging, including outfitting engineering with detailed design and workshop drawings in line with class approval, not to mention the construction, prefabrication and installation of approximately 100 tons of steel elements for the new ducktail. Brilliance of the Seas from the Royal Caribbean Cruises Radiance Class of vessels visited us for extensive works including a new application of silicon paint. At beginning of the year Blohm + Voss had two Fred. Olsen Cruise Lines vessels, Balmoral and Boudicca, stopover at the shipyard. Balmoral received an overhaul of the hatch covers and Boudicca was in for general repairs. These two ship fixes extended a 45-year relationship with Fred Olsen Cruise Line vessels, as the yard has completed more than 100 projects with the company.

LNG: Crowley Takes New ConRo

VT Halter Marine in Pascagoula recently completed a unique project when Crowley Maritime took delivery of El Coquí, one of the world's first combination container/roll on-roll off (ConRo) ships powered by liquefied natural gas (LNG). The ship is the first of two Commitment Class, LNG-powered ConRo ships being built for Crowley's shipping and logistics services between Jacksonville, Fla., and San Juan, Puerto Rico.

Construction of sister ship Taino is underway at VT Halter and she is scheduled to enter service later in 2018.

The new ships measure 219.5m (720 ft.) long with a 26,500 deadweight tons (DWT), able to transport up to 2,400 TEU at a cruising speed of 22 knots. A wide range of container sizes and types will be accommodated, including 53-foot by 102-inch-wide, high-capacity containers, up to 300 refrigerated containers, and a mix of about 400 cars and larger vehicles in the enclosed, ventilated and weather-tight Ro/Ro decks. This type of shipboard garage is offered exclusively by Crowley in the trade.

Construction of El Coquí, which is named for the popular indigenous frog on the island, has been managed in the shipyard by Crowley's solutions group, which includes naval architects and engineers from company subsidiary Jensen Maritime.

Fueling the ships with LNG will reduce emissions significantly, including a 100-percent reduction in sulphur oxide (SOx) and particulate matter (PM); a 92-percent reduction in nitrogen oxide (NOx); and a reduction of carbon dioxide (CO2) of more than 35 percent per container, compared with current fossil fuels. Working with Eagle LNG Partners, the ships will be bunkered from a shoreside fuel depot at JAXPORT.

Image: VT Halter

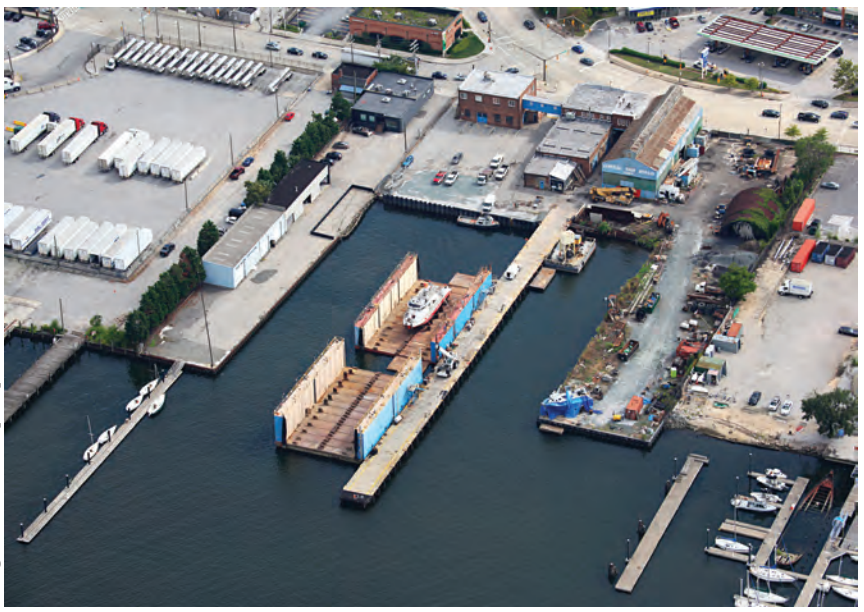
N-KOM: Repair Volume Up 25%

Images:NKOM

Operating since 2011, Qatar's Nakilat-Keppel Offshore & Marine Ltd (N-KOM) offers a range of repair, conversion, maintenance and fabrication services to marine, offshore and onshore industry. The ship-yard has delivered in excess of 800 marine and offshore projects to date, of which 20% is made up of LNG carrier repairs. In comparison to the first half of 2017, the year 2018 has a marked increase in vol-ume about 25% in terms of repairs and other works. In addition, the shipyard won a competitive bid for the installation of Scrubbers and Ballast Water Management Systems (BWMS) for a series of VLCCs belonging to one of the top tanker operators based in Greece. At the end of August, the first VLCC of a series will undergo routine dockings and retrofit of an in-line type of Scrubber as well as of a Ballast Water Treatment System. Three or four more will follow through September and October, where work is expected to continue through to 2019.

In the first half on 2018, the shipyard had retrofitted two sister Very Large Gas Carriers (VLGC) with Ballast Wa-

GSR Holding Steady



Images: General Ship Repair

The General Ship Repair has a century of experience providing full-service repairs to both the shipping interests of the Port of Baltimore and the workboat market of the Mid-Atlantic. As one of the few dry-docking facilities in the region, the yard sees a steady stream of tugs and barges, as well as passenger vessels, fireboats and small cruise ships.

The yard offers two, 1,000-ton floating dry docks to accommodate the increasing size of tugboats and barges within the Mid-Atlantic marketplace. In particular, Subchapter M regulations have driven an increase in business lately at the yard.

Major investments over the past year have included the construction of a water reclamation barge that is a processing system for wash water. Dry sandblasting is only performed within enclosures. Blasting on the dry docks is done with 40,000 PSI ultra-high pressure water blaster. All water is recovered and filtered.

A few major projects over the past year has included the overhaul of two 110-ft. Coast Guard cutters, Army Corps. Of Engineers Vessels, Cable Ships, Ready Reserve Ships and commercial ship repairs in the Port of Baltimore. General Ship crews are also mobile, often working on vessels in the Ports of Baltimore, Wilmington, and Philadelphia.

May Ship Repair Diversifies

The shipbuilding and repair market has been slightly increasing over the past year with most of the increase being sporadic on vessel repair. New construction has been steady and in May Ship Repairs business, we have been focused on infrastructure expansion such as passenger ferry landings for the City of New York. Looking to the future, May Ship anticipates this trend to continue or even decline due to possible trade tariffs and lack of needed new construction of small to midsized vessels because of market saturation and the current industry

Images: May Ship Repair

ter Management Systems (BWMS). N-KOM already had experience carrying out installation of three different BWMS previously – namely Samsung, OceanSaver and Alfa Laval respectively. As such, the duration in the yard between the first and second retrofit was observed to be significantly reduced by 43%, demonstrating N-KOM's competency and efficiency in handling such complex projects.

The shipyard continues to experience strong interest for its repair services from shipowners, with July and August fully booked for repairs at the facility. Most of these vessels underwent routine dry-docking and repairs such as cargo tank inspections, overhauling of main engine cylinders, LNG cargo and spray pumps, general steel repairs, hull treatment and painting, propeller blades cleaning and polishing, overhauling bow thruster, main boilers internal inspection, load tests for the life boats as well as various other inspections and repairs.

N-KOM's experience in LNG carrier repairs has attracted 18 vessels for routine docking and membrane repairs in the first half of the year so far, with a number of LNG carriers booked in for repairs later in the year. N-KOM has carried out extensive cargo tank membrane repairs for LNG carriers, using its in-house team of Gaztransport & Technigaz (GTT) certified welders to carry out welding works for GTT (Mark III and NO.96) containment systems. The presence of prominent maritime service providers such as GTT, Goltens, Wärtsilä, Wilhelmsen Ships Service, Turbo Technik and Cargotec operating within the shipyard greatly facilitates the overall repair process, offering convenience to ship owners and managers patronizing the shipyard. The growth of LNG spot market has resulted in a significant increase of inquiries for LNGC repairs from vessels that are not traditionally trading in the Middle East Gulf area. Notwithstanding the depressed tanker rates, the shipyard expects continued strong interest for tanker repairs in the second half.

conditions.

"As a result of the current market conditions, we are diversifying ourselves to new markets such as industrial structural steel fabrication – full manufacturing and detailing," said Mohamed Adam, May Ship's founder and president.

In addition, it is exploring the potential of the "green" markets, such as wind towers and underwater turbine structures, to name two.

Despite the diversification, May Ship will continue to focus on its core business: new construction, dry-docking & repair and conversion of marine vessels.

To help smooth the cyclical curves in maritime and the steel business, May Ship is investing to upgrade its facilities, modernizing its equipment and adding staff members, most recently appointing Kenneth D. Boothe, Jr., a shipyard operations veteran, as VP of production.

May Ship's Staten Island, New York-based shipyard is comprised of three dry docks with the capacity to dry dock vessels up to 300 ft., and it is in the process of building finger piers to utilize marine travel lift crane capable of handling 600 metric ton vessels – one of the largest on the East Coast.

Zamil: Focus on Competitiveness

Images:Zamil Shipyard, Dammam

Zamil Offshore is the largest integrated offshore Oil & Gas support services company in the Middle East, and it owns three subsidiaries; Zamil Shipyards, Zamil Marine and Zamil Offshore Construction, and 2 JVs; Zamil Mermaid in KSA and Zamil Marine LLC in UAE.

Zamil Shipyards manage and operate four shipyards out of the Saudi available 5, two in Dammam (one old and one new) both are for newbuilding and ship & rig repair plus one in Ras Tanura and one in Jeddah and both are for ship repair.

Zamil's shipyards are the premier and only shipbuilders in the Kingdom since 2002, with Zamil's new modern shipyard commissioned in April 2015 at an investment of $250m.

Generally, Zamil Shipyards have focused on building offshore, harbor and navy service vessels. To date it has built and delivered 50 diversified offshore vessels, harbor tugs, port service units, navy tugs and coast guard surveillance vessels, of them, 25 joined the Zamil marine subsidiary offshore fleet to serve Saudi Aramco.

Spanopoulos Group
Yacht Repair, Shipbuilding

Spanopoulos group provides a variety of services, from commercial shipbuilding & yacht repair, marine & civil constructions, towage & salvage, environmental protection services, as well as underwater services.

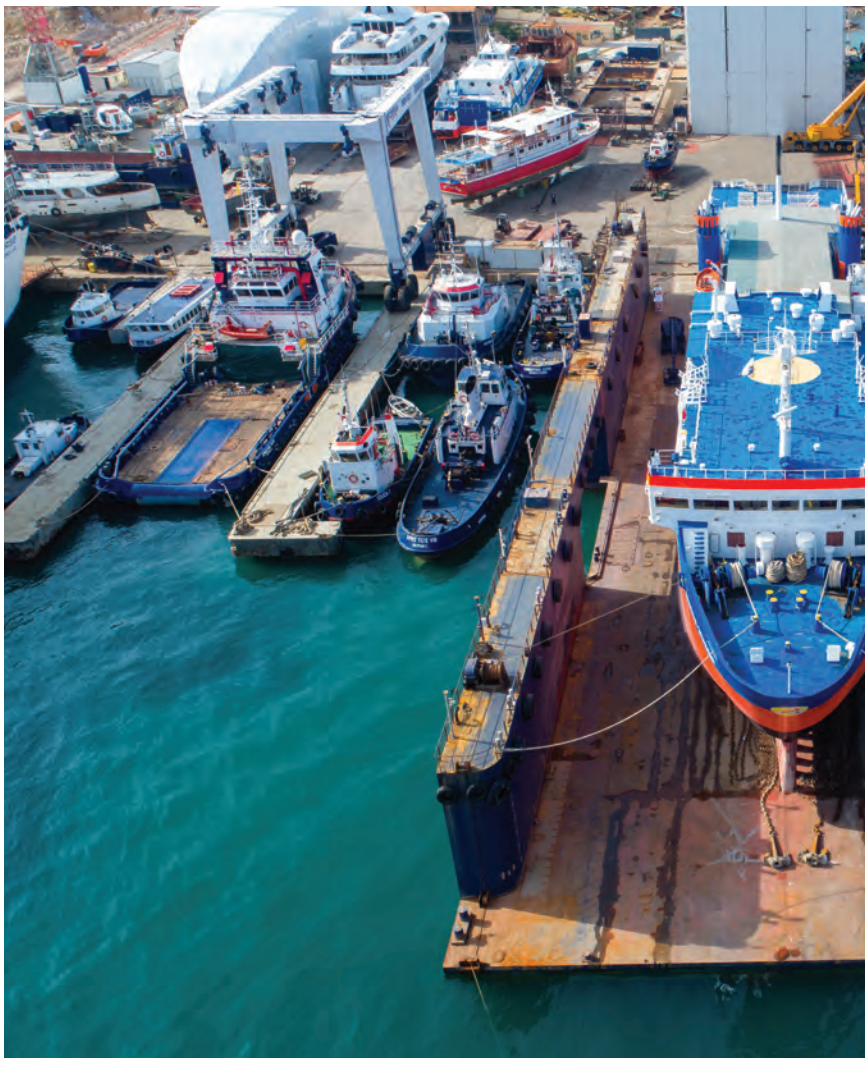
Spanopoulos Shipyard in Perama of Piraeus, occupies an area of 16,500 sq. m. capable of accommodating more than 30 yachts from 25m up to 65m. It consists of 2500 sq. m. housing offices, workshops, storage areas, cafe, gym, roof garden as well as apartments for crew and visitors. The new shipyard operates with a modern travel lift of 820 tons built in 2016 and a 300-ton Mobile Boat Trolley for the transportation of vessels inside the shipyard.

The width of the Perama yard's water dock is 14m allowing instant, easy and secure access. Fast and safe lifting and launching are also ensured by the company's experienced staff. A keel pit, built according to international standards, carries out specialized works on the keels of sailing yachts.

Spanopoulos Shipyard in Salamis island of Piraeus occupies an area of 40,000 sq. m., can accommodate vessels ranging from 35m to 100m, and approximately 25 moored boats.

Salamis Shipyard in Piraeus is equipped with 100m and 4,000-tons lifting capacity floating dock for shipbuilding and repair services, as well as upgrading of our clients' fleets under the guidance and supervision of our naval architects, mechanical engineers and technical department. Transfer ashore is courtesy of Kamag Technology 2000-ton trailers. In addition, the company owns a 100m Semisubmersible Pontoon.

But the Spanopoulos Shipyard story is not one only of heavy lifting, as it boasts an in-house technical department exceeding 320 employees.



Images: Spanopoulos Group

The two Dammam shipyards together offer 18 slots for building and repair of vessels up to 7,300 tons and 102 m long, with a total quay length of 1,200m with 8m water depth.

The Jeddah yard offers two floating docks which enables it to offer docking for all types of merchant and naval vessels up to 215 m.

In response to competition in the segment, the company has started implementing a diversification strategy. It has started preparing its new facility for lifecycle support of defense and security vessels for local and regional customers.

Recently, it received order from the Saudi Royal Navy to build a series of Aluminum very fast interceptors in cooperation with a French shipyard.

Its shipyards have been subjected to comprehensive restructuring to increase their competitiveness, by increasing efficiency, cost cutting and investing in new technology and training. A new General Manager Carsten Schumacher with track record of almost 30 years in the business was appointed to manage Zamil shipyards.

Currently its eastern shipyards are focusing on the repair of offshore rigs and small vessels and they become the preferred repair center for several rig owners including Rowan & Ensco.

Recently the Saudi Government launched the IKTVA program (In Kingdom Total Value Added) which is mainly to encourage localizing the manufacturing of machinery and components and their services in Saudi Arabia. This IKTVA helped in taking a step towards the increase the shipyard,s competitiveness in the gulf region by capitalizing on building a Saudi Maritime Cluster for onsite licensed repair centers at our Dammam and Jeddah shipyards. It now has agreements in place with Rolls-Royce, MTU and Sparrow, with others under negotiation.

By Hassan Abouraya

Shipbuilder in Focus: Eastern

Eastern Shipbuilding is arguably one of the more active and recently successful shipyards in the U.S., with a long list of commercial and government newbuild successes under it belt.

There's nothing like New York City for a maritime event, and McAllister Towing and Transportation Co., Inc., one of the historic family-run companies serving the industry for more than 150 years, held a signature ceremony and party at Pier 16 in Manhattan with the christening of two tugboats, the Rosemary McAllister and the Capt. Brian A. McAllister, both ABS classed FiFi 1 with propulsion systems meeting EPA Tier 4 emission regulations: 3516E Tier IV Caterpillar engines with twin Schottel SRP4000FP units.

The Rosemary is significant as it was started at Horizon Shipbuilding, but went out of business before it was completed. Eastern Shipbuilding stepped in to complete the tug for the company.

The Rosemary McAllister is named after the matriarch of the company. Rosemary is Chairman Capt. Brian A. McAllister's wife and mother to President Buckley McAllister and CFO Eric McAllister.

In early June 2018 McAllister Towing took delivery of Rosemary McAllister, the second in a series of four 100' x 40', 80 metric ton bollard pull tugboats. The new vessel, the 32nd tractor tug in McAllister's fleet, was started at Horizon Shipbuilding, but the company went out of business so it was completed at Eastern Shipbuilding in Panama City, Fla.

Rosemary is powered by 3516E Tier IV Caterpillar engines with twin Schottel SRP4000FP units. Packed into her 100' x 40' hull is 6,770 hp. She has already exceeded expectations as she achieved 82.75 metric tons during her ABS bollard pull certification. Rosemary's sister vessel, the Capt. Brian A. McAllister, are together some of the earliest EPA Tier IV tugs on the U.S. East Coast.

Combining her power with a Markey class III escort winch on the bow and a Markey 2 1/4" wire towing winch on the stern puts the Rosemary at the head of her class of shipdocking tugs. State of the art remote controlled fire monitors and deluge systems (ABS FiFi certified) complete the package, making the tug a total escort /shipdocking/rescue vessel.

Images: D. Trauthwein

The Rosemary McAllister is serving McAllister Towing's operation in Virginia, and according to Buckley McAllister these powerful new tugs are in high demand at ports around the country, extra muscle needed to handle the bigger containerships entering port.

Eastern is building both remaining tugs in the series. The Ava McAllister is due in January 2019 and the Capt. Jim McAllister is due in May 2019.

OPC Final Critical Design Review

Eastern Shipbuilding Group (ESG) has been one of the busier and successful U.S. shipbuilders, and recently it conducted its Final Critical Design Review (FCDR) with the United States Coast Guard on 29 June 2018 for the Offshore Patrol Cutter (OPC) Program. This accomplishment comes after a week of discussions, demonstrations, and design presentations by ESG's design team to the USCG and Department of Homeland Security (DHS). The purpose of the FCDR is to verify that the OPC detail design is integrated and internally consistent with the USCG requirements and points towards the exercise of the contract option for construction of the first hull USCGC ARGUS. Construction of the lead vessel is anticipated to start after the contract option is exercised with delivery in 2021. The OPC is designed to conduct multiple missions in support of the nation's maritime security and border protection. The OPC will provide a capability bridge between the National Security Cutter, which patrols the open ocean in the most demanding maritime environments, and the Fast Response Cutter, which serves closer to shore. The OPC design includes the capability of carrying an MH-60R or MH-65 Helicopter and three operational Over-The-Horizon (OTH) small boats. The vessel is also equipped with a highly sophisticated combat system and C4ISR (command, control, communications, computer, intelligence, surveillance and reconnaissance) suite that will enhance capabilities to execute the service's missions. The contract includes options for production of up to nine (9) vessels and has a potential total value of $2.38B.

Conrad: Investing in Facilities

Parker Conrad founded Conrad Shipyard in 1948, and today the company, headquartered in Morgan City, La., is now a public company with new generations of Conrad's at the helm.

"I grew up in the shipyard working side by side with my father," said Johnny Conrad, President, Chairman and CEO. "I saw firsthand how he treated customers, and how his handshake was as good as a contract. Many of our current customers did business with Parker, and not only are they valued customers, but they have become lifelong friends. They trust me to do what's right by them, and it is a responsibility that I take personally."

Conrad designs, builds and overhauls tugboats, ferries, liftboats, barges, offshore supply vessels and other steel and aluminum products for both commercial and government markets. Conrad provides repair and new construction services at its five Gulf Coast shipyards located in southern Louisiana and Texas.

Conrad Shipyard facilities are expansive and equipped with cutting-edge computerized manufacturing technology. During the last six years, Conrad Shipyard has invested $64.4 million in capital improvements to its five shipyards, including new manufacturing buildings, automated Panel Line, CNC manufacturing equipment, and the development of infrastructure at the company's Deepwater South shipyard. Current vessels under construction include: ATB Tugs; Offshore Tank Barges; Crane and Construction Barges; Inland Deck Barges; Deck Barges; and an LNG Bunker Barge. Conrad also has numerous vessels undergoing repairs — ranging from small inland towboats to large vessels from the dredging and construction industries. It has a seasoned and motivated workforce and an experienced in-house multi-disciplined engineering staff.

Images: Conrad

Left: Oceangoing tug Kapena Jack Young built for Young Brothers Ltd in Honolulu conducts sea trials south of Port Fourchon. Right: ATB tug One Cure and barge Edward Itta delivered to Harley Marine Services.

Spain: BWT, Scrubber Refits Drive Biz

New rules are always a driver for ship refit, and this truly is a transcendent time in maritime history, as rules regarding Ballast Water Management Systems and new emissions regulations are conspiring to create a lot of work for shipyards.

As IMO has set a global limit for Sulfur in fuel oil used on board ships of 0.50% m/m (mass by mass) from 1 January 2020, Astander and Astican, the two busiest privately owned ship repair & conversion shipyards in Spain, have owner's needs clear and started performing a plan to carry out this conversions in a quality, time and cost-conscious, and flexible manner. Astander has carried out five scrubber retrofit project, involving a total of 23 scrubbers installed, all of them for the French company Brittany Ferries. Open loop in line scrubbers to vessels such as M/V Normandie (2014), M/V Cap Finistere (2015) and M/V Barfleur (2015), in which seven in-line separate scrubbers were installed per ferry; one for each of the four main engines and three for the auxiliary engines. The conversion projects also included the fabrication of a new pump room to provide water to the scrubbers. This meant that a void space had be converted into a machinery room, with the required modifications, like installation of new ventilation, fire detection systems, automatic doors, etc. Same as with the open loop systems, hybrid loop, off line scrubbers, were installed in M/V Mont St Michel (2015) and M/V Armorique (2016). These two vessels, powered by four or two four-stroke MaK engines, had one single off-line scrubber designed to treat the exhaust gases of the main and auxiliary engines.

The conversion projects also included the fabrication of two pump rooms to provide water to the scrubbers and other systems, a dilution tank, hydrocyclons, a sludge tank, a magnesia tank; all to collect and treat the outlet water when operating as closed loop.

At this moment, all vessels are in operation, with the new systems installed, making Brittany Ferries one the leading ferry companies with a modernized and environmental friendly fleet equipped with new systems to reduce the emissions. Now that the IMO Ballast Water Management Convention has entered into force, more ship owners are looking into the installation of ballast water treatment systems. Retrofit requirements that once seemed far off are now rapidly approaching – and this leaves less time to prepare. In this sense, Astican has performed two installations on LPG for the Alfa Laval system, and 4 installations in cable layers for the Hydemarine system. To properly perform these installations, Astican Ship Managers received training from Alfa Laval and Optimarine, helping to increase the quality of the installation and reduces costs to the owner.

The yard has also cooperation agreement with Cathelco for the installation of BWTS. Consultancy by Technical office in Las Palmas for Engineering services is also available: 3D Laser Scanning on-board, Basic Concept Design, Feasibility Study, Detailed Installation and Final Engineering Study. 3D scanning of a vessel in advance of a project is becoming an increasingly valuable tool for shipyards to prepare for a ship. By having the 3D scan, the piping routing was clearly defined and isometrics available so by the time the ship arrived, we had all pipes prefabricated. The equipment was installed, with all piping and electrical connections, in 12 days.

Images: Astican & Astander

Photo: Heath Moffat Photography

Seaspan Shipyards:
Building Canada's Future

There's a shipbuilding resurgence underway in Canada that's being driven by a long-term multibillion dollar government initiative to rebuild the federal fleet of Royal Canadian Navy and the Canadian Coast Guard vessels and breathe new life into the country's shipbuilding industry. Seaspan's Vancouver Shipyards is an active player.

BY ERIC HAUN

Under Canada's National Shipbuilding Strategy (NSS), the Vancouver, B.C. shipbuilder was selected in 2011 to deliver several types of large non-combat vessels for the Navy and Coast Guard, while another shipyard on the East Coast, Irving Shipbuilding, will deliver the combat ships. The NSS also calls for a number of smaller vessels from several other yards throughout Canada.

Vancouver Rising

Seaspan Shipyards won the open competitive bid to build non-combat vessels over 1,000 gross tons in Vancouver. That backlog currently includes three Offshore Fisheries Science Vessels (OFSV), one Offshore Oceanographic Science Vessel (OOSV) and one Polar Class Icebreaker for the Canadian Coast Guard, plus two Joint Support Ships (JSS) for the Royal Canadian Navy. The company anticipates further work on non-combat vessels to be defined by its federal customer in the coming years.

This current and future activity is revitalizing an entire industry by creating new work up and down the shipbuilding supply chain. To date, thanks to its NSS-related work alone, Seaspan has $600 million in committed contracts and engaged approximately 500 Canadian firms, the vast majority of which are small- and medium-sized enterprises.

"The National Shipbuilding Strategy is causing a rebirth of shipbuilding on the West Coast, simply put," said Tim Page, Vice president of Government Relations at Seapsan Shipyards. "We have not had a backlog of work ever such as we have today, nor have we had the promise of that backlog of work because there has not been a federal, national commitment to a long-term strategic recapitalization program for our maritime forces probably since the Second World War."

Prior to the NSS, the shipyard had mostly built tugs, barges and ferries. "Currently, we have three active and concurrent and shipbuilding programs underway, which is a rarity in North American shipbuilding," Page said. Seaspan is well into the program to produce the three fisheries science vessels, and in June it began building the first of two joint support ships. The yard is also designing, planning and procuring long-lead items for our oceanographic science vessel. Work to produce a polar icebreaker is also due to join the mix.

'Considerable Risk'

Balancing such a workload has its challenges. "It's a portfolio that includes considerable risk, given the soft-toothed nature of program – three vessels, one, then two, then one," Page explained. "So, over the first seven vessels that we will be producing here at Vancouver Shipyards, there will be four prototypes, which is a pretty tall order for an industry that has recently been reborn."

"The federal government has decided that the best way of managing the program in the year to years is to have a series of contracts for each project. So, for the fisheries science vessel we have four separate contracts: an ancillary contract to get us started; engineering contract to do all the design and engineering – preproduction, if you will; a long-lead item contract that allows us to go to market to acquire vendor furnished information, to mature design work and ultimately get costing so that we can have a pretty good idea what it's going to cost to build the ship so that the government can then get us under contract to build."

"We don't have build contracts for the oceanographic science vessel yet," Page said, "and we have no formal contracts for our polar icebreaker program yet, nor do we have anything but a commitment by our federal government to build up to 10 additional vessels after we've completed the polar icebreaker." The build schedule will ultimately be determined by federal government demand, he explained: "We see this as a 20-year build program. It's for [the government] to decide how they want to manage that."

An Ecosystem of Suppliers

All the while, an expanding pool of suppliers is pitching in with Seaspan for the long-term endeavor. "The Canadian market is keenly interested in supporting us," Page said. "They are, like we, inexperienced in the business by virtue of not having built any large vessels in this country for 30 years. So, we're all learning together; we're all in the same classroom, if you will, all trying to figure out how to anticipate our federal customer's needs, and then how to procure those needs in a timely, cost-effective, quality-driven perspective."

"That supply base is growing with every successive program that we engage in with our federal government," Page said. "We're creating an ecosystem, if you will, that will sustain the efforts of Vancouver Shipyards and responding to the demand of our customer for a long, strategic build program."

The Canadian government estimates that contracts awarded through the NSS (overall, not just at Seaspan) have contributed some $7.7 billion to the nation's gross domestic product and create or maintain an average of more than 7,000 jobs per year.

Seaspan Invests

With the promise of steady work through the NSS, Seaspan has invested heavily in its facilities and staff required for the large-scale, long-term project. In 2014, the shipyard completed a two-year $170 million modernization program that included the addition of a very large gantry crane (named Hiyí Skwáyel, the Squamish language translation of "Big Blue"), four fabrication buildings and a load-out pier.

"We've created here, in our opinion, the most modern shipyard of its kind in North America," Page said. Additionally, in April this year, Seaspan opened a new 7,800 square meter office next to its yard that will serve primarily as a collaborative space for Vancouver Shipyards to execute preproduction work under the NSS.

With a project of this magnitude also comes demand for a new and larger tal-

ent pool. “We are heavily invested in universities, colleges and trade schools. We’re directly invested and indirectly training, and then we’re hoping that graduates of those programs will look at Seaspan Shipyards as a place to earn a well-paid salary and live a productive and enjoyable work experience,” Page said. “We’re also attracting a number of welders, pipe fitters, steel fabricators from the oil and gas sector which is currently experiencing a downturn in Alberta.

They’re certified tradespeople, but they have no relative experience building ships. So, we’ve got an active on-the-job training of our blue-collar workforce. And we’re training through apprentices and internships in that respect, as well as in the white-collar area.”

“Given the absence of shipbuilding in Canada and shipbuilding on the West Coast for 30 years, people hadn’t been looking to careers in shipbuilding or ship repair,” Page said. “We’re helping to change that but recognize that we have a responsibility to mature that workforce on a faster pace than simply through the formal education system.”

Progress and Lessons Learned

“As we’re managing a relationship with two different federal customers, figuring out how to flex the muscles of our newly-built shipyard, attracting and training a largely green workforce on both the trade side and the white-collar staff side, and developing a domestic supply chain isn’t used to building ships in this country for the last 30 years, there are considerable risks in all of that. And we are living those risks in real time,” Page said.

The first large vessel designed and built under the NSS, the lead of the three new OFSVs, was launched behind schedule near the end of 2017. “I think the schedule estimates were optimistic when they were first created, in part out of a political imperative to get the shipbuilding strategy underway,” Page said. “We were willing partners in that optimism because we’re very proud of having won the competition, very proud of the work done here in a very short number of years to rebuild Canada’s shipbuilding industry here on the West Coast and to be attracting and training as many young Canadians from diverse backgrounds as we have been able to.”

The milestone vessel, the 63-meter CCGS Sir John Franklin, was launched December 8, 2017. Together with its two sister ships currently under construction, the vessels will replace three aged Coast Guard vessels that are used for research to better understand the health of fish stocks and their ocean environment.

“A first-of-class vessel in a new shipyard always has a myriad of lessons to be learned from it, which we are now applying to the construction of the second and third vessels in that same class. A whole lot in the operations side and the production side, but whole lot as well in the engineering, planning and program management side has been learned. And we’re now applying those lessons learned to our downstream work for the oceanographic science vessel and joint support ship.”

On June 15, Seaspan held a steel cutting ceremony for the first JSS. The new ships will deliver fuel and other supplies to vessels at sea in support of the Navy’s defense and humanitarian missions. They’ll also offer medical/dental facilities and provide support for helicopter operations and equipment repair. Once completed, the 173-meter vessels will be among the largest ships ever constructed on Canada’s West Coast.

Photo: Heath Moffat Photography

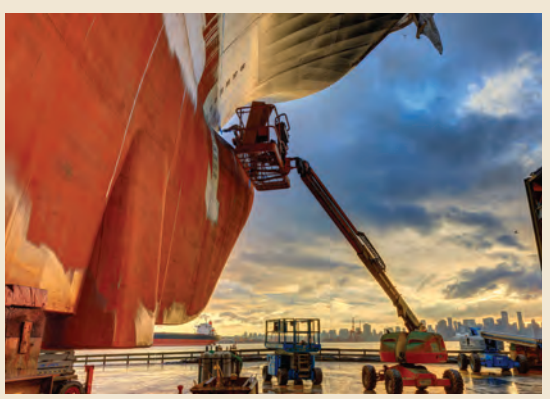
Lamarre Named CEO

Mark Lamarre, who most recently served as CEO of Australian Shipbuilding Company (ASC), has been named CEO of Seaspan Shipyards. Lamarre succeeds Brian Carter, who stepped down to pursue other opportunities. Lamarre's appointment follows recent Seaspan Shipyards additions to the senior leadership team, including Jari Anttila (previously with Philly Shipyard Inc. and Meyer Turku in Finland) as COO and Christof Brass (previously with Airbus Group SAS) as CFO. Lamarre is an experienced shipbuilding executive with more than 30 years of experience in operations, and business transformation. Previously, Lamarre worked at Bath Iron Works for 24 years Lamarre holds an MBA from Boston University's Questrom School of Business and a Bachelor of Arts.

Seaspan's Vancouver Drydock

Strategically located on the West Coast of North America, just north of the Canada-U.S. border, and on the north shore of the sheltered deep water Port of Vancouver, Seaspan's Vancouver Drydock (VDC) provides a full range of quality repair services year-round. A recent example of its innovative practice was a conversion project for Island Tug and Barge (ITB) which saw one of the company's barges transformed into an articulated tug and barge (ATB) unit. The project involved considerably more engineering and prefabrication work than VDC has undertaken in the past. The project saw corner units constructed for the barge in advance thanks to VDC's investment in 3D-scanning.

Conversions to ATBs represent a growing market. The ability to use 3D modelling to perform prefabricated work is becoming increasingly important. Later this year, Seaspan will perform work on Silver Seas Expedition's cruise ship Silver Seas Explorer. The ship will undergo the installation of a duct tail. With the pre-fabricated duct tail, the work is expected to take a mere three weeks. With its 3D modeling, VDC is able to perform work in advance of projects on its CNC machine. VDC's state-of-the-art CNC machine recently underwent a software upgrade, allowing it to cut profiles and perform angled cuts on thicker plates. This has led to new training opportunities for one of VDC's apprentices who is learning to master this machine. Having an efficient and upgraded CNC machine onsite, positions VDC as one of the most efficient yards in the region to perform steel fabrication work on repair projects.



Finland: A Hot-Bed of IC

Finland is a traditional marine tech hub, with almost 90 company members in the Finnish Maritime Industries association. While the country has a storied maritime history across many sectors, based on geographic locale, it's Arctic and ice marine technology is second to none, and it's hoping the U.S. Coast Guard is taking notice.

BY HENRIK SEGERCRANTZ

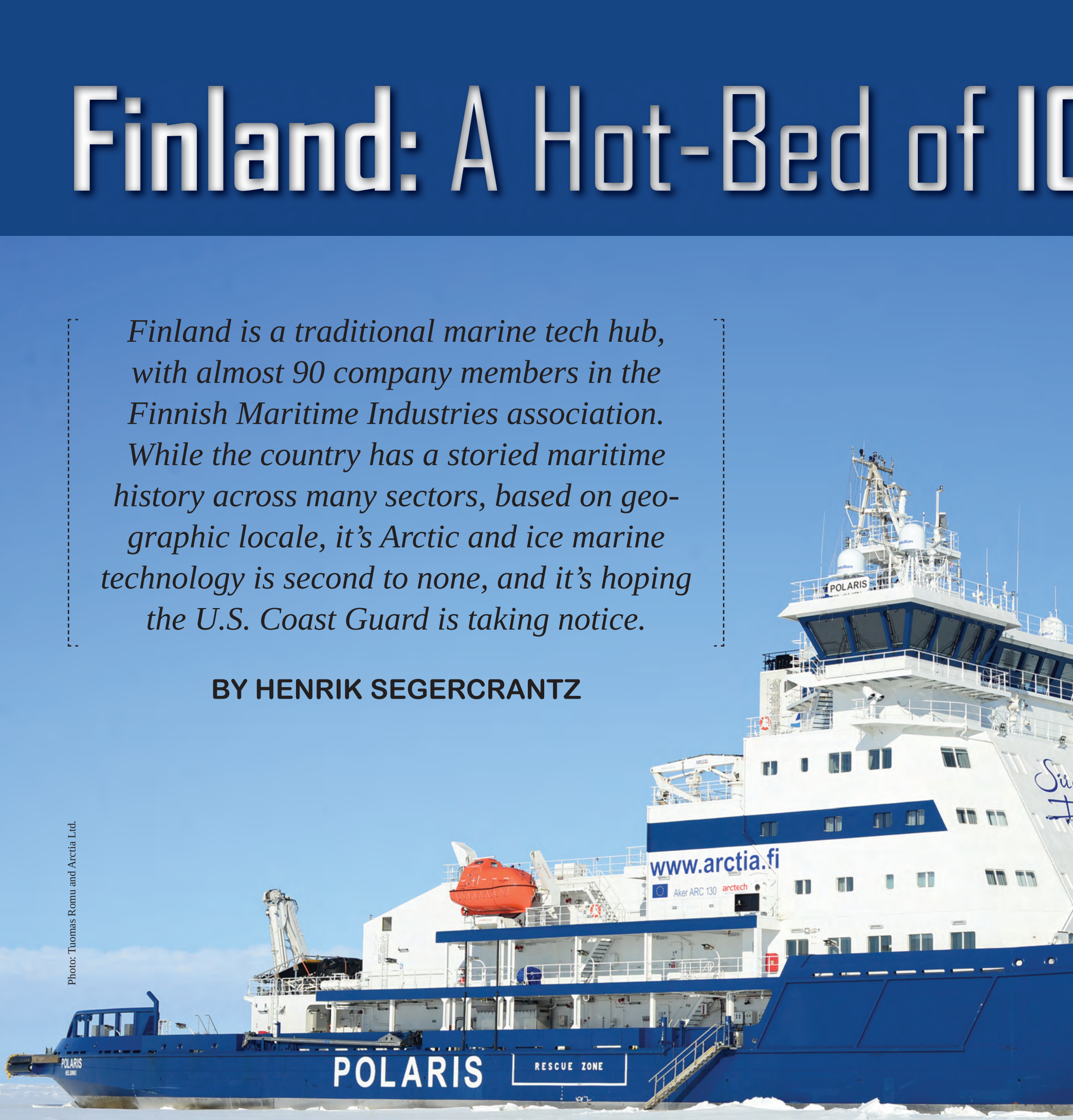


Photo: Tuomas Romu and Arctia Ltd.

CEBREAKER Technology

In 2016 the most recent Finnish icebreaker, Ib Polaris, was built at a cost of EUR123m. Arctia Ltd. received an LNG fueled double-acting PC4 class icebreaker capable of penetrating 1.8m thick level ice with a speed of 3.5 knots.

"With a 20 to 25 tons of average LNG consumption, Ib Polaris can work, during the normal winter conditions in late March, for 10 days between refuelings."

Pasi Järvelin is the Master of Ib Polaris

The Finnish maritime industry is hoping to get involved in developing the new icebreakers for the U.S. Coast Guard polar icebreaker program. Ulla Lainio, Arctic Maritime and Offshore Program Director at Business Finland, said that Finnish companies have already been involved in the design of vessels for the U.S. Coast Guard. "We hope that this cooperation will continue in the new projects." Finnish companies provided extensive conceptual development and design support including hull form development and propulsion line engineering for the icebreaker USCG Healy, and also developed the concept for the Great Lakes icebreaker USCG Mackinaw, which is based on the double acting icebreaking principle developed in Finland, where the vessel breaks heavy ice by going astern utilizing podded propulsion. Arctia's multi-purpose icebreakers have operated in U.S. Arctic waters transiting through the Northwest passage but also the Northern Sea Route. "Like the U.S., Finland is currently in a process of renewing its icebreaker fleet, provid-

Rendering of China's next Polar icebreaker.

Picture: Aker Arctic Technology

ing opportunities for cooperation." According to Lainio, Finland is the only nation in the world capable of providing solution to the U.S. covering the entire icebreaker value chain. "This covers R&D, design, construction, operation all the way to life cycle services," Lainio says. She also points out that Arctia could, if needed, also lease icebreakers to the USCG while their new icebreakers are being designed and built.

The Finnish Icebreaker Fleet

Finland has impressive experience in designing, building and operating ice going vessels for all parts of the world. In addition, the maritime industry in the country has always also focused on ice going vessels in their range of systems and equipment development, many projects initiated from the fact that needed technologies simply were not available on the market. A perfect nearby testing field of new ships and systems have been the Baltic, where the Finnish government-owned Arctia Ltd. owns and operates the fleet of eight icebreakers. Naturally the numerous vessels designed and built for the high Arctic seas, as well as the Antarctic, has resulted in a knowledge base not found elsewhere. The latest icebreaker, Ib Polaris, is globally the first icebreaker using LNG as fuel, backed up by MGO, using Wärtsilä's dual-fuel machinery and three of ABB's azimuthing Azipod propulsion units. The vessel is capable of performing oil recovery and also for breaking the ice moving sideways. The vessel has proven its capabilities to operate using LNG as fuel for two years.

Arctia is looking to hire its multipurpose icebreakers for offshore operations for oil companies, and for research and cable laying operations in the Arctic and in other waters. "Our angle to any kind of Arctic offshore industry operations is that if it is done, it has to be done safely and we will be there to provide safety and security in the form of ice management," Eero Hokkanen Communications Manager told Maritime Reporter onboard the icebreaker Polaris in May. Currently there are joint research projects under development. Hokkanen said a project with the US company Global Oceans is under development, and "we have also discussed with Alfred Wegener Institute in Germany."

Hokkanen expressed concerns about recent proposals in Russia which would result in restricting, on Russia's Northern Sea Route, western Polar icebreaker services. "We certainly hope that these legal changes will not go through, because we would not be able to operate in the Russian Arctic then."

Put to the Test

Aker Arctic Technology Inc. runs an ice model basin in Helsinki, Finland. The government-owned Finnish Industry Investment acquired the majority of the shareholding (66.4%) in 2013, while ABB Oy in Finland and Aker Solutions ASA in Norway each have a shareholding of 16.8%. The main services of the company include designing ice going vessels, ice model testing and Arctic related consulting and engineering. Aker Arctic boasts a 76m long, 8m wide ice model basin, as well as an Ice Simulator for training ship operation in ice, in cooperation with the Aboa Mare Training Facility in Turku, which arranges the training in their ship bridge simulators.

With a staff of some 60 people, net sales for 2018 is expected to be approximately EUR13m. According to Petri Tolonen, Director Sales & Marketing, Aker Arctic's services are typically used from the start of Arctic projects by oil and gas

companies or by mining companies considering transportation alternatives from Arctic regions. This was also the case when the Yamal LNG project was started by Russia's Novatek some 10 years ago. Aker Arctic conducted studies for them on how to transport the gas to the market, helping to determine optimal vessel fleet, vessel size and power and also best port arrangements. The new double-acting icebreaking LNG carriers, the biggest icebreaking vessels in the world, can, according to Petri Tolonen, Director Sales & Marketing at Aker Arctic, transport the gas from the Sabetta terminal independently, without icebreaker assistance, during most of the year. A total of 15 of these 172,600 cu.m. vessel are to be built. Currently there are five vessels in operation and seven vessels have been delivered from South Korea's DSME. A total of three 15MW Azipod units , provide an icebreaking capability of 2.1m level ice, by going astern. The length is 299m, breadth 50m, and draft 12m. The ice class is RMRS Arc7.

Another recent references includes the concept and parts of basic design of the Ponant icebreaking cruise vessel in cooperation with Ponant and Stirling Design International. The 270 passenger 150m vessel has the high ice class PC2 and is to be delivered by VARD in Norway in 2021. The vessel uses both LNG and MGO as fuel and will be fitted with two 15MW azimuthing electric propulsion units. Capable of operating in ice 2.5m thick allowing it to reach high Arctic regions including the North Pole.

Aker Arctic also did the basic design of the Polar Logistics Vessel for the French Southern and Antarctic Lands administration, the L'Astrolabe, delivered last year from Chantier Piriou Shipyard in France, and of two 24,500dwt Arctic Module Carriers, the Augnax and Pugnax, for transporting LNG plant modules for the Yamal LNG project were built for Dutch company ZPMC-Red Box Energy Services in Guangzhou Shipyard in 2016.

Ice Nav Training

Designing and building ice-class vessels is one thing, keeping the vessels in ship shape is another. That's where Aboa Mare comes in, a Maritime Academy and Training Center educating maritime professionals including Master Mariners, Marine Engineers, Watchkeeping Officers and Watchkeeping Engineers and offers a wide range of training courses for professional seafarers as well as full mission bridge simulator-based training to shipping companies all over the world, using their ten different bridge simulators, educating annually some 1,500 course participants. Maritime Reporter visited the facility in May. "In addition to the 10 bridge simulators, a complete engine control room (ECR) simulator is provided, with models for medium speed diesel engines, slow speed diesel engines, diesel-electric machinery and LNG fueled machinery, possible to be connected to the bridge simulators," said Ossi Westilä, Manager of Simulation Training at Aboa Mare. In addition there is one VTS- simulator one Navis DP-simulator and one GMDSS simulator. A recent project is the Arctic Simulator Training Program (ASTP) developing a next-generation simulator for ice navigation courses in Arctic conditions. The simulator provides high-quality training for ship handling, ice navigation training, icebreaker operations and escort towing. It uses decades of ice data collected by Aker Arctic technology. Operation in various ice and weather conditions can be simulated and also maneuverability at sea and in ports as well as various icebreaker assistance navigation scenarios. The IMO Polar Code is STCW mandatory as of 1 July 2018. The diversified training portfolio in ice navigation training includes Basic and Advanced training according to the Polar Code, as well as training for Baltic ice conditions. The STCW Polar Code courses are carried out in association with DNV-GL. Aboa Mare is also providing ice navigation courses according to the Polar Code abroad, at Giga Mare in Subic Bay, Philippines and at the GMC Maritime Training Center in Piraeus, Greece. "The courses can be varied adding some things needed by the shipping

Ossi Westilä, Manager of Simulation Training, at Aboa Mare, taking on of the Yamal LNG carriers into the port of Sabetta using one of its 10 simulators. *The Polar Code training includes a three days basic course and a two days advanced course, partly depending on the officer's working position.*

Picture: Aboa Mare

companies. It can be cruise vessels or LNG tankers which should operate from for example the Port of Sabetta, of which we quite a lot of experience," Westilä points out, referring to Russia's recently initiated LNG exports from that port on the Yamal Peninsula. Aboa Mare's ice simulator was used extensively in the development of the layout of that port, in 2013, and in the training of officers from Teekay, Dynagas, and MOL with LNG carriers operating there. "Another example, the U.S. Coast Guard is looking for new icebreakers and has visited Aboa Mare when looking into that project and in how to arrange the training of their officers. Their challenge is about the same as what we have, because the breaking of the ice in the best possible way is based on experience, and if you have a couple of winter when you do not see the ice, skills and the knowledge becomes less and less. He points out how you can use simulator training to keep up the skills in ice navigation, pointing out that you need to do it in real conditions as well. "But you can come quite close to reality in our simulators."

Changes in Arctic Ops

Leading themes of the Arctic Council relates to environmental protection, connectivity, meteorological cooperation and education. Mikko Niini is heading the Arctic Economic Council's Maritime Transportation Working Group. Priorities at the AEC during the Finnish Chairmanships until 2019 include projects under the three main themes, Interconnected Arctic, Competent Arctic and Safe Arctic. He notes that the global temperature increase is much higher in the Arctic than in other parts of the world. "This trend is going to continue and practically we are already in a situation where only the center parts of the Arctic Ocean is having multi-year ice and most of the ice cover is single year ice. The average winter ice thickness is still up to 2m thick, but recent ships developed can cope with such ice independently. He noted how, due to the political situation, ExxonMobil's joint drilling project with Rosneft in the Kara Sea is on hold now. "Because of the political situation Russia is now increasing cooperation with China. Chinese drilling rigs have been drilling in the Kara Sea and Pechora Sea of Russia. This is likely to happen also this year." He said there is a general trend of increased protective actions in Russia with the requirement for domestic content in their projects. "As new icebreaker projects are being developed in various countries, Finland tries to approach the companies and projects as an integrated team through Team Arctic Finland."

Photo: Flying Focus and Arctia Ltd.

KVH & Intelsat

On the Digitization Fast Track

While the ship owners and ship managers historically have eschewed the push to increase connectivity at sea, the path to efficiency in the digital age is paved with a robust, high speed and affordable connection. KVH and Intelsat are cooperating to provide all that and more.

BY GREG TRAUTHWEIN

According to the Crew Connectivity 2018 Survey Report, based on a survey of 6,000 serving seafarers and sponsored by KVH Industries and Intelsat, approximately 75% of seafarers can now use the internet at sea, a 32% jump in three years. Long gone are the days when entertainment at sea consists of a 'library' of 20-year-old magazines, books and movies. Attracting and retaining qualified crew, an industry-wide challenge, means delivering onshore quality amenities, as the survey also found that 92% of seafarers reported that internet access strongly influences their decision on where to work.

While crew amenities are important, it is really only half of the digitization story sweeping through maritime today.

"KVH is leading the way in connectivity, but it's beyond connectivity in itself, it's what the commercial marine industry is doing with that connectivity," said Elizabeth Jackson, Chief Marketing Officer and SVP Strategy, KVH, during a recent interview in Athens. "It's data transfer, it's data analytics, it's value added services, it's content delivery. With the partnership with Intelsat and the launch of our new HTS product at the end of last year we're leading the way in this 'dual channel' offering … they (vessel owners) pay for one channel, they get the other channel for free," allowing owners and operators to separate data for operations versus crew amenities, providing flexibility and choice.

A recent adopter is Nordic Hamburg, which in mid-June chose KVH's new TracPhone V7-HTS antenna equipment and the AgilePlans subscription-based Connectivity as a Service (CaaS) program to bring connectivity to 25 of its vessels. The AgilePlans program provides equipment and airtime for a monthly fee, with no commitment; installation at select ports and global tech support are also included, as well as NEWSlinkTM TV and NEWSlink Print news, sports, and entertainment content delivered via KVH's IP-MobileCast content delivery service.

"(AgilePlans) is unique in the market because we manufacture the antennas, we manage the installation and the service," said Jackson. "It has gotten rid of a barrier of buying expensive equipment up front."

According to Mark Woodhead, KVH's SVP Europe, there is one more attractive aspect to the plan, particularly from the perspective of a ship manager. "Ship managers can lose their vessels within three months, yet here we were asking them to sign 3-4 year contracts. We are confident in our product and systems, so instead of asking the customer to take the risk, we took the risk."

In the year since AgilePlans launched, it accounts for almost two-thirds of KVH's commercial shipments, Jackson said. "It has been successful, and to date we have not had one return."

KVH & Intelsat

While KVH prides itself on product and service, it knows that it is only as good as the pipeline on which it operates. In the autumn of 2017 KVH Industries announced the launch of its next-generation, advanced maritime broadband network, joined by service partner, Intelsat.

KVH's high-speed overlay to its current mini-VSAT Broadband service was expected to triple, and in some cases increase by a multiple of six, the data speeds for its maritime customers, and at the core of its capabilities, KVH's advanced maritime broadband network will incorporate Intelsat Epic satellite

Image: KVH

"KVH is leading the way in connectivity, ***but it's beyond connectivity in itself, it's what the commercial marine industry is doing with that connectivity.*** *It's data transfer, it's data analytics, it's value added services, it's content delivery."*

Elizabeth Jackson, *Chief Marketing Officer and SVP Strategy, KVH*

services and the IntelsatOne platform

"KVH are our launch partner for the Intelsat network, a global Ku band network that really takes advantage of the high throughput satellites that we have been investing in over the last few years," said Andrew Faiola, Director, Mobility Solutions, Europe, Middle East, Africa, & Asia-Pacific Sales, Intelsat. "KVH has done some unique things in the way that they have packaged and gone to market with some of their services. From our perspective, this is exactly what the network is designed to do; to allow enable to differentiate."

While KVH and Intelsat have a vested interest to increase communication usage at sea, the data and comms 'revolution' is still in its infancy.

"The entire shipping industry has set itself up on 'how to not use data'," said Woodhead. "Today, courtesy of high throughput satellites, suddenly this market has woken up to the fact that it can be connected, and start to manage the vessel operations and the crew onboard to optimize performance, as well as to simply make it a nicer place to work and to attract new people to the industry."

With more powerful satellites and service, the antennas have grown smaller and the logistics for installation have grown easier. "It brings down the total cost of ownership while enabling higher throughput at the same cost points," said Faiola. "It's opened the tap on what companies are able to do. With more and more activities happening in the cloud, the satellite network has become a real enabler." As the maritime industry enters a transcendent period of legislative and technological driven change, Woodhead explains the 'digital era' today in maritime concisely. "We are at a tipping point; similar to when we all went broadband in the early 2000s at home; we are now at that point at sea. KVH is well-positioned, as we recently launched our high throughput satellite network in partnership with Intelsat."

Regan

Art Regan, who has been the Executive Chairman at Genco Shipping and Trading (NYSE: GNK) since October 2016, **personifies the new type of shipping executive**, savvy on all things maritime coupled with a keen understanding of market dynamics.

BY BARRY PARKER

Genco Shipping & Trading

Regan, a graduate of SUNY Maritime College at Fort Schuyler, commenced his maritime industry career at sea, rising through the shipboard officer ranks completing as a Master Mariner during a more than ten-year period sailing on oil tankers and dry bulk vessels. From there Regan negotiated deals for StenTex and Stena Bulk, before taking the founding role of President and CEO at Arlington Tankers, a Stena offshoot at the leading edge of the wave of Initial Public Offerings gathering momentum in 2004.

Following the acquisition of Arlington by General Maritime Corp in an all-stock deal in 2008, Regan set a course to align with the beginnings of another wave of fresh capital into shipping - the inflow of financial investors, notably packagers of private equity funds. In 2010, Regan moved over to Apollo Global Management, where he launched their ship management and advisory entity, Principal Maritime, which serviced maritime investment holdings in the Apollo family. At that time Apollo had already invested in the maritime sector through their recapitalization of Norwegian Cruise Lines. At Principal Maritime, Regan created Veritable Maritime Holdings, a Suezmax crude oil tanker investment, and Princimar Chemical Carriers, an owner of specialty chemical tankers. as well as monitoring supplemental shipping investments throughout Apollo which included a range of structures including Preferred Equity, Mezzanine debt, First Lien Mortgages and acquisition financing across both an International and U.S. Jones Act scope.

Financial investors are always looking for eventual exits for their investments since the funds they are responsible to invest typically have fixed periods of investment duration. In 2014, Principal Maritime looked to float the Suezmax tanker investment through an Initial Public Offering, however Apollo withdrew from the process as public market valuation at that moment did not meet Apollo's price expectations. In late 2015, as the cyclically volatile tanker market was cresting, Regan was able to successfully complete the sale of Apollo's dozen Suezmax vessel bloc to Teekay Tankers (NYSE: TNK), for $662 million, with the majority of proceeds received in cash along with a portion of Teekay Tankers stock, which was then later sold prior to yearend 2015 at a premium for Apollo versus the fleet cash sale price.

While the tanker market, fueled by outsized cargoes being moved and stored, was doing well through 2015, the dry bulk shipping market at the time had been languishing due to oversupply of vessels. Huge building programs in China came out of the super-cycle of 2004 – 2007, but also in response to mini-boomlets in 2010 and 2013. Genco Shipping & Trading, which originally went public in shipping's continuing Initial Public Offering (IPO) boom in 2005, was a high flier stock for a while, sinking down to earth as the overall dry bulk fleet on order began to rival the aggregate tonnage actually on the water. In 2014 Genco declared bankruptcy and through that process and subsequent company debt to equity conversions, came under the significant ownership of a number of financial investors, including funds managed by Centerbridge Partners, Strategic Value Partners, and Apollo Global Management.

Around 2016, many traditional funding sources, notably European banks, began pulling back from financing shipping companies, with some exiting the business completely and selling their loans on to distressed debt investors. And while the dry bulk freight market had experienced a welcome period of improvement during late 2014 and into 2015, the freight rates were not enough to keep the sector away from serious financial distress once again, and as 2016 began the sector was in dire need of financial restructuring.

After the 2014 bankruptcy, Apollo had already emerged as the third largest shareholder (with 10.7% of Genco's shares), following the earlier conversion of debt into equity (shares). The new shareholders continued to seek changes in how the company was run, resetting the Board as Apollo (and a handful of other financial players) anteed up and purchased additional shares, an important enabler for Genco to enter into a major refinancing of its bank debt (simplified, with three lenders instead of nine). By this time, Apollo's equity stake in GNK had grown to nearly 16%. In October, 2016, Regan, who had joined the Board earlier that year, was elected the Interim Executive Chairman. At that time, he began setting Genco's new course; the correction took more than a year.

Art Regan describes the new strategic course embarked on by the Board, in late 2016. "The plan had several steps; first to recapitalize Genco through a substantial equity injection, which allowed its commercial banks to waive debt amortization for enough time to allow the revitalization plan to take hold, in what was anticipated to eventually be an improving freight market. Next step was to orchestrate conversion of the company's commercial strategy from passive to active customer engagement."

On the last point, Regan tells Maritime Reporter, "Since the end of 2016 Genco has been developed into an active commercial platform, servicing both major and minor bulk commodity producers

and end users directly." This contrasts with a previous fleet deployment strategy of leaving chartering decisions with outside managers of pools. Regan adds that technical management was also tuned up: "…Genco directly manages selected key functions such as fleet dry dockings, while leveraging the broad scale of experienced outsourced managers to administer crewing functions."

By early 2018, as dry bulk prospects had brightened significantly, the company was ready to move offensively and take advantage of its new strength. Regan tells Maritime Reporter: "With Genco rebuilt, we were able to complete a debt refinancing in June 2018 that allows Genco to seek growth initiatives as we see opportunities. Taking immediate action according to this well-structured strategic plan, Genco raised $114 million of additional equity in June through issuance of new primary common shares." Speaking at the June 2018 Marine Money conference, Genco President & CEO John Wobensmith, a company stalwart who was previously its Chief Financial Officer, said "The handcuffs are now off," referring to previous financings that had prohibited dividend payments and vessel purchases.

The investment community was impressed at Genco's actions; analysts at Fearnley Securities, in a May 2018 report, described Genco as "Joining the big boys club." In their report, they pointed to 2018 Q1 results exceeding expectations, and the new lower cash break evens as a result of the debt refinancing package. After commenting on the significant amounts of cash on hand (built up in 2017 into mid-2018, prior to the equity raise), the analysts said: "The company is ideally positioned to capture on the upturn we expect to see unfolding over the next three years." Other analysts agreed; for example, Jefferies- with a "Buy" on GNK shares, said: "We believe GNK is very well positioned to benefit from the strengthening dry bulk shipping market via its large and diverse fleet, 100% spot market exposure, & industry-leading balance sheet." Evercore ISI also praised the company's actions, writing: "GNK further increases its operational leverage to an improving dry bulk rate environment, while maintaining modest financial leverage."

By mid-2018, a year and a half worth of planning was now being converted into actions, with Regan telling Maritime Reporter: "The new equity has already been put to work as part of the funding to be used to take delivery of six recently acquired vessels into the Genco fleet". The vessels include four modern Capesize Eco vessels and two modern Ultramax Eco vessels which they expect to take delivery of during the third quarter this year. Genco are also selling older vessels at attractive price levels. As this article was going to press, Genco announced a new credit facility (along with cash in its coffers) would be used to fund these purchases.

Smoothing Maritime Cycles

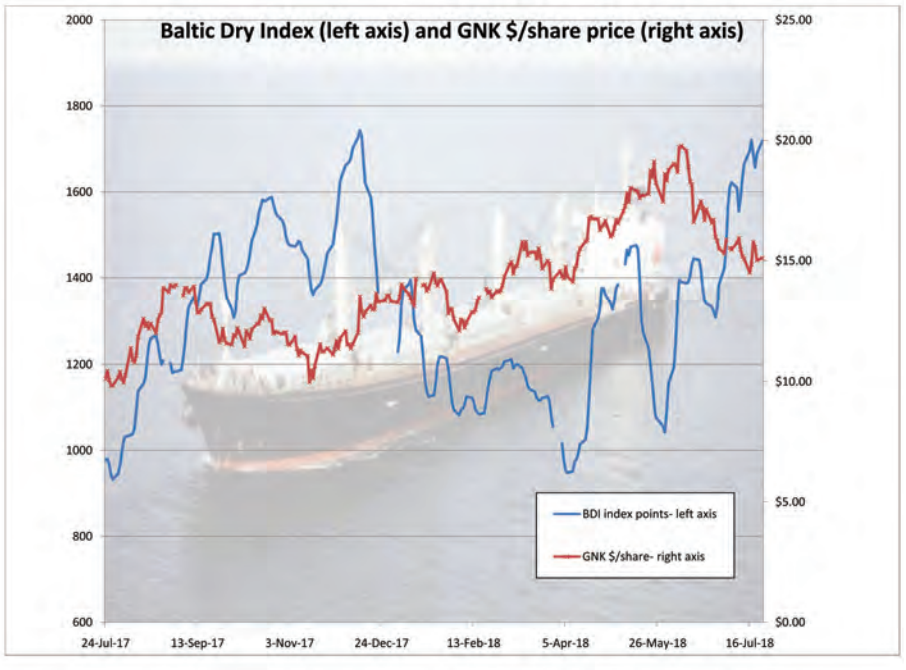
Besides his ship chartering and financial smarts, Regan has by necessity become an expert at reading the likely twists and turns in shipping markets, and building strategies around prognostications developed with his teams. Arlington's mixed tanker fleet of crude and product tankers, sold in 2008, and Principal Maritime's Suezmaxes, sold in 2015, both came at times of upward spikes, which by definition, don't linger. Regan told *Maritime Reporter* that "In the cyclical shipping industry the general trend of ton mile trade increases and global demand for commodities and energy has been reliable and positive." Like the savviest of the market analysts, Regan notes the importance of the supply side, adding that: "It has been the incremental vessel supply overhang bulges that have disrupted the consistency of shipping markets".

New Fuel Rules

"Historically significant regulatory changes in vessel operation have had long lead times for the industry to prepare," said Regan. "The IMO 2020 fuel requirement change was initially being discussed as a 2025 event, so the acceleration to 2020 has compounded the difficulty in shipowner considerations, especially as the shipping industry is still trying to integrate the ballast water treatment system costs and operation. And we've seen how challenging it has been technically to find equipment solutions that work effectively and reliably for ballast water treatment."

He stresses the importance of the human element, telling Maritime Reporter: "Industry is always ready to adapt quickly and proactively when safety of life of seafarers is the objective. And shipowners are always decisively supportive of installing such safety improvements even when that requires equipment retrofits at their own cost without consideration of the vessels age." And, finally, he views shipping in the context of broader societal trends. He says:

"The change in IMO marine fuel sulfur standards is essentially driving the international maritime industry to quickly catch up with the universal industrial trend towards air quality improvement. The most natural and consistent expectation would therefore be the increase of supply of compliant fuels to match the demand. I think that will naturally occur in time."



Working to Grow, Protect the Ferry Industry

Corrigan

In an exclusive interview, ferry industry leader Mike Corrigan reflects on progress and plans since taking the helm of global trade association Interferry.

BY ERIC HAUN

Pictured, L to R: Mike Corrigan; Technical Tour on a Jadrolina ferry at Interferry 2017; The Ultramar 1; Cancun, Mexico is the site of Interferry 2018. (First three photos courtesy Inferferry; fourth photo Copyright JW Marriott Cancun Resort and Spa.

Mike Corrigan, as CEO of Interferry since April 2017, has exchanged one significant role for another, with arguably even greater challenges and indisputably much wider influence. The former energy industry executive spent 14 years in leadership positions with BC Ferries – one of the world's largest ferry operators – in his native Canada, the last five as president and CEO. Now he heads the only body representing the ferry sector worldwide.

Recognized as the industry's global voice, Interferry has evolved from relatively modest U.S. origins in 1976 as a networking platform – which remains a key function – to become a key player on the political and regulatory stage. The association has held consultative status at the London-based International Maritime Organization (IMO) since 2003, enabling crucial pro-active intervention on safety and environmental policy. This was cemented in 2012 when Interferry established an office for regulatory affairs in nearby Brussels, Belgium, the administrative heart of the European Union, which increasingly emerges as the pacemaker on international maritime regulations proposals.

Following his appointment, Corrigan launched Interferry's latest three-year strategic plan. In a bid to continue building both membership numbers and the benefits of joining, key objectives include raising the association's profile beyond its core recruitment grounds of North America, Europe and Australia;

furthering its promotion of safety and quality improvement; extending its input in developing international regulations; and increasing opportunities for members to share knowledge, most notably though its annual conference. We caught up with him for an update on how he is steering Interferry's mission.

Broadly speaking, what is the state of the ferry industry today?

In the developed world, the ferry industry has never been in better shape. Traffic is growing and new ships are being ordered. Of course there are challenges as well as opportunities, particularly regarding safety, security and environmental issues – the main themes of our 43rd annual conference in Cancun, Mexico, this October - but we're getting there on the solutions. In the developing world, there are still too many accidents and fatalities, so we have our work cut out to share the knowledge we have and assist these countries to improve their safety practices.

Interferry's strategy is underpinned by the guiding principle that we are stron-

ger together. Acting together on issues of common interest is crucial to our aims because the ferry sector accounts for only about three to five per cent of total world shipping and sometimes seems like an afterthought among decision makers. We need to ensure that proposed shipping regulations do not unintentionally penalize the ferry industry. Globally, we carry more than two billion passengers a year – about the same as airlines – not to mention 32 million freight units. Even so, reminding politicians, regulators and consumers of our value to society is a much harder battle without the strength we gain from unity.

What are the numbers on Interferry's current membership? And when you look at all the world's regions, where and why do you see the best potential for growth?

We now represent more than 230 members from 37 countries. Our ferry operators range from the major giants to the not so big, and importantly we also have a wealth of suppliers including shipbuilders, naval architects, designers, equipment manufacturers, marine engineers, classification societies, shipbrokers, consultants and specialists in fields such as IT, finance, insurance and training. A big part of my job is to build on this foundation and take Interferry to the next level by extending our reach and influence in areas like the Asia Pacific region and Central and South America, which is why we chose Cancun to host our next conference. We particularly want to increase membership in countries that struggle to fund training and vessel maintenance to the standards required for optimising safe operation.

How are you going about this?

We have been heavily involved in some initial safety summits in Asia. We've also formed a Domestic Ferry Safety Committee to work closely with developing nations in establishing world-class training and safety regimes. A lot of time and money is involved so this can't be met from Interferry's limited resources alone, but we can act as a conduit to funding and additional expertise from the likes of the IMO, classification societies and suppliers. The committee is also engaging with operators such as Archipelago Philippine Ferries to leverage their experience as improvement leaders in their parts of the world. The safety sessions at this year's conference will provide further insights on practical solutions for the developing world.

Looking globally, what gives Interferry and its members most cause for concern on the legislative agenda and what have you done recently to help shape the requirements?

Our major concern is the IMO mandate on sustainability initiatives that support the shift to an eco-friendly, lower carbon economy while maintaining national trade needs. Other topics include the ballast water issue and the legal and will increase our exposure with regulators and help raise the profile of the ferry community to the mutual benefit of our industry.

Ando

The Monohakobi Technology Institute (MTI) is a research and development company which is 100% owned by NYK. Serving as the shipping and logistic giant's test bed for technology, MTI has 50 to 60 projects in motion each year to help make NYK Line operations safer and more fuel efficient. We met with ***Hideyuki Ando****, Senior General Manager, Maritime Technology Division, Doctor of Engineering, MTI, in Tokyo to discuss his views on emerging maritime technology trends.*

BY GREG TRAUTHWEIN

With 830 ships – 368 owned and 462 chartered – in its fleet, it is natural that NYK should have its own in-house R&D center which is focused on finding, creating, assessing and installing new technology on a diverse fleet of ships to improve efficiency and safety while reducing fuel consumption.

MTI provides that strategic R&D for NYK, a group of about 70 people in total. Hideyuki Ando runs the Marine Technology Division of MTI, leading a group of about 36 individuals tasked to consistently discover and test new means to make the NYK more efficient.

The Digital Evolution

With 70 employees MTI depends on partnerships with outside companies and solution providers to efficiently conduct its business, according to Ando. The scope of projects run yearly are as diverse as the NYK fleet itself, but Ando confirms a decided move toward data and data-driven technologies in MTI's quest to deliver ship and fleet efficiency. "Ten years ago, most of the projects (at MTI) were about hardware – a better propeller, a bulbous bow, energy saving devices – that were discovered, tested and trialed at sea in a conventional fash-

ion. Most projects at the time focused on energy conservation. “It is rather simple to measure the value of a technology regarding energy efficiency, because it is quite straight forward and easy to measure based on the cost of fuel,” he said.

While hardware is certainly still a focus at MTI, the shift toward software, data and analytics is unmistakable.

“When we would run a (hardware) project about energy efficiency, for example, we realized that data is crucial to understanding the true performance of the vessel, now and in the future,” said Ando.

The real ‘eye-opener’ came when the same technology was trialed on similar ships, and it was found that some ships literally consumed double the amount of fuel. In most cases Ando said the root cause was not the physical machinery or even the crew, but more likely bad weather, or order from shore to ‘speed up.’

“After we realized the importance of data 10 years ago, we (NYK) expanded the installation of data collection systems across the NYK fleet,” said Ando. “We installed our own data collection boxes on our own ships, about 200 vessels.”

The original plan was to collect data in the name of improving energy efficiency, but “from 2012 we updated our system to also collect safety data as well as energy efficiency,” expanding the sensor data output from about 50 sensor data points originally to 1000 to 2000 data points today. “We collect all available data,” said Ando.

NYK and MTI realize that data in and of itself is not a solution, so it has and continues to expend great effort internally to create dataset structure and standardization so that this mountain of information can be deployed efficiently and effectively.

To this end NYK created an in-house “data lake,” an in-house data warehouse to store and manipulate the data for its various needs, helping to not only standardize data but also to eliminate data errors and “noise.”

“Not many owners/ship managers are at the level of fully leveraging the power of data,” Ando observed, adding “We believe in it, but it is a large effort to collect, clean up and effectively utilize data. It is a step-by-step, bottom up approach.”

While he sees a number of new companies infiltrating the maritime market with proposed data solutions, he said the process to enter the maritime industry is neither straight nor short, as to succeed in maritime it is necessary to understand the hierarchy of players throughout the lifecycle of a ship. But his team is certainly amenable to working with outside solution providers, citing its work with a local Japanese telecom company.

“We needed some very stable technology (on the software side) to help us maintain our data boxes (across the fleet)” explaining how the telecom company was able to demonstrate the ability to routinely and seamlessly updates the ship’s data boxes software systems remotely. “We need to tap expertise found in other industries.”

Components Testing: The Quieter Side of the BWMS Discussion

BY WALTER POGGI, PRESIDENT, RETLIF TESTING LABORATORIES

Ballast Water Management Systems have dominated industry news for years, with millions of words generated on developing regulations, the approvals process, as well as on international interpretation and implementation. Additional volumes have been authored on USCG interpretation and implementation of compliant systems. Amid this ongoing typhoon of words, another area often gets lost in the shuffle because of its stability and consistency, but is no less important in the grand scheme of things: Electrical and environmental simulation testing and compliance of BWMS components.

In 2016, when Retlif Testing Laboratories became the first "Sub Lab" approved by the USCG for environmental simulation testing related to BWMS, the industry was becoming aware of the growing undercurrent of both process and protocol. Retlif, which currently has working relationships with five of the USCG designated Independent Laboratories (IL), led the way.

"As we all know, maritime operating conditions constitute a harsh and unforgiving environment." Richard Reitz, Retlif Director of Engineering said. "The acute and cumulative effects of vibration, inclination, not to mention the extremes of temperature, directly impact the performance of maritime equipment performance from Voyage Data Recorders to simple deck winches. The components of a BWMS are no exception. And unpredictable voltage variations can further impact the proper operations of such components."

To address these concerns, the USCG defined specific test criteria in 46 CFR 162.060-30 that BWMS system components must meet, related to environmental simulation and voltage variation. Table 1. to the right, shows these requirements.

In order to better understand the scope of this type of testing, Retlif engineers designated a critical First Step.

"The issue of interpretation regarding approval of BWMS is an often discussed topic." Reitz said. "While specifications are reasonably defined, the systems are complex, involving multiple parts and multiple modes of operations." This leads to the key question:

"How are the system and its components actually tested?"

Effective science-based testing, codified in a test plan is the smartest route to compliance. In this analogy, the lack of a test plan is like building a ship without a rudder. It means a potential loss of focus and direction, a serious enough void that could turn the effort into what the testing world euphemistically terms, "a misguided science experiment."

Nor is the lack of a test plan what the customer wants. Customers want the most economic testing program that will demonstrate compliance with the specifications, and ultimately result in market access. "Both the customer and the laboratory want a defined, cost effective testing program, that for the customer assures marketplace access a.s.a.p. The laboratory wants well defined scheduling of personnel and test instrumentation, because that provides the most efficient operation," said Scott Poggi, Retlif Director of Operations.

And this is anathema to regulators and approving bodies. They want to review a test report that is technically complete and "technically clear." An acceptable test report must convey how each test was performed and how the equipment under test (EUT) was set up, operated and monitored.

Understanding the Test Plan

To address such concerns before they become realities, the first step of a BWMS test program

is the development of a test plan. The process is not simple, requires a meaningful amount of

time, but will result in a lengthy but essential document. There are four basic steps involved.

• **Initial Documentation Review:** The laboratory will have technical documentation which it used in the generation of the quotation for the needed testing. Once an order is received to perform testing, an engineering team typically composed of one electrical and one mechanical test engineer will review the documentation. This is done to better understand the equipment to be tested and to begin strategizing the testing approaches for each of the test methods.

• **Customer's Manufacturing Facility Visit:** Next, the laboratory's engineering team will visit the customer's manufacturing facility. This visit is normally completed over two days, during which the laboratory engineering team interfaces with the customer's in-house engineering. During these meetings issues such as modes of operation and test setups are discussed and defined. These meetings are invaluable. The laboratory team sees the equipment for a better understanding of how it can be setup, energized and operated during testing, and the customer's engineering group gets a much fuller understanding of the actual testing that will take place.

• **Test Plan Generation:** Armed with the information gathered during the on-site visit, the laboratory's engineering team oversees the generation of the test plan. This process normally takes about two weeks and results in a document of approximately 175 to 200 pages. The document addresses test setups, modes of operation, monitoring technics and pass/fail criteria in detail.

• **General Approval:** After the test plan document is completed by the laboratory, it is then circulated to both the customer and the IL for the approval and sign off. Clearly at this point there can be give and take with slight modifications made. However, the end result is a document that is both customer and IL-approved which provides very defined and clear direction for the test program.

TABLE 1

Parameter	Condition	Duration
Sinusoidal Vibration	Sinusoidal Resonance Sweep 2 to 13.2 Hz: ±1mm 13.2 to 80 Hz: : ±0.7g Resonance Frequency Dwells Selected by the test engineer	at least 1 Octave per minute 4 hours per dwell
Temperature – Environmentally Controlled Spaces	Min: 0°C Max: +55°C	2 hours 2 hours
Humidity	90% RH at +55°C	2 hours
Voltage Variation	Voltage Variation ±10% Voltage, ±5% Frequency Voltage Transients ±20% Voltage, 10% Frequency	Long enough to check operation 3 seconds between transients
Static and Dynamic Inclination	Static Inclination ±15 degrees Roll and Pitch Dynamic Inclination ±22.5 degrees, Roll ±7.5 degrees, Pitch	Long enough to check operation

Environmental Sim & Voltage Variation Testing

Now let's look at the basics of the environmental simulation and the voltage variation testing

that are performed on the component parts of a BWMS.

• **Sinusoidal Vibration**

The purpose of this test method is to determine the ability of BWMS system component or Equipment Under Test (EUT), to withstand expected dynamic stresses due to vibration and to ensure that performance degradations or malfunctions will not be produced by the in-service vibration environment. During this testing, the EUT will be operating in its appropriate Mode of Operation(s) while mounted onto a vibration test machine. (See Figure 1) Vibration Testing will consist of first a Resonance Search followed by Resonance Frequency Dwells in each of the 3 orthogonal axes.

Actual testing is actually broken up into two parts. First a Resonance Search

FIGURE 1

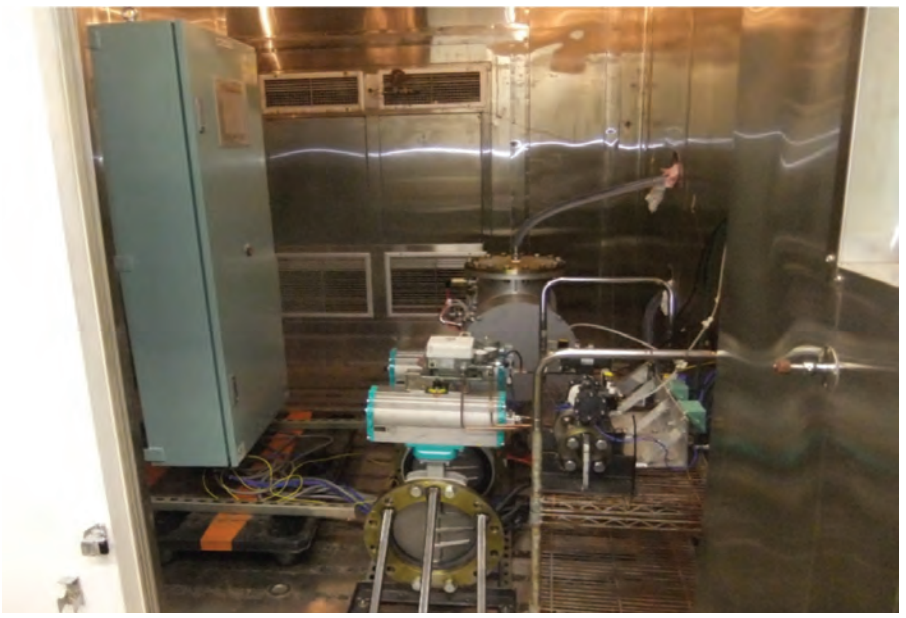


FIGURE 2

is performed at a rate sufficiently low so as to permit resonance detection over a frequency range of 2 to 80 Hz.

The typical rate for a resonance searches is 1 octave per minute. Utilizing the data obtained (any resonant frequency(s) in the resonance searches, the test engineer will select the frequencies to perform vibration testing. (Resonant frequencies are defined as response peaks

greater than twice the input acceleration amplitude). If no resonances have been found, the EUT will be vibrated at a frequency of 30 Hz with and acceleration of 0.7 g peak. Each resonant frequency dwell testing is applied for a minimum of a (4) hour period per axis. During each 4 hour test the EUT is monitored for any physical or mechanical damage for proper operation in the mode of operation selected.

- **Temperature – Environmentally Controlled Spaces**

The purpose of this test method is to determine the ability of the EUT to withstand the expected stresses due to extreme temperature conditions at in-service locations, and to ensure that performance degradations or malfunctions will not be produced in such environments. For this testing the EUT is placed inside a test chamber and setup in its operational configuration with all the necessary cabling connected and/or fittings engaged. (See Figure 2).

Prior to the start of the test, EUT operational status is determined to be in compliance. The EUT is then returned to its non-operational configuration with no pressure and/or electrical energy applied. With the EUT non-operational, the chamber temperature is adjusted to 0°C and once stabilized that temperature level is maintained for a period of 2 hours.

At this point the EUT is again energized and its proper operation again confirmed. The EUT is then made non-operational, and the chamber temperature is adjusted to 55°C. After this temperature has stabilized, it is maintained for a period of 2 hours after which the EUT is once again energized and its proper operation confirmed.

The temperature chamber is then returned to lab ambient conditions/temperature, and once again the proper operation of the EUT confirmed.

- **Humidity**

The purpose of this test method is to determine the ability of the EUT to withstand the expected stresses due to potential high humidity conditions that can be experienced at in-service locations, and to ensure that performance degradations or malfunctions will not be produced in such an environment.

For this testing the EUT is placed inside the test chamber and setup in its operational configuration with all the necessary cabling connected and/or fittings engaged. (See Figure 2).

Prior to the start of the test, EUT operational status is determined to be in compliance. The EUT is then returned to its non-operational configuration with no pressure and/or electrical energy applied. With the EUT non-operational, the chamber temperature and humidity are adjusted to a temperature 55°C, with 90% Relative Humidity. This temperature/humidity level is then maintained for a period of 2 hours, after which the EUT is once again energized and its proper operation confirmed. The chamber is then returned to lab ambient conditions/temperature/humidity and once again the proper operation of the EUT confirmed.

- **Voltage Variation**

This test is performed to determine the ability of the EUT to withstand the expected stresses ue to simultaneous power fluctuations in voltage and frequency that may occur in use, and to ensure that performance degradations or malfunctions will not be produced by such service power fluctuations environment.

For this testing the EUT is powered by a programmable power source capable of powering the EUT and producing the variations and transients shown in Table 2. Prior to the start of the test, the EUT is place in its appropriate Mode of Operation and proper operation is confirmed.

Proper operation is again checked at

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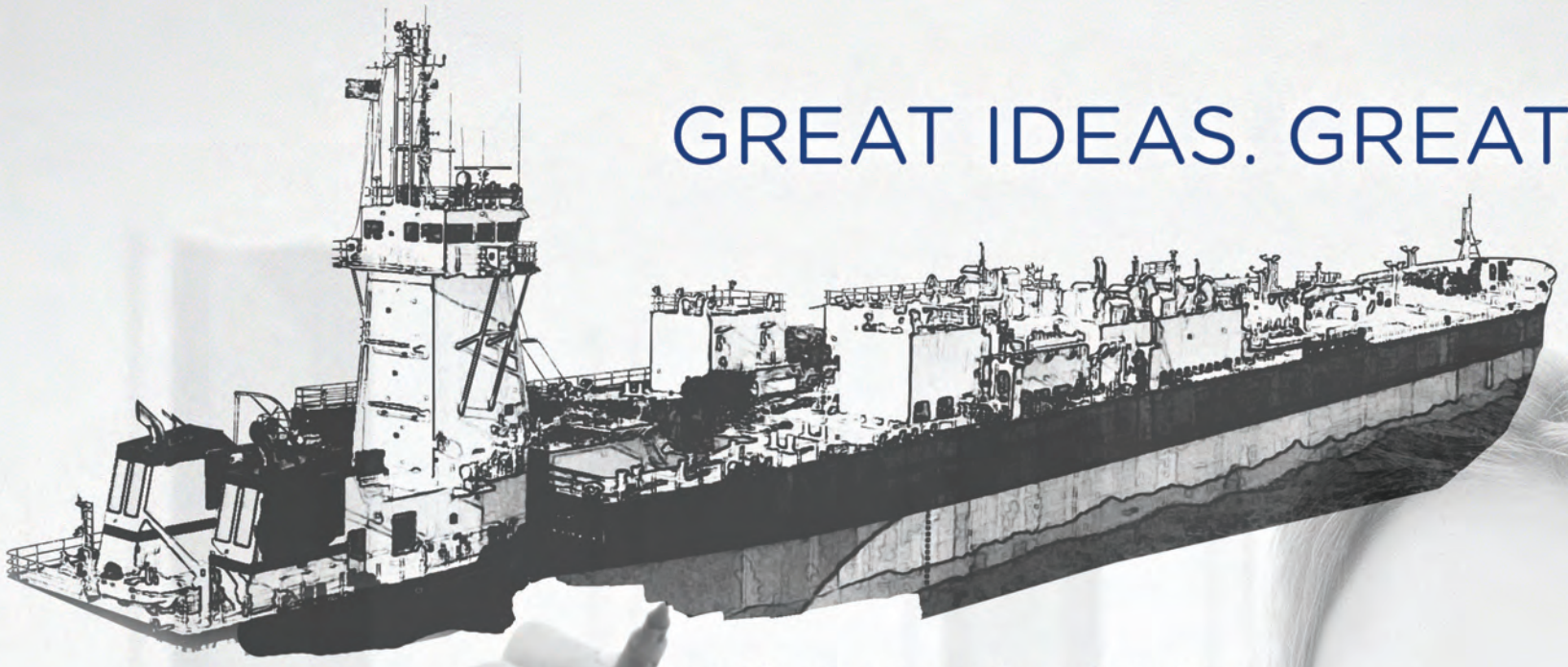

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each of the test levels shown in Table 2, and at the conclusion of the testing.

- **Static and Dynamic Inclination**

This test method is performed to determine the ability of the EUT to withstand the expected stresses due to static and dynamic inclination conditions that can occur at sea, and to ensure that performance degradations or malfunctions will not be produced by the in-service static inclination environment.

During this test, the EUT is placed in the appropriate Mode of Operation and subjected to both static and dynamic inclination test conditions, as shown in Table 1. Inclination is applied about the vertical axes in both directions. To perform this testing the EUT is placed on the Incline Table and oriented to the Inclination Machine table top as it would typically be aboard a ship.

The Static Inclination test consists of six test steps. With the EUT positioned on the inclination machine and with the machine set at 0° Pitch and 0° Roll position, the EUT is operated in its defined mode of operation and proper operation confirmed. The machine is then adjusted to the following positions and at each one, proper operation of the EUT is confirmed, +15° Pitch and 0° Roll position, -15° Pitch and 0° Roll position, 0° Pitch and +15° Roll position, 0° Pitch and -15° Roll position, and finally back to 0° Pitch and 0° Roll position. After Static Inclination is completed Dynamic Inclination is performed. For the Dynamic

Inclination testing the inclination machine is set to operate simultaneously at ±22.5° Roll, ±7.5° Pitch. During this testing, the EUT is monitored for proper operation. The inclination machine is then returned to the 0° Pitch and 0° Roll position and proper operation is again confirmed. The length of both the Static and the Dynamic testing is not set to a defined time, but rather "long enough to check operation".

TABLE 2

Test	Levels	Length of Test
Voltage Variation	+ 10% Voltage +5% Frequency	Long Enough To Check Operation
	+ 10% Voltage -5% Frequency	Long Enough To Check Operation
	-10% Voltage +5% Frequency	Long Enough To Check Operation
	-10% Voltage -5% Frequency	Long Enough To Check Operation
Voltage Transients	+20% Voltage +5% Frequency	3 Seconds Between Transients
	+20% Voltage -5% Frequency	3 Seconds Between Transients
	-20% Voltage +5% frequency	3 Seconds Between Transients
	-20% Voltage -5% Frequency	3 Seconds Between Transients

Conclusion

While it is highly likely that flux and more millions of words will be written re: Ballast Water Management Systems areas, the USCG environmental simulation and voltage variation requirements for system components are very well defined and have been tested to on a dailybasis for quite some time. The test methods used are based on and rooted in recognized national or international consensus standards. When applied to BWMS components the test methods provide assurances for proper operations when such equipment is place into a marine environment.

Radically Rethinking Ballast Water

What if your ship could comply with the Ballast Water Management Convention without even fitting a treatment system? What if ports could essentially commoditise treatment by offering it shore-side? What if systems could use a technology that was failsafe – one that has been proven over almost 150 years? BAWAT CEO Kim Diederichsen welcomes you to a new world of ballast water possibilities.

The best ideas in life are usually the simple ones. You know when you have one. The muddled pieces of a mental puzzle suddenly fall into place, your eyes close in satisfaction, you raise your hands and, smiling broadly, mutter 'of course!'. Well, here's today's eureka moment for you.

There are 60,000 vessels in the worldwide fleet that are expected to install ballast water treatment (BWT) systems in the rush to comply with IMO's Ballast Water Management (BWM) Convention. The timeframe is short, the technology, for the most part, is relatively new and unproven, and the expense, for an industry that is balancing ever-tighter margins with uncertain demand, is considerable. It's a recipe for, if not disaster, then certainly a fair bit of pain and confusion.

But, what if these vessels didn't have to install systems at all? What if BWT solutions could be placed portside and ships could just plug into them, emptying their untreated ballast as a normal part of cargo operations?

No hassle, no punitive CAPEX, and no issues with either compliance or technology. That's right, eureka.

Ready to Roll

IMO has already paved the way for such a development in Regulation B-3.6 of the BWM Convention where it highlights the concept of Reception Facilities, or mobile BWT units. The guidelines offered, essentially that convention standards do not have to be met by individual vessels if they discharge ballast water into compliant reception facilities, were adopted by IMO in 2004 in its Guidelines G5. So the regulatory pathway has been cleared.

The technology is available too. BAWAT has developed a prime example of a simple, mobile solution. Fitting neatly into a single shipping container – either 30ft or 40ft dependent on the capacity needed – the system can be dropped off at, and moved between, any suitable locations. It works through the proven, everyday and wholly accepted technology of pasteurisation – whereby any potentially harmful organisms are eliminated by heating the ballast water during discharge. The process is effective at temperatures as low as 64 degrees centigrade. It's a one-pass solution with no need for any chemicals, UV, filtering or post treatment holding time.

It is as simple, effective and environmentally friendly as BWT is possible to be. It is also a business opportunity.

Photo: BAWAT

On hand to help

Several thousand vessels have now installed their own BWT systems and many more will follow. However, numerous industry reports, including one by classification society ABS last year, have highlighted a catalogue of problems with crew training, spare parts and technology, impacting upon successful operations. Imagine a future scenario with your own vessel whereby issues with your on-board system means the crew can't treat the ballast water, and therefore can't discharge, and as a result can't undertake planned cargo operations at the destination. This could be a commercial disaster for your company.

But, if the destination port has a contingency solution – a shore-side treatment system – the vessel could, for an agreed fee, plug into it and continue cargo operations according to plan. This is a boon for shipowners and new source of income for the port, which will also be able to market itself positively on this new, added value service.

Reimagining BWT

However, we see the potential for a roll out of shore-side solutions that goes beyond contingency, moving towards standard practice and commoditized service.

There are around 7,000 ports in the world, with 835 of them processing more

than 99% of world trade per annum. We see a future where every one of these major hubs has shore-side BWT systems that are either owned and operated by the port or, the more likely scenario, by established port service providers that already handle tasks such as potable water supply, bunkering, or dealing with vessel waste. These firms will have their own mobile solutions that can be moved around on flatbed trailers or barges to service clients as they arrive in port.

In this way BWT becomes a simple commodity service that is handled by dedicated providers, leaving the shipping companies to focus on their core operations.

A simple solution

Beyond ports, shipyards will also be able to make use of mobile BWT systems. There are around 18,000 dry-dockings per annum and each vessel undertaking taking its (at the most) once every five year stop will need to empty and clean its ballast water tanks for inspection. The yard will then have to dispose of the ballast water, which much be compliant with BWM Convention standards. It therefore makes sense for the yards to have systems in place to cope with the task and add another revenue stream/service to their dry dock menus. There are around 428 dry dock facilities worldwide, so the demand here is substantial.

The BWM Convention took well over a decade to be ratified due to the complexity of effectively managing and treating the world fleets' ballast water. However, remove the blinkers that force focus on the need for on-board systems and one realizes the solution to this pressing environmental problem maybe isn't that complex after all. Shore-side systems will save money for shipowners, reduce crew workloads and enhance efficiency, deliver complete peace of mind, and provide valuable new revenues and opportunities for ports, shipyards and forward thinking service providers.

Photo: BAWAT

BAWAT

BAWAT's unique pasteurization technology is IMO type approved by DNV GL and Bureau Veritas, with full USCG approval expected in the first half of 2019 (all land-based testing has now been successfully completed). The system is as suitable for on-board installation as it is for shore-side operation and can be delivered as a turnkey project, with 'in voyage' installation optional to maximize vessel earning potential. On-board systems use waste heat scavenged from the main engine to heat the water to its required temperature of between 64 and 72 degrees centigrade. Mobile, or contingency, solutions come with a boiler built into the unit, or with the possibility to plug into localised electricity supplies for heating. All systems are built with off the shelf components to ensure rapid delivery times. BAWAT is headquartered in Copenhagen, Denmark and was established in 2011.

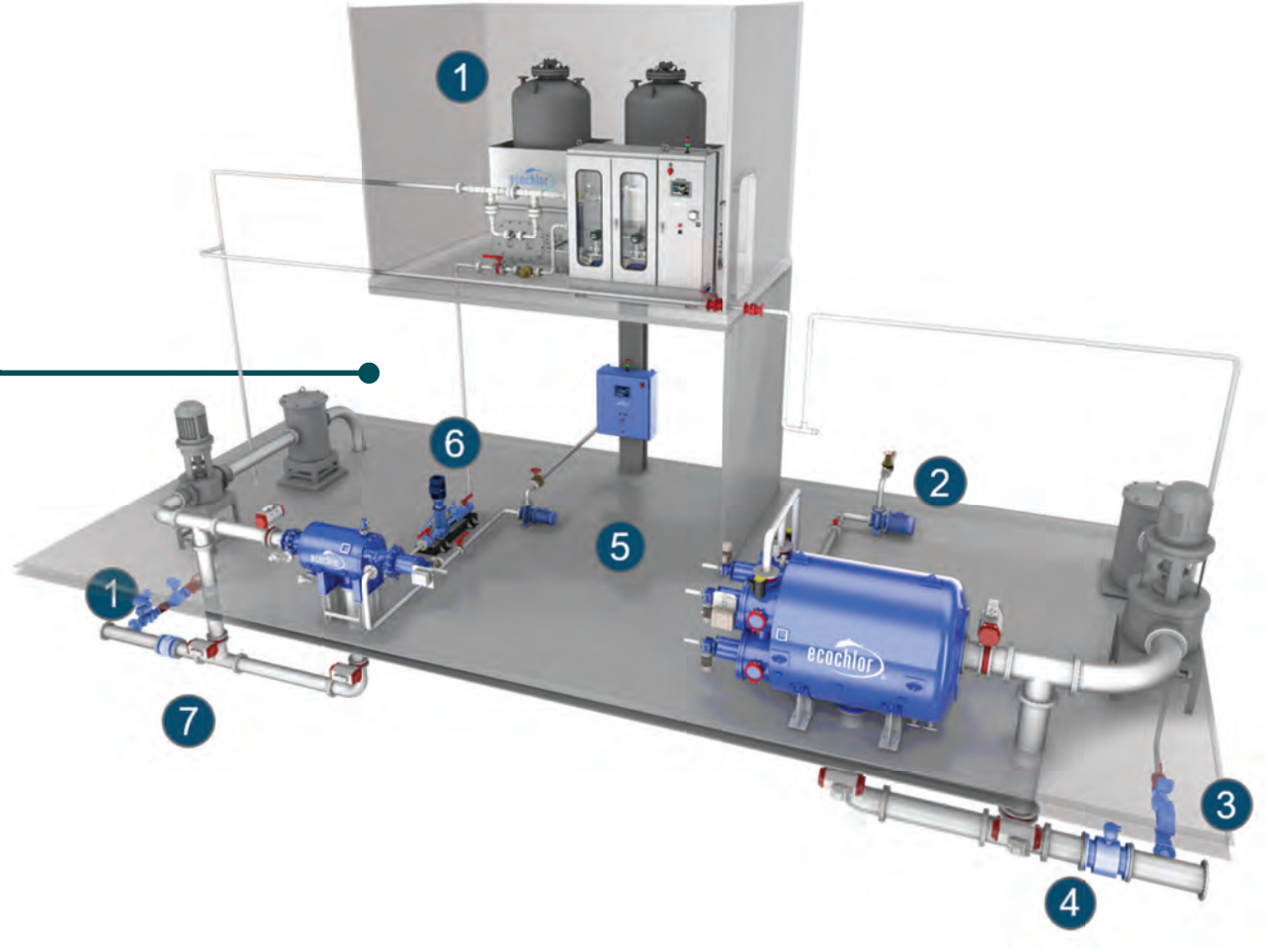
www.bawat.com

The BWMS Boom has arrived (really)

With the USCG approval process in full swing, the much-debated, long-awaited ballast water management system market is heating up

Edited By Tom Mulligan, Science & Technology Editor

The road from 2004, when the International Maritime Organization (IMO) adopted a new 'Convention for the Control and Management of Ship's Ballast Water and Sediments,' to implementation has been neither short, fast nor straight. But it appears the long wait is over – to the cheers of manufacturers of approved BWMS and the shipyards that will install them, and to the chagrin of vessel owners that must plow resources into a system that offers no return on investment. Tom Mulligan, Maritime Reporter & Engineering News' Science & Technology correspondent, reports on the latest developments.



Ecochlor offers BWT systems with USCG Type Approval for flow rates ranging from 500 to 16,200 cubic meters per hour and design options for a wide range of vessel types, including for tankers with hazardous areas and bulk carriers with gravity discharge ballast tanks.

Image: Ecochlor

Optimarin: BWT orders and revenues "rocket"

Optimarin said that a recent surge in new business orders and revenues is indicative of positive developments within the BWT market. The Norway-headquartered firm, which has now sold close to 600 of its USCG-approved Optimarin Ballast Systems (OBS), has shattered its initial growth forecasts for the year to date, with both orders and income up by more than 50 percent year-on-year.

"2017 was our best ever year in business, so we honestly didn't expect to outperform last year's figures so comprehensively," said Optimarin CEO Tore Andersen. "The fact that we've done so demonstrates not only the market's faith in our proven UV technology, compliance and business stability, but also that shipowners and operators are now being galvanized into action by the ratification of IMO's Ballast Water Management convention and the need to conform.

"This is excellent news for the environment and a positive development for those of us in the BWT sector that have invested many millions of dollars in testing, certifying and bringing our systems to market. As the first company to install a commercial system (18 years ago now), the first to receive USCG approval and the first to offer a five-year parts and servicing guarantee for framework agreements, it's gratifying to see that the firm foundations we've laid down can now really be built upon."

Optimarin sold more than 60 OBSs last year and has already signed contracts in 2018 to supply another 50. Recent agreements span a diverse array of shipping segments and owners, with orders from companies such as Besiktas Shipping, Eureka Shipping, Solvang, Koyo Kaiun and Ahrenkiel.

The company has also consolidated its leadership in the retrofit race, with about 140 OBSs now installed. Global engineering partners Goltens and Zeppelin account for the majority of these projects.

Current Optimarin customers include The Royal Netherlands Navy, Seatruck, Saga Shipholding, Technip, Gulf-Mark, MOL, Solstad Farstad, and Hapag Lloyd, amongst others. OBS is fully approved by both IMO and USCG, with certification through DNV GL, Lloyd's, RINA, Bureau Veritas, MLIT Japan, and American Bureau of Shipping.

Market "more crowded every day"

John Morganti, VP of Sales and Marketing, Ecochlor said that the ballast water treatment system market has been getting 'more and more crowded every day'. He noted that there are currently nine systems with USCG Type Approval and another six systems with approval pending: "It is worth noting that all systems utilize UV or electrochlorination technology while Ecochlor is the only system that uses chemical injection based on chlorine dioxide. While the regulations were proposed more than a decade ago, there was no rush to put these systems on board. Now driven by regulatory compliance, shipowners must

BWMS Notes

• **FRP Filters for Seawater Filtration:** The 180 Fiberglass Reinforced Plastic (FRP) Series filters from Forsta Filters offer corrosion resistance in brackish, brine and seawater filtration applications. All wetted components of the FRP Series self-cleaning filters are constructed from seawater-resistant plastic or other high-alloy materials. Forsta's FRP Series self-cleaning water filters are available with an on-line, or in-line flange configuration to accommodate simple installation, and easily integrate with any pipeline in a seawater filtration process. In a two-stage screening process, a coarse screen strains out large debris from the water source and the fine screen purifies the water to the designated micron rating.

• **Damen's InvaSave:** Inland Coastal Tanker Elena H. will make her maiden voyage from the Netherlands to Argentina on her own keel and, following her arrival, will remain permanently stationed in local waters. Instead of installing a ballast water management system (BWMS) on board the vessel for this single trip, Damen's InvaSave supplied clean D2-standard ballast water for ballasting of the vessel in the Netherlands. The InvaSave is the result of a Damen project aimed at both treatment and supply of IMO-certified D2 water to and from vessels. As part of a cooperative effort between Damen Green Solutions and Damen Shiprepair & Conversion (DSC), this ballast water reception/bunkering service is available to fill/empty the ballast tanks of newbuild vessels in an IMO-certified manner. Damen Green Solutions thus offers newbuild or repair yards worldwide the possibility to comply with the BWM Convention without having to install a BWMS on board a vessel.

• **Oldendorff Partners with ERMA FIRST:** Oldendorff Carriers will partner with Greece-headquartered ERMA FIRST following a review of approved BWT systems. The review included visiting manufacturing facilities, system regulatory compliance, capital cost, energy requirements, expected operating costs, space requirements, simplicity to manage and availability and the USCG Type Approved and IMO Type Approved ERMA FIRST BWTS FIT became the system of choice with its simplicity, flexibility, and suitability for small and large ballast-pump capacities. Another reason the company chose the system was its small footprint and low power consumption.

Wärtsilä's Aquarius UV Ballast Water Management System (BWMS) has successfully completed all testing procedures required for USCG Type Approval compliance.

Image: Wärtsilä

navigate the difficult waters of making a significant CAPEX investment to continue to operate. There remains concern over upfront system costs, ongoing operating costs, functionality and ease of use. Shipowners must also consider which system is best for their application, especially when it is no longer just about using an approved system, but whether the system will perform when regular, onboard ballast water testing begins."

There are currently 32 Ecochlor units installed on vessels and all of these systems are operational with the exception of three that remain offline at the owner's request. The company has 124 units on its order books. Angelicoussis Shipping Group (Maran Tankers / Anangel Maritime) has selected Ecochlor to retrofit 36 vessels, including Suezmaxes, Aframaxes, VLCCs, Minicapes and Capes, between 2018 and 2020 in Singapore, Dubai, Qatar and China.

Ecochlor offers BWT systems with USCG Type Approval for flow rates ranging from 500 to 16,200 cubic meters per hour and design options for a wide range of vessel types, including for tankers with hazardous areas and bulk carriers with gravity discharge ballast tanks. The Ecochlor BWTS uses a two-step treatment process that includes filtration and treatment with chlorine dioxide, a chemical that has been used in public water systems for more than 70 years. It is safe and completely effective on all aquatic invasive species regardless of turbidity, salinity or temperature. In addition, there is no treatment or neutralization required with the Ecochor system when discharging ballast.

"This 'green' technology coupled with ease of installation and operation makes it an excellent option for shipowners," said Morganti. "Additionally, the Ecochlor BWTS's energy consumption is negligible in comparison to other ballast water treatment systems on the market and it is not affected by changes in water quality."

Ecochlor maintains a service-centric relationship with its clients by proactively tracking all ballasting operations with a Functional Monitoring Data Sheet (FMDS). The FMDS summarizes critical operational data and allows the company's team of engineers to monitor for any issues or irregularities. If any issues are detected, Ecochlor can perform remote troubleshooting or, when necessary, quickly schedule a shipboard visit. "This added layer of support is something all customers deserve and we are pleased to include in our offering. Plus, we maintain a 24/7 international call capability for when crews and operators need to reach out to us," said Morganti.

The Ecochlor BWTS is a relatively easy system to install as it comes with many pre-fabricated parts. The treatment system is modular and can be skid-mounted, which allows for greater flexibility with respect to the retrofit. However, Morganti pointed out that shipowners should be aware of the complexity of a retrofit beyond the selection of a BWTS: "There needs to be proper time allotment for scheduling: shipyard time for the installation, upfront engineering services with firms experienced in BWTS installations, and time for design review and compliance with Classification Societies and Flag States are all factors that should be considered," he stated. "As we move toward 2020-22, it is expected that dry dock availability may become very limited and delays in approvals will be commonplace. We would encourage shipowners to move forward in their BWTS assessments sooner than later."

Morganti recommended that once the BWTS manufacturer and integration engineering firm have been selected, meetings should be scheduled to prepare for the installation. "A well-planned installation can prevent making costly mistakes and reduce dry dock time," he said. "Ecochlor has extensive experience working with our customers, their engineering firms and shipyards in order to ensure this process goes smoothly.

CMA CGM has contracted BIO-UV Group to supply BIO-SEA ballast water treatment systems to 17 of its containerships. The new order is the company's first for a BIO-SEA system following USCG Type Approval for the technology, which was awarded in June of this year.

Image: Bio-UV Group

USCG Lack of Crew Knowledge ... "not an excuse"

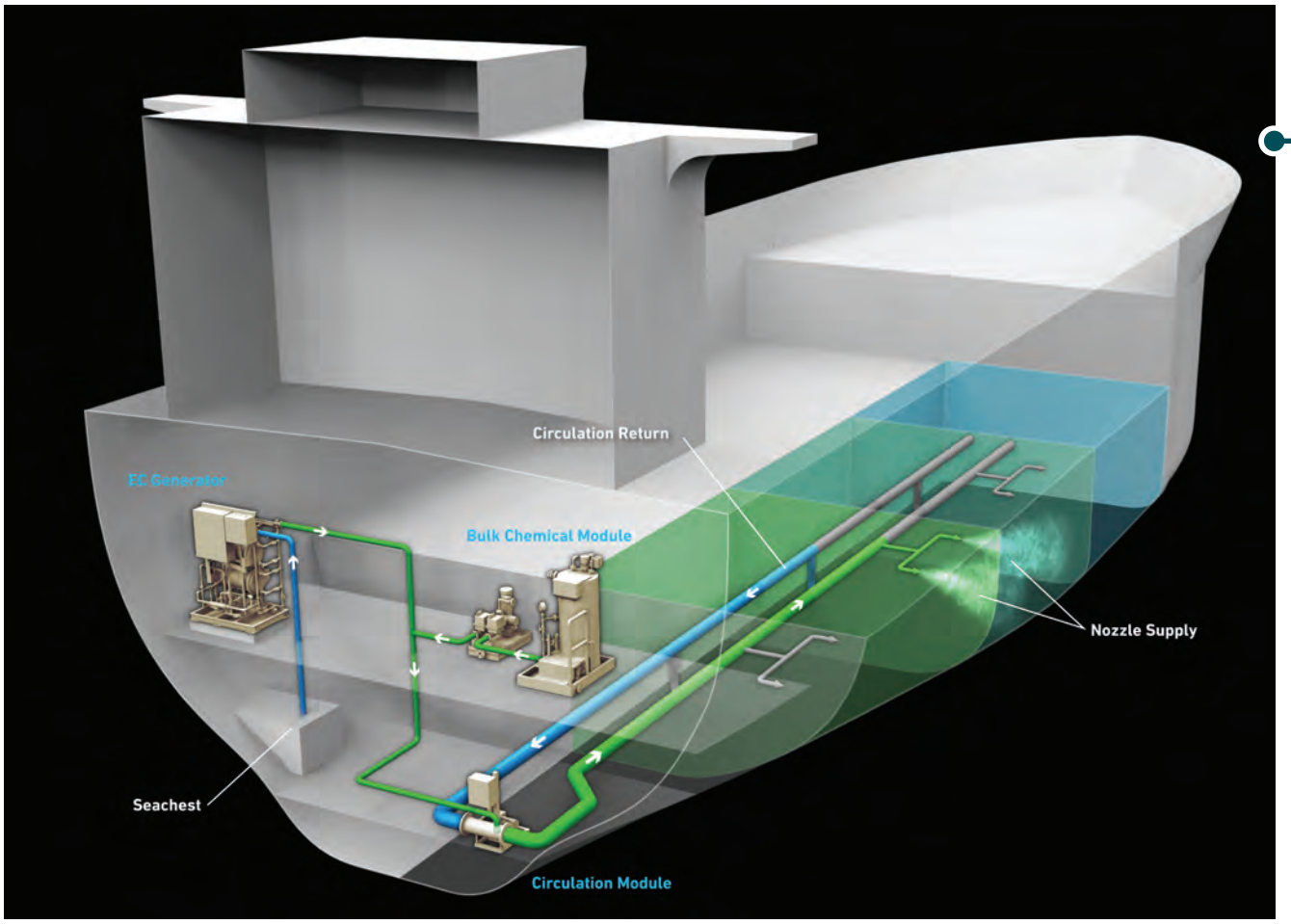
The U.S. Coast Guard has made it clear that lack of crew knowledge is not a valid reason for non-compliance with ballast water treatment regulations and the IMO Ballast Water Management (BWM) Convention guidelines also imply this. In response to the challenge of keeping crews updated and trained in ballast water management, Alfa Laval has introduced its Alfa Laval PureBallast 3 CBT online/offline training tool.

Alfa Laval PureBallast 3 CBT serves as a complement to crew training on board or at training centers. Combining self-study, a 3D computer simulator and a final self-assessment, it allows masters and crews to become familiar with the components of Alfa Laval PureBallast 3 and the basics of its operation. The training is available 24/7 and can be incorporated into existing e-learning portfolios and certification programs.

"PureBallast 3 CBT will save us man hours of training in the office, enhance safe operation and shorten the period of handovers on board," said Paul Noriellano, Training and Vessel IT Manager for Lauritzen Kosan Manila, a shipowner that plans on adopting the tool. "Handling of the equipment by our engineers should not be difficult because the system is straightforward and simple given proper familiarization and training in operation, maintenance and troubleshooting."

The training package begins with self-study about the problem of invasive species and ballast water management, as well as PureBallast 3 components and operation. This knowledge can then be strengthened using the 3D simulator, which gives crew members practical familiarity with PureBallast 3 and its integration with the vessel's piping and tanks. Trainees can explore and operate the computer-simulated PureBallast 3 system, learning how to start processes and attend to alarms.

The training concludes with a self-assessment, consisting of randomized questions that cover both ballast water management in general and PureBallast 3 specifically. The assessment provides a clear picture of crew skills, which are documented in a printed training report.



For Ecochlor's projects, prior to the scheduled dry dock, Ecochlor representatives meet with the shipyard, the integration engineering firm and the vessel's superintendent and crew for an overview of the process. Once at the dry dock, group meetings are scheduled for each morning to discuss daily goals and are followed up with daily reports sent to our engineering support team and the shipowner. This process allows key stakeholders to have visibility throughout the project. Open, consistent and clear lines of communication are critical for a successful retrofit," he concluded.

Ecochlor recently won a contract for 55 Ecochlor Ballast Water Treatment Systems (BWTS) from international refined petroleum products transportation specialist Scorpio Tankers Inc. for retrofit on its 38,000 to > 100,000 DWT product carriers. The installations are expected to begin in Q4 of this year and continue to the end of 2022. In addition, as part of the agreement Scorpio Tankers will become a minority investor in Ecochlor.

Envirocleanse Submits USCG Application

Envirocleanse LLC, division of Charter Brokerage LLC, a Berkshire Hathaway company, submitted its application to the U.S. Coast Guard for Type Approval of its patented inTank Ballast Water Treatment System.

The Envirocleanse inTank BWTS is the only applicant to date which treats ballast water during the voyage. There is no disruption to cargo operations and all in-port, ballasting and deballasting activities are completed as normal – including gravity discharge of isolated top-side tanks. Another featured benefit of the inTank BWTS is that no filter is required.

The inTank BWTS uses a unique dispersion system developed by marine consultancy Glosten, Inc. and patented by the U.S. Geological Survey for mixing the active substance (sodium hypochlorite) in the ballast tanks. The Envirocleanse inTank BWTS can use either electrically generated hypochlorite or bulk chemical as the means to provide disinfectant. Having these options allows the user flexibility to choose the system which best fits their vessel profile.

This flexibility allows a vessel with longer voyages, 72 hours or more, to exchange time for smaller equipment size. The Bulk Doser can maintain the option to complete short duration voyages when needed.

"The inTank BWTS is an important and unique addition to the current offerings in the marketplace," states Matt Hughes, EVP of Sales and Marketing, Envirocleanse. "inTank has a compact and flexible profile that does not impact cargo operations, ballast loading or discharge operations. In short, one of the primary concerns of today's ship operators – BWTS operational delays and related demurrage – has effectively been eliminated."

NYK Signs with SunRui

In July of this year, China's SunRui Marine Environment Engineering Company Ltd. signed an agreement with Japan's largest shipowner, NYK, to install BWMS' on 89 vessels. Founded in 1885, NYK is one of the oldest and largest shipping companies in the world and has a fleet of about 800 ships. SunRui has been cooperating with NYK on its newbuild and retrofit projects since 2013 and the new order recently signed in Tokyo is the largest single order in the global ballast water treatment market, covering VLCCs, large bulk carriers, mega container ships, chemical tankers and more.

In April, SunRui's BalClor BWMS received IMO G8 and IMO G9 certification from DNV GL, which was acting on behalf of the Norwegian Maritime Authority (NMA) and SunRui is the fourth company globally and the first in Asia to be awarded USCG Type Approval Certification. The BalClor BWMS is based on high-performance filtration and indirect electrolysis technology, with a ballast water treatment capacity of 170 to 8500 cubic meters per hour.

New Monitoring Tech

While treatment of ballast water has been a central theme, effective monitoring equipment to confirm compliance is

Envirocleanse LLC submitted its application to the US Coast Guard for Type Approval of its patented inTank Ballast Water Treatment System.

Image: Glosten

Forsta Filters FRP Series self-cleaning water filters are available in an on-line or in-line flange configuration.

Image: Forsta Filters

another. The new B-QUA Ballast Water Monitoring Solution from aqua-tools is designed to be an effective new technology based on ATP 2G. It is said to be a rapid and a portable microbiological analysis is the only one that can be applied simultaneously for all D2 organism size classes and gives compliance limits in accordance with the IMO convention for all three fractions (≥ 50 micron ; 10-50 micron; bacteria) in less than one hour. The technology offers a number of benefits for all stakeholders in the maritime sector, including shipowners, test laboratories, port authorities, and ballast water management systems manufacturers. B-QUA can be used within a Ballast Water Management Plan when commissioning new systems, completing retrofits or when confirming the long-term on-going operational efficiency of ballast water treatment procedures. A cloud solution, totally customizable by the user, is now available for sharing data and generating automatic reports. The B-QUA package includes global training and one year of technical support.

aqua-tools recently won a tender to supply Singapore's Maritime and Port authority (MPA) with the B-QUA ballast water test system. Five B-QUA ballast water monitoring solutions and test kits will be supplied by Singapore-headquartered Atlas Marine Services (AMS), which manages B-QUA sales and distribution across the South-East Asia region and was instrumental in securing the order.

First Korean USCG Type-Approved BWMS

In June Electro-Cleen System from Techcross became the first Korean BWMS to receive USCG Type Approval. The company stated that with the test protocol that is applied for systems and equipment to receive USCG Type Approval being far more difficult to pass than the one for IMO G8 Type Approval in spite of the respective regulations requiring the same discharge standard to be met, it was able to successfully complete all the USCG tests in June 2017 and submit all the required documentation last October. The ECS is based on full-flow electrolysis technology, thus minimizing the number of system components, providing ease of maintenance and a viable solution for shipowners and operators that need to install a USCG Type-Approved BWMS.

CMA CGM chooses BIO-UV

Group BWTS for 17 Ships: CMA CGM contracted France-based BIO-UV Group to supply BIO-SEA ballast water treatment systems to 17 containerships. Nine LNG-fuelled 22,000 TEU leviathans currently under construction at China's CSTC Shipyard will each be fitted out with two 3000 cu. m./hr. BIO-SEA B10-1500 FX units, while eight 9000 TEU Opera-class vessels will be retrofitted with a BIO-SEA B 10-1000FX unit capable of treating ballast water at flow rates of 1000 cu. m./hr. , marking the company's first BWMS retrofit contract for an entire ship class. The new order, valued at more than $5.85 million, is the company's first for a BIO-SEA system following USCG Type Approval for the technology, which was awarded in June of this year.

Wärtsilä BWMS Completes Tests

Wärtsilä's Aquarius UV Ballast Water Management System (BWMS) has successfully completed all testing procedures required for USCG Type Approval compliance. The documentation for full approval is being finalized for submission and awaits only final input from USCG-approved independent laboratory DNV GL. This latest development follows Type Approval for the Aquarius UV from the IMO in 2011, as well as Alternate Management System (AMS) acceptance from the USCG. Wärtsilä stated that the "consistent and exceptional" performance results achieved under both the IMO and USCG testing protocols demonstrated the suitability of its system in enabling shipowners and operators to comply with the global Ballast Water Management Convention regulations, which entered into force in September 2017. The Aquarius UV BWMS is a flexible system using a two-stage process involving filtration and medium-pressure ultra-violet (UV) disinfection technology that is in full compliance with the IMO D-2 discharge standard. Wärtsilä's offering also includes the Aquarius EC BWMS, which was Type Approved by the IMO's Marine Environment Protection Committee in 2013 and submitted for USCG Type Approval following successful testing procedures.

Thordon: Protecting Canadian Waters

Thordon Bearings has played a part in keeping Canadian Coast Guard (CCG) vessels running, with several vessels more than 40 years old.

As a Special Operating Agency within Fisheries and Oceans Canada, the Canadian Coast Guard (CCG) is entrusted to ensure the safety of all mariners, protect the marine environment and support economic growth through the safe and efficient movement of maritime trade in Canada's waters.

To conduct its missions it maintains and deploys a 116-strong active fleet of varying size and class, in diverse waters including the Atlantic and Pacific coasts, Arctic waters and on the Great Lakes. Its choice of seawater-lubricated bearings for stern tubes and propeller shafts, rudders and deck machinery was a nature, with water being the ultimate zero-pollution lubricant.

CCG installed Thordon's COMPAC and XL/SXL bearings and associated seals on numerous vessels in the fleet ranging in size from small fisheries monitoring vessels, to self-righting SAR vessels to its larger icebreaking and navigational aid ships.

The four grades of bearing systems the Burlington-based manufacturer has developed – COMPAC for blue water operation, XL and SXL for varying degrees of abrasives and RiverTough for the most abrasive water conditions – are proprietary synthetic elastomeric polymer alloys combining the best properties of composite materials with the toughness and abrasion resistance of rubber.

New Orders

Thordon's COMPAC systems have recently been ordered for two icebreakers. Having had more than 17 years operational experience with Thordon on the 6098-gt CCGS Des Groseilliers, CCG specified new COMPAC bearings as part of the vessel's major upgrade scheduled for 2020. Des Groseilliers' 5910-gt sister, CCGS Pierre Radisson, is scheduled to have its existing bearings replaced with Thordon COMPAC later in 2018.

These will also be supplied and machined by RMH Industries, along with supply of a Thordon Water Quality Package (WQP) which maintains the correct seawater flow rate to the bearings and removes any abrasives in the seawater, ensuring a long bearing wear life. The Pierre Radisson was launched in 1978, while the Des Groseilliers entered service four years later.

"The Thordon COMPAC bearings were fitted to the Des Groseilliers to replace another manufacturer's dovetail staves," said Jasmin Racicot, Technical Development Director of RMH Industries. "Wear and fatigue had led to the dovetail staves becoming loose between the bronze separators, leading to high levels of vibration. Replacing dovetail staves with full form bearings was a significant improvement in this situation."

A third CCG ship in the same 1200-class, the Amundsen is expected to be converted to Thordon COMPAC bearings in 2019.

Permanent Repairs

CCGS Hudson, an offshore oceanographic and hydrographic survey vessel, first entered service in 1963 with the Canadian Oceanographic Service, transferring to CCG in 1996. Hudson's diesel-electric propulsion plant is arranged with twin shafts running in dovetail stave bearings which were also considered to be worn out due to age. Thordon distributor, Avalon Marine, was approached in 2016 about the possible options available for refurbishing the vessel's propeller shaft bearings.

During discussions it transpired that the original shaft packing glands were severely worn and leaking seawater into the ship, requiring continuous pumping out. With the proposed replacement vessel still a number of years away from delivery, CCG wished to carry out permanent repairs to the stern tubes and at the same time fit new inboard shaft seals. Avalon Marine proposed upgrading the vessel to Thordon XL full form bearings (from the existing staves) and to fit new Thordon SeaThigor mechanical seals during the same refit, which CCG accepted, along with a WQP to maximize the life of the Thordon bearings. The company was contracted to engineer the upgrades, refurbish the existing bearing carriers, supply and install new stern tube bearings and to design a compact WQP and integrate it into the ship.

This contract was notable as the first order for SeaThigor, which was placed with Avalon through the Government's 'Build in Canada Innovation Program' (BCIP), introduced to support home-grown innovations and facilitate sustainable economic growth.

The SeaThigor forward seal incorporates a secondary seal module to provide Safe-Return-To-Port capability in the event of a face failure of the primary seal.

Hero Class

The Hero Class Mid-Shore Patrol Vessels are relatively modern, the first of the nine-vessel class being delivered in 2012. They are designed to operate at high speed in heavy weather, engaged in maritime security, search and rescue, fisheries enforcement, anti-smuggling and maritime patrol duties. They were built by Irving Shipbuilding, and based on the Damen Stan Patrol 4207 design, with a 43m (141 ft.) long steel hull and aluminum superstructure. Four are deployed on the Great Lakes and St Lawrence seaway, with the remaining five on coastal patrols on the Atlantic and Pacific coasts. The Hero Class is powered by twin CP propellers driven by two Caterpillar diesel engines, rated at 4992kW for a maximum speed of 25 knots. The propellers run on Thordon COMPAC bearings while Thordon SXL bearings are used in the rudder. Each ship is equipped with a Thordon Water Quality Package. The WQP and SXL bearings were supplied by distributor Avalon Marine, while the COMPAC bearings were supplied and machined by the Duwel Group, Thordon's distributor in Sweden.

Samuel Risley

Icebreaker CCGS Samuel Risley, built in 1985, was converted from oil to Thordon seawater lubricated stern tube bearings in 2009. The 69.7m (229 ft.) long vessel is equipped for buoy handling, emergency towing and firefight-

Photos: Thordon Bearings

Jasmin Raicot, RMH Industries, Thordon's distributor with the Pierre Radisson.

ing, and has a twin-screw geared diesel propulsion system with two Wärtsilä Vasa 16V22 engines driving CP propellers. The change to seawater lubrication was a decision made by the CCG as part of their commitment to environmentally friendly vessel operation. Thordon supplied COMPAC bearings, a WQP, and the shafts were protected against wear and corrosion with Thordon's Thor-Coat two-part toughened epoxy system. Thor-Coat was specifically developed to complement Thordon COMPAC bearings by providing corrosion protection to meet extended shaft withdrawals.

Louis St Laurent

CCG's largest and heaviest icebreaker, the CCGS Louis St Laurent, was first commissioned in 1969, with steam turbine propulsion. It has undergone several major refits and at least one life extension since it was commissioned, including upgrading to a triple-screw diesel electric system based on five MaK 16V453Cs prime movers. When one refit found that the original dovetail stave bearings were severely worn, CCG considered several repair options to keep the ship in service for another 10 years or so, when Canada's long-awaited replacement heavy icebreaker CCGS Diefenbaker may be delivered.

Avalon Marine was again approached by CCG to put forward a proposal for repairing the existing bearings in order to extend the operating life of the stern tubes.

"It became clear early on that in order to justify the costs of upgrades, SCM implementation would be needed in order to reduce the life cycle costs for the remaining life of the ship," said Avalon Principal Thom Hofmann. "A number of life cycle cost scenarios were completed by Avalon taking into account the costs of implementation and upgrades as well as the periodical survey cycles required by Class."

The outcome was a series of contracts between CCG and Avalon Marine to engineer, assess, submit and obtain the Class approvals as well to design the bearing upgrades and shipboard equipment integration. Based on Avalon's contract, Thordon supplied three full shaft line sets of full form Thordon XL bearings and three custom water quality packages to continuously condition the bearing lubrication water. This was the first time Thordon WQP's had been customized and integrated into the existing propulsion cooling water system of the ship, without dedicated pumps. Avalon worked very closely with the shipyard handling the dry docking. Quebec-based Thordon Distributor, RMH Industries, handled all of the machining to recondition the propeller shafts and machine the new bearings. The ship went back into service with all new bearings and WQPs in August 2017

Since then, Avalon Marine has recently completed engineering studies for upgrading the tailshaft bearings on two CCG Type 1100 Class 2 medium icebreakers, the CCGS Ann Harvey and CCGS Wilfred Laurier to the latest Thordon specifications. These projects are expected to be undertaken during the ships' 2018 drydockings.

Heating Coil Repair with No Welding

BY CHRIS PEITCHINIS, VP, TUBE-MAC PIPING TECHNOLOGIES LTD.

Tube-Mac provides a non-welded solution called PYPLOK for shipyards to repair heating coils inside hazardous areas, highlighted in a couple of recent repair jobs. For the oil tankers Montesperanza & Montestena from Ibaizabal Group, the repair jobs were carried out in Navantia's repair shipyard in Ferrol, Spain, by the ships' own crew. Both tankers had leaks in the welded fittings of heating coil tubes in COT and SLOP tanks. The leaks were due to defective welds of socket weld couplings during the ships construction. The 44.5 x 2.0 mm wall tubes were made of Aluminum Brass and the system operated at 168 °C and 7 bar operating pressure. The leaking tube connections were wrapped with a reinforced tape as temporary repair, which did not solve the problem.

Ibaizabal's aim was to be able to permanently repair the ships' piping with no hot work. This way it could eliminate several costly and time-consuming processes required by welded connectors. For example, using a cold worked solution, the repair could connect the tubes even with traces of fuel and fumes inside the confined spaces of the tanks. They would also avoid the need of fire watch personnel and fire extinguishing equipment. The on-site installation time would be greatly reduced and they could use the ship's crew to complete the repair. Ibaizabal's wanted a safe, reliable and permanent leak free connection.

Photos: Tube-Mac

Left: Ibaizabal crew member installed PYPLOK fittings using Model 55 Tool and 44.5 mm Head assembly. For safety reasons, an ATEX approved pneumatic (air) pump XA11G was used to activate the PYPLOK tool.

Right: The permanent repair was completed safely with out the hazards of welding using PYPLOK 360° radial swage non-welded fitting technology.

Tube-Mac proposed to repair the heating coil tubing with 44.5mm copper nickel (CuNi) PYPLOK fittings. Specifically, PYPLOK fitting type 301 was selected, which is a specially designed elongated maintenance fitting for connecting two tubes with a gap left after cutting out the welded fittings.

The welded fittings were cut using a pneumatic reciprocating saw and the entire repair process from cutting, cleaning, deburring and swaging the PYPLOK fitting took 30 minutes to complete. The actual swaging process took less than 5 minutes.

In another case, Spanish shipyard Metalships & Docks, from Vigo, Spain, carried out the repair jobs on heating coil lines in two container ships – AS Federica & Stadt Gera – using PYPLOK non-welded fittings.

In this case the steam leaks of the pipes were inside the service fuel tanks. The pipes were 2-in. Schedule 40 (60.3x3.91 mm) carbon steel pipes, and the system operated at 168 °C and 7 bar working pressure.

Metalships wanted to eliminate the leaks using a cold method, quickly and permanently, in an explosion risk environment. There was some fuel and residue inside the tanks. PYPLOK's non-welded fitting was the solution chosen. Metalships was able to repair the lines safely and without the fear of explosion, thanks to PYPLOK non-welded technology. The section of leaking pipe was cut out using a manual hand saw and replaced with new piece of pipe using two standard straight PYPLOK fittings.

"PYPLOK has provided us with a way to reduce time, improving costs and simplifying the tasks necessary for the repair of this type of leak-age, very common inside tanks," said Pablo de Celis, from Metalships & Docks. "With a brief training, our staff was trained by Tube-Mac to carry out the repair job ourselves"

As in Case Study 1, due to the hazardous environment a pneumatic (air) pump unit was used to operate the PYPLOK swaging tool. The whole process took 20 minutes per connection from which the actual swaging time of the PYPLOK fitting was less than 5 minutes.

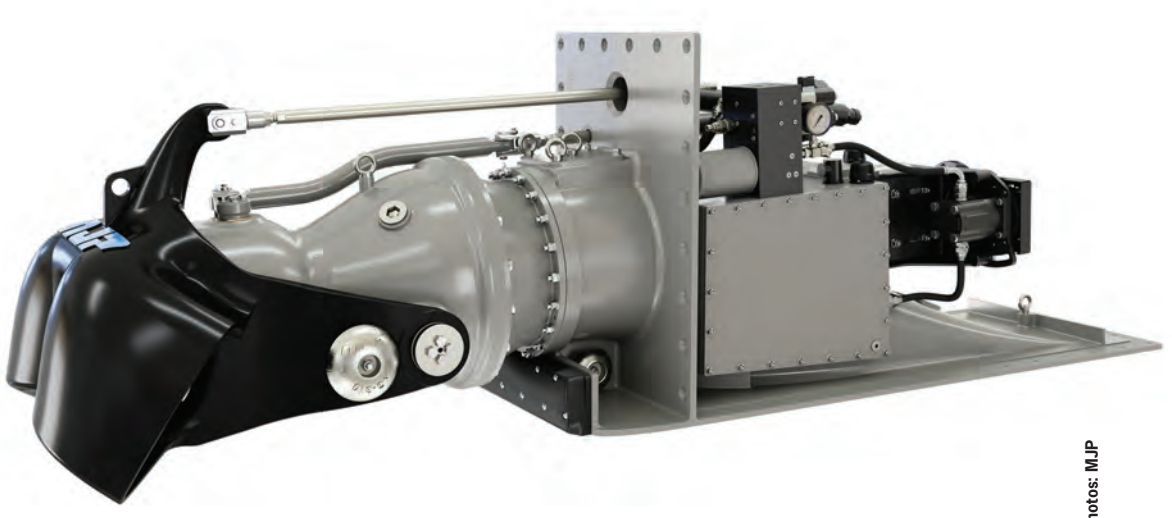
PYPLOK fittings from Tube-Mac are available in carbon steel, 316 stainless steel, duplex, super duplex and copper nickel (CuNi 70/30). It is one of the only fittings in the world availa-ble for NPS pipe, OD tube and Metric tube sizes with a wide range of shapes and end connec-tions. More notably, Tube-Mac is the only company to offer a non-welded metric CuNi fitting for 44.5mm, 57mm and 76mm metric CuNi tubes.

MJP Debuts Next-Gen Waterjets

At SeaWork International in Southampton Marine Jet Power (MJP) introduced the X Series, a new waterjet propulsion range that the company claims comes in at a "much lower price point" while reducing power demand by up to 20 percent and reducing weight up to 10 percent. Designed from the start with an eye on ease of maintenance in the field, key features of the X Series include one-piece skidded installation and easily accessible inspection hatches. "We've really taken the time to design and engineer this product with designers, builders and operators in mind," said Magnus Sörenson, MJP CEO. "This product is easy to install and even easier to maintain in the field, saving time and money over the total lifecycle of the product."

The X Series has been optimized to integrate with the company's JetMaster 3 electronics system, but it is also designed for hydromechanical (HM) controls. The series currently features three sizes, the 280X, 310X and 350X, with the 310X available now and on display at SeaWork International. The 280X and the 350X are both under development and will be available in 2019.

www.marinejetpower.com



Photos: MJP

ABB: Cable-Layer Achieves 60% Fuel Savings

ABB's power, control, distribution and automation solutions, specialized cable layer NKT Victoria reportedly achieves up to 60 percent fuel saving when compared with cable-layers in its class. At the heart of the technology is ABB's power and distribution solution, Onboard DC Grid, which has played a key role in the vessel's fuel-saving performance, as part of the complete ABB Ability System 800xA and a 156kWh energy storage system (ESS). "We are really impressed with the impact that has been made by ABB technology on board, and in particular the Onboard DC Grid package," said Lars G. Carlsson, VP – Offshore Operations, NKT. "This technology has helped us to achieve our vision of a more sustainable and environmentally-friendly future for cable-laying vessels, and our experience over the first year has inspired complete confidence in Onboard DC Grid's efficiency and reliability."

"We are naturally very pleased with the performance of this new vessel design, but we have to pay tribute to the importance of ABB's technology solutions in optimizing performance and reducing emissions," said Tor-Henning Vestbostad, Sales Director, Salt Ship Design. "The results we were aiming for in developing NKT Victoria are no longer just theoretical but have been proven by operational experience in the field."

Conceived, developed and delivered as the result of a close collaboration between NKT, Salt Ship Design and ABB, the 140-m long, DP3-capable ship is a new generation cable layer featuring many of the solutions enabling ABB's "Electric. Digital. Connected." strategy that envisages shipping's digital and connected future.

Onboard DC Grid and its associated marine software systems have been designed to increase efficiency by allowing the ship's engines to work at variable speeds and draw on stored energy for peak load shaving and during dynamic positioning. The main cable laying equipment on board is also fed directly from the DC switchboard and, when braking, energy is fed back into the power system.

The three ABB Azipod thrusters installed are among 36 vessel components generating over 1,500 signals and a daily 80MB data package for analysis on board, sent on to ABB Ability Collaborative Operation Centers for remote vessel performance and diagnostics support. NKT Victoria also benefits from ABB's Performance Management System and Voyage Advisory System, which help crew optimize energy efficiency decisions in real time.

The vessel has also achieved about 60 percent reduction in CO2 emissions, as well as NOx reductions of 60-80 percent – with the help of the selective catalytic reduction (SCR) system, which converts NOx emissions into water and harmless nitrogen. In addition, when loading cable, a ship-shore power connection means that NKT Victoria consumes no fuel at all, enabling a zero emissions performance during this phase of the vessel's operations.

Photo: ABB

SKF Hydraulic Bolts

Damage caused by a propeller shaft misalignment problem and related excessive vibrations and flange coupling wear, is remedied with the aid of SKF Supergrip hydraulic bolts.

While at sea in early May 2017, the crew of a Greek owned, Marshall Islands registered 170,000 ton bulk carrier became aware of unusually high levels of mechanical vibration, the origin of which was eventually traced to the ship's propeller shaft. Indeed, when metal debris was discovered in the lubrication system of the tail shaft, the problem was considered severe enough to prompt an immediate request for docking at the closest facility – in this case, a shipyard in Hamburg, Germany.

Propeller shaft problems are among the most critical issues a shipping company has to deal with, and in virtually all cases immediate remedial action is required to avoid further damage and total loss of propulsion. Wear, fatigue, and corrosion can weaken the tail shaft of a vessel, eventually causing cracking and fractures. In the most serious of cases, unless emergency maintenance is undertaken, the tail shaft can undergo a catastrophic failure, resulting in the loss of the ship's propeller. Clearly, this can lead to significant delays to the ship's itinerary and, of course, enormous costs for the owners.

To reduce the risk of such incidents, shipping companies must dock their vessels at five-year intervals for inspection, a process that sometimes involves removal of the complete shaft, a task requiring the withdrawal of the coupling's heavy-duty bolts. Any complications arising during the course of this work can add many hours – sometimes days – to the duration of this maintenance task.

With costs rising and delivery schedules slipping, the bulk carrier owners urgently sought a solution to their particular propeller shaft problem. Given the combination of the high cost of repairs and the dry docking fees, this unscheduled downtime and its knock-on effect upon delivery schedules could prove to be costly. The situation was made even worse when, during the propeller shaft removal procedure, the repair team were confronted by a problem with the flange connection between the two shafts.

The team of technicians at the Hamburg shipyard had identified the source of vibration as shaft misalignment and they advised both the shipyard and the ship owners on how to remove the existing flange coupling bolts without causing additional damage to the flange. Unfortunately, the holes left by the old bolts were found to be worn and this necessitated on-site machining.

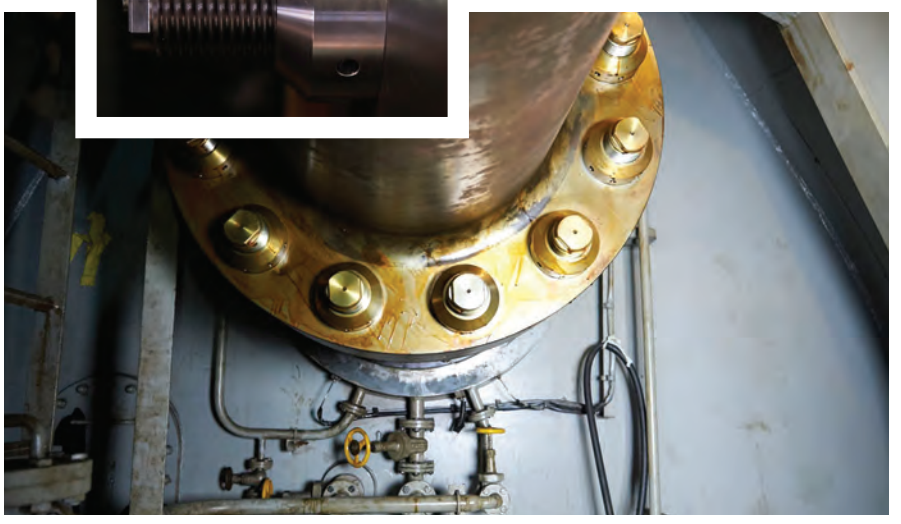
The ship owner contacted its partner J & E Papadopoulos SA, an official distributor of SKF products based at the Greek port of Piraeus, to find a solution and coordinate the repair work. Since the bolts needed to be installed and removed several times during the repair operation, J & E Papadopoulos SA, along with SKF, recommended the use of hydraulic bolts – in particular SKF's Supergrip Bolts, which eliminate uncertainties about the length of downtime needed for removing and installing bolts during unscheduled outages.

Supergrip Bolts are a solution for connecting flange connections, including flange couplings. The bolt is hydraulically expanded and tightened into the coupling bolt hole using a set of portable tools, eliminating the need of nitrogen-cooling bolts to achieve an interference fit.

The bolt holes on the bulk carrier's intermediate shaft couplings were simply line-bored for initial installation, as the expandable bolt sleeves were, to perfectly match each individual hole. Releasing the expansion pressure allowed the bolts to be easily withdrawn by hand during the fitting and refitting process. This reduced the incidence of further damage being caused to the flange coupling during bolt insertion and removal and enabled the same bolts to be used time after time.

To minimize downtime, the new bolts from SKF were delivered within four days, with all the required documentation in place from the classification society to state that the materials and components met industry standards.

Thanks to the hydraulic bolts, the service technicians were able to complete the repair operation in 10 days.



Photos: SKF

Mega Cranes for Port Everglades

Photos: Broward County's Port Everglades

Broward County's Port Everglades reports that it is progressing with manufacturing the first three new Super Post-Panamax container-handling gantry cranes being built by Shanghai Zhenhua Heavy Industries Co., Ltd. Inc. (ZPMC) of China. The design phase is nearing completion, and Port Everglades Chief Executive Steven Cernak recently issued a second notice to proceed to begin manufacturing the cranes valued at $13.8 million each. In addition to the three cranes approved for manufacturing, the Port has options to purchase up to three additional cranes over the next five years. The new cranes will have the ability to handle containers stacked eight containers high and reach across 22 containers on a ship's deck. Port Everglades' existing seven gantry cranes in the Southport area, where the majority of the Port's containerized cargo handling takes place, are limited to containers stacked six containers high and only reach across 16 containers on a ship's deck. In addition to purchasing the new cranes, existing cranes will be upgraded to a lift capacity of 65 tons from the current 46.5 tons. The new cranes are part of the Port's largest expansion project in its history, which includes lengthening the Southport Turning Notch from 900 feet to 2,400 feet to allow for up to five new cargo berths.

Barge Master 3D Motion

Compensated Crane for Wagenborg

Wagenborg awarded Barge Master a contract for a second 3D motion compensated crane for its new walk-to-work vessel Kasteelborg. The first motion compensated crane on the Kroonborg (pictured) has increased the workability from approximately 180 to 330 days per year. The Barge Master Crane, as configured for the Kroonborg, makes it possible to continue safe and stable crane operations even in the North Sea's famously rough conditions. It is able to lift 32m above sea level at a reach of up to 20m or 15 tonnes at a reach of 10m.

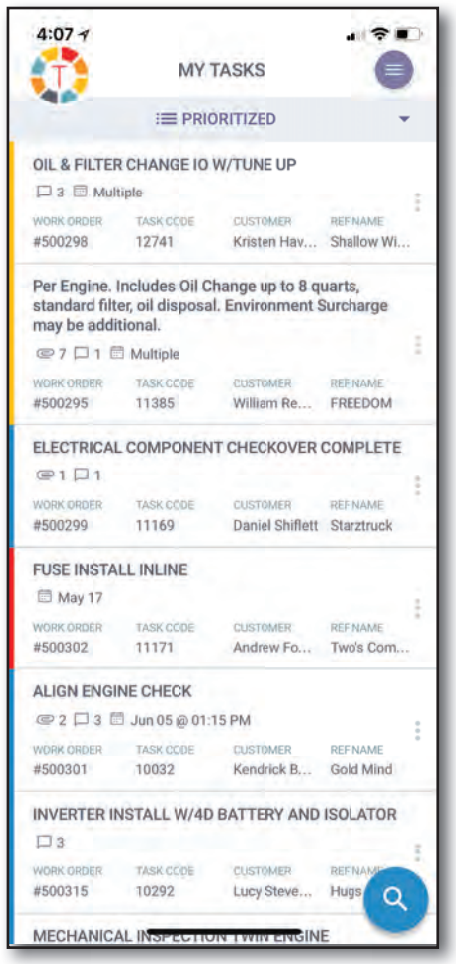
Photos: Barge Master

New MyTaskIt Mobile App

The new Mobile App from MyTaskit has been a long-awaited tool for the field staff in boatyards and those of whom work remotely, designed to revolutionize the ease of use for work coordination, reporting and real-time updates. MyTaskit is an award-winning work coordination platform for marine service, repair and construction businesses, and the new mobile app expands on MyTaskit Pro's ability to transform how a service company coordinates work—in real time, from the field. The app was developed for field technicians, designed to enable service companies to get more organized and in control of their business helping their team get more done. Key points include:

- **Offline / online modes:** The offline /online mode can accommodate a wide range of work site scenarios and environments. service, repair and building work is often out of cell signal and Wi-Fi range, such as inside an engine room or in a concrete structure. During these times, the app functions in a disconnected state, which synchronizes once a connection is reestablished.
- **Time-stamped support content:** As a job is in process, before-and-after photos, videos can be quickly uploaded into the MyTaskit mobile app. Supervisors view the progress of the project and can share this time-stamped content with their customers. The feature promotes enhanced trust between the company and the customer and greater visibility into work quality.
- **Record voice notes to text:** The record voice notes to text feature allows technicians to record voice notes on their mobile phones in self-contained, real-time messaging format, instead of via a separate email or SMS text system. It delivers the ability for everyone to instantly see the same notes – supervisors, in-office staff, field technicians and even sub-contractors – critical when several people are working on the same project. Up to four hours of administrative time can be saved every day by not having to transcribe hand-written notes.
- **Efficient, accurate labor hours reporting:** Work time is submitted directly into the MyTaskit mobile app in real-time, providing efficient and accurate recording of billable hours. MyTaskit's software integrates directly with DockMaster and QuickBooks, allowing faster and more accurate invoicing, with bills getting out an average of 10 days sooner.
- **Enhanced Search:** With an integrated search and filter feature, MyTaskit's new app provides technicians easy-to-use access to their schedules and prioritized task lists, with less chance of misinterpretation of instructions. It offers users a real-time view into tasks, who is assigned to what and confirmation that it has been completed.
- **Real-Time Job Updates:** As work is in process, real-time updates from technicians enable supervisors to view progress. It offers the ability to deploy service teams and adapt to changes quickly and to gain greater control over the business.

The MyTaskit app is available for Android and iOS at Google Play and in the iTunes App Store.



Keller Gearbox for Polar Cruise Vessel

In 2016 Keller was contacted with the request to offer a propulsion gearbox for a passenger vessel. The specs called for a gearbox suitable to meet the harshest conditions a ship can meet during the winter time in the Arctic or Antartic. After detailed intensive technical discussions with the customer, the gearbox was offered.

When finally the order for the gearbox was placed by Schottel in December 2016 neither Keller, Brodosplit (the shipyard) or Schottel (the supplier of the propulsion drive train) knew exactly about the latest design criteria for Polar Class 6 (LR PC6) from Lloyds Register. The ship Hondius will be the first vessel in the world to be built according to the class "LR PC6" meeting the latest and highest demands of Lloyd's Register for "polar class 6".

It was first during the design stage that it became clear to all parties involved that the design criteria for a Polar Cruise Vessel strongly differ from those in the past. The main engine had to be capable of being starting and running the propeller with the CP in full pitch and the propulsion gearbox also had to cover this issue. The basic concept consists of a gearbox driven by two diesel engines of 2,130 kW each, and one output shaft, to drive the propeller. To determine the size of the gearbox, the maximum torque on the input shafts resulting from the TVC´s (Torsional Vibration Calculations) had to be considered. This included the clutches, shrink fits and gearing. Above the portside drive shaft is a secondary PTO shaft to drive a generator. On each input drive is one hydraulic multi-plate clutch, so it is possible to drive the gearbox with one of the both diesel engines or with two diesel engines together. It is also possible to drive the PTO shaft with one of both diesel engines.

The thrust bearing had to be designed considering different loads. Furthermore the thrust bearing of the gearbox has a special design to absorb the high axial thrust which comes from the ice cutting process of the propeller.

Another two aspects in the design of the gearbox was a gearbox with a high efficiency and low sound emissions. In other industries such as mining, Keller is well known for its silent, high-efficiency" gearboxes. The propulsion gearbox is 2.6m long, 3.9m wide and 3.2m high with a weight of approximately 22.5 tons.

The vessel is scheduled to start cruising in March 2019.

Photo: Keller

Tech in Focus: **Ventair Shipyard Kit**

COPPUS Portable Ventilators is a part of the Curtiss-Wright Steam and Air Solutions (SAS) business unit, within its Electro-Mechanical Systems Division. SAS is a newly established business unit for Curtiss-Wright, as a result of its April acquisition of Dresser-Rand's Government business unit (see box below). We spoke with Tyler Smith – Supervisor, COPPUS Portable Ventilators, for insights on business prospects in the commercial shipyard sector.

Is the ventilator line the only product in the SAS business unit?

In addition to our ventilator product line, the SAS portfolio includes compressors, steam turbines, and steam system valves. The primary applications for these products are power and compression for propulsion, pump drives, ship service air, oxygen/nitrogen (O2N2) feed air, generator drives, and de-ballasting. We also produce Terry steam turbines for nuclear power safety applications.

What is the Ventair Shipyard kit?

The Ventair Shipyard Kit is an upgrade to our standard Ventair offerings. The Ventair is a high-pressure, high-flow, centrifugal ventilator that can be used as a blower or exhauster. The Ventair Shipyard Kit offers the performance and reliability of the standard Ventair Portable Ventilator while incorporating enhancements that expand its capabilities for a wide range of applications. The key features that set the Shipyard Kit apart from a standard Ventair is the fork lift base, isolation pads, starter, and silencer. Customers also have the option to select their electrical configuration based off the operating conditions at their specific yard (e.g. voltage, phase, cycle, non-hazardous, explosion proof or drill rig duty). Additionally, a multiple inlet adapter and duct may be included to allow users to extract poor quality air, fumes and particulates from up to 16 different locations with a single ventilator.

When was the kit was developed and where it is deployed today?

The shipyard kit was developed more than 20 years ago to meet the needs of those within the shipbuilding industry. Our clients, predominately in the naval yards, were already very familiar with our Ventair but expressed a need for a blower or exhauster that was easy to transport, easy to operate and that would not produce excessive noise in congested areas. The Ventair Shipyard Kit was the solution. Today these units are employed for a variety of marine applications in yards throughout the U.S. – including Groton CT, North Kingston RI, and Bath, ME.

Looking in the commercial space, where to you see opportunity?

The Ventair Shipyard Kit has proven to be successful in the Navy shipyard market and the same activities need to be carried out in the commercial shipyard market. Extraction of poor quality air from a confined space and providing fresh air ventilation is required at the shipyard and other onboard ship applications. So for us, I think the opportunity lies in connecting with those like-minded shipyards and whole heartedly supporting their efforts to supply the world with the next generation of ships.

Curtiss-Wright Completes Acquisition

Earlier this year Curtiss-Wright Corporation completed the acquisition of the Dresser-Rand Government Business (Dresser-Rand), a business unit of Siemens Government Technologies which is a wholly-owned U.S. subsidiary of Siemens AG in Germany, for $212.5 million in cash.

Dresser-Rand is a designer and manufacturer of mission-critical, high-speed rotating equipment solutions, including reciprocating compressors, steam turbines and steam system valves, supporting most major U.S. Navy shipbuilding programs. In addition, Dresser-Rand is the sole supplier of steam turbines and main engine guard valves on all aircraft carrier programs.

The acquisition significantly increased Curtiss-Wright's footprint on U.S. Navy Nuclear vessels, and expanded its existing U.S. Navy aftermarket business and provides an opportunity to leverage Dresser-Rand's prominent presence at U.S. Navy shipyards. The business will operate within Curtiss-Wright's Power segment and its sales are principally to the naval defense market, with additional sales to the power generation market.

Three Questions for

Claus Ulrich Selbach

Business Unit Director, Maritime and Technology Fairs

There are many marine exhibitions and conferences globally. **What is special about SMM 2018?**

The sheer dimensions of this trade fair are stunning: 93,000 square meters of exhibition floor in 13 halls, and 50,000 expected industry visitors from more than 120 countries make SMM the world's biggest trade fair for the maritime sector. Even more important is the quality of the fair's 2200 exhibitors which cover the entire value chain of the maritime industry. This allows us to claim international technology and innovation leadership once again.

At the exhibition stands, visitors will not only be able to speak personally with major market players but also find hands-on technology, including spectacular, huge exhibition items as well as demonstrations of the latest production processes. Furthermore, at the accompanying subject-specific conferences a total of 70 high-profile international speakers will discuss concerns that are right at the top of the industry's current agenda, ranging from maritime safety, security and environment protection to aspects of ship finance, through to innovative technologies and promising future markets. In just four days, SMM takes its visitors on a journey around the entire maritime globe, saving them weeks or even months of tiresome business trips. That is what makes SMM special.

Having traveled to Hamburg for the SMM personally since 1992, I know it perennially is the global new technology showcase for the marine industry. From the exhibition side, **what is new at SMM in 2018?**

We have enhanced our proven event concept in various ways this year. We are especially proud of our special exhibit on maritime 3D printing as well as the TradeWinds Shipowner's Forum, both first-time features at this year's SMM.

We've also refined our hall assignment concept: We traditionally group exhibitors together based on themes. For example, Hall A5 will once again be fully dedicated to Green Propulsion. What is new is that we are making more space available for the rapidly growing cruise market: in addition to Hall B5, half of B8 has been set aside for exhibitors of marine interiors for passenger ships. The new Cruise & Ferry Route directs visitors to exhibitors who serve this segment. This is a great addition to our existing theme routes focusing on Security, Green Shipping, Digitalisation, and Jobs. The Maritime Career Market on the last day of the fair completes the list of innovations – for the first time it will be enhanced by a maritime career forum comprising lectures about maritime job profiles and career advice.

So what are you especially looking forward to?

I'm especially looking forward to the first day of the fair and the joy of watching exhibitors and visitors from around the world flocking to fair at the central entrance. And to the last day of the fair – I hope to see lots of happy exhibitor and visitor faces!

MacDougall's Increases Productivity with New Mobile App

MyTaskit®
Get More Done, Faster

MacDougalls' Cape Cod Marine Service is in Falmouth, Massachusetts and has been in the marine service business for 80 years and employs up to 30 technicians in the busy season. The boatyard services more than 200 recreational and commercial vessels year-round in multiple out-buildings including one of two of the largest working paint bays on the island.

Trevor Vermette, Operations Scheduler and the executive team at MacDougalls' wanted to improved efficiency in their business, especially in the Spring, when they are at the height of the boating season. They also wanted the ability to bill faster for some of their transient and seasonal boat owner customers who needed a quicker turn-around. The yard was running their service business manually with paper work orders, index cards, spreadsheets and whiteboards to hand-write technician assignments and schedules.

MacDougalls' decided to engage MyTaskit, a mobile work-coordination software platform which has allowed them to cut down on technicians going back and forth between the out-buildings and the office, trying to confirm which job is next or to provide status updates. The techs now can enter their job status and report labor hours throughout the day enabling a faster billing cycle for their customers.

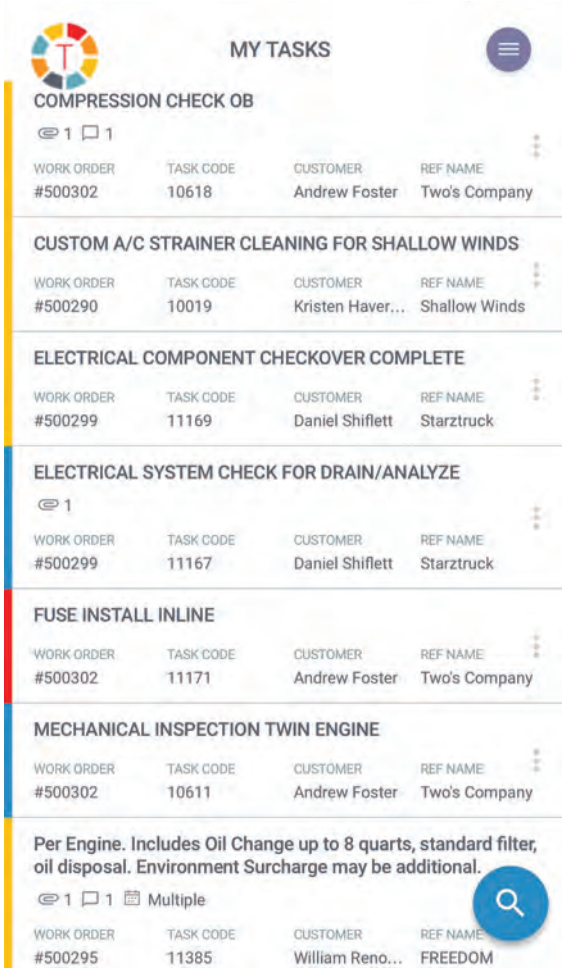
With the ability to send photos and videos and add them to the work order, technicians can stay in place on the job, to send the photos to notify supervisors of any challenges or parts needed, due to a challenging repair. They can also send before-and-after photos and videos to show work quality and to build greater trust with their customers. MacDougalls' has used it to show hard to reach spaces to justify increases in labor due to technician proximity to the repair area, which helps the customers better understand the complexities of the job.

The techs love the new mobile app, especially the voice recording and messaging features, so they no longer need to translate then later to the in-office staff.

Better communication has resulted between supervisors and the technicians as Trevor remains in touch with his team wherever they are in the yard or on a boat. "There is no difference between what we see and what the techs see, which clears up a lot of mis-communication on the job," said, Trevor.

For commercial customers where every minute counts for any time off the water, the increased efficiencies and reduced overtime enables them to get back on the water much more quickly than with manual service work orders and hand-written notes.

Trevor can assign more work and get more work scheduled than before with the MyTaskit Mobile App. Most importantly MacDougalls', Trevor can keep customers current on job status which creates a better customer work relationship and keeps them coming back due to a better customer experience.



SMM

The leading international maritime trade fair hamburg

SMM Hamburg 2018
Japan Pavilion

Hall B7.440 — **4 – 7 sept 2018**

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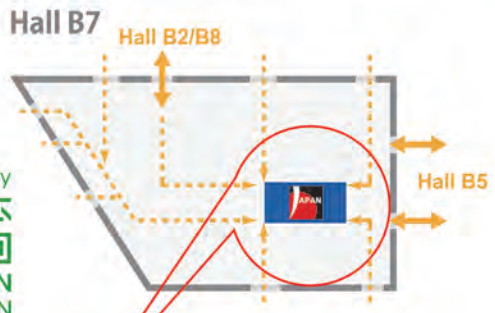
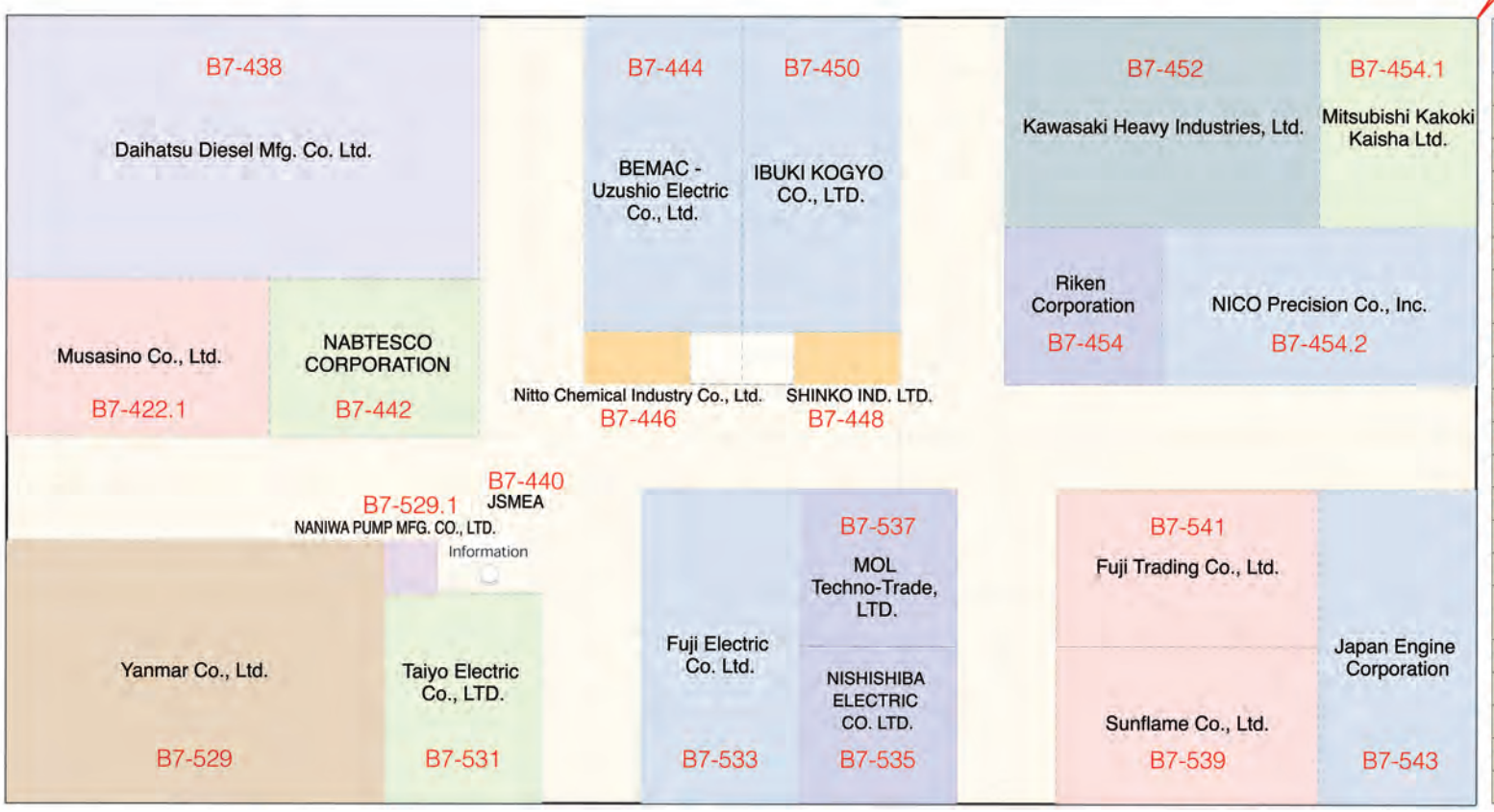




Stand number	Company Name
B7-444	BEMAC-UZUSHIO ELECTRIC CO., LTD.
B7-438	Daihatsu Diesel Mfg. Co., Ltd.
B7-533	Fuji Electric Co., Ltd.
B7-541	Fuji Trading Co., Ltd.
B7-450	IBUKI KOGYO CO., LTD.
B7-543	Japan Engine Corporation
B7-440	Japan Ship Machinery and Equipment Association
B7-452	Kawasaki Heavy Industries, Ltd.
B7-454.1	Mitsubishi Kakoki Kaisha, Ltd.
B7-537	MOL Techno-Trade, Ltd.
B7-442.1	Musasino Co., Ltd.
B7-442	NABTESCO CORPORATION
B7-529.1	NANIWA PUMP MFG. CO., LTD.
B7-454.2	NICO Precision Co., Inc.
B7-535	NISHISHIBA ELECTRIC CO., LTD.
B7-446	NITTO CHEMICAL INDUSTRY CO., LTD.
B7-454	Riken Corporation
B7-448	SHINKO IND. LTD.
B7-539	Sunflame Co., Ltd.
B7-531	Taiyo Electric Co., LTD.
B7-529	Yanmar Co., Ltd.

Japan Seminar and Reception

4th Sept (the first day of SMM)

Supported by THE NIPPON FOUNDATION

JAPAN JSMEA
Japan Ship Machinery and Equipment Association

MARITIME REPORTER AND ENGINEERING NEWS

【EVENT】

Date	4th September
Time	18:30～20:30
Style	Seminar and Reception
Venue	Inter City Hotel Hamburg Dammtor Messe (Top floor)

【Time Schedule】

18:30	Opening remarks　Mr Shinzo Yamada (Chairman of JSMEA)
18:35	Keynote speech Mr Yoshikazu Kawagoe　(Senior Managing,Executive Officer MOL)
18:50	Keynote speech　German Shipbuilding and Ocean Industries Association : Speakers to be announced
19:05	Networking reception
20:30	Closing

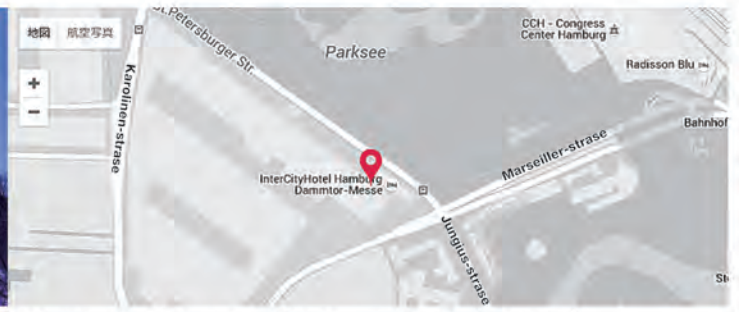
Japan reception at SMM Hamburg2016

Japan Seminar and Reception Registration

To Participate in the reception requires registration.

http://www.jsmea.or.jp/en/reception/2018/smm/register

Venue



Inter City Hotel Hamburg Dammtor Messe（St. Petersburger Strase 1 20355 Hamburg Deutschland）
https://www.intercityhotel.com/en/hotels/all-hotels/germany/hamburg/intercityhotel-hamburg-dammtor-messe

JAPAN JSMEA Japan Ship Machinery and Equipment Association
For more information, Please visit our website at
http://www.jsmea.or.jp/index_en.html

Booth A1.226
At SMM 2018 in Hamburg, Alfa Laval will focus on lifetime vessel performance products and systems, including Alfa Laval PureBallast Compact Flex.

Company: ACO Marine
Booth: A1.407
Product: Water Treatment

The marine division of Germany's ACO Group, ACO Marine, will be attending SMM this year, where the water treatment specialist will officially unveil two completely new vacuum toilet systems, developed specifically to meet the requirements of the passenger ferry and cruise ship sectors. The supply and installation of toilets, urinals, interface valves and all associated pipework, marks ACO Marine's entry into this market segment, and thus closes the company's wastewater treatment loop. ACO Marine can now supply the complete ship sanitation package, from the toilet via the treatment process using its Clarimar and Maripur systems, to discharge overboard, and all the pipework, drainage systems and valves in between.

Company: Alfa Laval
Booth: A1.226
Products: Focus on lifetime vessel performance
(See photo on top of page)

Equipment from many of Alfa Laval's seventeen product groups for vessel performance will be on display at the stand, including flagship systems like Alfa Laval PureBallast 3 and Alfa Laval PureSOx. More importantly, Alfa Laval experts will be on hand to discuss the ways Alfa Laval equipment, knowledge and services combine to achieve customer goals throughout the vessel lifetime.

Company: aqua-tools
Booth: B.544.2
Product: B-QUA BWT test kit

French water microbiology specialist aqua-tools will present its B-QUA ballast water testing kit. B-QUA adopts a pioneering bioluminescence methodology called ATP2GTM to monitor Adenosine Tri-phosphates (ATP) in the ballast water. It is capable of analyzing, in less than one hour, all three factions (bacteria, >10 to <50µm and >50µm) required of the IMO Ballast Water Convention's D2 Standard.

Company: ChartCo
Booth: B6.211
Product: ChartCo OneOcean

ChartCo will introduce an upgraded version of its flagship software, Passage Manager at SMM 2018, as well as announcing a completely new eNavigation and compliance platform, which represents a significant development for shoreside operations and fleet management as well as onboard crew. All the key functions and content of the previous version of PassageManager have now been fully integrated enabling users to access information in one place. An ENC can now be overlaid with all the critical content required for passage planning purposes, without the user having to switch screens. A completely new feature within the ChartCo OneOcean platform is the incorporation of data from ChartCo's market leading environmental solution, EnviroManager, which help crews comply with both MARPOL and national regulations.

Company: CM Technologies GmbH
Booth: A3.204
Product: New Performance Indicator to save fuel

The PREMET X measuring device presented by CM Technologies GmbH makes it possible to pre-cisely determine the cylinder pressure at every cylinder position, the actual injection and ignition timing, as well as other aspects of the combustion process. Based on the results, the injection can be optimized and fuel consumption reduced. Furthermore, nearly all wear processes can be monitored and maintenance planned accordingly. Innovative sensors from Kistler Switzerland are used for maximum reliability, making it possible to measure pressures up to 350 bar.

lso includes a sensor that detects the exact angle of the crankshaft. "This is particu-larly useful in the context of fuel savings. If the combustion is just 1° late, consumption increases by about two percent," argues Winkler. Optional for all versions is an acoustic emission sensor, which makes it possible to also monitor the injection process and the valve control.

CM Technologies has equipped the device with a shock-absorbing cover to prevent damage caused by falls, especially considering the harsh environment on board.

In the unlikely event of a failure or if the device needs to be calibrated, the company offers comprehensive calibration and repair services.

Improving First-Time Quality of Ship Design

Reducing shipyard engineering rework man-hours by 50%

Auros Knowledge Systems was recently selected as a major participant in a National Shipbuilding Research Program (NSRP) project to significantly improve first time quality of ship design, with a reduction in engineering rework of up to 50% and a 10% reduction in development lead time.

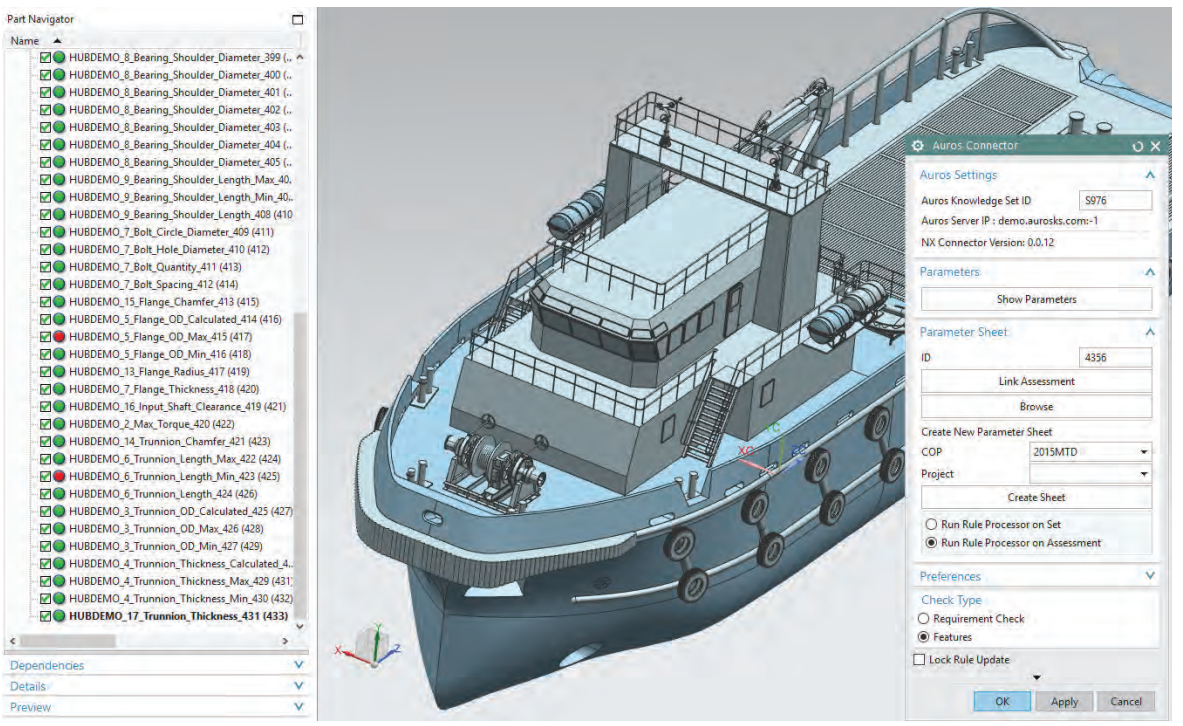
Ship Design and Engineering Challenges

Shipyard time studies have documented that only 16% of the shipyard engineer's time is spent on "value-added" activities because most of the engineer's time is spent trying to locate, manage, filter, vet, and validate useful information. In today's world, the ship designer and engineer face expanding complexity of systems, increasing requirements, more schedule constraints, and the challenge of ensuring design producibility. They rely on standards and input buried in manuals, scattered among excel spreadsheets, individual files, and hiding in the minds and experience of their peers.

As a result, recurring mistakes are made resulting in increased costs, missed design optimization opportunities, rework, and schedule delays. Continuing this passive approach to knowledge management and delivery in the ship design process fails at supporting the increasing complex needs of shipbuilding programs and introduces significant financial and schedule risk.

The Vison for Shipyards

As one of the NSRP project technology participants, Auros will address the inadequacy of today's management and application of knowledge (best practices, lessons learned, requirements, and standards). The NSRP project, titled "*Knowledge Provisioning to Improve First-Time Quality of Ship Design*," will utilize the Auros system to automate the provisioning of information at each step of the ship design process as the designer/engineer progresses through the flow of work. It will ensure relevant knowledge and information is readily available in a "digestible" format at the exact time the information is required to make quality design decisions and perform engineering activities.



Auros allows users to access and incorporate knowledge directly into their workflow.

Auros is designed to integrate within existing engineering workflows through multiple channels including CAD and web-based engineering interfaces. The NSRP project includes the development and implementation of a CAD connector to the ShipConstructor CAD system to provision technical knowledge within the engineering design processes automatically.

This CAD connector will provide bi-directional technical knowledge transfer for provisioning of the technical knowledge to the CAD designer as the designer works within CAD. Compliance and non-compliance events will automatically be designated within the ShipConstructor interface as represented in the figure above through green and red status icons. Throughout the process, Auros assesses the application of the knowledge and documents whether the design is compliant while providing traceability of the design evolution.

Booth: B1.EG.213
At SMM 2018 in Hamburg, Iver C. Weilbach & Co. A/S debuts WENDIS Viewer, a Digital Platform for Nav Services

Cobham SATCOM
Booth: B6.407
Product: Sailor VSAT
Cobham SATCOM will show its software-controlled maritime antenna systems, including a new 1 meter Ku-band SAILOR VSAT solution. Cobham SATCOM will demonstrate that its position as a single supplier of antennas for all major satellite networks and services, combined with a harmonised procurement, global delivery, installation and support strategy, and competitive lifecycle costs enables it to optimise the value chain for service providers and end-users. Additionally, with the commercial service launch of Iridium Certus forthcoming, Cobham SATCOM is also highlighting the SAILOR 4300 L-band terminal at SMM.

Company: Evoqua
Booth: B.544.2
Product: SeaCURE BWT
Evoqua will showcase its type approved electrochlorination-based SeaCURE ballast water treatment system. The company unveiled a remodelled, compact SeaCURE unit last year as a skid-mounted, plug-in-and-play ballast water treatment system that is 76% smaller and 85% lighter than existing electrochlorination-based systems. Mounted on a 2m x 1.5m, easy to install skid. It is one the of smallest ballast water management solutions available capable of treating flow rates of up to 6,000 cu. m./hr. SeaCURE BWMS can be configured to work as a vessel's marine growth prevention system, protecting against the build-up of biofouling in seawater in critical machinery and cooling systems.

Company: FuelSave
Booth: A5.515
Product: Fuel Consumption Reduction
Germany's FuelSave will present its fuel consumption reducing technology, FS Marine+. FS Marine+, introduced to the market in June this year, is a novel solution aimed at optimizing the fuel consumption efficiency of all marine diesel engines. The technology is offered with a contractually guaranteed 10% saving on overall fuel costs. The technology also significantly reduces CO2, NOx, and Particulate Matter (PM) emissions, through a cleaner and cooler combustion process.

Company: Hydrex
Booth: B7.505
Product: Dredging innovation
Hydrex will unveil a new concept developed to protect the marine environment from the spread of contaminated sediments during dredging operations. The novel solution is designed to contain the sediment plume when the seabed is disturbed, to avoid any underlying contaminants from entering the water column or food chain. Company specialists will also be available to go into detail about how the underwater hull cleaning in January this year of an Ecospeed-coated hull of a 23,539dwt general cargo ship was in perfect condition after almost eight years of continuous operation. All the Ecospeed-coated areas of the hull, across the mid, stern and bow sections had zero biofouling.

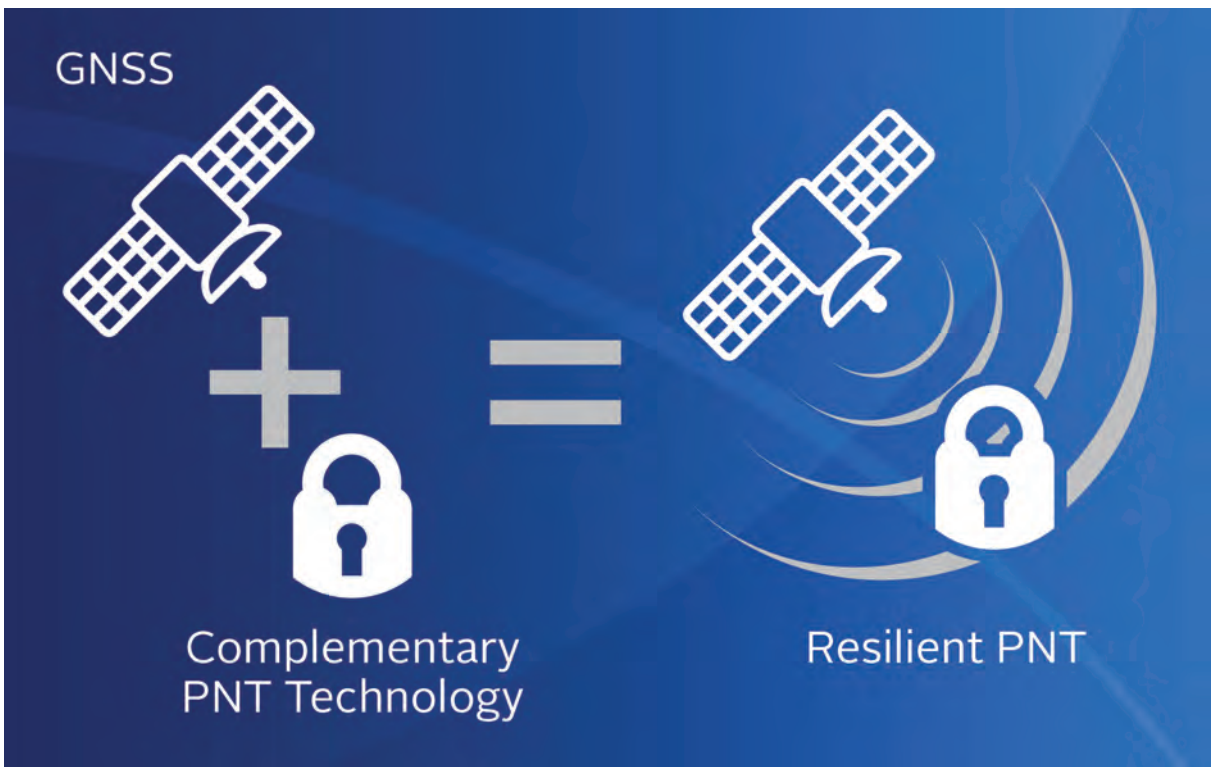
Company: Iver C. Weilbach & Co. A/S
Booth: B1.EG.213
Product: WENDIS Viewer: Digital Platform for Nav Services ***(See photo on top of page)***
At SMM 2018, Danish supplier of nautical charts Iver C. Weilbach & Co. A/S is launching a digital platform – WENDIS Viewer – with multiple navigation services that is designed to reduce administrative costs. Iver C. Weilbach & Co. A/S has upgraded its digital platform WENDIS Viewer by integrating ADMIRALTY e-Nautical Publications (AENP) from the UK Hydrographic Office (UKHO). One of the features where WENDIS Viewer excels is in the integration of the UKHO's ADMIRALTY Information Overlay (AIO), which displays ADMIRALTY Temporary and Preliminary Notices to Mariners (T&P NMs) and ENC Preliminary Notices to Mariners (EP NMs) on top of Electronic Navigational Charts (ENCs). In addition to ensuring accurate data on board the vessel, that data can be shared between vessels as well as between a vessel and the land-based office.

Don't *Always* Believe Your Eyes – is your Bridge Resilient to Spoofing & Jamming?

Positioning and timing have been the foundation blocks for navigation since man first took to the oceans. Since the development of the Global Navigation Satellite System (GNSS) in the late 1970s, position, navigation and timing (PNT) based on satellite input has been vital to many critical systems on board vessels, allowing receivers to determine location to a high-degree of precision using time signals transmitted from space. The commercial maritime industry relies on trustworthy PNT in transport infrastructure, ECDIS navigational sources, communications, search and rescue applications, fishing operations, regulation and increasingly to support digitization and vessel automation.

Intentional interference can be the denial of access to satellite signals or jamming, so your vessel's ECDIS can't determine its exact location. Spoofing, also known as advanced jamming, is the creation of additional signals that provide misleading PNT information, so the vessel's ECDIS position or time reference is no longer accurate.

UK Government research in 2017 identified that a five-day loss of GNSS would cost the UK maritime economy over a billion pounds, highlighting the fundamental value of the signal in core marine operations, and the growing realisation that GNSS as a source of PNT needs to be both protected and irrefutable. This realisation of the importance of GNSS has led to the birth of what is now known as Resilient PNT

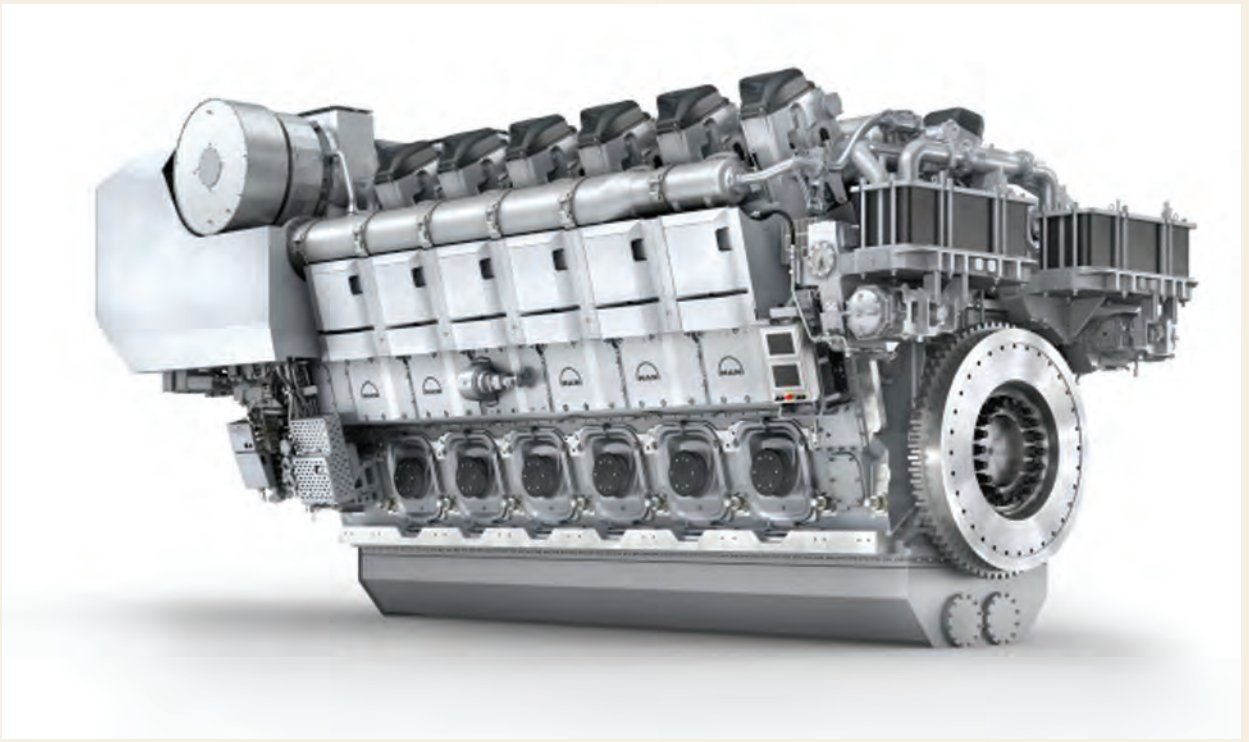


Resilient PNT is the convergence of traditional positioning, navigation and timing technology with non-traditional and emerging technology to improve the reliability, performance and safety of mission-critical applications, where discrepancy in data accuracy, availability and stability can impact the safety, security and economic viability of vessels at sea. Resilience offers vessel's EDCIS systems positioning and timing information it can trust, by detecting vulnerabilities, authenticating signals and offering alternatives to existing PNT sources.

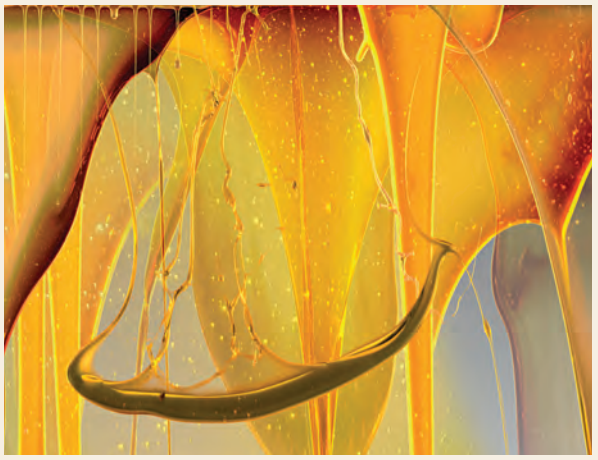
Navigation Protection Devices (NPD), such as Orolia Maritime's Broadshield, monitors GNSS receptions, analyses the signals and alerts the pilot on the bridge to navigational discrepancies, independently of the vessel's navigation system

Typical detection scenarios include, the NPD activates on the presence of additional signals in the GNSS band or anomalous behaviour of the signal; it determines its navigation solution does not match the ship's GNSS guidance solution due to equipment malfunction or malicious signals; or it identifies that the navigation solution differs from the GNSS constellations and its' alternatives sources.

Orolia Maritime is a global leader in resilient position, navigation and timing and will be demonstrating its latest solutions at this year's SMM exhibition in Hamburg. Learn more about Orolia Maritime's new Navigation Safety Solutions at SMM stand B6.402. Book your 1-2-1 now, email **oroliamaritime@orolia.com**



Booths: A1.13, A3.200 & A3FG.3
At SMM 2018 in Hamburg, MAN Energy Solutions will focus on future themes and new hardware on its stand,



Company: Klüber Lubrication
Booth: A3.309
Products: New EALs
Klüber Lubrication is presenting a whole series of new products for on-board applications at SMM 2018 with the motto "Plain sailing even in rough seas". The showcase focuses on extending the product portfolio to include EALs (environmentally acceptable lubricants). These include new special greases for wire ropes, high-performance synthetic gear oils and rolling bearing greases. On example is the new EAL Klüberbio AM 92-142 has made its mark on the industry, thanks to its excellent wear protection, exceptional adhesion and good water resistance, reliably protecting steel cables against corrosion, even when they come into contact with sea-water.

Company: Kongsberg Maritime
Booth: B6.104
Product: Digital transformation and autonomy
Kongsberg Maritime will show innovations in its operational, digital and seaborne transportation systems including autonomy and hybrid solutions at SMM 2018. Additional highlights include new technology for LNG/gas powered vessels, integrated ocean science and condition monitoring.

Kongsberg has taken a position at the forefront in maritime digital transformation with Kognifai, an open, collaborative digital platform designed to improve integration between information technology and operational technology by optimizing data access and analysis using applications developed by KONGSBERG and uniquely, certified third-party developers. Kognifai and Digital Twins are an important developmental and operational component of autonomous systems such as those being developed by Kongsberg for the Yara Birkeland, the world's first autonomous, all-electric, zero emissions container vessel.

Company: KS Kolbenschmidt GmbH
Stand: A4.309
Product: Pistons & Bushings
KS Kolbenschmidt GmbH is displaying various-design pistons for the international large-engine market with diameters extending from 150 to 640 mm as well as pistons for present-day dual-fuel power units. Co-exhibitor is the affiliate KS Gleitlager GmbH with bushings for diesel and gas engines along with bearing elements for non-engine uses.

Company: MAN Energy Solutions
Booths: A1.13, A3.200, A3.FG.3
Products: New Hardware to support Decarbonization, Digitization Trends
(See photo on top of page)
At SMM, MAN Energy Solutions will focus on future themes and new hardware on its stand, which will present itself in a totally new livery in accordance with the company's recently unveiled, new corporate design.

A new departure for MAN Energy Solutions at SMM this year is the introduction of its Vision Talk Box that will bring together a group of experienced panelists from across the industry to take part in exclusive debates on stand. The company is using SMM to further its decarbonization agenda by presenting new dual-fuel engines. The two-stroke business unit will be promoting its new ME-LGIP dual-fuel engine, aimed at decarbonization and the growing LPG (Liquid Petroleum gas) sector. MAN Energy Solutions' Four-Stroke interests will also be represented by the new MAN 45/60CR engine. The marine unit is initially available as 12V/14V versions with 15,600 and 18,200 kW power outputs respectively, while the land-based version is available as a 20V45/60 unit that can deliver 26 MW, the most powerful four-stroke engine ever built. Additionally, MAN PrimeServ, the company's after-sales division, is using SMM to advance the decarbonization vision through, among other possibilities, the promotion of its retrofit service that converts existing, HFO-burning engines in the field to dual-fuel operation.

Company: Marlink
Booth: B6.415
Product: Cyber Security
Marlink plans to unveil a unique approach to cyber security in Germany. The company is harmonizing its existing cyber-security portfolio, which already provides high levels of protection on its global multi-band network with solutions like SkyFile Anti-Virus, firewalls on board and ashore, and remote IT access with soft-

Ecochlor BWMS: Superior Service Assists Shipowners in Regulatory Compliance

According to the U.S. Coast Guard's annual report, there are a growing number of compliance deficiencies in Ballast Water Management (BWM) Plans and inspections because the crew is not properly trained to operate the system on their vessel.

Ecochlor views training and post-installation service just as important as the installation and commissioning. The training process begins during the vessel's shipyard period with focused efforts near the completion of installation and commissioning. Training beings with classroom instruction headed by an expert technician explaining the operation of the system and safety procedures. Hands-on training is handled during the commissioning, along with additional instruction for the crew at the first ballast operation.

"We make an effort to attend the first full ballasting operation of each vessel following the installation of the Ecochlor BWMS. This gives us an opportunity to provide additional crew training, further observe the system operation and close any open issues," said Max Hasson, Ecochlor Service Manager.

For crew training requirements beyond the first ballast operation, Ecochlor offers an interactive software training program which can run on the ship's computer and is available in varying levels of detail. In addition, Ecochlor plans to open a Training Center in North Haven, Connecticut, USA in the fourth quarter of 2018. At this site, Factory Acceptance Testing (FAT) is performed allowing students to see the BWMS in operation. In addition to observing the system during FAT, there will also be a Human Machine Interface (HMI) simulator training room that will replicate the real-world operation of the Ecochlor BWTS on the vessel.

The realistic scenarios and equipment will allow for crew members to practice in a classroom environment while mastering the elements involved with running an Ecochlor BWMS in an effort to reduce on-the-job errors and comply with BWM Plan regulations.

Ballasting Operation Communication and Maintenance

The Ecochlor Service Group has grown considerably in the last 18 months with the expectations that it will be the largest group in the company by the end of 2019. While our system requires very little periodic maintenance, keeping open channels of communication with the Ecochlor Service Team are an important factor to the ship's crew. There is an international Customer Service Call Center that is available 24/7 for service needs.

Ballasting operations are tracked through a Functional Monitoring Data Sheet (FMDS) that summarizes critical data sets of the Ecochlor BWMS. This information is sent via the ship's crew to the Service Group after each operation and distributed on a weekly basis to the engineering team and senior management at Ecochlor for review. If anyone notices any irregularities in the data, or if the crew has concerns, they are immediately addressed through remote troubleshooting or by a ship board visit. This same information is also required for the BWM Plan and VGP compliance so it does not require additional efforts on behalf of the crew.

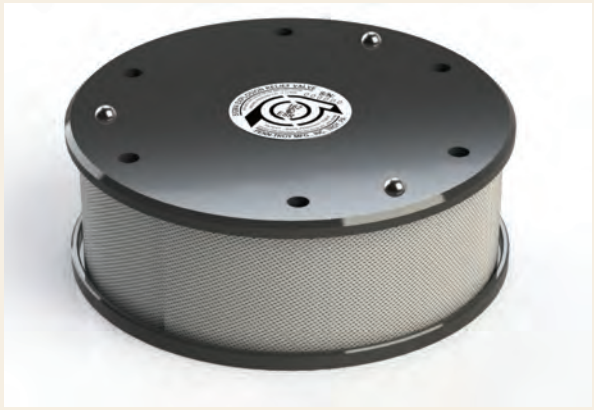
Ecochlor strongly believes that it is vital that during the retrofit that our experienced installation team is working at the dry dock alongside the shipyard, superintendent, engineering integrator and crew to ensure that the ballast water treatment system is installed properly and operating effectively at commissioning. Our company philosophy is that the sale and installation of an Ecochlor system begins a relationship with the shipowner and operator that will continue through each ballast operation on the vessel for the life of the vessel.

NavalDome
maritime cyber defense solutions

ware management and monitoring using the KeepUp@Sea platform. Marlink's current cyber-security portfolio will be augmented with a new layer of defenses based on a real-time maritime focused threat detection platform, designed to provide even deeper net-work security. Marlink has partnered with cyber-security industry experts to develop its new integrated platform, which is expected to deliver a step-change in the way the shipping industry defends itself against cyber-crime, helping to improve not only safety, but reduce the risk of data-theft and resulting financial penalties.

Company: Naval Dome
Booth: B1.138
Product: Cyber Security

Naval Dome, an Israeli-based manufacturer of a cyber protection system, will attend SMM for the first time this year. Earlier this year, the company's defence system was selected to protect 55 Stamco-operated Pure Car and Truck Carriers (PCTC). Naval Dome will install the security system onboard the vessels' bridge, navigation, communication and machinery control systems to deliver maximum, multi-layered protection from any existing or future cyber security threat. Naval Dome's cyber defence technology, which can be installed on multiple ship systems, uses intelligence agency security technology to prevent internal and external cyber-attacks with minimal human intervention.



Company: Penn-Troy Manufacturing
Booth: A2.241
Product: BICERA Sigma Crankcase Explosion Relief Valve

Penn-Troy Manufacturing's new BICERA Sigma Crankcase Explosion-Relief Valve is significantly smaller and lighter than existing valves. Current (162-mm-diameter, valve-opening) explosion relief valves, at a little over 12 inches in overall diameter (317 mm), are about the size of your car's steering wheel and weigh 24 pounds. At just over 9 inches in diameter (233 mm) and weighing just 13 pounds (6kg), the BICERA Sigma is substantially smaller and lighter. Not only does the BICERA Sigma take up less space on the engine, but, being almost 50% lighter and 25%

Marine OEMs worldwide improve reliability with Altra's innovative power transmission products

The companies of Altra Industrial Motion utilize advanced technologies and materials together with extensive application expertise and world-class engineering capabilities to provide highly reliable clutches and brakes, couplings, pump mounts, gear drives, belted drives and more.

Preferred by marine OEMs worldwide, Altra products are designed to provide dependable performance for critical applications in challenging marine environments.

Andy Smith, Altra Marine and Offshore Systems Market Manager, said: "As a leading multinational designer and producer of a wide range of electromechanical power transmission equipment, we are able to offer our commercial and naval marine customers highly engineered solutions for applications where reliability and accuracy are necessary to avoid costly downtime and assure safe operation and consistent performance."

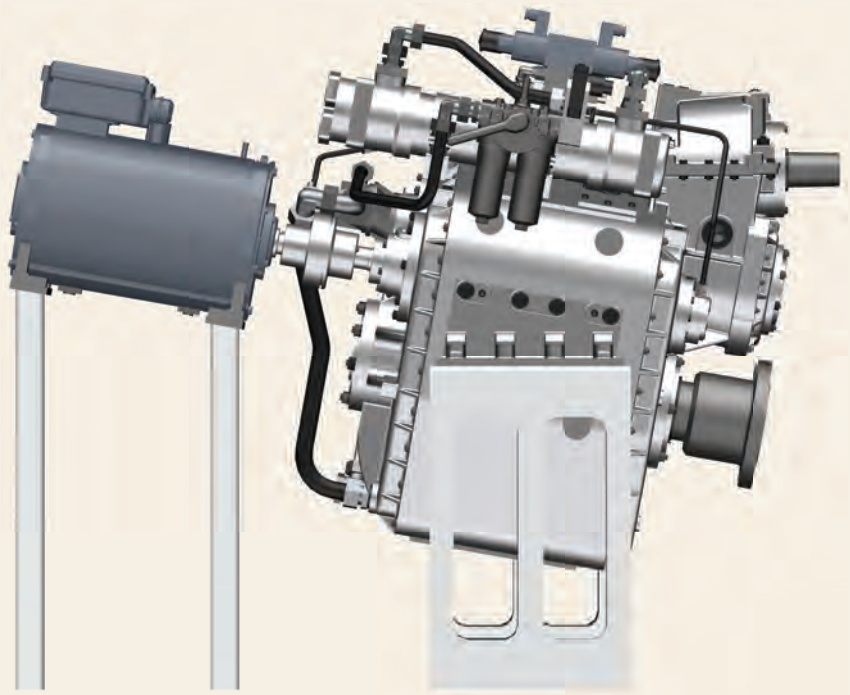
Wichita Clutch and Industrial Clutch are well-recognized in the industry for superior marine solutions, including low inertia, standard vent, and LKM clutches along with wcbAquaMaKKs, LI-SSB and HBS brakes. Matrix offers oil-immersed, multi-disc clutches and brakes designed for in-gearbox installation. All these products are widely used on propulsion drives, anchor handling & mooring winches, fire and dredge pumps, and cranes and hoists.

Ameriflex® couplings, Amerigear® couplings and Americarden universal joints from Ameridrives, along with high-performance Turboflex couplings and cost-effective Torsiflex couplings from Bibby Turboflex, are popular choices for main propulsion drive shafts, pumps and compressors. Most of these custom-designed, lightweight couplings are capable of transmitting high torques at high speeds while accepting significant angular, radial and axial misalignment.

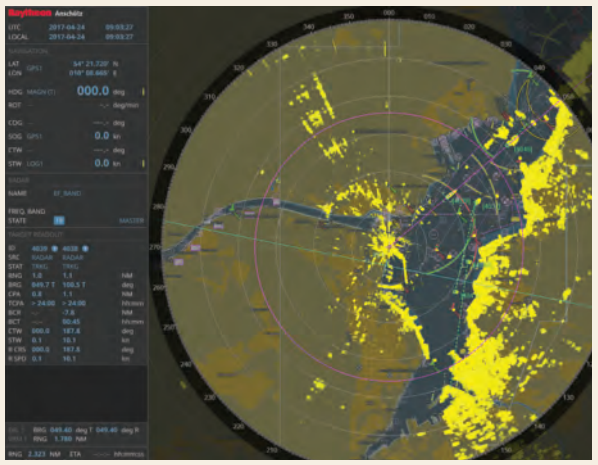
Twiflex and Svendborg Brakes provide a variety of direct, pressure-applied caliper brakes for dynamic stopping and holding functionality on propulsion shafts and mooring winches. Compact floating solutions for limited space and axial shaft movement are also available. Twiflex also offers robust, compact caliper brake solutions for podded and azimuth drives.

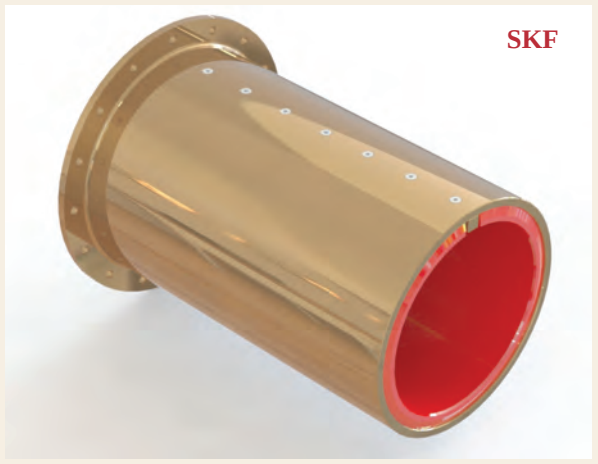
The Twiflex Turning, Locking and Braking (TLB) system is designed for use on marine vessels where there is a need to rotate and hold the propulsion shaft during maintenance. When in dock, the brakes are used to stop the shaft when the propellers rotate due to flow stream. Once they are stationary, the locking device is used to secure the drive.

Stromag Vector® and Periflex® couplings provide superior performance on propulsion systems, winches, and dredge pumps. Guardex, Superflex, FH and Fusaflex flywheel couplings from Guardian Couplings are often found on lube, bilge and cooling pumps as well as fire and dredge pumps. Guardian E Series mounts are utilized on shipboard compressors.



Booth: A4.207
At SMM 2018 in Hamburg, Reintjes will focus on its down angle gearbox.





SKF

smaller, it's cheaper to ship, as most applications require multiple valves per engine. The smaller size of the BICERA Sigma means there's more space for other engine design considerations, without concern about interference. The valves also occupy less space in inventory. Finally, their lower weight and smaller size make the valves easier to handle. As a final point, replacement is simple, as existing valves can be directly replaced with the BICERA Sigma without making any other changes.

Company: Radio Holland
Booth: B6.301
Product: Furuno Partnership, Radar, Service, BWT
Radio Holland, known for its global service network, shows its network at SMM as well as new developments and innovations in its network. Most important themes at the Radio Holland stand

• The 55-year partnership between Radio Holland and Furuno. On show also the latest FURUNO FAR-22x8/23x8 series, including ECDIS FMD3200 and the Furuno Voyager Bridge system

• The Global Service Network, latest innovations in service calls, class surveys, remote monitoring and showcasing examples of the growing number of partnerships with customers in cost-saving Managed Service Agreements

• Latest Hatteland innovative maritime displays, Danelec VDR solutions, Cobham Sailor 3965 firefighting portable radios and the VSAT V-600, Skipper speedlog DL2, Thrane Iridium LT3100.

Company: Raytheon Anschütz
Booth: B6.304
Product: New Radar NX Software
Raytheon Anschütz offers a new navigational radar and chart radar software. It is designed with an intuitive user interface and a smart range of scalable functionality characterize the new Synapsis Radar NX application. With the new radar and chart radar application, Raytheon Anschütz completes the Synapsis NX series of innovative bridge navigation systems. The optimized grouping of data and current settings provides operators with clear situation awareness. In addition, the quick access bar makes the most often used operations and functions available at a fingertip. Operators benefit from a superior non-distracted overview, situation awareness and a fast interpretation of the radar picture.

Company: Reintjes
Booth: A4.207
Product: Down Angle gearbox
(See photo on top of page)
The Down Angle gearbox series WVSA which has been exhibited by Reintjes at SMM 2016 for the first time will be presented at this year's leading maritime trade fair as a "developed to the next level" product. Reintjes will display a ZWVSA 440 U HS06. In collaboration with customers Reintjes upgraded its Down Angle construction, which enables a horizontally installation of the diesel engine while the propeller shaft is sloped downwards, by adding even more customer specific details. The product naming ZWVSA 440 U HS06 exactly stands for:

Z: Zweigang (two speed gear)
W: Wende-Leichtgetriebe (reverse reduction gear in light weight design)
V: Achsversetzt (offset between input and output shaft)
S: für schnelle Schiffe (for fast vessels)
A: in Down-Angle-Ausführung (in Down Angle design)
440: Achsabstand (center distance in mm)
U: Antrieb und Abtrieb auf derselben Seite (input and output shaft on same side)
HS: Hybrid System (Hybrid system included)
06: 60 kW E-Motor (60 kW electric motor)

Company: SKF
Booth: A1.210
Products: Four New Products to Launch
SKF will showcase a range of new products that help owners and operators comply with present and future environmental regulations, as well as help them improve maintenance processes and performance. SKF will launch four new products, including:
• SKF's new environmental-friendly shaft line solution – Simplex BlueRun.

HOW LONG DOES A FAST® LAST?

Type II MSDs should include long-term performance requirements. For 40+ years, Scienco/FAST provides long-term, advanced, wastewater treatment systems and technical support.

In 2011, one of the first MarineFAST® Marine Sanitation Device (Type II MSD) units ever sold was retired after 38 years of continuous commercial marine service. The customer then promptly replaced it with another MarineFAST unit.

The FAST® (Fixed Activated Sludge Treatment) process actually in the real world and not just in land certification tests without filters, membranes, microprocessors, adjustments, gimmicks or trained operators. It is a submerged fixed film aerobic sewage treatment process. There are no adjustments and performance does not depend upon the skill of the operator. The process can handle any combination of blackwater, graywater, ground food waste, freshwater, seawater, vacuum toilets and conventional toilets.

HOW IT WORKS:

1. In the tank, fixed media is submerged beneath the surface of the water in the treatment tank.
2. A microbial film grows on the surfaces of this fixed media and uses the incoming organic matter in the sewage as "food" to remove from the water.
3. Oxygen is provided by an aeration blower to keep this microbial population aerobic and active.
4. The resulting "effluent" is clear odorless water with high oxygen content and exceeds any known effluent standard worldwide.

There are no moving parts in contact with sewage and no adjustments. Clogging is virtually impossible and proper operation does not depend upon the skill of the operator. In the July 2011 official testing for MEPC.159(55) and without filters or membranes of any kind, a standard FAST Model L-3XM produced:

- BOD5 = 4.1 mg/l versus 25 required.
- TSS = 5.8 mg/l versus 35 required.
- COD = 30 mg/l versus 125 required.
- Coliform = 4 versus 100 required.

The result is a much lower sludge accumulation rate than other units. Also, the sludge is heavier and more concentrated than that obtained from any suspended growth system, including membrane bioreactors (MBR's). One byproduct of this biological oxidation process is carbon dioxide which is vented to atmosphere. Another byproduct is a fine residual sludge of partially oxidized organic material that settles into a storage compartment at the bottom of the tank.

For marine and offshore applications, this effluent is disinfected and then discharged to the surrounding waters. Unless otherwise specified, design and construction of standard marine sewage treatment units shall follow basic guidelines for correct sizing and installation. All standard FAST units are certified for installation on USCG inspected vessels. This not only insures safe and high quality equipment, it also recognizes that as regulations change previously uninspected vessels are increasingly becoming USCG inspected vessels.

When vessels are scrapped, it is not unusual for operators to remove the FAST units and transfer them to newly purchased vessels. Older units can be easily be updated and upgraded as required to meet the newest regulations. All claims for the FAST process and for FAST sewage treatment systems are supported by more than 65,000 installations worldwide and over 40 years of research, development and real world operating history.

Booths: B6.124
At SMM 2018 in Hamburg, Sonardyne will present its Navigation and Obstacle Avoidance Sonar (NOAS).

• SKF's EcoMode, software to ensure optimized fin stabilizer operation
• Turbulo SolidMaster, a filtration unit that precedes an oily water separator and mechanically removes suspended solids in the bilge water.
• Turbulo HycaLogger, an electronic tool/log book to log raw data of the oily water separator i.e. all oil discharges from the oily water separator.

Company: Sonardyne
Booth: B6.124
Product: Sonardyne's NOAS system
(See photo on top of page)

With vessel activity in poorly or uncharted waters on the rise and reports of satellite signal spoofing becoming more frequent, UK-based underwater technology company Sonardyne Inter-national Ltd. is bringing technology designed to close the gap in a captain's situational awareness. NOAS (Navigation and Obstacle Avoidance Sonar) is a forward looking sonar that paints a 2D or 3D high resolution picture of the seabed and water column ahead of a vessel to identify naviga-tion hazards. Mounted in the bow of the vessel, the system's sonar arrays can detect wrecks, rocks, reefs, sand banks and floating objects at very long ranges, alerting crew so that avoiding action can be taken. Sonardyne has chosen this year's SMM to preview an expanded NOAS product lineup. The sys-tem that's been available to naval vessels, commercial ships and very large private yachts, is being joined by a second model that is half the size and weight of the original yet possesses col-lision detection capabilities that are equally impressive. The move is expected to enable a wid-er fleet of vessels to install or retrofit NOAS collision avoidance technology.

Company: Thordon Bearings
Booth: A4.124
Product: Shaft bearing & seals

Thordon Bearings will present its propeller shaft bearing and seal systems, COMPAC and SeaThigor. Thordon will also use the SMM platform to announce a pioneering new development in seawater lubricated shaft bearing technologies. Although this major development currently remains under wraps until the event, Thordon will also release the findings from its research paper Our Future, Our Ocean. Key figures from ship owning companies and environmental agencies will also be available to discuss the merits and sustainability of seawater lubricated propulsion.

Company: transfluid
Booth: B2.3G. 324
Product: Tube Processing System

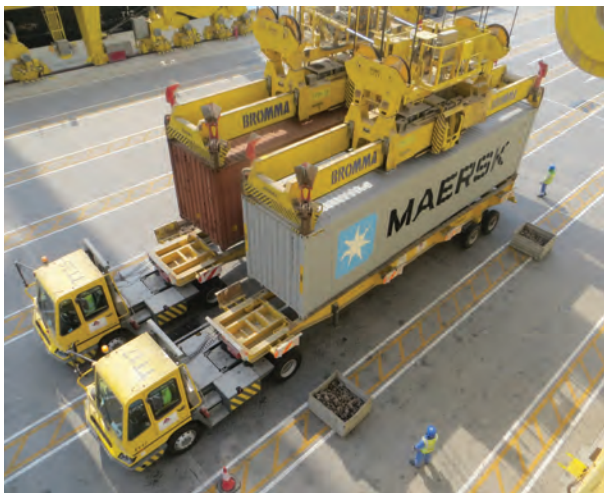
The transfluid software is said to improve mobile processes and high-performance bending machine for large tubes offer up to 60% time savings, bending tubes with a diameter of up to 400mm faster.
According to the company, it is possible to achieve much simpler and much cheaper tube processing, when the flanges are welded onto the straight tube beforehand, because the welding process is considerably faster at that stage. With the internal connection to the CAD programs, the 't project' bending software can process the isometrics immediately. Flanges can be chosen from a database and integrated in the isometrics, also in terms of bending technology. With the directional bending of the flanged tubes our solution is able to improve the flexibility of the manufacturing.

Company: V. Group
Booth: B3.EG 105
Product: Digital Transformation

Cut Commercial-Manager-Position-List
Digital transformation and mobility are in focus for London-headquartered global marine services provider V.Group at SMM 2018. The company has taken a position at the forefront of digitalization with the ShipSure 2.0 marine digital platform enabling its clients to access and leverage the power of busi-ness and operationally critical data. ShipSure 2.0 is designed to give V.Group clients more control and transparency across their fleet, with real-time data on the desktop, and uniquely iOS/Android tablets and smartphones anywhere in the world. The objective is to ensure that ship owner teams can leverage data driven insight for decision making on the move, with real-time information from across the operational and business spectrum, from marine technical to safety & compliance, procurement, crewing and finance.

Cheaper and faster bending of large tubes with the 't bend' tube bending technology from transfluid. **Image: © transfluid**

CEO: Qatar's QTerminals To Hit 2 Million TEUs Mark at Hamad Port by Year End



QTerminals, the terminal operating company jointly established in 2017 by Qatar Ports Management Company (Mwani Qatar – 51% shareholding), the national port authority, and Milaha (Qatar Navigation – 49% shareholding), a Qatar-based maritime transport and logistics conglomerate, to manage Phase 1 of Qatar's Hamad Port, expects total throughput, since the start of operations in December 2016, to hit the 2 million TEU mark in the fourth quarter of 2018, its CEO Neville Bissett said. Phase 1 includes a container terminal (CT1), a general cargo terminal, a multi-user terminal for RORO and livestock, and an offshore supply services terminal.

This milestone did not come easy as Qatar continues to counter the challenges of a boycott imposed by some of its neighboring countries. Since the beginning of the boycott, Qatar's only land border was closed, forcing the gas rich emirate to rapidly change its supply chain to maritime and air transport connections. As a result, container and non-container cargo at Hamad Port has more than doubled and the average capacity of vessels calling at the port increasing to an average of 8,000-10,000 TEUs.

Our future target is to handle Ultra Large Container Vessels (ULCVs) of 21,000+ TEU capacity with 400+m length overall and draft of up to 16m. Our equipment selection going forward will be based on these minimum specifications.

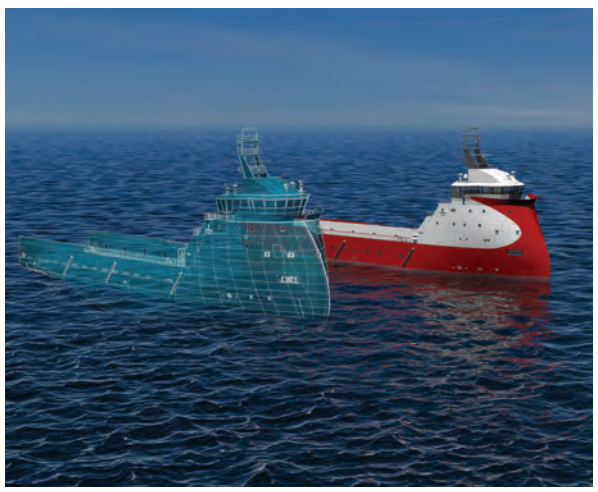
Bissett is optimistic about the future of QTerminals and Hamad Port despite the geopolitical challenges. He said: "Virtually overnight, Qatar has moved from being almost fully reliant on feeder services from other ports in the region to being essentially self-sufficient in maritime transport. It has gone even further by finding new trading partners, and shipping services to Qatar now call direct from exporting countries, making Hamad Port a major main line port. That alone is a commendable feat considering how quickly and seamlessly it was done as everyday consumers did not even feel the impact of the blockade."

Bissett added: "Maersk, MSC, CMA-CGM, Hapag-Lloyd, COSCO, Evergreen, Hyundai, The ONE, Yang Ming & PIL - and major alliances such as 2M, The Ocean Alliance and The Alliance are among several global shipping lines and alliances calling Hamad Port. Additionally, other operators such as Milaha and major feeder operators, including Samudera, Tehama, Simatech and Xpress Feeders, also call at Hamad Port and cater to the Upper Gulf, particularly Shuwaikh Port (Kuwait) and Umm Qasr Port (Iraq). We are fully booked in terms of berthing windows, and we have a berthing average of over 60%."

Company: Royston
Booth: B1.OG.501
Optimal Speed and Efficiency with Ecospeed EFMS Algorithm

Royston has developed a special ecospeed analysis capability as part of its enginei electronic fuel management system (EFMS) to enable ship operators to identify and maintain optimum vessel speeds for efficient fuel usage. Devised with marine engineering specialists from Newcastle University, Royston has developed a new ecospeed algorithm based on speed modelling and an analysis of vessel operating data, correlating and synchronizing information from different sensors installed on the vessel. Ecospeed calculates a unique optimum performance profile for individual vessels by taking into account a range of shipping data including fuel use, speed and distance, as well as sea state, wind speed and current.

This information is gathered during a dedicated sea trial or from a vessel's existing enginei system installation and is used to identify optimum vessel speeds in different conditions to ensure that maximum fuel efficiencies are maintained.



DNV GL
Booth B4.EG.221
@ SMM: Digitalization, innovative technology solutions, and alternative fuels in focus

DNV GL puts digitalization, green shipping, and innovative technology solutions at the focus of its trade fair presence during SMM in Hamburg. Visitors can attend presentations at the DNV GL Forum, a separate area near the East Entrance. Among other topics, DNV GL experts will present a new open simulation platform, guidelines for autonomous shipping, and options to improve cyber security. Link to the forum program. At the DNV GL booth visitors can experience a VR (virtual reality) presentation on how digitalization and innovative solutions further enhance classification services. Another focus area is the assessment of alternative fuels which help the shipping industry to prepare for the incoming global sulfur regulation.

Company: CMR Group
Booth: B6.417
Product: Smart Engine Solutions

A new generation 'smart' engine and IAMCS integrated marine console technologies will be the focus of instrumentation, control and power management specialist, CMR Group's stand at SMM.

The company's range of 'smart' wiring, instrumentation and engineering solutions for industrial, power and marine applications are built around proprietary J-SENSETM technology linked to its range of J1939 Connect CANTM smart sensors and harnesses.

IAMCS microprocessor-based system contain all necessary functions for protection and control of the complete marine ship installation and can be fully integrated with other systems to provide full Vessel Management System capability for craft of all sizes.

Inland Waterway Repower

Recently the owners of the 1989-built bulk carrier Stadt Würzburg, named for the city of that name on the Mainz, made the decision to repower. Designed for the 12-meter wide inland locks the boat is 110 by 11-meters (360.9X36.1-feet) with a 3.1-meter depth. The boat operates under the auspices of MSG Mainschiffahrts-Genossenschaft eG, of Würzburg.

Having had excellent service from the original Cummins main engine, the owners opted for the updated electronic controlled Cummins QSK50-M delivering 1700 HP (1268kW) at 1800 RPM to a Reintjes, WAF 760 marine gear. This powerful combination gives the Stadt Würzburg and the additional barge, that is pushed with a similar size cargo, the power to handle the strong currents that can develop at times on Europe's inland waterways.

THE VISWA GROUP

IMO Sulfur 2020 and the Scrubber Decision

The IMO Annex VI regulations on reduction of sulfur content in marine fuels to 0.1% in ECA (emission control areas) and 0.5% in non ECA regions will be implemented on January 1st 2020. While there are a few options available to ship charterers and owners, the vast majority will be choosing between installing a scrubber and using distillates as the marine fuel. With the projected high differential cost between heavy fuel and distillates, the number of vessels taking up scrubbers is rapidly increasing. This is due to a variety of reasons including very high operating costs if using distillates, quick return on investment using a scrubber, the current buyer's market for scrubbers, existing knowledge of using heavy fuel and the need for global compliance.

What are factors that should be considered when making the decision on the right scrubber manufacturer? The decision should be made using a long-term view as an end goal. The factors should include design, materials and dependability of these materials, knowledge of potential problems and ways to counter them, ease of installation, price and return on investment, reliability and automation of the unit and ease of retrofit (for the older ships) and technical support.

Founded in 1991, Viswa is dedicated to providing the highest quality and value for energy and emission reduction solutions to the Marine industry. Viswa Scrubbers™ was created to meet the needs of our customers.

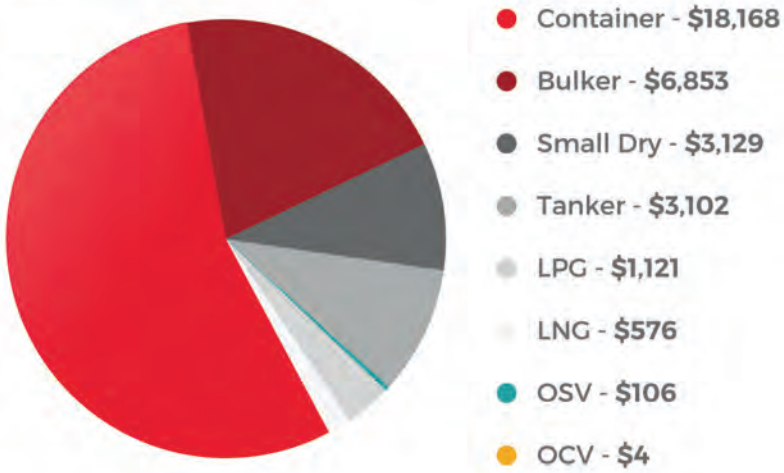
After spending 3 years on a vertical scrubber design, Viswa Scrubbers chose to innovate a unique horizontal design which offers many advantages such as lower foot print, lower weight, skid mounted design, ease of installation, reduced immobilization time, ease of service and problem solving and if necessary, even the ability to remove the scrubber.

Viswa Scrubbers are made of the highest quality material and are fitted with highest quality instruments and components. Viswa Scrubbers also offers a shorter manufacturing time, multiple locations for manufacture and installation, a dedicated and professional team with expertise in Marine engineering, Chemical engineering, IoT and Electronics. In addition to a11 this, Viswa Scrubbers has the additional advantage of being connected to an Energy Efficiency Management System (VEEMS) that can organize, systematize and manage the ship engine, hull, trim and fuel oil consumption and reporting (IMO MRV starts January 1st, 2019). Combining an innovative design, highest quality and value, with an Energy Efficiency Management System and a single loT platform, Viswa Scrubbers is working towards a simpler, safer, and greener world **for the mariner.**

BEST AND WORST 2018

GERMAN FLEET

GERMAN FLEET BY VALUE (USD M)



TOP 5 GERMAN OWNERS BY VALUE (USD BN)

1. Hapag Lloyd	$4.80
2. Oldendorff Carriers	$2.61
3. Hamburg Sud	$1.77
4. Schulte Bernhard	$1.65
5. Offen Claus-Peter	$1.61

GERMAN FLEET AGE PROFILE

DELIVERY DATES	VALUE USD M	NO. OF VESSELS
On Order	$1,426	77
0-4	$8,249	244
5-9	$13,710	864
10-14	$7,562	795
15-19	$2,004	372
20-24	$506	156
25-29	$94	42
30-34	$18	24
35-39	$9	11
40+	$3	10

Grand Total = $33,581

GERMAN S&P ACTIVITY (USD M)

info@vesselsvalue.com
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July 2018

Vessels Value

DIGITAL TOOL BRINGS SIMPLICITY AND WORKFLOW EFFICIENCIES TO ENVIRONMENTAL COMPLIANCE

By Alexandra Anagnostis-Irons, President, Total Marine Solutions

Environmental compliance can be a great challenge at sea. With thousands of international, national, regional, port and company regulations involved in environmental compliance, staying current with regulations is time consuming and difficult. Enhanced attention by regulators has brought severe penalties and fines on maritime companies in the last several years. As an environmental compliance solutions company, our clients have been asking for a tool to make compliance simpler and more efficient onboard. Recognizing that the marketplace lacked a tool comprehensive enough to handle the complexities of the global regulatory environment, Total Marine Solutions collaborated with Brenock to build Ocean Guardian.

Ocean Guardian uses a vessel's GPS position and matches it to a comprehensive, proprietary global database to provide immediate access to applicable regulations anywhere in the world. A simple red, yellow and green system allows operators to immediately understand which waste streams are permissible to discharge, while click-of-a-button access to actual regulations provides additional details, guidance and insight when necessary. Voyage planning capabilities allow vessels to quickly and easily plan for discharge when unexpected events arise.

Regulations are input to the database by maritime professionals and are vetted by a third-party maritime law firm before being activated. International, national, regional and port information is included in the database. The system also allows companies to input company policies and regulations for discharge of waste streams. By removing the need for referencing numerous manuals and printed updates, Ocean Guardian significantly improves workflow efficiencies onboard, allowing crew to spend time on other tasks. The enhanced efficiency benefits of Ocean Guardian improve communication for decisionmaking, leading to better outcomes and safer vessels.

Customer service is always a top concern with digital tools being used in challenging environments. Like our traditional line of business, Total Marine Solutions is committed to client satisfaction. We beta tested the tool aboard numerous types of commercial and training vessels around the world, giving our developers insight into how operators would interact with the tool. Their feedback enhanced the user interface and experience for our second release, and continual user feedback will enhance future versions.

Simplified compliance benefits operators, owners and our global marine environment. That's a win for everyone.

Alexandra Anagnostis-Irons is founder and president of Total Marine Solutions, an environmental products and services company. She started her shipping career in the cruise sector and spent 16 years serving in various executive roles within marine & technical operations before founding TMS in 2000. Ms. Anagnostis-Irons is immediate past president of WISTA USA.

Chasing the Perfect Chassis

The most important part of the domestic waterfront that you never heard of is heating up. The stakes are huge and, for the North American intermodal supply chain, failure is not an option.

BY JOSEPH KEEFE

In a tersely worded, late July press release, the Federal Maritime Commission (FMC) announced that 'Ports in South Carolina and Georgia would be able to establish a Common Chassis Pool.' That seemingly innocuous bit of news might not resonate with anyone outside of the rapidly expanding southeastern United States, but here, it likely heralds one of the most important changes in container port logistics in more than a decade.

No one knows that fact any better than Keith Lovetro, then the President & CEO of TRAC Intermodal – the largest pool manager and chassis supplier in North America. He has since retired. Lovetro, in June, well prior to the FMC edict, told MLPro, "We concentrate on rebalancing our fleet to make sure that we have available fleet where demand is taking place. Then consider adding to the fleet to make sure that it's sized properly. And then, having equipment repaired and ready to go – those are the three variables. So, it means having equipment in the right place, a quantity of fleet to match demand, and then equipment well-repaired and available for use."

In a perfect world, then, and assuming that TRAC's actions match Lovetro's language, it would seem like TRAC is ideally positioned to provide exactly what shippers and ports need and want. But, the latest salvo from the FMC – the federal maritime watchdog – suggests that all is not perfect in paradise. A deeper look at the issues provides better perspective.

Changing Chassis Landscape

In response to July's FMC announcement, TRAC's CEO provided a prepared statement. "TRAC Intermodal is a long-time contributor to the current South Atlantic Chassis Pool (SACP) that is managed by Consolidated Chassis Management (CCM). We've contributed close to 15,000 TRAC chassis to support our customers' shipping needs in the SACP," said Lovetro, adding, "As the current pool shifts to the new Southern States Chassis Pool (SSCP), TRAC Intermodal will continue to support the growth in the South Atlantic Ports by upgrading all of our currently contributed chassis to include radial tires, LED lights and ABS braking systems. A large portion of these upgrades will be made with our refurbished chassis which include not only radial tires and LED lights but also new ABS brakes and airing systems, new electrical wiring harnesses and newly applied anti-corrosive "TRAC Blue" paint. We've also offered to add an additional 3,000 newly manufactured chassis to the SSCP to help ensure that the Ports have the needed supply of chassis to support their anticipated growth."

In other words, TRAC will continue to be active in the same markets, regardless of what the FMC edict means for the broader markets. Closer to home in Charleston, the sea change in control for shore-based chassis assets was a long time coming, and not a surprising development. In the fourth quarter of 2016, South Carolina Ports Authority (SCPA) President and CEO Jim Newsome told MLPro, "There is a lot of waste in intermodal, and if I were back in the shipping line industry, that's where I would focus. I also see some opportunities in the chassis fleet area, and demurrage and detention can be more effectively handled." He might get his wish.

More recently, the Georgia Ports Authority and SCPA both said in a prepared statement that, "Both South Carolina and Georgia are pleased to be moving forward with the proposed SSCP agreement in an effort to add chassis to the current pool. GPA and SCPA hope to not only increase the number of chassis in the Southeast fleet but improve the quality and provide an at-cost model to support the growth in containerized trade in the Southeast." Hence, the move involves three metrics; availability of equipment, quality of assets and price. Most important in all of that, perhaps was the mention of price.

For his part, Keith Lovetro addressed all three concerns, one at a time. And, he brought up a fourth – one which doesn't get nearly enough discussion.

In terms of chassis supply, he insists that there isn't necessarily a huge problem at the present time. In fact, he said, "We have 180,000 marine chassis and by the end of this year we'll have closer to 190,000 because we're adding fleet. But we don't see there being a congestion point in the system today. These are very dynamic situations. As cargo comes in or cargo moves around, that picture changes hourly if not more frequently."

TRAC's CEO may have a point. That's because the most recent edition of the Descartes Datamyne U.S. Port Report (for 2017) showed that just two of the nation's top 20 boxports experienced a drop in TEU volume from the previous year, and one of those – Tacoma – involved the shift of cargo within the young Northwest Port Seaport Alliance, and the port of Seattle. The robust national numbers have, by and large, continued to increase. Combined traffic to Savannah and Charleston alone increased 10 percent last year, and that trend has continued in 2018. Hence, if traffic is increasing then it would follow that chassis demand should follow. And TRAC is adding capacity daily.

Lovetro and SCPA's Newsome agree on one thing: the quality of the chassis asset has always been an issue. Where they might diverge concerns what being done about the problem, and how fast it is getting done.

Lovetro says it boils down to a few common denominators. "When the chassis were principally owned and/or managed by the steamship lines, they did it differently. Today, it's a core business for a company like TRAC Intermodal, so improving the quality of the rolling stock, improving the chassis, is a key goal of ours. We're constantly looking at evolving the equipment and improving it. And so we improve it by doing a couple things: first, and the easiest, is simply by adding new equipment. And this year, we're adding about 7,000 new chassis and we're taking delivery of those even starting now."

A number of chassis await their ultimate box cargoes at one of SCPA's inland ports.

On another front, TRAC has pledged to improve the quality of its rolling stock, refurbishing as many as 8,000 existing chassis, in this year alone. That involves stripping each down to bare metal, sandblasting, repainting and installing new electrical systems to bring it back up to like-new condition. Separately, some of the TRAC fleet did not have radial tires, so that was another way of improving overall quality. He added, "TRAC also standardized its parts, maintenance and replacement policies for the entire fleet. For us, the value is that it creates a more predictable and reliable piece of equipment."

The Logistics of Chassis Management

After an atypically strong first quarter of 2018, Lovetro told MLPro that TRAC's management team talks with steamship line customers frequently. "One of the questions we'd ask them would be, 'Why are we seeing abnormally high volumes?' We want to know what's causing those volumes, and to better understand the root of the situation. And, I'm not sure we ever got a completely clear picture, or we certainly got a variety of answers." Therein, perhaps, rests the real problem.

From TRAC's perspective, the issue involves getting better or advance notice that more robust volume is expected. At that point, providers can move or reposition or even add equipment to make it available where it's most needed.

It is here that it becomes apparent that logistics for the chassis supplier is every bit as important as it is for ports, terminals and containership operators. For an industry that sees Hong Kong to Los Angeles sea transit times of as much as 16 days, the advance knowledge of a particular box – or 5,000 like it – shouldn't be that much of a mystery. But, sometimes it is. According to Lovetro, this is one of the most important parts of the supply chain, and yet, one of its most secretive.

"Knowing where demand is going to be is paramount. If we get advance notice that one of our customers is expecting increased demand in a certain market, we can proactively go out and make equipment available – either move it into market, bring new equipment in – whatever that piece of the solution is, but we can respond and then be well-timed to handle it," he said, adding, "If it just shows up, then that's always a difficult scenario. So communication is absolutely critical."

At the same time, shipping companies tend to be very protective of proprietary information. But, for chassis provid-

ers, that information, given on a 'need to know basis,' is very much something they need to know in order to service customers in a timely fashion. Lovetro adds, "That's been one of our points to the steamship lines for a very long time. Some do pretty well at it and some seem to struggle. And we keep telling them: Let us help you. Tell us what's coming inbound, we'll be able to service you better."

To that end, TRAC has joined the Blockchain in Transport Alliance – BiTA. TRAC's involvement is in its very formative stages, but says Lovetro, the firm hopes it will bring access to inbound volumes, the sizes of those boxes (20', 40', 45', etc.), and the ultimate landing point of those boxes in a port like Los Angeles which has as many as 11 possible discharge points.

Service: More than a Chassis

The job involves more than hardware. Both RoadStar – emergency road service – and an Online chassis booking system– TRAC's EZBook – are both intended to improve service, but are targeted to address different solutions. For example, EZ Book allows a motor carrier to go online and book a chassis in a location. So that makes it simpler for them, and it gives TRAC warning about what they're going to need and where they will need it. EZ Book is designed for the end user – not for the import shipping line.

RoadStar is a new application that TRAC introduced to facilitate emergency road service. In essence, the 'AAA' of chassis users, the nimble tool is all about speeding up response and getting the motor carrier back on the road. Lovetro insists, "That's how we respond quickly to the motor carrier – because if you're broken down, and this is how you make your living and now you're sitting on the side of the road – you want to know that someone got my call, they dispatched help, and help is on its way."

In another proof positive that TRAC is aiming for better service to its customers, TRAC Intermodal this year introduced a product that combines a new Carrier underslung genset with a premium 40-foot marine chassis. These pre-mounted genset-chassis are available through the TRAC Select pool in the New York/New Jersey port complex and was expanded to the LA/Long Beach complex in June. As a function of the new USDA rules which now allow selected southern US ports to unload produce in reefer cargoes, demand might just be robust in other places, as well.

In a nutshell, the new genset-chassis improves efficiency by providing a one-stop solution for motor carriers to pick up a chassis already equipped with a genset, eliminating an additional stop before the refrigerated container is mounted on the chassis. And, like other maritime stakeholders, TRAC is focused on improving its environmental signature. The new GenSets will be compliant with West Coast CARB regulations.

As comprehensive as those improvements might sound, TRAC is looking into additional improvements. These include the idea of adding tracking devices to its chassis so that TRAC knows exactly where they are at all times. "We ran a couple of pilots recently – one in New York and one in Chicago – to test out some concepts," explained Lovetro, who added quickly, "When it comes to repositioning equipment, we'll know exactly where it is."

Beyond that and along the same lines, is a future development, one which Lovetro calls the 'Telematics of Chassis.' Ultimately, TRAC Intermodal might be able to supply a driver (and remote monitoring sites) with as many as 8 or 10 different data points that will help him manage that load more safely and more efficiently. It isn't nearly as complicated as it sounds.

It all sounds good, but the proof is where the rubber meets the road. Last year, and for the second year in a row, TRAC was named by the Association of Bi-State Motor Carriers as the Best Overall Chassis Provider. We asked Lovetro what went into that victory. He replied simply, "When you ask, 'why did we win?' it's because we increased supply, and secondly, we put a darn good piece of equipment in the fleet."

Neutral & Grey Pools

As the port ports of Charleston and Savannah transition their chassis pools into a gray or co-op pool – one that involves one set of rules, and presumably – one price – with multiple contributors, that isn't necessarily the pool of choice for providers like TRAC.

Today, TRAC operates nine TRAC-owned and managed pools across the country. These private, so-called neutral pools have just one contributor and one manager. 75 percent of TRAC's fleet runs through its private pools, with the balance contributed to co-op pools. We asked Lovetro if the neutral model was his preferred method of providing service. He answered unequivocally, "Yes, it is. The neutral pool allows us to can invest in our fleet so we can provide a better service to our customers, as opposed to if I invest in my fleet in a co-op pool, then the other guy gets to use it. And so I'm investing money that they use, and so that doesn't really work too well. In a private, neutral pool, we've invested in both the availability of fleet and the quality of the fleet and our customers reap the benefit in terms of reliability and availability."

The neutral or co-op pool discussion ultimately comes around to price. That's where it becomes obvious that quality also comes at a price – typically a premium price. Lovetro agrees, saying, "We do see a bifurcated or split market. So when we build our neutral pools, we put a high quality piece of equipment into those pools. But through discussions with our customers, we recognize that that equipment doesn't always meet their specific needs, and there are times when they might want a different piece of equipment, or a piece of equipment configured in a different way. So we, about four years ago started a pool called "TRAC Select." TRAC Select is your upper end; the premier product pool. And so we put chassis in place – we have 20 distribution points around the country today for our TRAC Select

Photo: TRAC

> ***There is a lot of waste in intermodal,*** *and if I were back in the shipping line industry, that's where I would focus. I also see some opportunities in the chassis fleet area, and demurrage and detention can be more effectively handled.*
>
> ***– Jim Newsome, President and CEO, South Carolina Ports Authority (SCPA)***

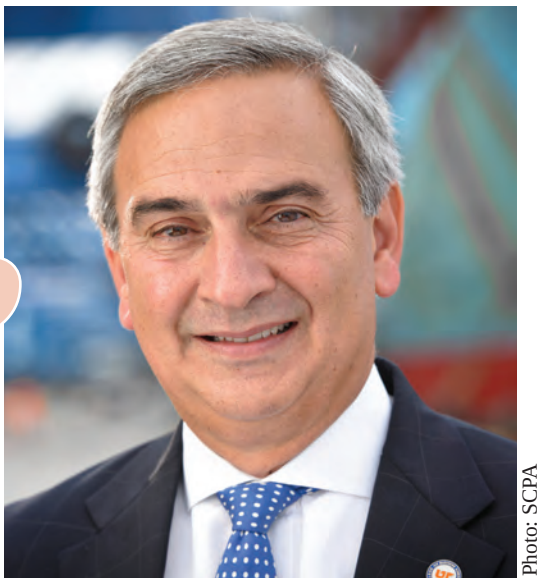

Photo: SCPA

pool. In TRAC Select, we have chassis that are the 40-foot marine chassis with radial tires, LED lights, ABS brakes, they have GPS on them ... In fact, our GenSet chassis are distributed through our TRAC Select pool."

Now, though, and for Savannah and Charleston, the trucker-founded North American Chassis Pool Cooperative (NACPC) will operate the Southern States Chassis Pool. Truckers will pay a single rate, regardless of which equipment provider is chosen. No profits will be distributed to the NACPC owners, according to NACPC chairman Dave Manning. That way of thinking might be at odds with an outfit like TRAC, whose myriad service and hardware improvements come – by their own admission – at a premium cost. At the same time, Charleston and Savannah both have publicly stated that they want more, better and newer chassis, and that the Southern States Chassis Pool is the ticket that will get them to the Promised Land. The real solution probably resides somewhere in between. All parties want the same thing: improved service and better logistics for all stakeholders. To that end, and in November of 2016, a delegation from the Canadian Port of Prince Rupert Sound gave a compelling presentation at a Hong Kong Logistics Trade Event. I was there for it. One by one, each stakeholder – trucking, the port, rail, and liner companies – all weighed in port efficiencies. United in their message, they told listeners, "We're only as good as the mode that is immediately in front of us or immediately behind us, and if the efficiency of any of those modes is not good, then the entire supply chain … it hurts."

This year, in the ports of Charleston, Savannah and other regional destinations, a new way of trying to make sure that chassis are not the weak link in the supply chain, is underway. Importantly, the FMC edict comes at a time when the normally five-position commission is seating only two commissioners. Hence, a vote which emanates from a federal body that arguably can't even muster a quorum is set to impact the domestic, intermodal landscape. Predictably, not everyone is on board with the nascent effort. Only time will tell who is right.

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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COMMUNICATIONS

David Clark Company (Wireless Headset Communication Systems), 360 Franklin Street, Worcester, MA 77060, USA , tel:(800) 298-6235 , www.davidclarkcompany.com/marine

DECK MACHINERY- CARGO HANDLING EQUIPMENT

Allied Systems Company, 21433 SW Oregon Street, Sherwood, OR 23462, USA , tel:(503) 625-2560, cranes@alliedsystems.com, www.alliedsystems.com

EDUCATION

San Jacinto College, 8060 Spencer Highway Pasadena, TX 77505

EXHAUST

Marine Exhaust Systems of Alabama, 757 Nichols Ave., Fairhope, AL , USA , tel:(251) 928-1234, mark@mesamarine.com , www.mesamarine.com

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In-Mar Solutions, LLC, 3011 S Ruby Avenue Gonzales, LA 70737 USA , tel:(225) 644-7063 ext 15, toby@inmarsolutions.com contact: Toby Whitfield, www.inmarsolutions.com

FUEL TREATMENT

Advanced Power Systems / Fitch Fuel Catalyst, 18 Hemlock Drive New Hartford, CT.06057 , USA , tel:860-921-0009, info@fitchfuelcatalyst.com , www.fitchfuelcatalyst.com

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Silicon Sensing Systems Ltd, Clittaford Road Southway, Plymouth, Devon PL6 6DE United Kingdom , UK , tel:+44 (0) 1752 723330, sales@siliconsensing.com

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Tandemloc, 824 Highway 101(FONTANA BLVD) HAVELOCK, NC 28532

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Central Boat Rentals, Inc., P.O. Box 2545, Morgan City, LA , USA , tel:985-384-8200, fax:985-384-8455, earl@centralboat.com or gary@centralboat.com

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Viega, Mountain View Corporate Center Building 1, Suite 395 12303 Airport Way, Broomfield, CO , USA , tel:904-315-3899, fax:888-782-6188, paul.switzer@viega.us contact: Paul Switzer, www.viega.us

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Gilbert Associates, 100 Grossman Dr. Suite 205 Braintree, MA 02184 USA , tel:(781) 740-8193, jgilbert@jwgainc.com contact: John Gilbert, www.jwgainc.com

The Shearer Group, Inc, 3118 Harrisburg Blvd., Suite 100, Houston, TX , USA , tel:(281) 532-2080, gbeers@bristolharborgroup.com

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Viega, Mountain View Corporate Center Building 1, Suite 395 12303 Airport Way, Broomfield, CO , USA , tel:904-315-3899, fax:888-782-6188, paul.switzer@viega.us contact: Paul Switzer, www.viega.us

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Advanced Mechanical Enterprises, 217 SW 28th Street Fort Lauderdale, FL 33315 , tel:(954) 764-2678, Joanna@AMEsolutions.com

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In-Mar Solutions, LLC, 3011 S Ruby Avenue Gonzales, LA 70737 USA , tel:(225) 644-7063 ext 15, toby@inmarsolutions.com contact: Toby Whitfield, www.inmarsolutions.com

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Grand Bahama Shipyard Limited, P.O. Box F-42623, Freeport, Grand Bahama , Bahamas , tel:+1 242-350-4000, enquiries@gbshipyard.com

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Jacksonville Marine Center, 1901-C HILL STREET JACKSONVILLE, FL. 32202 , tel:904-559-1020, lsnyder@stjohns-ship.com contact: Lisa Snyder, www.jaxmarinecenter.com

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Scienco/Fast - a division of Bio-Microbics, 12977 Maurer Industrial Drive, Sunset Hills, MO , USA , tel:+1 314-756-9300, fax:+1 314-756-9306, solutions@sciencofast.com

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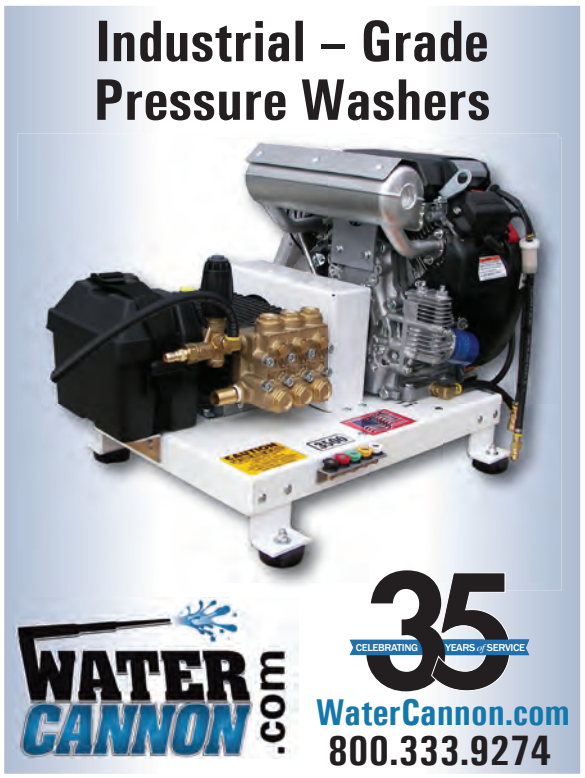

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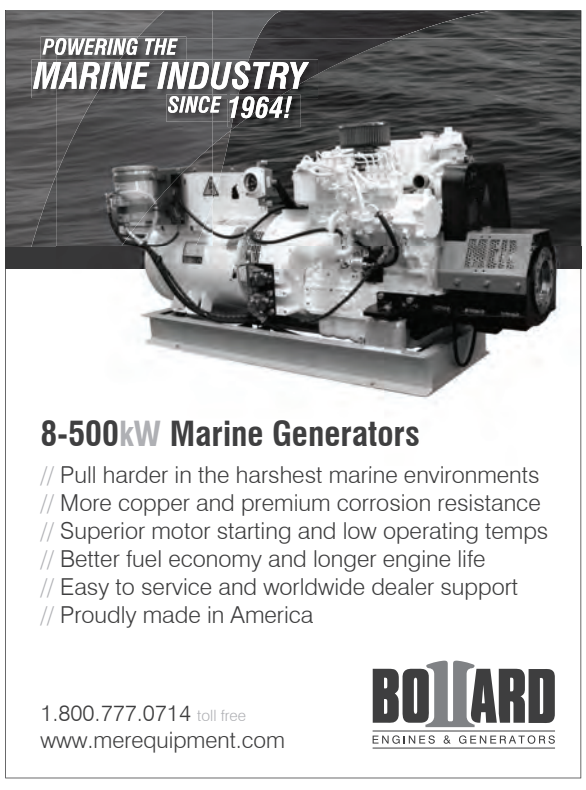

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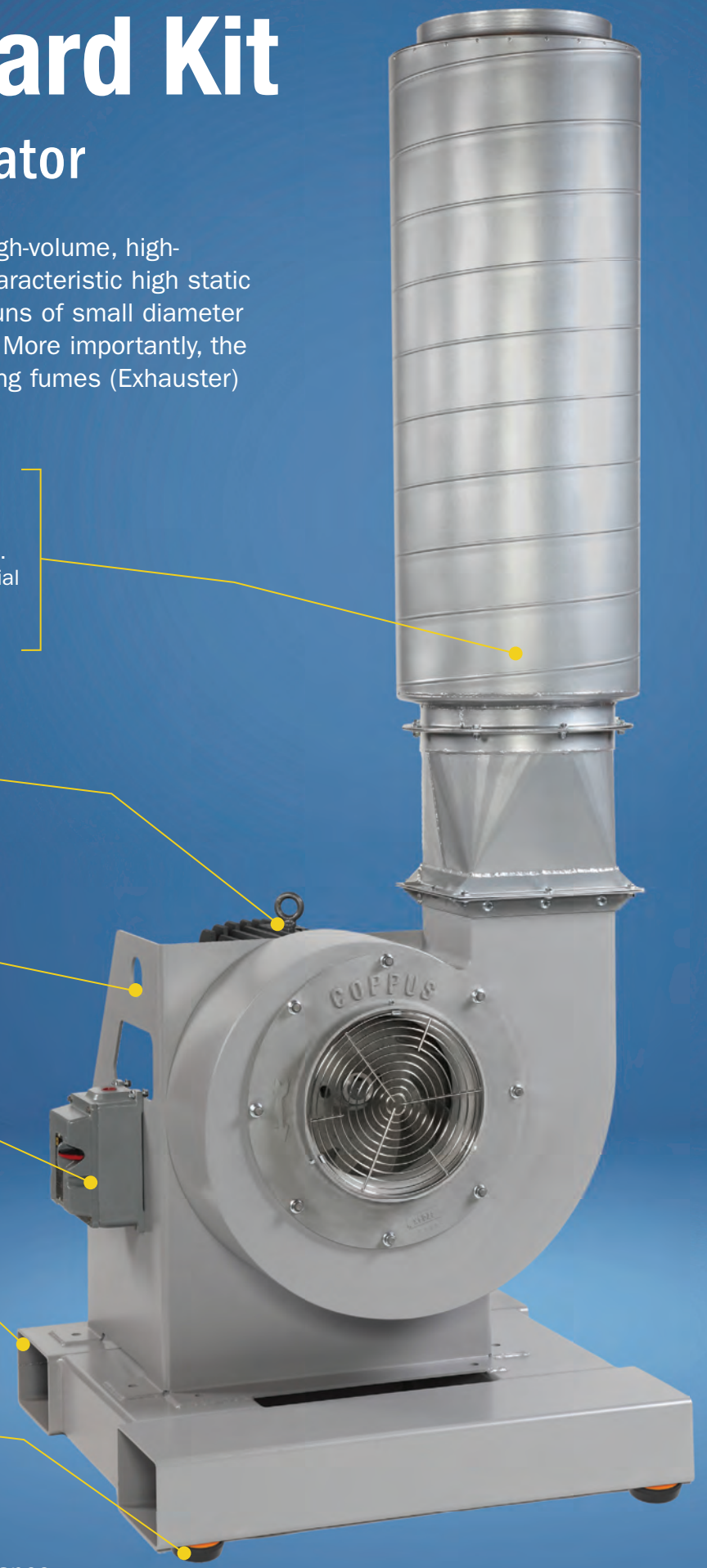

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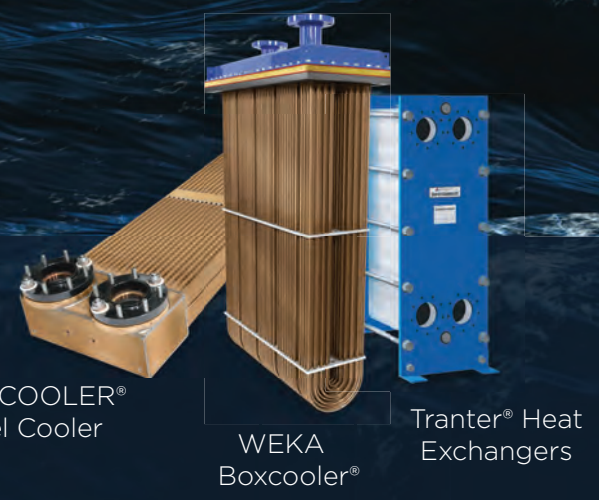

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