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MARITIME REPORTER AND ENGINEERING NEWS

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April 2018

BOURBON

Gael Bodénès, CEO discusses the company's future. It's Bold; It's Digital; It's #BOURBONINMOTION

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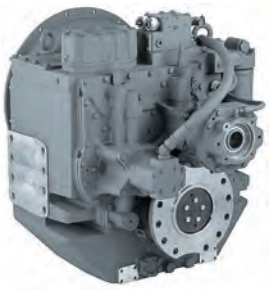

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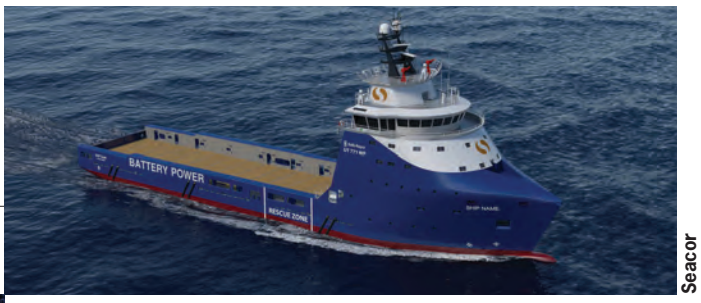

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THE COVER

#BOURBONINMOTION
Gael Bodénès, CEO, Bourbon Corporation, shares his thoughts on the future of the offshore energy market, and explains how the company is evolving and investing in its future.

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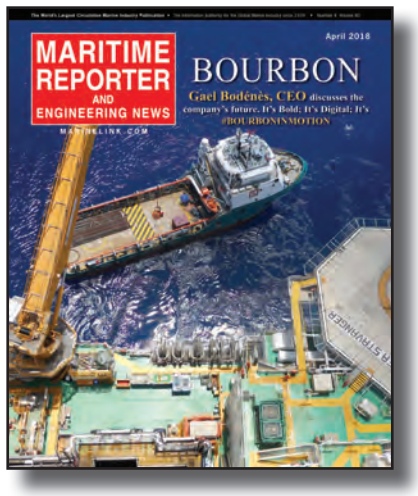

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MARITIME REPORTER AND ENGINEERING NEWS
MARINELINK.COM

ISSN-0025-3448
USPS-016-750
No. 4 Vol. 80

Maritime Reporter/Engineering News (ISSN # 0025-3448) is published monthly (twelve issues) by Maritime Activity Reports, Inc., 118 East 25th St., New York, NY 10010-1062. Periodicals Postage Paid at New York, NY and additional mailing offices.

POSTMASTER: Send all UAA to CFS. NON-POSTAL AND MILITARY FACILITIES send address corrections to Maritime Reporter, 850 Montauk Hwy., #867, Bayport, NY 11705.

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In U.S.:
One full year (12 issues) $84.00;
two years (24 issues) $125.00

Rest of the World:
One full year (12 issues) $110.00;
two years $190.00 (24 issues)
including postage and handling.

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Theory of Evolution

The pace of technological change is picking up rapidly everywhere you look. While I have, for more than a quarter of a century, sat in this chair and proudly proclaimed that the maritime industry is a tech adoption laggard, there are many signs that this, too, is changing rapidly.

This month's cover subject is an inside/out look at France's Bourbon Corporation, a company that has perpetually pushed the boundaries of the norm to deliver its services safely and efficiently. My thanks to **Gael Bodénès, CEO, Bourbon,** for spending a chunk of his valuable time to share with us, to share with you, the vision for his company premised on **#BourbonInMotion** plan.

#BourbonInMotion is much more than a trendy #, rather it represents a fundamental shift in the way his company – and indeed this industry – will go about the business of offshore oil and gas search and service. Talking about "the new norm" in the offshore energy business is common, but Bodénès and his team are not simply 'talking the talk,' they are 'walking the walk' in transforming the Bourbon business model to its core.

> *"We are in the worst crisis that we have ever seen on this market…. well beyond the Lehman Brothers crisis of 2009. Even in the 1980s oil crisis was not as violent as the situation we are facing today," said Bodénès in explaining the need for change. "We therefore cannot wait and shall be proactive and take exceptional measures to adapt to this situation."*

And proactive Bourbon has been.

#BourbonInMotion is about developing integrated services with performance based on data. It's about capitalizing on digital revolution to connect the fleet, a Smart Shipping program to reduce crew, costs and increase performance. It's about building partnerships with industry partners, locally and globally. Finally, it's about changing culture and communication. Everyone's roles and responsibilities, skill-sets and organizations will and are already changing.

The plan is dramatic, and it is premised to position the company for a strong run as the market picks up, which he sees coming in 2019.

While Bourbon is the headline, there are many others moving in step. As William Stoichevski reports starting on page 28, **Seacor Marine has taken a lead role** in the integration of batteries and hybrid systems onboard its future generation of PSVs, a move that is lockstep with the industry's overall mandate toward rapidly reducing its carbon footprint globally. As you read this and others in our pages, print and electronic online @ **MarineLink.com** and our various other news source properties, increasingly you will see the trend of the 'large getting larger,' as evidenced last month by the significant announcement that **Wärtsilä had acquired Transas**. This is significant on a number of fronts, as it further solidifies the Finnish-based company as a global leader across the full spectrum of maritime automation, power and connectivity.

Yet another huge development has been the creation of **"Massterly"** the world's first autonomous shipping company set to debut in the summer of 2018. This, too, involves the collaboration of a pair of industry giants, in this case **Wilhelmsen and Kongsberg** which are collectively taking the next step in autonomous shipping by offering a complete value chain for autonomous ships, from design and development, to control systems, logistics services and vessel operations. See full details on page 13.

While I'm not 100% certain what the next big move announced will be, you can be sure it is brewing now.

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MARITIME REPORTER AND ENGINEERING NEWS

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First Autonomous Shipping Company

Massterly

The road toward autonomy has taken a major step with the announcement that Wilhelmsen and Kongsberg are collectively taking the next step in autonomous shipping by offering a complete value chain for autonomous ships, from design and development, to control systems, logistics services and vessel operations. The new venture is dubbed "Massterly."

See Full Story on page 13; Tom Mulligan covers the tech behind autonomy starting on page 50

(Photo: Kongsberg/Wilhelmsen)

The Mariner & Autonomy

Technology is great, but ...

There have been increasing levels of automation on ships to help lessen the work load of the officer in charge, **but to replace that officer in charge with a fully autonomous ship ... that's pretty scary.** I've been on ships that have been hit by lightning and you get power surges and outages, and then it comes to bringing out a sextant to figure out where you are in the world. Sailing on a ship is a dynamic thing. The recent U.S. Navy collisions have shown that a ship must be manned by people that are well-trained, well-educated and able to respond quickly to a changing dynamic. **Technology is a great tool, a great trainer, but it augments, not replaces a thorough education and a thorough level of experience.**

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Photo of the Month

Cap San Antonio Anchoring in front of Montevideo

Herbert Boettcher took this photo for Hamburg Süd when he travelled on the container ship Cap San Antonio from Europe to South America and back to Hamburg. 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.

More works you will find at his website:
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A Good Day for the Domestic Waterfront

Maritime asks and Washington delivers funding for myriad maritime projects, newbuilds and infrastructure renewals. There is something for everyone in the FY '18 Omnibus.

About the Author

Joseph Keefe is a 1980 (Deck) graduate of the Massachusetts Maritime Academy and the editor of both Maritime Logistics Professional and MarineNews magazines. He can be reached at keefe@marinelink.com

The recent signing of the FY '18 Omnibus Funding Bill contained a raft of good news for the domestic waterfront, its many stakeholders and the individual parts that make it up. The American Association of Port Authorities (AAPA) was especially pleased with the package, and they characterized the funding bill as the "first step toward funding President's goal of strengthening America's infrastructure.

The omnibus spending package will fund the federal government through September 30, 2018. Signed by President Trump on March 23, it contains funding for a number of AAPA's top infrastructure and intermodal priorities, both on the landside and the waterside.

Infrastructure, Ports and Marad

On the waterside, the omnibus includes $6.83 billion for the U.S. Army Corps of Engineers (Corps), an increase of $789 million from fiscal 2017. The bill funds the Corps' navigation program at $3 billion, with $123 million for General Investigations (GI), $2.085 billion for Construction General (CG), and $200 million for the Corps' regulatory program. The Corps' Operations & Maintenance (O&M) program, which pays for crucial maintenance dredging in America's deep-draft harbors and channels, is funded at $3.63 billion, with $1.4 billion coming from the Harbor Maintenance Trust Fund (HMTF) … an increase of $100 million over last year's appropriation. The bill also requires the administration to include six new studies and five new construction starts in the Corps work plan.

Other notable items in the legislation included $100 million for the Port Security Grant Program, and Customs and Border Protection (CBP) will receive $14 million, a nearly 15 percent increase over fiscal 2017, in which $7.6 million will be used to hire 328 new CBP officers. In the maritime environment alone, AAPA advocates that a minimum of 500 new CBP officers are needed annually. But, this is a pretty good start.

Separately, a $15 million increase to $75 million for the Diesel Emissions Reduction Act (DERA) will provide increased grants to eligible entities, including ports, for projects that reduce emissions from existing diesel engines. But, the good news didn't stop there.

$980 million was approved for the U.S. Maritime Administration (MARAD), an increase of $457 million over fiscal 2017 appropriations. According to AAPA, and among the MARAD programs important

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to ports, is its Marine Highways program, which received an increase to $7 million for fiscal 2018.

The NSMV Lives

For State Maritime Academies, the budget contained the long sought after funds to begin the recapitalization of the nation's fleet of aging training vessels. $300 million was approved to begin the State Maritime Academy Training Ship Replacement Program. Known as the National Security Multi-mission Vessel (NSMV), this new-build replacement training ship program will improve the training and stabilize the production of mariners by the nation's maritime academies for decades to come.

Work to advance this program began over eight years ago and thanks to much effort by the State Maritime Academies' presidents & superintendents, our nation's elected officials, maritime industry leaders, the Maritime Administration and the U.S. Department of Transportation, completion of the final design and construction of the first vessel can commence. These state-of-the-art training platforms will each carry 600 cadets and 100 officers and crew. They will also be designed to support the Federal Emergency Management Agency (FEMA) as a response vessel in times of national emergency.

A prepared note from RADM Fran McDonald at the Massachusetts Maritime Academy told stakeholders, "It is important to note that the first ship is scheduled to replace SUNY Maritime's aging Empire State and that the second ship is scheduled to replace Massachusetts Maritime's Training Ship Kennedy (built in 1967). It is critical that funding for the second ship, currently in the President's FY19 Budget, receive the full support of Congress. As such, I encourage the entire Massachusetts Maritime Academy community to contact your Congressperson and Senator and encourage them to throw their full support behind the NSMV program." That's good advice.

Coast Guard Icebreakers

In FY17, Congress appropriated $150 million of Advance Procurement funding in the Navy's SCN account. The president's FY19 budget request includes an additional $720 million for icebreaker construction to continue the planned recapitalization of the Coast Guard's polar icebreaker fleet and associated non-recurring costs for the class. The total cost of the lead ship is expected to be less than $900M and the average total cost of the three ships is expected to be less than $750M.

The FY18 omnibus included $150 million under the Department of Defense title for advance procurement activities under the Shipbuilding and Conversion, Navy account. The Department of Homeland Security title included $19 million for program management activities related to releasing the RFP, reviewing industry proposals, and ultimately leading to a detail design and construction award in FY19.

The $150M in FY18 (like the $150M in FY17) was provided to the Navy and supports the Navy-Coast Guard Integrated Program Office's work to award a contract for detail design and construction of the polar icebreaker class in FY19. The $300 million fully funds detail design and long lead time materials for the first heavy polar icebreaker.

Production of the first and follow-on heavy polar icebreakers will, said a Coast Guard spokesperson, be funded in future fiscal years. The Coast Guard's FY19 request includes $750 million to continue these recapitalization efforts.

Christmas in March

It certainly feels like Christmas in March, but there's a lot of work ahead for stakeholders in all the maritime sectors; government and commercial alike. That said; it isn't often that this much good news in way of funding for the waterfront is out there to tell, certainly not all at once.

Outgoing Coast Guard Commandant ADM Zukunft exuded optimism at his recent (final) state-of-the-Coast-Guard address at the National Press club, and, by all appearances, this omnibus did not disappoint. Similarly, funding of the U.S. Army Corps of Engineers should leave commercial inland marine operators with a sense that the pace will quicken on the recapitalization of the nation's aging inland locks and dams.

From my perspective, I was especially happy to see the funding for both the NSMV's and the desperately needed icebreakers. Both were 'must have' items for different reasons and different stakeholders, but I honestly had my doubts as to whether both could survive in the same funding vehicle. It turns out, they can. It all bodes well for the domestic commercial waterfront, which, right about now, could use some good news. And, they got some.

– MLPro

Tugboats & Vessel Response Plans (VRPs)

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About the Author

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Traditionally, tugs and towboats (hereinafter tugs) have largely been uninspected vessels of the United States. They were subject to basic examinations by the US Coast Guard, but the standards were little higher than those applicable to recreational craft. These tugs were also subject to examination by the Occupational Safety and Health Administration (OSHA). The OSHA examinations were rare, but when they took place any violations found could be costly. After one of the OSHA penalty cases was litigated all the way to the US Supreme Court, the industry decided that it was time for a change.

With the support of the U.S. Coast Guard, the tug industry approached Congress and requested that its vessels be treated as inspected vessels of the United States. As such, OSHA would have no jurisdiction. Execution of the plan took longer than expected, but the day is fast approaching. Tugs have become accustomed to operating almost anywhere and performing a wide variety of missions. Prevented only from carrying cargo, their major regulatory restrictions involved safety standards and the qualifications of master.

Certificate of Inspection

Inspected vessels have significantly more restrictions on their operation than do uninspected vessels. The vessel's Certificate of Inspection (COI) identifies the waters within which it is authorized to operate. If limited to coastwise waters, the vessel may not transit more than 20 miles offshore. If limited to lakes, bays, and sounds, it must remain within the boundary lines, which generally follow the U.S. coastline. The COI may also indicate the sea state within which the vessel may operate.

The COI also identifies the service or services in which the vessel is authorized to engage. A vessel that is authorized to engage only in carriage of freight may not routinely hire itself out for carriage of passengers, oceanographic research, or spill response. To qualify for such activities to be listed on the COI, the vessel must show that it is appropriately equipped to conduct these operations.

In addition, if an activity for which the inspected vessel intends to engage requires carriage of personnel in addition to the regular crew, this carriage of additional personnel must be reflected in the COI.

Vessel Response Plan

Most commercial vessels operating in US waters are required to have a Coast Guard-approved vessel response plan (VRP). The VRP addresses the actions to be taken in the event of an oil spill. It must identify the outside resources that it has retained by contract or other approved means to respond to the maximum extent practicable to a discharge, including a discharge resulting from fire or explosion. Tank vessels that transfer oil within waters subject to the jurisdiction of the United States (out to the limit of the exclusive economic zone, generally 200 nm) must have a VRP addressing those waters. Other covered vessels must have a VRP providing coverage out to 50 nm off the coast.

Response vessels may only be included in the VRP if they are authorized to provide the intended services and are authorized to operate in the intended waters. Thus, a vessel authorized in its COI to only engage in towing may not hire itself out to engage in spill response. A vessel authorized to operate on only a coastwise route may not hire itself out to engage in spill response beyond 20 nm offshore. A vessel not authorized to carry personnel in addition to its crew may not hire itself out to carry a marine firefighting team.

VRP holders and developers must carefully examine their plans to ensure that the resources listed therein are actually authorized to respond when called. VRPs listing outside resources that are not authorized to provide the listed service may be invalid and subject to disapproval. As a result, the vessel may find that it is no longer allowed to operate in U.S. waters.

Generally

As mentioned previously, tugs have become accustomed to providing a number of services. As they become inspected vessels, it behooves their owners and operators to determine what services in addition to towing they anticipate that the tugs will or could be engaged. The owners and operators must then work with the Coast Guard to ensure that the tugs meet the applicable requirements and have the service reflected on the COI. They should also work with their insurers and other involved third parties to ensure that everyone is on the same page.

Massterly

World First: Autonomous Shipping Company

The road toward autonomy has taken a major step with the announcement that Wilhelmsen and Kongsberg are collectively taking the next step in autonomous shipping by offering a complete value chain for autonomous ships, from design and development, to control systems, logistics services and vessel operations. The new venture is dubbed "Massterly".

What is Massterly?

Thomas Wilhelmsen, Wilhelmsen group CEO, explains: "Through the creation of the new company named Massterly, we take the next step on this journey by establishing infrastructure and services to design and operate vessels, as well as advanced logistics solutions associated with maritime autonomous operations." The Massterly plan is to have land-based control centers monitor and operate autonomous ships globally, tapping Kongsberg's tech solutions and Wilhelmsen's logistics and ship management operations. Geir Håøy, President and CEO of KONGSBERG, said, "Autonomy and remote operations are an important development for the maritime industry and Norway's lead has been made possible as a result of close cooperation between the Norwegian maritime cluster and the Norwegian authorities. When autonomous ships soon are a reality, Massterly will be crucial for digitalizing the infrastructure and operations,"

(Photo: Kongsberg/Wilhelmsen)

L to R: Geir Håøy, President and CEO of Kongsberg and Thomas Wilhelmsen, Wilhelmsen Group CEO.

Yara Birkeland Milestone

A key milestone in Norway's maritime autonomy story was the announcement of Yara Birkeland in May 2017. It will be the world's first fully-electric container vessel and will be completely autonomous by 2020, sailing between Yara's Norwegian production facilities at Herøya and the ports of Brevik and Larvik. Massterly can deliver and operate autonomous vessels such as Yara Birkeland.

"Currently, we are at the very beginning of this development, but we see and believe that there will be a significant market for these types of services in the near future. At first, short sea shipping will use autonomous ships. This also implies increased competitiveness to move transport from road to sea. The gains are increased efficiency and reduction of emissions. For Norway as a maritime nation, this will be an important contribution to reach the UN sustainable development goals," says Wilhelmsen. The JV will be based at offices in Lysaker, Norway, with plans to be fully operational from August 2018.

See Tom Mulligan's Autonomy Tech Report starting on page 50

Cyber
Risk Management
Steps to Take Now Ahead of the IMO 2021 Deadline

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

The IMO January 2021 deadline for ship owners and managers to incorporate cyber risk management into existing Safety Management Systems is closer than many realize, especially given the complex profile that the risk presents and the need for a well detailed procedure to help protect marine assets and businesses. The failure to properly address cyber risks is much greater than the simple fact that a vessel could be detained by Port State Authorities if it were found to be not in compliance. It is good that the risks that a cyber event poses to maritime interest are being brought forth, but it is important that we remember that it is only one of the many risks we face. By examining past failures dealing with traditional risks, we can better understand how we have underestimated or normalized the risks that are present in our environment. With the recent release of the NTSB Final Report on the EL FARO's sinking, I have spent time reviewing the report and looking back at my own experiences. I am saddened to see many similarities in the conditions present for both the EL FARO loss and that of the MARINE ELECTRIC in 1983. Several statements and findings in the NTSB Report affect numerous shipboard operations – not just the heavy weather that was the case with the EL FARO. The shipboard operations impacted will include the upcoming Cyber Security safeguards and procedures.

The NTSB Report has the following passages regarding vessel Safety Management Systems:

"Safety Management System. According to the ISM code, it is the responsibility of the company—the owner or any other organization that has assumed responsibility for operation of a ship—to establish an SMS for its vessels. According to section 1.2.2 of the code, the SMS should "assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards." In this manner, the code (section 7) directs that the "company should establish procedures, plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the personnel, ship, and protection of the environment." Furthermore, the code requires that the company "identify potential emergency shipboard situations, and establish procedures to respond to them."

Also;

"Summary. Merely having an SMS is not sufficient to prevent catastrophes. It is necessary to have dedicated person-

While the vessel Safety Management System is **the best platform for the Cyber Security program to reside on,** *we cannot overlook the fact that this is a non-traditional Risk.*

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nel assigned to provide captains with effective guidance and procedures. Robust training and auditing ensure that guidance and procedures are being followed. DPs should be actively involved in the maintenance of the SMS and should monitor their assigned vessels throughout each voyage."

The NTSB Report also contains the following recommendations:

- NTSB recommends to the US Coast Guard in Safety Recommendation M-17-40 to: Review and implement training of Coast Guard inspectors and accredited classification society surveyors to ensure that they are properly qualified and supported to perform effective, accurate, and transparent vessel inspections, meeting all statutory and regulatory requirements.
- NTSB recommends to the American Bureau of Shipping in Safety Recommendation M-17-62 to: Enhance training of your surveyors to ensure that they are properly qualified and supported to perform effective, accurate, and transparent vessel surveys, meeting all statutory and regulatory requirements.
- NTSB recommends to TOTE Services, Inc. in Safety Recommendation M-17-69 to: Conduct an external audit, independent of your organization or class society, of your entire safety management system to ensure compliance with the International Safety Management code and correct noted deficiencies.

These passages and the three recommendations stemming from the EL FARO incident should be remembered when planning for the upcoming Cyber Security SMS Procedures and the issues that will arise in writing, implementing and auditing effective procedures.

While the vessel Safety Management System is the best platform for the Cyber Security program to reside on, we cannot overlook the fact that this is a non-traditional Risk. We cannot approach our procedures and auditing process the same way we have the majority of our operational risks within the SMS. The fast paced world of cybersecurity and the risk it presents lie in many ways in direct opposition to our traditional Maritime environment and risks that we have faced for generations. You can't hear it or see it like a traditional risk. But it is continually making additional inroads into the way we operate and manage vessels on a daily basis. That fact is not going to change and the risks associated with using this technology are not going to go away. Unfortunately that is the risk approach that many within the Maritime community approach cyber security with. This must change, because the nature of cyber risk is such that it could have catastrophic impacts throughout our industry. The nature of ports and shipping lanes is such that the fate of one company impacts the fortunes of all.

Some of the key questions that we need to be asking include:

- What are the required levels of shipboard and shoreside support that these new technologies require in the near and short term?
- Have the costs and additional risks of a particular technology been properly evaluated?
- Do the benefits outweigh the risks -- bottom line does it make sense?

As we approach the IMO Cyber deadline of 2021, it is important to keep in mind the goal of our Safety Management Systems and ensure that our cybersecurity procedures are practical, functional and effective. It is also important that we look at the role that auditors and shoreside support have in the effective implantation of these policies. As the NTSB stated in the EL FARO report: Merely having an SMS is not sufficient to prevent catastrophes. It is necessary to have dedicated personnel assigned to provide captains with effective guidance and procedures. Robust training and auditing ensure that guidance and procedures are being followed.

To that point, the need for independent cybersecurity audits to ensure that procedures are adequate is a departure of our normal SMS Auditing criteria. However given the nature of this risk and the potential impact of the failure to adequately protect a vessel, a new approach is warranted. A key point that we at Allianz Global Corporate & Specialty raise with our assureds is the fact that cyber security is a race without a finish. As we proceed further on the course of utilizing technology to address the concerns and challenges of marine transportation, the need for proactive, customizable cyber security platforms will continue to grow. The first step in this process is to identify your current exposure. While cyber risks continue to evolve and develop, we cannot lose sight of the traditional risks that ships and sailors face. Perhaps the most important lesson from the loss of the SS EL FARO is that we learn from our collective past to protect our future.

Cyber Security

What's Your Approach?

It is time to move toward a quantitative approach *that provides deeper understanding of individual risk elements observed in marine operating systems*

About the Author

Rick Scott, PE, BSIE, ME, is ABS Senior Technical Advisor who has worked in academia, high-tech manufacturing and the maritime industry for more than 45 years

Increasing connectivity in complex maritime operating systems is escalating the potential impact of cyber-related incidents and complicating the task of defending against them. Traditional methods for assessing cyber risk provide inadequate guidance for applying limited security resources.

Currently, available risk assessment methods are largely qualitative. Even so, these methods do provide the current foundation for risk management plans, on which owners and operators base programs to identify, protect, detect and recover from cybersecurity breaches. Building on that model, it is time to move toward a quantitative approach that provides deeper understanding of individual risk elements observed in marine operating systems, and provides owners with engineer¬ing "knobs to turn" to reduce them.

The most common equation used to represent cyber risk is: Risk = Threat x Vulnerability x Consequence. This equation has proven useful for practitioners insofar as it has helped analysts intuitively understand that risk has three constituent elements, and infers that by removing one of these elements, risk can be reduced. But this formula is less an equation, in a mathematical sense, than a reference model for understanding the nature of cybersecurity risk. Its three elements largely are difficult to measure and are problematic when trying to engineer and/or calculate a cybersecurity solution. For the modern maritime risk practitioner, the core challenge is to create a model that defines cyber risk so it

One of the things **ABS' research with the Stevens Institute** *discovered was that the nature of maritime risk within cybersecurity is not well defined or understood.* **Nor is it particularly well managed.**

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can be counted, measured, computed and modeled for maritime operating systems.

ABS recently collaborated with Stevens Institute to research this problem for the maritime sector and redefine the equation in terms that are countable, observable and easily understood. One of the things our research with the Stevens Institute discovered was that the nature of maritime risk within cybersecurity is not well defined or understood. Nor is it particularly well managed.

The result is a new model that helps owners proactively gain control over cybersecurity risks.

These risks in turn drive specific requirements, engineering decisions and resource commitments. The model focuses on identifying solutions that are computationally engineered, highly detailed and in context with the risks to be managed.

Effectively, it places the controls for responding to cyber risks back into the hands of the asset owner.

Shifting industry cyber risk practices away from more traditional defensive methods to a measurable process will require the industry to change the conversation, but most importantly it also will require a change in how risk practitioners think about risk.

To represent 'Consequence, Vulnerability, and Threat' as calculable elements of a risk equation for operating technology, we replaced them with the concepts of 'Functions, Connections, and Identities' (FCI), respectively.

'Functions' allow the crew to maneuver the vessel or perform its mission, which can be anything from drilling oil, to carrying people and cargo, or combinations of each. In the FCI risk equation, they represent systems that a cyber attacker would seek to control or defeat: steering, location monitors, propulsion systems, communications, anything to serve their purpose.

'Connections' represent, in relation to maritime operating technology, how the functions communicate with one another, to shore, to satellites, to the Internet, etc.

Within each connection is a 'node', the point through which a cyber incursion gains access.

'Identities' are either a human, or a digital device. Replacing Threat with Identity allows threats to be counted, a breakthrough concept for advancing maritime risk calculation.

In the context of the FCI model, a threat has to have an agenda. These can range from lack of awareness of cyber risks to unintentional behaviors – "I'm not going to adhere to company rules and perform my duties in a secure way" – or actions such as the hijacking of navigational systems to steal or destroy a vessel, or other acts disruptive to normal operations, typically for monetary gain.

The quantitative data from the Functions, Connections and Identities are then counted and used to populate a worksheet that builds a Risk Index to demonstrate how specific FCI alterations would change the relative risk of each system's configuration.

The process described here is simplified, but the Risk Index ultimately provides a quantitative view of the relative risk associated with the architectural design of individual systems onboard the vessel. That is something that has been missing in the maritime cybersecurity space.

The FCI method determines whether Connection nodes (the access points) are adequately protected, and whether or not the asset owner has controlled the Identities of those who have been provided access to nodes and restricted areas within the vessel control system architecture.

The Index illustrates each component's contribution to the overall risk. Based on those individual risk contributions, for example, the owner can redesign a network architecture to re-engineer how the system is being accessed, either through human-machine interfaces, cell phones, thumb drives, or connections to the Internet.

This new approach allows the owner to take a fleet-wide view to determining the relative risk associated with each vessel based on the way its digital system is designed, the way people are allowed to access it, and the way the nodes, or access points, are protected.

ABS delivers a risk index calculated through the FCI approach, which is a number that represents the relative level of risk inherent in the design and operation of the digital system on the ship. It helps owners to decide where to deploy their often-limited cyber-defense resources.

There is an old adage in industry: you can't manage what you don't measure. As the maritime industry continues its march towards auto¬mation, companies that can measure and manage cyber risk will be better positioned to tackle challenges in the new digital era.

As an industry, the ability to measure cyber risk will become a core foundation for operational efficiency and safety.

Cyber Security
Incident Response

Cyber Incident Response and Incident for the Resilient Organization

About the Author
James Espino is president of Gnostech Inc. A career Coast Guard Officer, he worked in maritime law enforcement, defense operations, and C4ISR development and procurement.

Even prior to NotPetya, *regulatory bodies, insurers, P&I clubs, port authorities, and other segments of the maritime industry started taking steps to minimize the industry's exposure to cyberattacks.*

The maritime industry has had an awakening. We have awoken to the fact that digitalization has woven its threads throughout the industry, and we have greatly benefited from being able to operate in an interconnected cyber environment. Likewise, being able to transmit shipboard machinery diagnostic information to shore-side operations centers, having the ability to navigate in restricted waters using position and navigation data originating from space, and being able to provide crews the luxury of streaming video from the web while at sea introduces significant risk to the overall industry and to interconnected segments of the economy in general. The NotPetya attack in 2017 was a watershed moment that forced the industry to assess its cybersecurity posture. Clearly, if a global company like Maersk can be significantly impacted, then every other maritime company can be attacked. At best an attack will result in a financial loss, at worse, an attack could possibly force a company to cease operations indefinitely.

Even prior to NotPetya, regulatory bodies, insurers, P&I clubs, port authorities, and other segments of the maritime industry started taking steps to minimize the industry's exposure to cyberattacks. The U.S. Coast Guard released a draft Navigation and Vessel Inspection Circular 05-17, Guidelines for Addressing Cyber Risks at Maritime Transportation Security Act (MTSA) regulated facilities, to introduce the idea of creating a cyber risk framework for the maritime industry based on the National Institute of Standards and Technology (NIST) Cybersecurity Framework. Shipping associations such as BIMCO and ABS have released their own cybersecurity guidelines, and countless other organizations and groups have released best practices to mitigate cyber risk in the maritime industry. Although the industry generally realizes "something must be done," the progress made to mitigate cyber risks within the industry are as varied as the industry is diverse. The variety in cyber risk mitigation in the industry is based on the varying levels of resources available from one organization to another, the systems and technologies being used, and the differences in risk management governance models between organizations and companies. Additionally, subtle but also significant differences in cybersecurity requirements and regulatory bodies between the shipping industry, port and terminal operators, port authorities, and other agencies, companies, and organizations that make up the "maritime industry" add an additional layer of complexity can slow the adoption of comprehensive cyber risk management plans industry wide.

Post Cyberattack Actions. Given the immediate need to understand what must be done to limit the damage and protect systems from a cyberattack, the maritime industry also needs to answer the question, "What must we do after we experience a cyberattack?" To answer this question, the following question must be asked, "What do we do to prepare for a cyberattack?" In this case, the maritime industry has the pedigree to address this question and can pull from existing regulations, best practices, and experiences gained from responding to physical incidents such as oil spills, search and rescue response, terrorist threats, and actions needed to ensure continuity of operations due to a major storm or other physical threats.

Cyber Incident Response and Incident Handling (IR/IH) implies pre-determined action plans, table top exercises, and IR/IH resources are pre-staged in order to minimize damage to the maritime and port operations. These activities aim to minimize the negative impacts to commerce, the environment, and safety of life at sea or on and about the water. Additionally, no different than a major environmental disaster response, the industry must be prepared to address all aspects of a cyber-incident response including the development of a well thought out public, stakeholder, and investor relations engagement plan.

Pre-determined Action Plans. No different than other disasters, catastrophes, or emergency situations, prudent organizations will have a cyber incident response plan in place to exercise predetermined action plans when a cyber incident occurs. Unfortunately, a recent study by the Ponemon Institute and IBM found that 77% of its respondents do not have a formal cyber incident response plan applied consistently across their organization. Response plans would, at minimum, need to include action plans responding to ransomware, Distributed Denial of Service (DDOS) attacks, infiltration of a network, and introduction of malware in an organization's network. Underway or mobile assets must also

include actions that take into account other scenarios such as losing Global Positioning System (GPS) or other Position, Navigation, and Timing (PNT) systems, impact to a vessel's steering or machinery control system, and loss or manipulation of electronic navigation systems. In most of these underway scenarios, contingency plans are already in place for these scenarios caused by other means, but there may be additional response requirements to the nature of the attack.

Once developed, these action plans must be exercised on a regular basis. This is no different than other required drills. Many organizations have incorporated cyber incidents in table top exercises or have created cyber incident specific table top exercise to see how well their action plans work.

Attack in Progress. Being able to identify and understand that an attack is in progress must be incorporated into an organization's training programs. Likewise, hardware and/or software solutions will need to be configured or acquired to help employees and crews determine whether a cyberattack is taking place. Depending on the type of attack, the characteristics of the attack may be obvious, but not always.

How an organization communicates the nature of the attack and how they respond externally to a cyber incident is just as critical as the technical and engineering actions taken to manage an attack internally within the organization's systems. Organizations need to develop a communications and public relations action plan to ensure confidence among customers, investors, partners, other stakeholders, and the public that the organization can effectively respond to a cyber incident while minimizing disruption to operations and commerce.

Post Incident Analysis. Depending on the nature of the attack, an organization can expect law enforcement to treat a cyber incident as a crime, thereby making the systems and network that were attacked a crime scene. Therefore, to identify the origins of an attack, an organization should also implement procedures to preserve evidence during and after an attack. This requires putting in place a chain of custody procedure, digital evidence handling procedures, potentially performing internal digital forensics activities, and having a Continuity of Operations Plan, which may include using a back-up system during an investigation.

Post incident analysis will need to include a post-mortem to determine how to prevent similar attacks in the future. Much like implementing cybersecurity safeguards, identifying and taking action on the lessons learned from a cyberattack must be driven from the top down.

Reconstitution. In most cases, organizations have a systematic process for reconstituting operations. These processes will need to be extended to include post-cyberattack incidents. Organizations will need to determine how expeditiously they can return to full operational capacity. Organizational leadership must continue to communicate with all their stakeholders what steps are being taken to return to a fully operational status.

Preparation for a cyberattack is a critical component for maritime organizations to ensure that environmental, commercial, and safety impacts are kept to a minimum. Fortunately, the industry has existing response plans for other types of catastrophic events that can be used as a model for preparing and responding to cyberattacks.

Photo courtesy Nor-Shipping

Per Martin Tanggaard

Director, Nor-Shipping

Nor-Shipping's straight-talking new Director plots a path forward for an industry and exhibition that, he believes, can access new opportunities by playing to traditional strengths.

BY ALAN JOHNSTONE

"We're not here to challenge the industry, we're here to serve it," says a freshly shaven-headed Per Martin Tanggaard, Nor-Shipping's newly installed Director. "But that doesn't mean we're going to take a submissive role either.

"We believe we can actively help maritime address current challenges and increase future profit and sustainability. So we intend to work in partnership with our customers to find solutions and access new business opportunities.

"But how?" Tanggaard smiles, sensing the question already hanging in the air. "By looking at where the growth is," he says simply.

"By looking to the oceans."

A New Arena

Nor-Shipping is, without doubt, one of the major events on the maritime calendar. Once every two years it attracts around 35,000 industry decision makers to a series of venues across the Oslo region, with it's bustling hub at the 21,000m2 exhibition halls of Norges Varemesse in Lillestrøm. Here approximately 1000 exhibiting companies showcase their latest products, services and innovations, building relationships, creating awareness and, most importantly of all, doing deals. It has been, up until its last outing in 2017, 'the leading maritime event week'. But no more.

From 2019 Nor-Shipping is undergoing a subtle but important change. It will now be marketed as 'your arena for ocean solutions'.

"Shipping remains at the heart of Nor-Shipping, you can see that in our name," laughs Tanggaard, until recently Nor-Shipping's Exhibition Director and before that a former offshore broker, sales manager for Wartsila Ship Design and, somewhat surprisingly, funeral director. "Showcasing and supporting the maritime industry is what we exist for. And the best way to do that, we believe, is by embracing new ocean opportunities."

Going With Growth

The 'we' Tanggaard refers to are his team, Nor-Shipping's advisory board, key sponsors and stakeholders, and, it seems, a growing body of individuals and organizations both within and outside the traditional maritime industry.

"According to the Organisation for Economic Cooperation and Development (OECD), value creation from ocean activities is set to double by 2030," he states, "with key growth areas including, for example, port activities, tourism, food production and processing, energy development, minerals and mining, amongst other segments. At the

same time maritime is under increased pressure, with a recent report from Danish Ship Finance forecasting growth of just 1% over the next five to ten years."

He continues; "No one needs me to tell them that shipping, and its traditional cyclical nature, has changed over the past decade or so. The only thing we seem able to predict is its unpredictability, and that clearly isn't a reassuring platform for growth. But here, with ocean activities, we have very clear positive indicators and that provides a huge opportunity for maritime."

Intersecting Industry

As Tanggaard goes on to stress, the ocean industries, particularly those focusing on 'new' arenas, cannot grow in isolation. They require the expertise, resources and infrastructure of maritime to realize their potential. As an example, look to the growth of commercial fish farming and the offshore wind industry, which have been reliant on adapting the skills, technology and assets of offshore shipping to prosper.

"Maritime is the foundation for building success in the ocean environment," he explains. "So as ocean industries grow maritime players that are open to new opportunities can grow in tandem with them. This is in no way a threat to our industry. It is simply a compelling prospect for a new wave of development."

Tanggaard and his team are now positioning Nor-Shipping as the point at which the maritime, ocean and wider business sectors can intersect – the natural arena for meeting, establishing mutually beneficial partnerships and collaborative working models, and moving towards a sustainable, successful and profitable future.

"Everybody looking to the ocean needs our competence, technology and products," he reiterates. "At the same time, maritime can benefit enormously from working closer with industries where we can adopt new skills, understanding and innovation – whether that be the tech sector, logistics, manufacturing or financial services. We want Nor-Shipping to be the arena where all these parties can meet, access one another's talents and build better businesses."

Sensible Steps Forward

But, and it's a big but, the new Director is at pains to stress that a fresh focus does not mean a departure from established strengths.

"We live and breathe for maritime," he says with conviction. "We are taking this move to support the industry, rather than dilute what we do or tinker with a winning formula. Nor-Shipping's mission will continue to be showcasing and selling the best maritime products, innovations and solutions, but we'll be strengthening that by attracting new audiences and accessing fresh business opportunities. We believe that will make perfect sense to everyone in the market."

As does, he believes, Nor-Shipping's on-going focus on sustainability. Sustainability for Tanggaard means more than just the environment, it also encompasses commercial sustainability and the benefits that commerce provides for people worldwide, including education, employment and increased prosperity.

"Sustainability is one of our strategic pillars and we tailor all our activity with the UN's Sustainable Development Goals front of mind. As maritime and the ocean industries embrace one another and activity blossoms, it is crucial that we safeguard our environment, people and standards. For long-term success we have to build on solid foundations. We hope to play an important part in that process."

Capital Idea

Nor-Shipping 2019 takes place 04 - 07 June 2019 across a series of venues in Oslo and Lillestrøm. As in 2017 it will feature six themed halls, with Hall A dedicated to the concept of Disruptive Sustainability, showcasing transformative ideas and innovations from maritime and the broader business, tech and finance sectors. A tailored programme of activities designed to enable networking, learning and good old-fashioned fun will take place around the social hub of 'Festival Street' in city centre Oslo.

The Oslo area itself will play a greater role in proceedings in 2019. In the same way Tanggaard plans to use Nor-Shipping as an arena for bringing together industries, he also wants to bring in new regional organizations, businesses and partnerships, with activities across new venues. "There is a lot going on in and around the city," he says, "a thriving business ecosystem. We are part of that, but, as yet, we haven't fully exploited it.

"I believe we can tap into that energy, potential and infrastructure to further boost the industry and our activities. We can create more of a 'business festival' feel rather than a standalone exhibition and support activities. That will attract more people and, as a result, more possibilities for our industry."

Opening Moves

In another landmark development, those wishing to take advantage of the Nor-Shipping arena won't have to wait until next year. Or head to Norway for that matter. In May this year Nor-Shipping launches its first activity outside its homeland with the Opening Oceans Conference in Copenhagen.

"As the name implies, this event supports and initiates the focus on accessing ocean business opportunities," Tanggaard explains. "It aims to attract the most senior levels of maritime, ocean industry, financial, advisory, and policy leaders within Northern Europe, providing a new platform for collaboration, knowledge sharing and growth. The calibre of speakers we've already attracted, with big names like Maersk, Statoil, OECD, the UN and World Economic Forum, shows the desire to work together and take advantage of this chance to build a strategy and framework for sustainable business within the ocean space. It is a genuinely exciting initiative for us and, we believe, everyone interested in commercial activity associated with the sea."

"I can't think of a better way we can serve this industry than working to enable its future growth and success."

Opening Oceans Conference is timed to coincide with Danish Maritime Days, 2-3 May 2018, and is supported by both the Norwegian Shipowners' Association and Danish Shipping. For more details see **www.openingoceans.com**

Photo courtesy Nor-Shipping

"According to the Organisation for Economic Cooperation and Development (OECD), **value creation from ocean activities is set to double by 2030** *... (giving us) very clear positive indicators and that provides a huge opportunity for maritime."*

Photo courtesy Nor-Shipping

Under the Sea

A Roadmap for Renewable Energy

About the Author
Jessica Williams is an analyst at S&P Global Ratings, where she contributes to environmental and climate risk research focused on energy transition risk, energy storage, climate policy, and ESG risk.

Thanks to increasing levels of debt financing for climate-aligned projects, wind-generated power has become one of the fastest-growing green industries. Jessica Williams, an Infrastructure Analyst at S&P Global Ratings, considers the submarine technologies that are making this progress possible. Renewable energy is making an increasing contribution to the electrical grid. By the end of 2016, "green energy" sources accounted for almost a quarter of the world's electricity supply, according to REN21. Wind power has contributed significantly to this shift and is second only to hydropower in terms of renewable capacity. And largely thanks to de-carbonization efforts worldwide, wind energy's market penetration is increasing; the Global Wind Energy Council (GWEC) estimates global capacity will reach 817 gigawatts (GW) by 2021, a 68% increase from 2016.

A strong pipeline of technologies is driving this growth. As the technologies improve, this pushes down costs, making wind energy more viable. For example, enhanced technology allows for bigger wind turbines and foundations, which increases manufacturing and production efficiency. Taking advantage of these efficiency gains, undersea cables are thereby addressing the challenges of inconsistent supply and demand; they enable power generated offshore – or in remote geographical locations – to be transmitted to the urban areas that need it most.

Geography of Renewables

Take the state of New York, for example, which has four densely populated counties, two that are part of New York City, located on Long Island. The island faces significant challenges meeting its substantial electricity demands due to legacy issues of gas and electric transmission constraints, as well as limited geographical access to renewable alternatives (such as solar or wind). Nonetheless, New York State has made renewable development a primary policy goal under its Clean Energy Standard – which mandates that 50% of its electricity originates from renewable sources by 2030.

So, although the target is ambitious, New York State's carbon reduction goals are flexible enough to incorporate green energy transmitted from elsewhere. This is particularly significant for Long Island, which benefits from the Cross Sound Cable, an undersea transmission line that transmits excess clean electricity across Long Island Sound from renewable-rich New England.

In addition to its vast hydrologic and wind resources, New England has its own state-level carbon reduction policies that date back over a decade. The Cross Sound Cable can transmit 330 MW of hydrologic and wind power originating in New England to Long Island, which equates to substantial carbon savings on par with about 600MW of wind capacity. Ultimately, this not only provides Long Island with enhanced grid stability but it also provides a use for New England's excess wind energy.

Transmission Overseas

In Europe, comparable projects are underway. For example, the Western Link initiative – a £1 billion project located in the U.K. – will transmit electricity generated by Scotland's abundant onshore and offshore wind resources to England and Wales using undersea and underground cables.

Similar to Cross Sound Cable, the Western Link is also bi-directional. This means that, while these cables enable certain areas to benefit from excess renewable power generated elsewhere, electricity can also flow in the opposite direction, according to electricity supply and demand requirements. In turn, this promotes grid stability at both ends – and the longevity of the cable.

In Germany, the transmission system operator (TSO) TenneT Holding B.V (TenneT), has raised €1 billion of green bonds to finance transmission lines connecting offshore wind projects in the North Sea to the German grid. Indeed, an increasing number of projects in the North Sea are contributing to impressive European wind power growth; according to WindEurope, the region enjoyed a record year in 2017, adding 14GW to the renewables grid. In the Asia Pacific area, too, a substantial proposal is underway. The Asian Renewable Energy Hub encompasses 7,000 square kilometres of land in the East Pilbara region of Western Australia, and is set to house both solar and wind power generation facilities for the purpose of transmitting the energy produced to South East Asia.

The Asian Renewable Energy Hub entails the construction of 1,200 300m-high onshore wind turbines, with a further 2400MW from solar panels – all of which will be exported via high voltage undersea transmission cables to Jakarta and Singapore. The project will generate power for 7 million homes in Indonesia, and will offset almost 1 billion tonnes of carbon emissions over its lifetime.

Careful Construction

However, due to the speed of technological development, there is ever-changing technology risk to consider – as well as the environmental impact of construction and implementation.

For example, with more robust undersea cables come greater distances to shore and harsher sea conditions – two important considerations when it comes to both the construction and operation phases of offshore wind projects. These risks become accentuated when there are discrepancies between the technologies proposed at the bidding phase and those that are, in fact, installed during the construction phase. Indeed, some German utilities – in structuring their assumed costs – have put their faith in technology improving between now and 2021, when future offshore wind projects will be built. Reducing environmental impact at the construction phase of a wind project is a key priority, too. For this, comprehensive environmental impact assessments (EIAs) and low-impact construction techniques – such as soft start procedures and noise reducing technologies – can be employed.

The TenneT projects in Germany are a case in point. As well as enhancing the usability of sustainable energy, TenneT aims to minimize the physical impact of its North Sea-based operations. On top of using EIAs and low-impact technologies, all contractor ships installing the TenneT undersea transmission cable must attain certification to prove that they do not discharge effluent into the sea. Ultimately, undersea cables are enabling the distribution of renewable energy to areas that can benefit. These projects could help to drive a global shift in the power grid, which may see an increasing number of homes and businesses make fuller use of renewable energy sources – thereby reducing their carbon footprints.

Above the Sea

To 5 Trends to watch in offshore wind

About the Author

Eric is a NYC-based journalist, web editor of MarineLink.com and a contributor to New Wave Media's growing portfolio of global energy reports.

1 Follow the Leader

Offshore wind's established leader, Europe, will continue to show the way forward and build capacity. At the end of 2016, nearly 88 percent of the world's offshore wind installations were located in European waters. In 2017, Europe saw a record 3,148 MW of net additional offshore wind capacity installed, with 560 new offshore wind turbines across 17 wind farms, according to WindEurope. Europe's total installed offshore wind capacity is 15,780 MW, which corresponds to 4,149 grid-connected wind turbines across 11 countries.

Growth in this sector is expected to continue. WindEurope said in its 2017 "Scenarios for 2030" report that total installed capacity offshore could increase fivefold to 70 GW by 2030 according to the central scenario, or by as much as 99 GW in the high scenario. The majority of offshore wind installations will occur in the North Sea, with almost 48 GW installed by 2030 in the central scenario. In the Baltic Sea, where 1.5 GW of offshore wind is online today, projects in Poland, Estonia, Germany, Denmark and Sweden could add 9 GW installed by 2030. In the Atlantic Sea, where there is almost no capacity today, close to 8 GW could be reached thanks to installations in France, the U.K. and, on a smaller scale, Portugal. The U.K. will also install the majority of the capacity in the Irish Sea, which will total close to 6 GW. Italian and French installations could boost capacity in the Mediterranean Sea to 0.5 GW.

2 Bigger is Better

Across the globe, offshore wind projects are incorporating the latest innovations in wind turbine technology as manufacturers are building larger turbines on advanced foundation designs in even greater water depths.

Larger turbines that are able to capture more energy and are more efficient allow fewer installations and lower maintenance costs and are therefore key in the industry drive to minimize costs and maximize efficiency.

This trend toward increased size and scale will continue.

In March 2018, GE Renewable Energy announced it will invest more than $400 million over the next three to five years to develop and deploy the Haliade-X 12 MW, a new world's largest offshore wind turbine featuring a 12 MW capacity, 220-meter rotor, a 107-meter blade.

Towering 260 meters over the sea, Haliade-X will produce 45 percent more energy than any other offshore wind turbine presently available and will generate up to 67 GWh annually, GE said.

3 Cut Costs

The offshore wind industry set a goal to decrease prices toward the target of €100/MWh by 2020. With the help of larger and more efficient turbines, auction prices in many instances have far exceeded the cost reduction targets with projects delivering bids significantly below that level. "All of a sudden offshore is competitive with onshore wind, and the repercussions have been felt across the world, setting the stage for a round of large investments in offshore not only in Europe, but also in Asia and North America," the Global Wind Energy Council said in its Market Forecast for 2017-2021 report.

As cost reductions continue, new opportunities will arise and new ground will be broken. For example, in March this year, the Dutch Government awarded Vattenfall a tender to develop the twin 350 MW Hollandse Kust Zuid offshore wind farms, which when built by 2022 will be the world's first to be built without public subsidy.

This follows another landmark zero-subsidy offshore wind tender in Germany last year which was the first to attract zero subsidy winning bids, but will be built later in 2024-2025.

4 U.S. Emerges

With the U.S.'s first commercial offshore wind project online (Deepwater Wind's five-turbine 30 MW Block Island Wind Farm off Rhode Island) others will follow suit.

The success of a first project, together with decreasing global costs and stronger state policy commitments have led to increased confidence in the nation's offshore wind market. In the U.S., a total potential capacity of more than 54GW of wind energy generation is currently being planned, with a total capital investment of over $1.5 trillion by 2030, according to the Business Network for Offshore Wind.

Most coastal states have at least one planned offshore wind project in the pipeline, with several states having enacted new policy or bolstered their existing policy to support project development.

5 Floating Future

Once written off as infeasible, floating offshore wind farms are gaining momentum. The 30MW Hywind Scotland wind farm operated by Statoil in partnership with Masdar 25 kilometers offshore Peterhead, Scotland began production as the world's first full-scale commercial floating wind farm in October 2017. And in its first months of production, Hywind Scotland has performed better than expected. During the winter, when the wind is at its strongest, the typical capacity factor for a bottom-fixed offshore wind farm is 45-60 percent. By comparison, Hywind Scotland achieved an average of approximately 65 percent during November, December and January, Statoil said.

Floating wind turbines hold potential for locations where the water is too deep for typical fixed-bottom turbines. This promise will become greater as technological advances and cost reductions continue, much as they have in the bottom-fixed segment. Statoil sees key markets for its Hywind technology in Europe, Japan and West Coast U.S., and predicts there could be nearly 13 GW floating wind capacity installed by 2030.

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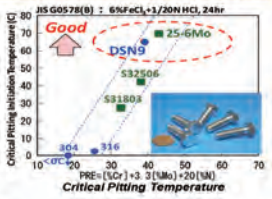

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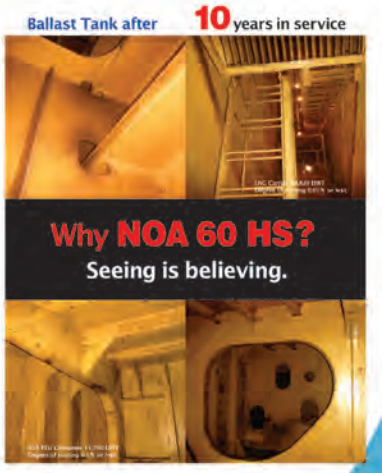

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Ace-Line D (HMPE ROPE)

Trend for Mooring Rope, Comparison with Steel WR

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▼		▼	
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Cylinder bore×stroke	260×385
Output[shaft] (kW)	1200 ~ 1533
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Mean effective pressure (MPa)	2.00
Fuel	Natural gas / Fuel oil A / [Fuel oil C]
Engine Dry Weight (kg)	19500

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For Hire:
Battery Hybrid
PSVs

Image: Seacor

Systems integrator and equipment maker, Rolls-Royce, has quietly been adding hybridizing energy-storage packages to a diverse list of vessels. Yet, so, too, has one of its clients — **Louisiana-based SEACOR Marine**, as it reacts early to tightened emissions and energy-management standards, or EMS, for vessels plying Europe and North America. **Fuel savings and energy-company clients seeking green credentials are, it turns out, just part of the upside driving battery retrofits.**

BY WILLIAM STOICHEVSKI

The fuel savings to be had for keeping thrusters on battery power are a powerful selling point, to be sure. In Norway alone, price add-ons like carbon-dioxide and sulphur charges helped fire-up fuel costs by about six percent in 2017, the Finance Ministry's national numbers crunchers report.

Seeking a market advantage for SEACOR vessels, CEO, John Gellert, has seized on fuel-saving battery power. He's quick to point out the benefits for offshore operators: "The hybridized (offshore service vessel, or OSV) will be offered to support our customers worldwide, having the advantage that while significantly cutting fuel consumption and emissions they are not reliant on existing infrastructures such as those required to support LNG-powered vessels," he tells Maritime Reporter & Engineering News by email.

In late-January 2018, six of eight platform supply vessels, or PSVs — grouped by SEACOR into the SEACOSCO joint venture with COSCO Shipyard — were cued for Rolls-Royce efficiency upgrades to help them stand out in the market. Among the upgrades these brand-new boats are getting are containerized Corvus battery packs and accompanying Rolls-Royce dynamic-positioning, ACON control and EMS systems.

Rolls-Royce retrofits

It's a quiet hybridization that needs some trumpeting, as the benefits of energy storage are key selling points for system integrator and fleet owner.

Although moving in different directions — Rolls-Royce Marine losing money of late but gaining energy-storage and digitalization clients, and Seacore cash-rich but needing to know where potential oil-company clients are heading — neither system operator nor fleet owner have been content to stand still in a still-tough offshore market. Apart from the six, 672 KWh upgrades for SEACOSCO, Rolls-Royce has provided energy storage solutions to six other projects, all medium to large vessels with dynamic positioning. The projects include 1,356 KWh battery systems for two new Hurtigruten coastal steamers and a 200 KWh pack for an upgrade of Island Offshore's PSV, Island Crusader.

SEACOR has moved quickly too. In 2017, it partnered with Kongsberg to put batteries aboard the Mexico-based SEACOR Maya, which was due for a retrofit in January, when the work scope was enlarged to include battery retrofits for other vessels plying the Gulf of Mexico: SEACOR Azteca, SEACOR Warrior and SEACOR Viking.

SEACOR's offer

"The Rolls Royce packages follow on from four systems we have developed with Kongsberg, the first of which will be installed on the SEACOR Maya next month (April 2018) with vessel available from about mid-May, followed thereafter at six weekly intervals for the remaining three," Gellert says.

Battery Upgrade: An illustration of the Rolls-Royce UT 771's in SEACOR'S fleet.

"For the six-plus-two (upgrade options) Rolls-Royce packages, (SEACOR) Engineering & Procurement has already started with the first two units scheduled to be in operation by the end of the year, followed at monthly intervals thereafter for the remaining units."

For Gellert, the yard and Rolls-Royce, it's a classic case of choosing to organize rather than agonize. The offshore market is still tough. The availability of the newly built, Rolls-Royce UT 771 designs themselves are testimony to how bad things once were. Their former Singapore-based charterers, Chelsea Group, couldn't pay for them, it seems, and so they were left with the COSCO shipyard. Turning weakness into a sort of strength, the new-builds became the SEACOSCO JV's starting point. Now, the shipyard has them on the building block or at anchor, and SEACOR fleet operations will take over once Engineering declares all battery projects ready.

The batt-pack

Since the arrival in Norway of Canadian battery outfits, Corvus and PBES, Rolls-Royce may be the system-integrator that has done the most to ready energy storage for OSVs.

While competitor Siemens has done well electrifying ferry operations, Rolls-Royce is conspicuous for its success with a variety of vessel hybridizations (see table). Apart from partnering with the Canadian battery system suppliers, it recently teamed up with UK energy storage start-up, Superdielectrics, hoping for a "next-generation, high-energy storage technology" based on the "remarkable properties of polymers".

The University of Bristol estimates that newly discovered polymers have dielectric property values which 1,000-times to 10,000-times greater than conventional electrolyte solutions, company literature says. New energy storage technology superior to existing battery technology is the stated goal of the partnerships, and Superdielectrics's technology is said to not be reliant on "rare or expensive elements" while potentially offer "higher energy density than both lead-acid and lithium-ion batteries". But, that's an aside. Keen to press ahead, Rolls-Royce is supplying the tug boat sector with its first hybrid propulsion arrangement for a tractor tug being built for Baydelta Maritime at Nichols Brothers Boat Builders in Washington State. They're not alone, there, however, as Dutch electrical firm Werkina and Asto Shipyard are working on a first, large, electric container barge for Port-Liner. Like the SEACOR hybrids, they're partly aimed at surviving Europe's "draconian" rules banning emissions in some ports cities and coastal waters.

Competition

For now, all system integrators in Norway, at least, are heavily dependent on the production runs of Corvus and PBES batteries. System integrators and ship owners are also heavily reliant on how linked reductions of "environmental impacts" like sulphur-dioxide or "energy costs" become to EMS outside of Europe and North America. The U.S. and Europe have made it clear that these ought to be in place to enable reductions in energy costs, with a battery in-place to get the most of EMS.

Where in force, these international strictures make EMS with energy storage more marketable. For now, that's Europe and North America, corporate social responsibility is said to also be a driver of energy-management.

Containerized retrofits

That'll help make it worth what is understood to be a USD 130 million price tag for all of SEACOSCO builds and conversions understood to be at Singapore and Guangzou, China. These are understood to include the SEACOSCO Amazon and SEACOSCO Ohio originally ordered in 2013-2014 by the Chellsea Group.

The oil price and resulting offshore standstill is understood to have put them out of reach for their original charterers. Green-tech and a containerized Rolls-Royces battery upgrades may be what finally gets them some work.

In all, "It's a very big order", a Rolls-

Image: Rolls-Royce

Battery-powered Coast Guard: the OV Ryvingen, a Rolls-Royce client reference

Royce source admits, implying, too, that it stands out in the supplier' orderbook and OSV-owner crowd for its size. But, the retrofit with containerized battery pack is seen as "a way forward" due to its ease of installation. Easing the retrofit, is that all six SEACOSCO vessels were built to a Rolls-Royce design and fitted with a Rolls-Royce equipment package. "They're packed with Rolls-Royce equipment," the source says, adding, "We piloted this on the UT 776 CDG vessel Island Crusader using a 200kWh/600kW battery container on deck. The batteries tested on this ship were coupled in to investigate load smoothing and peak shaving, and the effect of this on performance and emissions. A key attraction of using a containerized battery is that it can be moved from vessel to vessel to suit different requirements."

Fleet-scale

Andreas Seth, SVP of electrical, automation and control for Rolls-Royce says the company can now due more than just hybrid-charging, depending on the vessel's offshore role: "Vessel operating profile is the key factor when deciding which combination of technologies to use, so we have developed several system solutions, both for part-time and full-time battery operation." Full-time battery power will capture charterer's attention, as it did last year, when Statoil decided on hybrid-power PSVs. The chosen fleet was to be retrofitted with battery packs to meet the charter terms.

The IMO says you can work with any Class society to achieve your EMS ISO 50001 standard, with or without batteries. SEACOR went to DNV GL, with its own path to battery power linked to the brains behind Corvus and PBES.

Asked what fuel savings and other fleet-management advantages SEACOR was expecting, Gellert pointed to the data: "As part of work with DNV GL Hybrid Energy in the offshore domain, significant data analysis was carried out for the target vessels, and fuel savings in various operations ranged from 15 to 25 percent with a commensurate reduction in emissions. The other key advantage that we have identified is enhanced dynamic performance particularly in DP and enhanced blackout recovery. We also intend to offer in-port operation on battery-only for limited periods, reducing the significant problem of in-port pollution." Like every fleet owner or operator in the world, SEACOR has little to no in-house experience handling battery-operated hybrids. Like others, they first point to limited experiences in Norway: "While we have no vessels yet in operation, references from vessels operating in Norway indicate a positive experience. What we believe will be the case is that hybrid vessels will offer our captains and crews a safer and more responsive vessel. DP operations will particularly benefit from this technology."

The IMO backs that up, reminding the world's fleet owners and charterers that not only are battery conversions new, but so, too, are the EMS and the still-voluntary ISO 50001 standard that go with them. The best part of hybridization is yet to come, however, as even the IMO indicates a potential future environmental premium, perhaps even trade in marine emissions credits.

Bodénès

Bourbon Corporation CEO Gael Bodénès & his team plot **a bold new course** for this offshore industry stalwart, as he explains.

BY GREG TRAUTHWEIN

Your career with Bourbon has traversed many industry fluctuations. Looking back to when you joined the company, how is Bourbon today most the same, and most different?

BOURBON has transformed from a conglomerate with a small regional company footprint in offshore to a world recognized leader in offshore marine services. It has seen its teams grow from a 3000 to more than 8000 employees of 88 nationalities, the fleet has grown to more than 500 units, a new vessel being delivered every 15 days over several years. Bourbon today is very different from what it was 10 years ago and it will be very different in the next 10 years.

Please describe your business management style, and discuss how (or if) it has changed over the last 5 to 7 years.

My management style is participatory. I am very much attached to being close to the teams and to operations. I also believe in close relations with our clients. It is paramount to always focus on the essential: clients' needs and operational excellence.

I am convinced that management should be aimed at supporting the teams who are themselves in a key position to support clients and provide the best services at optimum costs. More generally, I have not changed my management style over the years. I am still attached to the same values: diversity of cultures and backgrounds, multicultural spirit, multiplicity of points of views and constructive exchange. I believe in listening to the others in order to best respond to their needs and even anticipate them. I am attached to working hard in order to support Bourbon's teams. I believe in Eisenhower's motto: "Take your job seriously, never yourself"

With this historic swoon in energy prices, today we hear of "the new norm": adjusting business practices to the new per barrel level. What does "the new norm" mean to Bourbon?

We are in the worst crisis that we have ever seen on this market…. well beyond the Lehman Brothers crisis of 2009. Even in the 1980s oil crisis was not as violent as the situation we are facing today! We therefore cannot wait and shall be proactive and take exceptional measures to adapt to this situation.

Let's recall that we are in an exceptionally long low cycle but that things will hopefully start to pick up in 2019. Some positive signals are worth mentioning:

- The first is the price of the barrel. It has been stable for a year now at over $50. $50 is the threshold at which oil companies continue to reinvest, as this is where shale oil and deep offshore begin to make sense.

- Oil companies have indeed begun to regain some leeway, and once again generate positive cash flows.

As a result, the marine services market is starting to be positively impacted. We believe that we reached a low point in 2017, and that the activity is gradually starting to recover.

In that environment, the new norm for offshore marine services means we must be able to deliver operational excellence at optimum costs. It means deploying low cost structure and inventing new business models.

We, at Bourbon, think we must innovate and find new ideas in terms of services and technologies to answer this challenge. That is why we have announced our **5. #BOURBONINMOTION** strategic action plan mid-February.

#BOURBONINMOTION. Please give our readers insight to the new, recently announced plan for the company.

In today's environment, waiting is not an option for Bourbon. The crisis has highlighted the need to change our model. We have to evolve. We have to reinvent ourselves. That is what the #BourbonInMotion plan is all about.
This plan means better serving our clients through

- Developing integrated services with performance based on data. Not simply by adding new functions, but pragmatically, step-by-step, taking measured risks thanks to digital technology.
- Splitting Bourbon into three independent companies:
  - Bourbon Marine & Logistic: Marine integrated logistics services
  - Bourbon Mobility: Passenger experience transportation
  - Bourbon Subsea Services: Light turnkey project & integrated solutions

#BourbonInMotion means enhancing operational excellence at optimum cost by

- Capitalizing on digital revolution to connect the fleet ie. our Smart Shipping program will improve safety and reduce crew onboard from 15 to 10,
- Building on technological partnerships (like the ones we signed with Kongsberg or Bureau Veritas, for example), and
- Divest what we identified as a "non-smart fleet" (41 vessels)

Finally, #BourbonInMotion also means changing culture and communication, monitoring the human revolution, which is clearly the most complex and exciting aspect of this business. Everyone's roles and responsibilities, skillsets and organizations will and are already changing.

I would say that positioning ourselves in the best competitive conditions to benefit from the recovery to come, is definitely the objective of this strategic plan for us.

In announcing #BOURBONINMOTION you said "tomorrow will look very different from yesterday." Can you please expand on this?

As already said, we think business models are going to change under the influence of this severe downturn but also under the impact of the digital revolution, which is also touching our industry and the behavior of all market players. We think it will mean integrated services business model more than day rates business model, sharing more responsibilities and risks with customers (in terms of chartering, fuel oil consumption for instance). Today, we have the possibility to share those risks: we have the data, the skills and the assets to jointly participate with our customers to deliver effective solutions. There is therefore an issue at stake here: we need to accept to take more risks to bring value added to our customers. Tomorrow will be the era of cooperation and partnerships, both technological and geographical.

The Smart Fleet: We see there will be a 75 million euro investment over the next 3 years to connect Bourbon's "smart fleet". In as much detail as possible, can you discuss the specific technologies and points of investment that will be made?

To connect this fleet, we have developed the Smart Shipping program, a program we've been working on for two years. Smart shipping is the operational backbone for the group's transformation. Through digitalization, this program will give us the opportunity to offer our clients more reliable, more efficient and optimally streamlined operations. We target an operational cost reduction of 20 to 30% by optimizing our processes and by transferring vessel-borne functions to land.

It is based on three levels: the vessel, local shore-based support and overall performance management. For the vessel, we intend to refocus the crew on running operations in order to deliver operational excellence to our clients. As for local support, it will be in charge of the technical and operational vessel support as well as contractually interfacing with the client representative on site. And lastly, overall performance management will provide remote support, based on consolidated and analyzed data feedback.

We will need to invest approximately €500,000 per ship to connect these vessels, representing a total CAPEX invest-

The Future of Bourbon is Smart, Connected

#BourbonInMotion evolves the Bourbon business model, now. It's about developing integrated services with **performance based on data**. It's about capitalizing on digital revolution to connect the fleet, a **Smart Shipping** program to reduce crew, costs and increase performance. It's about **building partnerships** with industry partners, locally and globally. Finally, it's about **changing culture** and communication. Everyone's roles and responsibilities, skill-sets and organizations will and are already changing.

All Photos Copyright : BOURBON

ment of €75 million. We have planned deployment over three years.

To carry out this fleet conversion, we will be strengthening our technological partnerships and will be open to new ones. I strongly believe that tomorrow will be the era of cooperation and partnerships!

Looking at the offshore energy market today, where do you see challenge?

The challenge today is to reinvent ourselves, to innovate, and to recreate value in this sector.

Where do you see opportunity?

Our customers are very open and demanding about these changes and this revolution. Having already started to connect their FPSO and their offshore installations, they have showed us the way. The major opportunity for us is to develop more services so that they can concentrate on their core business. I believe that the digital revolution brings us plenty of opportunities in order to be more efficient and cut our costs.

If #BourbonInMotion works as planned, what will Bourbon look like in three to five years?

In 5 years, I see Bourbon more towards as a services company focused on operational excellence and innovation, supported by data management.

If you had to pick one technology that you see as the clear leader in making maritime operations more efficient, what would it be?

Data management and process digitalization.

New tech and new information are part of the equation, moving these new tools and data into actionable results is another. What is the key to success in this regard.

I think "proof of concept" can really help us to test project in "real life", learn and optimize to get the real project on the market. Also, explore and co-develop in a collaborative manner with our clients and technological partners will help us implement new ways of efficient operations

"Quotable"

Favorite Motto

"Take your job seriously, never yourself" - Dwight D. Eisenhower

The Digital Revolution

"I firmly believe that the digital revolution also brings us plenty of opportunities in order to be more efficient and cut our costs."

"Capitalizing on digital revolution to connect the fleet ie. our Smart Shipping program will improve safety and reduce crew onboard from 15 to 10."

Building the "Smart Fleet"

"To connect this fleet, we have developed the Smart Shipping program, a program we've been working on for two years. Smart shipping is the operational backbone for the group's transformation."

Market Conditions

"We are in the worst crisis that we have ever seen on this market…. well beyond the Lehman Brothers crisis of 2009. Even in the 1980s oil crisis was not as violent as the situation we are facing today ... but things will start to pick up in 2019."

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in the offshore services industry, with a fast time-to market, while enhancing the level of operational excellence.

We talk more often these days of autonomous operations. Can you discuss Bourbon initiatives in regards to autonomy?

Beginning in 2018 we have taken another step into fleet digitalization through the strategic partnership we signed with classification society Bureau Veritas. With help of our strategic partner Kongsberg Maritime we are going to develop and deploy automation and real time monitoring fleet applications, while mitigating cyber risks. The partnership will thus deliver advanced automation of dynamic positioning systems to enable: Improvement of DP operational safety through real-time advisory tools for bridge operators and remote support for onshore teams; Streamlining ofonboard organization leading to potential reduction of manning; A reduction in fuel and DP maintenance costs

A pilot of "proof of concept" has been implemented on the Bourbon Explorer 508 operating in Trinidad waters with the support of BP. Certified by Bureau Veritas, it collects data from the DP system and drives the development of novel decision-making and verification applications for both offshore crew and onshore support teams. The autonomous vessel is not a goal in itself. We rather need to innovate in the way we operate vessels in order to bring a response to this new cycle focused on operational excellence at optimum cost. Streamlining work organization onboard vessels, we also want to deploy innovative technological solutions offering tangible benefits to our customers.

Finally, every position has its challenges. What do you consider your biggest challenge to the success of Bourbon today and in the future?

The major challenge is human evolution and change management. It is clearly the most complex and exciting aspect of this business. Everyone's roles and responsibilities, skillsets and organizations are changing. The technology and the machine are not going to replace the human being. But little by little, the machine or artificial intelligence will take on certain functions: the analysis of information and, why not, in the long term, decision-making and action undertaking.

Then, in parallel, the roles and responsibilities of humans will evolve towards more vision, action, management, risk analysis and monitoring of global activities.

This is a major change, and it is the path that is being taken by the men and women of Bourbon. Change has always been in Bourbon's DNA and, once again, I'm confident in our ability to deliver on it.

Meet the 'New' Bourbon: 3 Independent Companies

Bourbon Marine & Logistics

- A young fleet, built in series, of 210 vessels (including the 130 "smart fleet vessels").
- Operations in 39 countries, generating sales of over €400 million.
- 4,500 employees and eight ship owners who manage day-to-day operations.
- A unique business model: the company is international, the fleet being located in most offshore areas. Hopefully, the company is also very local. This is the result of Bourbon's strategy of gradually setting up operations, generating growth in partnership with strong local partners.

Key expertise:

- Supplying offshore installations and vessels.
- Towing, anchoring and positioning of offshore installations.
- Support to floating oil and gas production, storage, and unloading units.
- Its strategic objectives: connect the fleet to deploy the Smart Shipping program.

Bourbon Mobility

- Leader in the market of high-speed passenger transport at sea for majors and contractors, carrying about 3 million passengers this year.
- A fleet of nearly 270 high-speed crew boats, the so-called surfers.
- A turnover of €216 million in 2017, generated in over 10 countries.
- A strong local presence also with a team of over 2,300 employees based in these countries.

Key expertise:

- Crewliner services, focusing on speed, punctuality and comfort.
- Interfield services, ensuring employee and light equipment daily transfer.
- Specific support services, on customers' request.
- Its strategic objectives: move to a passenger centric services.

Bourbon Subsea Services

- A fleet of 22 MPSV and 25 ROVs for €220 million in 2017 turnover.
- A team of 1,000 men and women around the world, 100 of whom work in our engineering offices.
- Core subsea expertise: engineering, supervision and management of subsea operations.
- A track record of 500 subsea connections and 350 wellheads installed.
- The fleet is positioned in West Africa, Asia, the Middle East and India.
- Its strategic objectives: develop light turnkey project business.

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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The new ATAIR from FASSMER WERFT will be commissioned in 2020.

BY PETER POSPIECH

German Shipbuilding Stro

While orders for new vessels have continued to decline worldwide in 2017, the situation in the German and European shipbuilding market is different, with an increase of incoming orders. As shipping experts state: "…this is not a trend but a snapshot, but it indicates a high competitiveness of the German shipbuilding industry, particularly on technologically advanced projects."

The global mood barometer of the maritime industry had reached its lowest point in 2016. From the abyss confidence and order have carefully increased, and with about 13.5 million CGT ordered in the first three quarters, the value has passed the entire previous year.

Despite the decided uptick, this order volume is far away from full production capacity. As the global orderbook shrinks further, for a number of large Asian shipyards this could be an acid test for the upcoming year. Two important points become clear:

- The domestic shipbuilding industry is highly competitive, particularly at technologically advanced projects.
- The success of the large Asian shipyards in the past is not viable without state support

In step with the growing German shipbuilding orderbook is a continuation of the maritime energy revolution. The German orderbook for natural gas powered vessels, including for the first time also governmental vessels, exceeds 10 billion Euro and is probably the largest level of investment for clean shipping worldwide.

The German Federal Government has now adopted a LNG funding program, where as to date the program addressed mainly ship owners.

The past year saw lots of movements also in naval shipbuilding. Important partnerships were established and new orders from home and abroad have been agreed. As maritime hot spots and flash points of conflict continue to increase globally, the high performance of the local naval shipbuilding industry is a valuable and strategic asset.

Deliveries & Orders

It is little secret that, as the shipbuilding orderbook volume for tankers, bulkers and containerships have slipped to yards in the Far East, vessel which are more technically advanced and demanding have remained the province– and dominate the orderbooks – of German shipyards. The majority of the ordered or under production vessels are cruise liners, river cruise ships as well as governmental and naval boats. An additional segment which is currently showing a very positive trend is the ferry and RoRo sectors, which can be seen in the latest orders for new ships of Flensburger Schiffbau-Gesellschaft (FSG).

The order book of Meyer Werft is currently filled up to 2023 (6 delivered in 2017, 26 on order, including up to now seveb new buildings which will run on natural gas). Such a long-term perspective in the existing highly competitive

Photo courtesy ©FSG

Launching of the W.B.Yeats at FSG.

ong Vessel in a Heavy Sea

shipbuilding market is not self-evident and requires a permanent high adaptability and further development of the yard.

Rostock based Neptun Werft with a staff of around 550 employee are experts at delivering modules that contain the complete engine room, the LNG storage tanks as well as all systems and equipment.

Within the project “green cruising concept” they are among the first cruise vessels which will use 100% natural gas as fuel and are therefore particularly environmental friendly.

AIDAnova

At 337m long, 42m wide with a 8.6m draft, with four main engines transferring 62 MW to two pods, The AIDAnova is the biggest AIDA Cruises new building, currently under construction at the Meyer Werft, scheduled to be delivered in late 2018. It also sports a 3,550 cu. m. liquefied natural gas (methane) storage capacity in three storage tanks, with the storage tanks developed in-house and built by Neptun Werft. The tanks are located in a 120 x 42 m x four deck high module. Two tanks feature a length of almost 35m and a diameter of around 8m with a volume capacity of 1,500 cu. m. each. An additional tank features a length of 28m and a diameter of 5m with a volume capacity of 550 cu. m.

Another module being built at Neptun-Werft contains the four dual-fuel engines from Caterpillar in Rostock. The dimensions of the Floating Engine Room Units (FERU) are 120 x 42 m x three decks high.

Fassmer Werft

Fassmer is a dynamic family-owned shipyard in its fifth generation. The internationally successful company is active in six business areas: Shipbuilding, Boats and Davits, Deck Equipment, Wind Power, Composite Technology and the company service activities which operate under the name of Fassmer Service. Fassmer’s orderbook features seven vessels delivered in 2017 and eight on order.

The current product line includes ferries, yachts, pilot boats, work-boats, offshore supply and service vessels, research vessels, rescue cruiser, patrol boats as well as naval vessels.

Research and development, design, construction and production are included in the shipbuilding department. The coastal tourism vessel Helgoland was the first German new build which operates on natural gas.

In December 2017 the keel laying of the research vessel ATAIR took place. It was ordered by Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency). This new building is the first seagoing government vessel which uses natural gas as fuel. The new ATAIR replaces a 30-year-old vessel, and the new ship will be commissioned in 2020. She will be the biggest vessel in the BSH fleet, measuring 75 x 17m with a five meter draft and a maximum speed of around 13

Photo courtesy ©MV Werften

Photos left and right courtesy © Pospiech

The first Floating Engine Room Unit (FERU) on its way from Rostock to Meyer Werft Papenburg.

knots. The new vessel offers room for 18 crew and 15 scientists.

Flensburger (FSG)

TT-Line and Irish Continental Group chose Flensburger Schiffbau-Gesellschaft (FSG) to build new ferries. Australia-based TT-Line Company has signed a letter of intent (LOI) with FSG for the construction of two new ships.

The next-generation passenger ferries will replace the company's current Spirit of Tasmania vessels by the year 2021. Mike Grainger, TT-Line Chairman, said the companies would now commence contract negotiations and agree to final design specifications. "FSG was endorsed by the board after the company short listed a number of international shipyards to build the new tailor-made vessels," he said. "As previously announced, we expect to place an order for the new vessels in the first half of the 2018 calendar year and for them to be delivered in time to commence operations on Bass Strait in 2021." Built in Finland in 1998, Spirit of Tasmania I and Spirit of Tasmania II operate sailings across Bass Strait between Melbourne and Devonport on Tasmania's north coast.

Irish Continental Group plc (ICG) has entered into an agreement, with the German company Flensburger Schiffbau-Gesellschaft & Co.KG (FSG), whereby FSG has agreed to build a cruise ferry for ICG at a contract price of €165.2 million. Upon completion, it will be the largest cruise ferry in the world in terms of vehicle capacity. The cruise ferry will accommodate 1,800 passengers and crew, with capacity for 5,610 freight lane meters, which provides the capability to carry 330 freight units per sailing. Overall, it will effectively be a 50% increase in peak freight capacity compared to the MV Ulysses.

MV Werften

MV-Werften are the heart of the maritime industry in Mecklen-burg-Vorpommern. In April 2016 Genting HK bought shipbuilding capacity from Nordic Yards the Wismar, Rostock and Stralsund located yards. This is a special situation: Genting is client, contractor and ship owner, all in one. It was initially planned to do the ship production under the name of the group subsidiary Lloyd Werft. But in July 2016 the company announced to run the three yards under name MV Werften, with Wismar selected as headquarters.

January 2017 started the first steel cut at the Stralsund location for the production of the luxurious expedition yacht Crystal Endeavor for Crystal Cruises. MV Werften's orderbook includes four delivered and nine on order.

Complex Challenges

Ship building in the north German region faces complex challenges:

"Because of the early concentration to build specialized vessels, such as particularly environmentally RoRo ferries which run on natural gas and highly innovative offshore oil and gas vessels out of Flensburg towards unique megayachts in Rendsburg, Kiel and Wewelsfleth our yards are not that much affected like the containership industry," said Dr. Bernd Buchholz, Economics Minister of Schleswig-Holstein.

Kiel based yard TKMS (Thyssen Krupp Marine Systems) builds submarines for Egypt – the second of four ordered subs has been delivered last summer – the last two shall be delivered in 2021. The orderbook looks impressive: one sub delivered and 17 on order.

Kiel based German Naval Yards (2 delivered, 2 on order) received a small portion of the order volume to build five ships for the German Navy. The majority of the 1.5 billion worth order for five corvettes was awarded to Lürssen (Bremen) and TKMS (Kiel).

German Naval Yards repairs continuously navy ships, e.g. the, at the ship's stern, damaged FRANKFURT AM MAIN which got off the course in Wilhelmshaven - resulted in considerable damages at the stern which affected also the propulsion and the steering gear.

Peters-Werft in Wewelsfleth specializes in special ship building and yachts – till 2020 the yard will be busy to recondition the four-masted barque PEKING.

The world largest sail yacht A has been designed by Rendsburger Nobiskrug-Werft and produced at German Naval Yards in Kiel. If the futuristic seeming

MV Werften starts with production of Crystal Endeavor.

Kiel based yard TKMS (Thyssen Krupp Marine Systems) builds submarines for Egypt. The picture shows one sub on test trial in the Baltic Sea.

Photo courtesy ©Irish Ferries

Irish Continental Group plc (ICG) new cruise ferry will accommodate 1,800 passengers and crew, with capacity for 5,610 freight lane meters, which provides the capability to carry 330 freight units per sailing.

vessel for both the companies involved are a stroke of luck, must be open – numerous negative headlines about unpaid invoices and probable illegal used tropical wood went around the world.

Only in Mecklenburg-Vorpommern and Niedersachsen employees are searched in big numbers. In all other German shipyard locations the workforce is smaller. This is the result of the yearly questionnaire answered by the workers' council on behalf of the labor union IG Metall. According to them 15,800 employees are working at 37 German shipyards – as was the case in previous years since 2013.

"The German shipbuilding industry maintains its position in the heavy seas of the worldwide shipbuilding. But it cannot escape the negative influence of the world market," says Thorsten Ludwig of the Struktur- and Personalentwicklung (AgS) agency who is the author of the study. In Mecklenburg-Vorpommern alone are about 2450 people busy in the large yards. The most of them at the three locations Rostock, Wismar and Stralsund (1.454), at the Peene-Werft in Wolgast about 300 and the Neptun-Werft in Rostock features around 550 employees.

3

Photo: MISC Berhad

4

2

Photo: Bollinger/USCG

5

Image: Royal Caribbean

1. World's Largest Cruise Ship

With much of the talk in the cruise sector turning to the fast growing 'luxury adventure' sector, it is refreshing to see 'bigger' taking back the limelight. At 362 x 66 meters and 70 meters high, Royal Caribbean's new 228,081 GRT cruise ship takes the "world's largest" title. Symphony of the Seas was delivered to Royal Caribbean International from STX France who has been building the ship since 2015. Everything about the new cruise liner is big: 18 decks, 6,800 passenger capacity, 2,747 staterooms and 2,000+ crew and staff. The delivery comes barely two years after the delivery Harmony of the Seas, and will be followed by another of her class due in 2021.

Among the ship's notable features are a 10-deck-tall slide, a zipline, laser tag, a large selection of dining options and Broadway musicals. She is also the first cruise ship to be granted with the "SILENT-E" class from DNV-GL for her low level of underwater noise.

2. USCGC Nathan Bruckenthal Delivered

The U.S. Coast Guard took delivery on March 29, 2018 of the USCGC Nathan Bruckenthal, built by Bollinger Shipyards and delivered in Key West, Florida. The 154 ft. patrol craft USCGC Nathan Bruckenthal is the 28th vessel in the Coast Guard's Sentinel-class FRC program, built using a proven, in-service parent craft design based on the Damen Stan Patrol Boat 4708. It has a flank speed of 28 knots, state-of-the-art command, control, communications and computer technology, and a stern launch system for the vessel's 26 foot cutter boat. This vessel is named after Coast Guard Hero Nathan Bruckenthal. In April 2004 while serving aboard USS Firebolt, Bruckenthal was killed in the line of duty while conducting maritime intercept operations in the North Arabian Gulf.

Photo: Gladding-Hearn/Circle Line

Photo: Wärtsilä

3. MISC Berhad Names FSO Benchamas 2

MISC Berhad held the naming and delivery ceremony of its new Floating, Storage & Offloading (FSO) facility for Chevron Offshore (Thailand) Limited (COTL), the FSO Benchamas 2. The contract was signed between MISC Offshore Floating Terminals (L) Limited (MOFT) and COTL in August 2016. The FSO will be deployed for a full field development for COTL at the Benchamas field in the Gulf of Thailand. FSO Benchamas 2 has a storage capacity of 650,000 barrels with 12 years design life without dry-docking.

4. Gladding-Hearn Delivers Ferry for NYC's Circle Line

Gladding-Hearn Shipbuilding, Duclos Corporation, delivered again for New York City-based Circle Line Sightseeing Cruises, Inc., this the sixth 165-ft., 599-passenger sightseeing vessels. Designed by DeJong and Lebet, N.A. and builf from steel, the 165 x 34 x 12.8 ft. vessel has a top speed of 14 knots powered by twin Cummins QSK-38M1 diesel engines delivering a total of 2600 hp and connected to ZF W3355 gear boxes, spinning 60-inch, 5-bladed bronze propellers. For dockside maneuvering, the vessel is equipped with a 125 hp Wesmar bow thruster, powered by an electric motor. Two 140 kW, John Deere generators supply the ship's service power. The vessel carries 8,200 gallons of fuel and 4,000 gallons of potable water. The pilothouse is equipped with port and starboard wing stations, in addition to the centerline helm.

5. Two Sinopacific-built LEG Carriers Named

Chinese shipbuilder CIMC Sinopacific Offshore & Engineering Co. Ltd. (CIMC SOE) completed the first two vessels in a series of five liquid ethylene gas (LEG) carrier newbuilds for a Chinese ship owner. The series includes two 17,000- and three 22,000-cu. m. capacity LEG carriers, with the smaller two vessels named and one delivered during a ceremony on March 28. The 17,000 cu. m. capacity carriers are fitted with cargo handling systems designed and produced by Wärtsilä. The systems include a reliquefaction plant for ethylene, ethane and liquefied petroleum gas (LPG), as well as for various petrochemical cargoes.

Also included is the transfer system comprising the cargo pumps together with the control, monitoring and safety system.

Wavepiston put Renolit Films to the Test

With its "Film Instead of Paint" concept Renolit is exploring new horizons in the maritime sector, as the company now plans to enter the renewable energy market with its films. The first step has been made with the use of the flock-film RENOLIT SEAL for an innovative enterprise in Denmark, where the company Wavepiston has developed at similarly-named wave-powered energy generation project.

The idea

A steel cable is stretched between two anchored buoys. Energy collectors developed by Wavepiston are attached to this cable at intervals of five to six meters. These collectors consist of a plate and a lateral hydraulic pump. The oscillation of the waves move the plates back and forth, which in turn, pumps seawater to an onshore turbine. To achieve the greatest possible energy efficiency, substantial wave movements are needed, which experience shows are found, above all, in fishing waters.

Naturally, the Wavepiston project suffers from fouling. "Encrustation with mussels, barnacles and algae increase the weight of the plates and if they become too heavy, they sink down where the wave energy is lower" says Martin von Bülow, Wavepiston's CTO. To protect the plates against fouling, the company invested a lot of time in researching the best anti-fouling solution. The challenge was: Most anti-fouling coatings contain toxins and biocides. "Especially for our project, these were totally unsuitable because in the fishing areas in which our units are preferably stationed, the use of all materials containing biocides is strictly prohibited" says von Bülow. Renolit's films presented a good alternative; effective again biofouling and biocide-free. To perform long-term real-life tests on our concept, a test field was set up in a fishing area off the coast from Hanstholm in Denmark. The 120-m long prototype consists of eight energy collectors with four square meter and seven square meter plates. Two of these plates were coated with a Renolit film, namely Renolit SEAL. This film not only has excellent anti-fouling properties but also has a very special "flock-type" surface. "We expect the film's surface structure will increase water friction and thus lead to a higher energy gain" says Sébastien Charlés, Manager of the Renolit Maritime Business Unit. As part of the long-term test in Hanstholm, the efficiency of the different plates will be tested to determine if the filmed plates generate more energy that the non-filmed plates.

© Wavepiston

Installation of the prototype near Hanstholm.

Equipment Procurement for Future Frigate

Naval Group has started to select the first equipment suppliers for the five future intermediate-size frigates (FTI) intended for the French Ministry of Defense. In the framework of the execution of the contract awarded by the French Defence Procurement Agency in April 2017, Naval Group initiated its process of selecting the program's industrial suppliers for the five future intermediate-size frigates, the first of which will be delivered to the French Navy in 2023.

"We expect a lot from our suppliers," said Frédéric Massa, Director of Naval Group Purchasing. "The success of the program is dependent on them fulfilling their commitments: timely delivery of input data and equipment for which they are responsible, with the expected quality level. We therefore selected them for their capacity to deliver on this strategic program for France."

To date, the main suppliers selected are:

- Axima, for heating, ventilation and air conditioning (HVAC) systems;
- CNIM, for sonar hatches and torpedo hatches;
- Ixblue for navigation units and their computers;
- Leonardo for 76 mm medium calibre artillery systems;
- MBDA for integration and services relating to missile-firing installations;
- MTU, one of the world's leading manufacturers of large diesel engines;
- Safran Electronics & Defense for the optronic identification system incorporating the very long range of the PASEO XLR (eXtra Long Range) sight;
- Thales, for the sonar suite, the electronic warfare suite, the IFF (Identification, Friend or Foe) and the communications system.

The French version of the Belh@rra, a world-class frigate of an approximate displacement of 4,000 tonnes intended for anti-submarine warfare, is designed to respond to the various French national needs. It will be endowed with extended self-defense and special forces projection capacities. Furthermore, it will integrate the new Thales SEA FIRE four flat antenna radar and will be equipped with reconfigurable firing installations for Aster 30 and Exocet missiles from MBDA.

Naval Group

MAN D&T, Hyundai Invest in News Test Facility

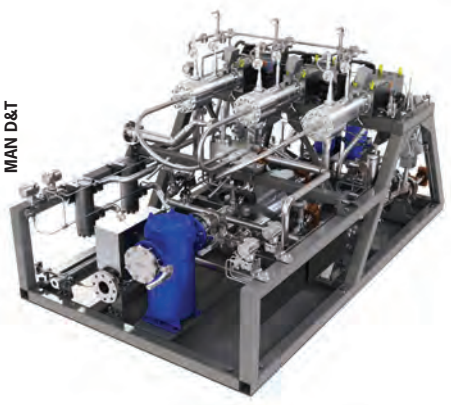
As the global maritime industry steams toward ever-stricter fuel and emission rules, industry leaders such as MAN Diesel & Turbo and Hyundai continue to invest in facilities and technologies. MAN D&T said it will build a new test-engine facility in collaboration with its two-stroke licensee, HHI-EMD, the engine and machinery division of Hyundai Heavy Industries. The new venture –located in Ulsan, Korea at HHI-EMD's works and scheduled to open in 2019 – will expand MAN Diesel & Turbo's R&D test capacity and strengthen its development of dual-fuel gas engines.

"This new test set-up will enable us to further advance our pursuit of highly reliable and environmentally-friendly technology with a strong focus on cost-competitive gas engines and related equipment," said Lars Juliussen, Senior Manager and Head of MAN Diesel & Turbo's Diesel Research Center. It will be the first test engine with online remote control, supporting MAN's digitization strategy.

ME-GI Pump Vaporizer Unit

The new test engine set-up will also feature MAN Diesel & Turbo's own ME-GI Pump Vaporizer Unit (ME-GI PVU), touted as a high-pressure LNG supply unit that makes FGSS installations significantly more compact – reducing both cost and weight. The ME-GI PVU is designed to pressurize and vaporize the LNG fuel to the exact pressure and temperature required by ME-GI engines. Gas pressure is controlled via control of hydraulic oil flow to the pump, ensuring a very quick and precise control of the LNG supply to the engine. Separate control of each pump head provides full redundancy.

Above: MAN B&W 2S5ME-C-GI test engine bound for HHI-EMD.



MAN D&T

Below: The new test engine set-up will also feature MAN Diesel & Turbo's ME-GI Pump Vaporizer Unit.

GustoMSC Evolves Chela 'Smart' Crane


GustoMSC

Nearly two years ago GustoMSC introduced a smart crane for lifting and wireline operations under the drilling cantilever. Two years later, following industry feedback and further development, the equipment has evolved into Chela, named after the Greek word for a crab's claw. Chela offers an extra hand in operations, and due to its crab-like motion characteristics, it can reach below the cantilever as well as elevate towards the main deck, providing crane access to an area traditionally blocked by the cantilever when drilling.

Three key elements to enhance the overall efficiency of the drilling jack-up were used in the development of this piece of equipment: providing a large lifting envelope and wireline operation capabilities below the cantilever, easing material handling to the platform and increasing safety for lifting over live wells by applying high safety standards. Besides the reduced human involvement on the drill floor and access to the work area without handshakes, Chela features improved safety features with a fully redundant main hoisting system, a key technical feature needed when working over live wells. As a consequence, no single failure, including the failure of a hoisting rope, will lead to a high risk situation.

MOSES Connect Edition 10.12

Bentley Systems has released MOSES Connect Edition 10.12 with key changes for added functionality and integrated solutions in meshing and pre-processing actions. Concurrently, the latest developments on interoperability options with SACS Connect Edition 11.2 promise a smoother modelling experience in offshore operations.

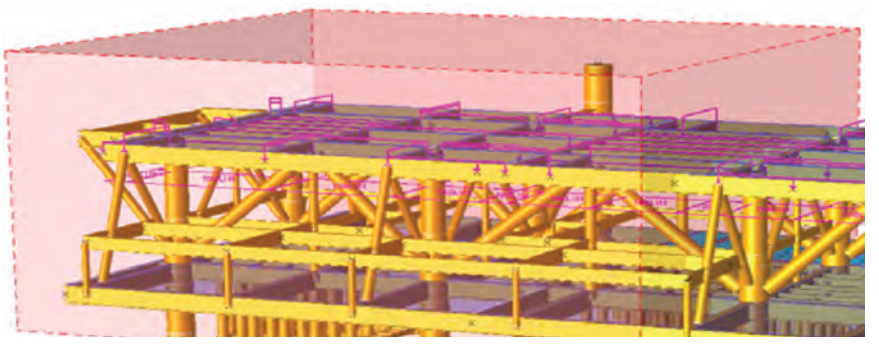
Naval architects and marine engineers will have access to a complete range of high fidelity solutions aligned with their project needs, with functions for hydrostatic, hydrodynamic, mooring, multi-body interaction, transportation, launching and structural analyses in the time or frequency domain. Among them, industry specific software like MOSES and SACS apply best practices to predict motion and structural response. Traditionally, engineers have used both technologies separately in their own environments, but recent developments by Bentley Systems have introduced a combined modeling environment where MOSES and SACS interact.

The latest developments in MOSES Hull Modeler 10.12 have focused on implementing further manipulation commands for Trimesh surfaces. Naval architects can now move, resize, flip, rotate, align and offset Trimesh surfaces interactively and save pre-processing time in their analyses. These automation tools mitigate modelling risk from misaligned surfaces likely to result when importing CAD geometries and allow the designer to explore alternatives efficiently while maintaining mesh properties throughout.

Another new mesh operation is the ability to offset a Trimesh surface concentrically or longitudinally. This feature can be useful when modelling double hull and internal stiffening arrangements. Similar operations can be carried out when modelling repetitive elements like double bottom stiffeners and stringers throughout the ship length.

Further consideration was given in SACS Connect Edition 11.2, where naval architects can share a combined environment where SACS and MOSES coexist in what is known as SACS-MOSES interoperability. While MOSES already offers a suite of capabilities for pre-processing, analysis and post-processing, the first step in creating the best of both worlds has been taken.

Engineers can now select a new analysis type under "Marine Applications" in SACS where they can find MOSES Launch in the available analysis subtypes. This modernisation of the SACS Marine products allows for the interoperability between SACS and MOSES, with automatic data exchange creating a smooth analysis workflow. This cooperation allows engineers to study the structural integrity of the barge during launch by making sure that shear forces and bending moments remain within permissible limits. This technology implements MOSES' technology for transportation and launch within the SACS interface for the first time. Post-processing in this synergy takes place within SACS without changing environments.


Topside module prepared for motions analysis and barge longitudinal strength

Naval architects can draw conclusions and make project decisions based on the motions while on tow to launching site and during launch.

Other areas of activity within naval architecture is decommissioning. With decommissioning operations on the rise, SACS invested in specific tools to assist naval architects in lifting topside modules and calculating confidently dynamic motions and longitudinal strength once placed on the barge. An example of a topside sub-model is shown above.

About the Author

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BSM
Maxwell


TOTE
Chiarello


HII
Thomas


Kvaerner
Loken


Bollinger
Eymard


Bollinger
Battaglia

Obituary: Robert Maxwell, MD, BSM Singapore

BSM announced the passing of Robert (Bob) Maxwell, Managing Director of the Singapore office. Bob passed away on Monday, 26th March after a long struggle with cancer. Bob trained as a Mechanical Engineer at Southampton College of Higher Education. He started his career at sea in 1988 as a 2nd Engineer and in 1993 became a Chief Engineer officer sailing on bulk carriers ranging from 149,000 to 186,000 tonnes.

A few years later, in 1996, he joined Hanseatic Shipping as a Chief Engineer sailing on large containerships and gas carriers. After a succession of roles of increasing seniority, Bob was appointed Managing Director of BSM Singapore in 2014.

TOTE President Chiarello to Retire

TOTE Inc. president and CEO Anthony Chiarello will retire this summer after eight years at the helm and nearly four decades in the maritime industry.

Thomas Named VP Pricing, Contracts at HII

Huntington Ingalls Industries said that Christie Thomas was promoted to vice president of contracts and pricing at its Newport News Shipbuilding division. She will succeed Tom Johnston, who will retire on April 1. Thomas will have overall responsibility for contracts, pricing, and export/import licensing and compliance for the Newport News shipyard.

Løken Named CEO at Kvaerner

Karl-Petter Løken has been appointed President and CEO for the international contracting company Kvaerner. Løken succeeds Jan Arve Haugan, who left Kvaerner for a position at Aker Energy.

Bollinger Promotes Eymard, Battaglia

Bollinger Shipyards President announced the promotions Jerome Eymard to the position of Director of Human Resources, and Rachael Battaglia to the position of General Counsel.

Stolt-Nielsen Names Grüner-Hegge CFO

Stolt-Nielsen Limited announced Jens F. Grüner-Hegge has been appointed as its new Chief Financial Officer, effective from April 2, 2018. Grüner-Hegge, who has served as Vice President, Corporate Finance since 2007, succeeds longtime CFO Jan Chr. Engelhardtsen, who will retire from his executive role and has been appointed to fill a vacancy on the company's board of directors.

Edvardsen Takes the Helm at VesselMan

VesselMan announced the appointment of Glenn Edvardsen as its new CEO effective March 1, 2018. Prior to joining VesselMan, Edvardsen held a position of VP and Head of shipping at StormGeo.

RH Taps Bannerman to Head Americas

Radio Holland Group appointed Philip Bannerman as Regional Director Americas. Bannerman will be based at the RH regional head office in Houston and will be responsible for all offices and activities of Radio Holland in the Americas region, being USA, Canada, Curaçao, Panama, Brazil and Trinidad & Tobago.

Ozegowski Named CEO at Atlas Elektronik

Michael Ozegowski, 52, has been appointed the new Speaker of the Management Board and Chief Executive Officer of Atlas Elektronik GmbH with effect of May 1, 2018. He succeeds Dr. Jens Bodo Koch who is to become CEO of Heckler & Koch Group.

Valkonen Named CFO of Evac Group

Tuomo Valkonen, M.Sc. (Econ), has been appointed as the new Chief Financial Officer (CFO), Evac Group, effective as of May 1, 2018. He will be based in Espoo, Finland, and report to Tomi Gardemeister, President and CEO of Evac Group.

Valkonen has more than 20 years' experience in various financial roles. Previously, he has worked as the CFO at HKScan Group and CFO at CPS Color Group.

Comer to Step Down from Lead at SAi

Ship Architects, Inc. (SAi) announces its current Principal Naval Architect, Joseph H. Comer is stepping down and turning over the leadership position to Altug Basaran, P.E., its current Director of Operations.

Darling, Parker Join Tidewater

Tidewater has strengthened its management team with the appointments of David Darling as VP and Chief Human Resources Officer and Mark Parker as Vice President, Corporate Taxation.


Radio Holland

Bannerman


Atlas Elektronik GmbH

Ozegowski


Evac Group

Valkonen


Ship Architects Inc.

Comer


Ship Architects Inc.

Basaran

Solstad & Yxney

"Vane Launch" Launched


Vane Brothers

The Vane Brothers Company introduced Vane Launch, a new division that builds on the company's existing launch service offerings, a division designed to be synergistic with Vane Brothers' bunkering operations. Among many service offerings, Vane Launch delivers ship's stores and supplies, including fresh and frozen foods; transports passengers on U.S. Coast Guard-inspected vessels; delivers lube oil bulk and package products via launch or truck; delivers non-potable water; and, as of 2017, is authorized to remove USDA-regulated garbage from vessels.

San Francisco Orders New Fire Boat

Moose Boats won a contract from the San Francisco Fire Department for the construction of a M2-38 Catamaran CBRN, Dive and Fire Rescue vessel to enter service in the third quarter of 2018. The aluminum catamaran, which is 75 percent funded by FEMA's FY2015 Port Security Grant Program, will be powered by twin Cummins QSB6.7 425hp turbo diesel propulsion engines with Hamilton HJ292 waterjets.

The vessel will be equipped with a host of electronics including a Simrad multifunction navigation screen, radar and 3D side scan sonar, L3 AIS, FLIR stabilized thermal imaging camera, Icom communications radios and an OTS diver recall system.


Moose Boats

Solstad, Yxney Maritime Join Forces

SolstadFarstad and Yxney Maritime AS have completed a pilot project to develop and roll out the Yxney fuel efficiency and emission reduction software MarESS. During the pilot, the combination of MarESS and skilled crews generated significant fuel savings for SolstadFarstad and their clients, leading to the contract for implementation for the entire fleet.

Ontario Accepts Damen's Proposal


Damen

L to R: Mark Gerretsen, MP for Kingston and the Islands; Leo Postma, Sales Manager, Damen Shipyards Gorinchem; Sophie Kiwala, Member of Provincial Parliament; Mike Bossio, MP of Hastings-Lennox and Addington.

The Government of Ontario has accepted Damen's proposal to build two ferries with full electric propulsion.

Damen is building a 68-m Road Ferry 6819 and a 98-m Road Ferry 9819 to operate in the Canadian waters of the Great Lakes. The vessels will be the first fully electric, non-cable vessels in Canada.

As part of the tender process for the contract to build the ferries, Damen was required to identify future innovations and green technologies for sustainable power solutions. The Government of Ontario has accepted Damen's electrification proposal. It is estimated that electrification of the two ferries one servicing Kingston and Wolfe Island and the other Millhaven and Amherst Island (Loyalist Township) – will reduce emissions by the equivalent of 7 million kg carbon dioxide per year.

Their capacity to transport 300 passengers and 42 cars (6819 – Amherst Island Ferry) and 399 passengers and 75 cars (9819 – Wolfe Island Ferry) at speeds up to 12 knots remains the same as with conventional propulsion.

Finnlines to Lengthen Two

Finnlines has opted to lengthen two additional vessels as part of its $86 million Energy Efficiency and Emission Reduction Investment Program launched in 2017, the company said today. The first two vessels, MS Finntide and MS Finnwave, have already returned to operation after lengthening, and a further two vessels, MS Finnsky and MS Finnsun, will be lengthened by the end of May 2018. With the newly exercised option, work to lengthen MS Finnbreeze and MS Finnsea will be carried out from September to December 2018. According to Finnlines, each lengthened vessel will be 217.7 meters long with capacity of around 4,200 lane meters, an increase of about 30 percent.

Finnlines

Samsung's Smart Ship Solution Obtains ABS Cyber Approval

ABS granted a Certificate of Cyber-Safety Compliance for South Korean shipbuilder Samsung Heavy Industries' (SHI) Smart Ship Solution demonstrating adherence to the ABS Guide for Cybersecurity Implementation for the Marine and Offshore Industries and ISO 27000 series, IT Security Control Code of Practice. SHI's Smart Ship Solution aims to improve vessel efficiencies using real time data from hull and equipment sensors in collaboration with land-based technical and fleet managers. Real time data transfer between ship and shore facilities, to enable automated operations, presents a growing cybersecurity challenge for the marine and offshore industries.

ABS

Dr. Dong Yeon Lee, SHI, Paul Walters, Director, Global Cybersecurity, ABS

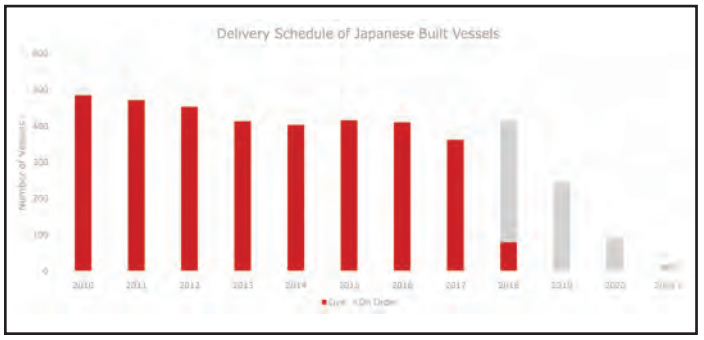
Clarification

In the March 2018 edition of *Maritime Reporter & Engineering News,* page 63, there was a picture of an that was mistakenly labeled "Markey Machinery's CTD-11V" in the caption. The crane pictured, which was part of Markey's 'Oceanographic' offering, is an Allied Marine Crane CTD-11V. For more information on Allied products and systems please visit: **www.alliedsystems.com**

Photo: Ross Murray, Markey Machinery

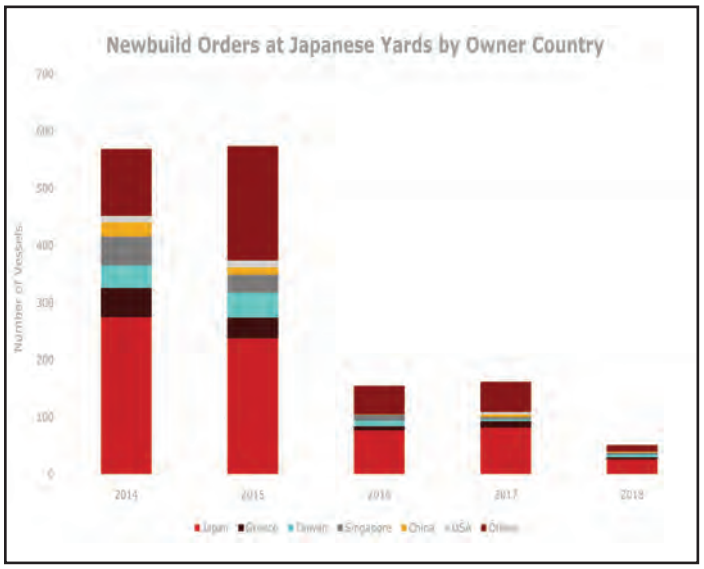
Japanese Built Fleet by Delivery Year

Build	Live		On Order		Total	
Date	# of Vessels	Value $m	# of Vessels	Value $m	# of Vessels	Value $m
2010	485	$9.08			485	$9.08
2011	471	$9.05			471	$9.05
2012	453	$8.62			453	$8.62
2013	413	$8.26			413	$8.26
2014	403	$8.54			403	$8.54
2015	416	$8.94			416	$8.94
2016	410	$10.13			410	$10.13
2017	362	$10.23			362	$10.23
2018	79	$2.80	334	$13.72	413	$16.52
2019			243	$9.71	243	$9.71
2020			91	$3.88	91	$3.88
2021+			17	$1.65	17	$1.65
Grand Total	**3,492**	**$75.64**	**685**	**$28.96**	**4,177**	**$104.59**



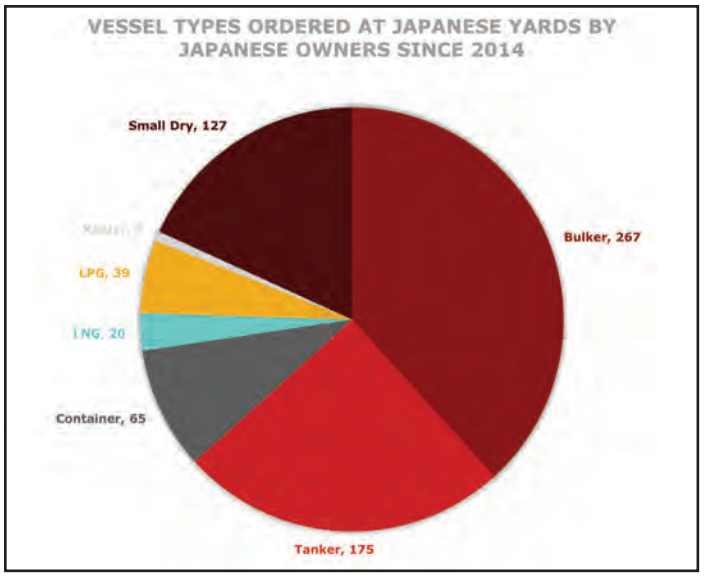
Newbuild Orders at Japanese Yards by Owner Country

Orderer	2014	2015	2016	2017	2018	Total
Japan	275	238	77	82	26	698
Greece	51	36	7	11	4	109
Taiwan	39	44	10	3	5	101
Singapore	51	31	10	4	3	99
China	25	13	1	5	2	46
USA	11	12		4		27
Others	117	200	50	53	11	431
Grand Total	**569**	**574**	**155**	**162**	**51**	**942**



Vessel Types Ordered at Japanese Yards by Japanese Owners

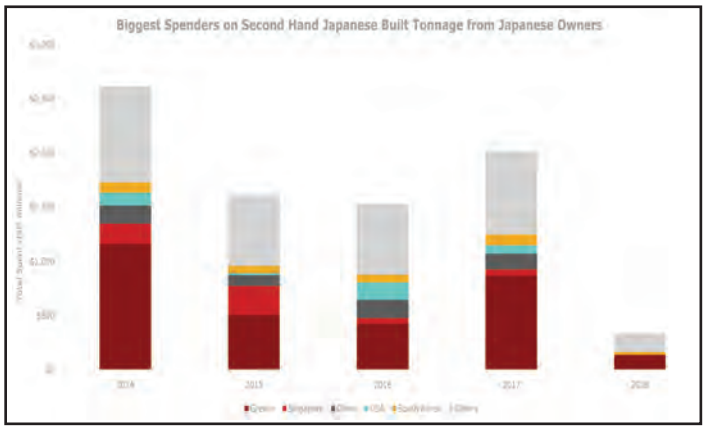
Vessel Type	2014	2015	2016	2017	2018	Total
Bulker	126	94	10	32	5	267
Tanker	48	61	36	27	3	175
Container	22	23	7	1	12	65
LNG	8	11	1			20
LPG	16	5	12	5	1	39
Reefer	5					5
Small Dry	50	44	11	17	5	127
Grand Total	**275**	**238**	**77**	**82**	**26**	**698**



Biggest Spenders on Second Hand Japanese Built Tonnage

Buyer	Total*	
Country	# Vessels	$m
Greece	221	$3,092
Singapore	45	$573
China	53	$570
USA	22	$376
South Korea	39	$358
Others	319	$3,124
Grand Total	**699**	**$8,093**

Greece is by far the biggest spender on Japanese built, second hand tonnage from Japanese owners, accounting for 38% of the total spent. The next biggest, Singapore, accounts for only 7% of the total spent.



THE DAWN OF THE AGE AUTONOMY

While debates rage in regards to safety, insurance & cyber security, the tech powering autonomous maritime operations continues to power ahead.

Edited By Tom Mulligan

This second marine industry sector review by Tom Mulligan shows how the day of the unmanned ship is dawning and reports on the projects that are set to make autonomous shipping a reality.

DNV GL Virtual Bridge Cargo vessels without a superstructure could one day be controlled from a virtual bridge on land.

Photo courtesy of DNV GL / Rolls-Royce

Photo courtesy Rolls-Royce

Rolls-Royce's Intelligent Awareness (IA) system uses data collection to enhance navigational safety and operational efficiency.

Rajant's Kinetic Mesh ensures the mobile connectivity ports need to function fully and securely.

Advances in sensor technology, data analytics and bandwidth-to-shore are fundamentally changing the way shipping works. And as operations are digitalized, they become more automated, **Dr. Pierre C. Sames, Director of Group Technology & Research at class society DNV GL**, has stated.

Governments around the world are looking into unmanned shipping as a way to move more cargo to sea in order to contain the spiraling costs of road maintenance caused by heavy truck traffic, not to mention air pollution. Norway is one of the countries taking a lead in exploring this issue: Norwegian distribution and transportation companies need to be able to bridge the country's many fjords and sea passages in order to ease transit, and cost is a key consideration in this. In 2016, Norwegian government agencies and industry bodies established the Norwegian Forum for Autonomous Ships (NFAS) to promote the concept of unmanned shipping and, in support of these efforts, the Norwegian government has turned Trondheim Fjord into a test bed for autonomous ship trials. Other nations, most notably Finland and Singapore, are pursuing similar goals.

DNV GL is heavily involved in this development, with a mission to ensure that the technologies that enable ships to operate autonomously will benefit human society and the environment: If we look at recent advances in driverless car technology, the thought of trying something similar with ships does not appear too far-fetched, said Sames. After all, water has at least one great advantage: there is less traffic than on roads and reaction times are usually longer. Automation reduces the potential for human error and, in addition, water transportation can be cheaper and more energy efficient than moving goods on land. DNV GL has initiated or is taking part in several autonomous operation projects and its ReVolt project is one example: here, using a 1:20 scale model of DNV GL's concept vessel ReVolt, students from the Norwegian University of Science and Technology (NTNU) in Trondheim are investigating how advanced control systems and navigation software could control an unmanned vessel and, once all aspects of the autonomous control technology are mature, how such a design could possibly be built and deployed as a feeder vessel on fixed routes in coastal waters.

Another project in which DNV GL is taking part is the Advanced Autonomous Waterborne Applications initiative (AAWA) led by Rolls-Royce: this project is investigating a wide range of technological, safety, legal, economic and societal issues related to the development of commercial-scale unmanned shipping. At DNV GL, we are doing a lot of work to understand the potential risks that come with autonomous ship systems in order to set new standards for them, said Sames. We are already working on developing requirements to be able to test and classify unmanned vessels in the future. In one project nearing completion, Rolls-Royce is supplying automatic crossing systems for two DNV GL-classed double-ended, battery-powered vessels for Norwegian ferry operator Fjord1, scheduled for commissioning this year. The vessels will navigate autonomously under the supervision of a human captain who will be able to take over control of the ship at any time. One of these ferries will still require human-controlled berthing, but the other has been designed to be able to berth itself automatically.

In similar fashion, the unmanned offshore vessel Hrönn, which is under construction at Fjellstrand shipyard for a Norwegian and UK consortium led by Automated Ships Ltd and KONGSBERG Group, will also be delivered this year. This light-duty, fully automated utility ship will be deployed in a shuttle service for offshore installations, but will also be able to be used for a wide range of other purposes from research to fish-farming operations. Furthermore, plans for the first unmanned and fully-electric container feeder ship Yara Birkelandwere announced last year by KONGSBERG Group and Norwegian fertilizer company Yara. After delivery, the ship will initially operate as a manned vessel but will commence traveling between the Norwegian ports of Brevik and Larvik autonomously in 2020. However, Sames has expressed a word of caution: While existing know-how from the aerospace and automobile industries can be leveraged, specific expertise in ship autonomy has yet to be built up, he stated. Another concern is the operational availability of on-board machinery, as immediate repairs are simply not possible on an unmanned vessel: the reliability of all mechanical and electronic components is crucial. In addition, having battery-powered unmanned vessels would eliminate movable parts from the power generation system and make them easier to maintain, noted Sames. Another issue is

Photo courtesy Rajant

Photo courtesy Inmarsat

Inmarsat networks will play a vital role in autonomous ops.

Photo courtesy Wärtsilä

Wärtsilä's recent acquisition of Transas will help it connect smart ships with smart ports more seamlessly.

Photo courtesy DNV GL

NTNU researchers use the experimental scale model DNV GL's ReVolt unmanned vessel for trials.

Great Intelligence, a 38,800 dwt bulk carrier with Lloyd's Register cyber-enabled ship descriptive notes, using the application of ShipRight Procedure risk-based methodology.

that there is, as yet, no legal framework that governs the use of unmanned ships. DNV GL is developing a set of rules, but to avoid potential conflicts with international law, autonomous ships will not be able to operate in international waters until appropriate regulations are enacted and enforced by the IMO, and this will take time.

For the deep-sea segments, autonomous shipping is not an option today, Sames stated. These vessels travel distances that go beyond the range of battery propulsion, and they require well-trained crews on board who can respond quickly to any technical issue. If an unmanned vessel had a technical issue in the Atlantic, it would take days to reach it and fix the problem. This would not be safe or economical. Advances in automation can, however, benefit all industry segments in some way, even without fully autonomous control. Some ship traffic might be able to be controlled remotely from land-based virtual bridges, with one ship master overseeing several vessels at the same time. But the most likely scenario is that the technology that enables autonomous ship operations will simply be an additional option for operation – meaning they could be used for specific purposes without fully replacing traditional, manned operations, Sames has suggested. So, for example, autonomous navigation and control systems could support the crew in steering a vessel, thus increasing safety and optimizing operational efficiency.

The most likely scenario is that autonomous shipping will be an additional option for future ship operation, he concluded. The great debate As Ronald Spithout, president of the maritime division of satellite communication specialist Inmarsat, has commented, the idea of autonomous vessels has ignited a great deal of debate across the industry. There are still plenty of challenges that must be overcome, not just with the technology required but also with regulatory issues having to be addressed, and commercial questions on the viability of such vessels needing to be answered. Spithout has observed that, although it may seem counter-intuitive, the likelihood is that technological advances that bring greater levels of automation to certain ship systems will make the role of human maritime industry workers more important than ever. AI-assisted health monitoring of onboard machinery, for example, will reduce failure rates by allowing pre-emptive interventions to fix issues before any breakdown. Such data analytics and access to immediate support from shore-based experts would profoundly change the role of the marine engineer, empowering staff to take a more strategic approach to vessel operation.

Rupert Pearce, CEO of the Inmarsat group, has noted that the true impact and the real benefits of the digital society are only now being experienced within the maritime sector and that the opportunities open to the industry will be as great, and as unexpected, as has been seen in other sectors. He observed that at the highest level, satellite communication offers a greater degree of visibility on vessel and cargo position and performance, which in turn produces tangible metrics that may be shared with the customers of shipowners and managers, as well as with other stakeholders.

Inmarsat and its partners at the Norwegian Maritime Competence Center envisage that the continuous flow of data from a vessel to the shore not only provides specific, measurable benefits, but also captures, analyzes and shares information with key internal and external stakeholders: this wealth of data can, in turn, provide the necessary insight to develop new ways of working and new ways of enhancing the value proposition for the end customer. Satellite communication One increasingly popular benefit of employing satellite communication is the ability to continually and cost-effectively monitor a vessel's main engine and its associated systems and, through this, to derive real-time vessel performance data. The use of applications such as passage planning and weather routing for optimal sailing will also contribute to a more profitable voyage, while greater availability of bandwidth will also play a vital role in bridge procedures, whether for navigation and

Photo courtesy DNV GL / Kongsberg

Hrönn: Kongsberg's unmanned multi-purpose utility vessel.

Photo courtesy Rolls-Royce

MAXCMAS project, a partnership between Rolls-Royce,LR, Warsash Maritime Academy, Queen's University Belfast and Atlas Elektronik UK.

Photo courtesy Lloyd's Register

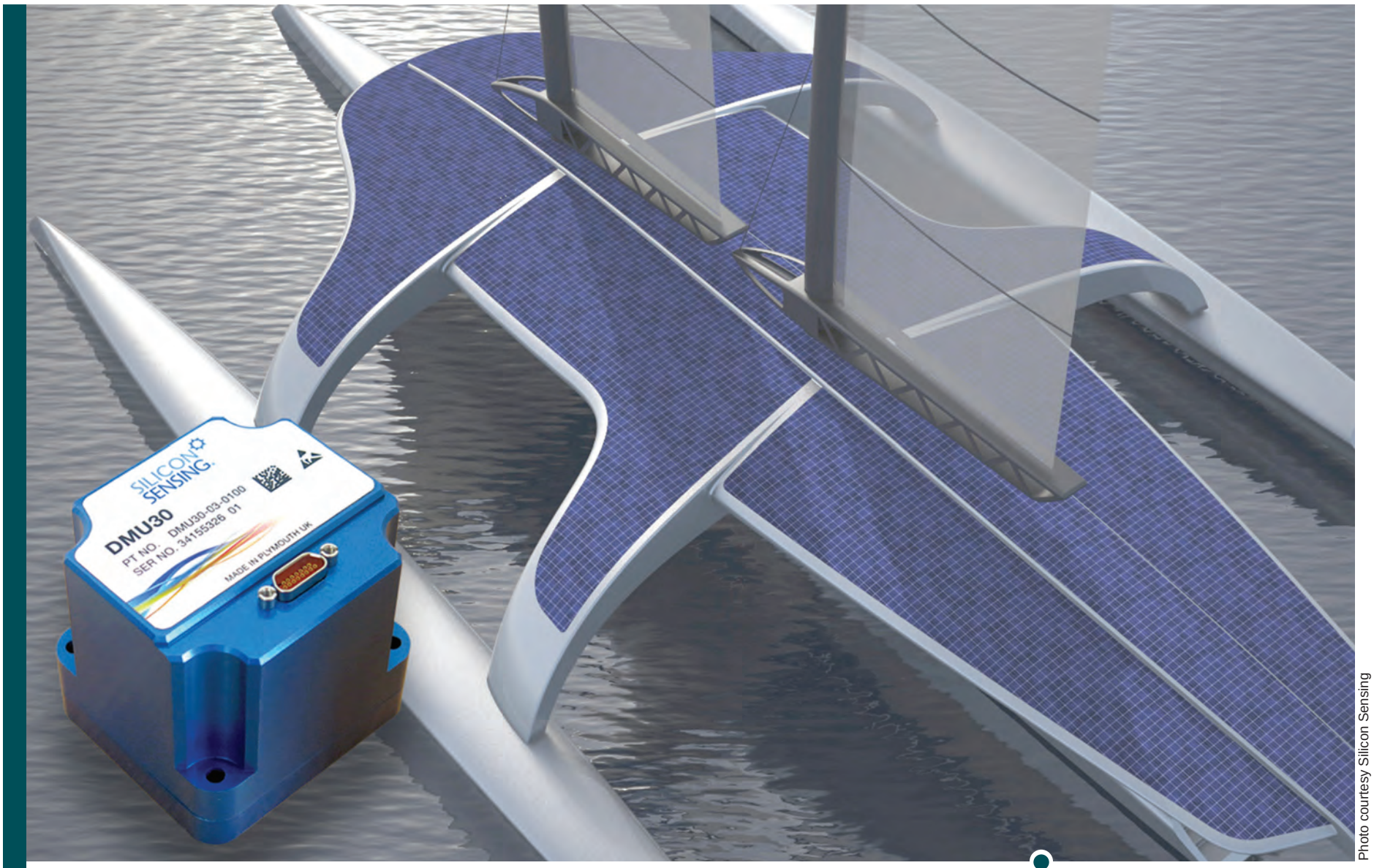


Photo courtesy Silicon Sensing

Silicon Sensing DMU30: An artist's impression of the MAS 400 autonomous ship with, inset, the new DMU30 inertial measurement unit which is 68.5 x 61.5 x 65.5 mm.

situational awareness or for security of physical and cyber assets. Pearce said, however, that the era of the connected ship, and even of the remotely operated vessel, does not signal the end for competent seafarers, nor for their counterparts ashore, but that it does signal large-scale changes. He said that satellite connectivity is now becoming the differentiating factor that can transform commercial opportunities for and the profitability of maritime companies, both for shipowners and their suppliers.

Companies that see how industry in general is being transformed understand that there are immediate benefits from the new technologies, boosting their bottom line today, but they also appreciate that, while the future is hard to predict, embracing the digital society will make them best-placed to take advantage of what the new world of the connected ship can bring. The future of connected ships lies in high-speed networks that guarantee the app-triggered bandwidth to support the autonomous ships of the future. To meet regulatory, safety and security needs alone, communications must be accurate, scalable and support the multiple systems required to achieve redundancy. Broadband connectivity supports the real-time decision-making, remote monitoring/control and automated processes that will support the emergence of the autonomous ship. Satellite communication is already being used to trial the behavior of complete autonomous ship systems and to consider the consequences for regulation, cyber security and seafarers. Inmarsat takes part in AAWA initiative Inmarsat is also a participant in the AAWA initiative: the company's role is to provide the project's satellite communications link and platform, an essential for remote control capability. Data transfer between ships, as well as between ships and shore-based control centers, is one of the key development areas for remotely-controlled and autonomous ship research, and forms a fundamental element of AAWA. The project will build on existing ship-to-ship and ship-to-shore communication platforms and work on improving their effectiveness for supporting remote-control functionality. Inmarsat's Fleet Xpress service, delivered through the company's Global Xpress and L-band constellations, the world's first hybrid Ka/L-band mobile satellite system, forms the basis of the system. Cyber-enabled intelligence systems for autonomous vessels Lloyd's Register became involved in autonomous shipping at a very early stage: in 2014 the maritime classification society and business services organization signed a JDP agreement with smart system manufacturer CSSC SERI for the development of the SOMS system, the cyber-enabled intelligence system that has been installed on board bulk carrier vessel Great Intelligence. CSSC then began to discuss the possibility of building a vessel equipped with this system, the Shanghai Merchant Ship Design & Research Institute (SDARI) became involved, and Lloyd's Register helped to develop the system specification. At that time, Lloyd's Register had written its cyber-enabled ships guidance and therefore was able to apply this while working with several industry stakeholders in co-creating what would become the first cyber-enabled ships procedure in the marketplace.

Although the technology is new, Lloyd's Register said it had learnt how to approve a system and its integration with other systems when prescriptive requirements were lacking. Because of the application of Lloyd's Register's ShipRight Procedure risk-based methodology and its new rule for software, combined with its understanding of how to apply its existing rules related to the integration of software-intensive systems, the class society was able to work effectively with all parties involved in the project. Lloyd's Register has commented that there has been much smart talk in the industry but that it has been concentrating its efforts in developing smart solutions and that it has launched notations that address these new areas. The organization said it had been very fortunate to engage with stakeholders that enabled it to set a standard that addressed the unique risks of such novel technologies, making its notations reliable for the industry, being based not only on leading technical capabilities but also on extensive, leading experience. Tracking moving assets for increased operational productivity and efficiency. With the global GDP of

Photo courtesy Kongsberg Maritime

The un-crewed RALamander 2000 fireboat will keep marine firefighters at a safe distance.

the Internet of Things predicted by U.S. information technology research and advisory company Gartner to reach $1.9 trillion by 2020, more and more IoT sensors, systems, and technologies are being implemented across the maritime industry to connect people, equipment, infrastructure, vehicles and other critical assets. However, to truly deliver on the promise of everywhere connectivity, operators applications require a network that can readily adapt to constant change – a living network that moves with their operations.

To meet this demand, Rajant Corporation has developed its Kinetic Mesh as a private wireless network that can keep track of moving assets and provide the continuous on-the-go connectivity they demand. There is a multitude of operational and security functions required for the successful movement of cargo in and out of ports: a Rajant Kinetic Mesh network is designed to help operators mobilize all of these: it enables port operators to meet increasing demands to move more volume – 11,000 cargo containers are moved daily in and out of some the US's busiest ports – while protecting assets with improved situational awareness (the global video surveillance market is projected to grow at a CAGR of more than 22 percent between 2016 and 2020).

The Kinetic Mesh also enables operators to capitalize on the increased adoption of automation, which is expected to increase productivity in ports by about 30 percent.

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Captain
Salary: $ $7342 - $9873/mo.
Category: Shipboard Officer / Personnel / Crew
Job Location: Kitsap Transit Bremerton, Washington, 98337 United States
Contact
HR Admin Asst
Email: Catalinap@Kitsaptransit.com
Work Phone : 360-478-0275
Kitsap Transit Bremerton, Washington, 98337 United States
Skills: Must be able to operate the vessel safely and reliably. Responsible for leading emergency operations per United States Coast Guard regulations.
Description:Captain
(Full-time, part-time, on-call and waitlist)
Salary range $7342 - $9873/mo. ($42 -$56/hr.). Job Duties: Master of a small ferry vessel, resp. for operating the vessel safely and reliably. Also resp. for leading emergency ops per USCG regs.

Master Unlimited (USCG Licensed)
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Salary: $ Competitive plus benefits , Contract , Company Employee
Category: Shipboard Officer / Personnel / Crew
Description:
Job Title: Captain
Work Shift: 12-Hours a day, 7 days a week; on call 24 hours a day.
Excellence participates in the Bering Sea pollock fisheries as well as the Pacific Whiting (Hake) fisheries, off the coasts of Washington and Oregon. When not involved in fishing activities, the vessel is home ported in Seattle Washington.

Chief Operating Officer (COO)
Full Time , General / Operations Manager
Category: Shoreside Operations
Job Location: Mount Pearl, NL, Canada
Email: mcolp@kbrs.ca
Work Phone : 902-421-2009
1894 Barrington St Halifax, Nova Scotia, B3J 2A8 Canada
Description:
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Maritime College
Full Time
Job Location: Throggs Neck, New York, 10465 United States
Email: none@given.com
Work Phone : 888-888-8888
Apply Online Bronx, NY, 10465 USA
Job Description:
The Relief Captain has ultimate command of the Empire State Training Ship and is responsible for its safe and efficient operation, including: ship's seaworthiness, safety and security conditions, training operations, safe navigation, crew management and ensuring that the vessel complies with all federal, state and international laws and regulations, as well as Maritime Administration (MARAD), State (SUNY), Maritime College, Classification Society (ABS) and Flag State rules and policies. The Relief Captain of the Training Ship is also responsible for facilitating the Colleges' deck and engine shipboard training programs which are managed by the academic departments.

Able Bodied Seaman (AB)
Full Time
Category: Shipboard Officer / Personnel / Crew
Job Location: Port Fourchon, LA, 70357 USA
Contact
HR Generalist
Email: recruiting@hornbeckoffshore.com
Work Phone : 985-727-2000
Port Fourchon, LA, 70357 USA
Description:
SUMMARY DESCRIPTION Performs routine deck operations aboard the vessel, including maintaining the cleanliness of the vessel. SCOPE OF DUTIES AND RESPONSIBILITIES Performs necessary routine maintenance, repairs, and handles ship's business under the direction of the Mate. Prepares for trip and load cargo and ship's stores Stands watch while vessel is underway as required in order to reach destination safely and expeditiously.

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