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Marine News

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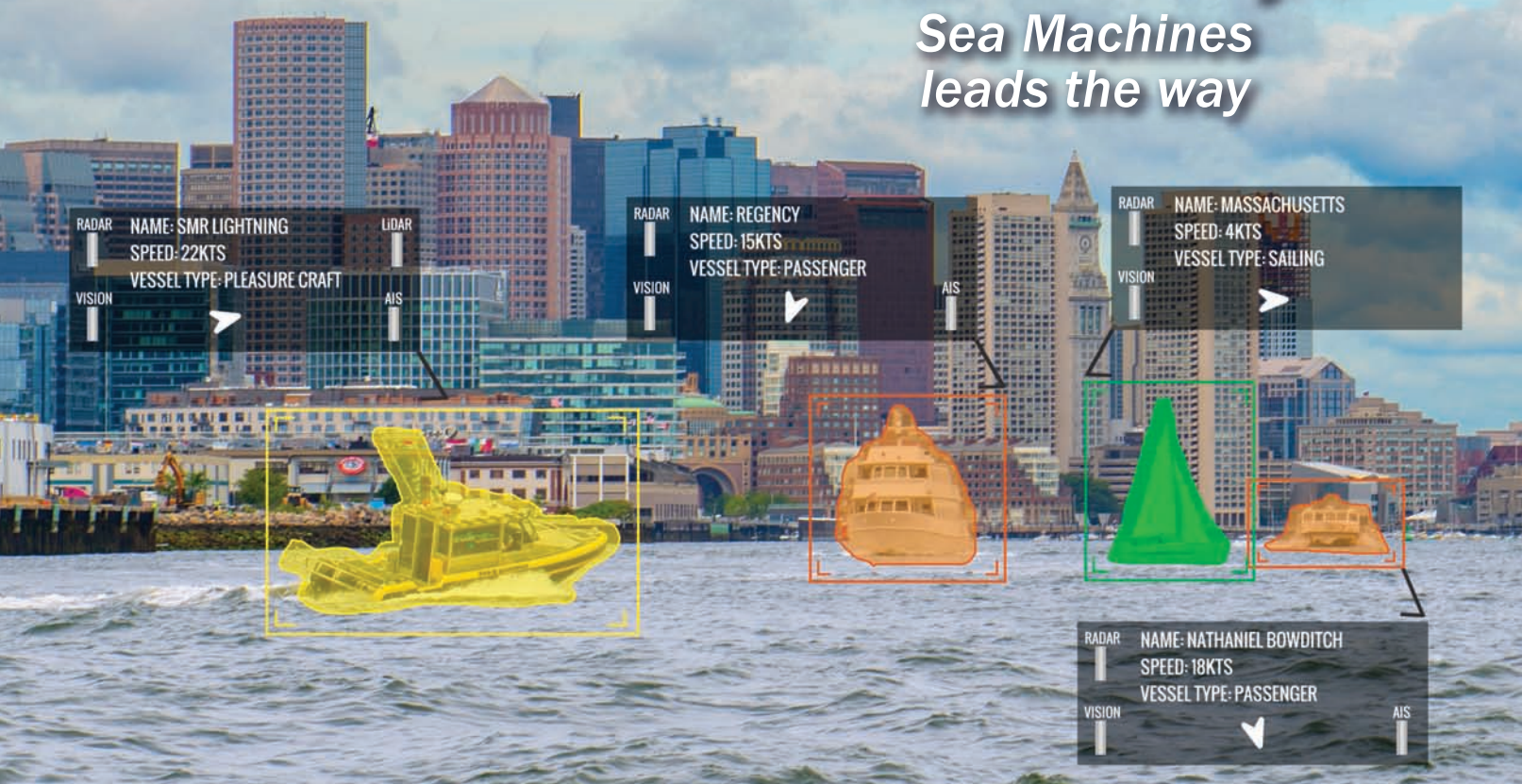

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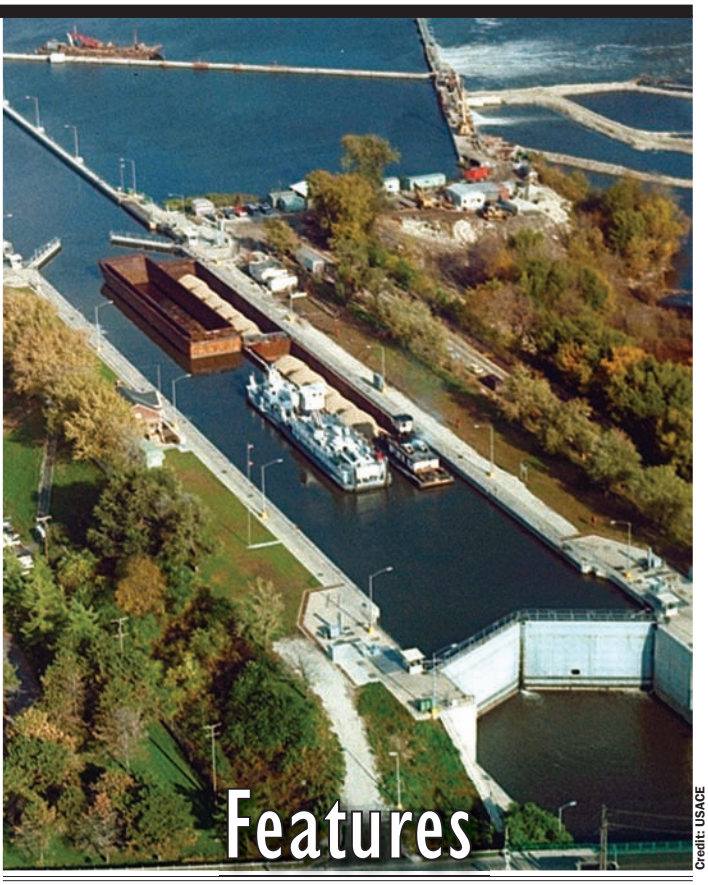

Credit: USACE

ON THE COVER

Sea Machines find themselves at the leading edge of that which will soon become the biggest disruptive event on the commercial waterfront in more than a century: Autonomous marine vessels.

Image credit: Sea Machines Robotics

Series 9100 Digital Communication System installed on the new 13M ZH-1300 OB Interceptor demo boat from Zodiac Hurricane

The David Clark Series 9100 Digital Marine Communication System

Jeanne Metayer - Technical Project Manager, Zodiac Hurricane Technologies

"Zodiac has worked closely with reliable partners including David Clark for the intercom system, combining both hard-wired and wireless technology. The installation and integration of the Series 9100 Digital System on our ZH-1300 OB was easy and smooth. And whenever questions arose David Clark representatives were always very responsive."

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The headliner for this edition represents a wide reaching topic that promises to be the most disruptive event that the domestic maritime industry has experienced in more than a century. It's also a subject that evokes much excitement and at the same time, great fear. That's because autonomous operations on the commercial waterfront aren't just coming; this futuristic phenomenon is already here. The hundreds of hulls already on the water, fitted with some aspect of autonomous or remote controlled equipment, are ample proof of that.

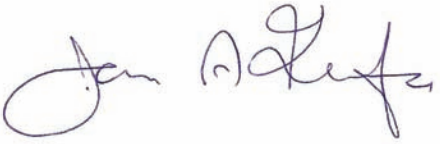
First, the good news: It was no accident that hordes of labor representatives flocked to the recent Marad-sponsored conference on the U.S. Vessel Automation Industry. With furrowed brows during coffee breaks, they huddled together, whispering about what might come next. They needn't have worried. It was ASV Global CEO Thomas Chance who first said, *"The dirty little secret of the unmanned boat business is that it is not completely unmanned."* That sounds complicated. Let me help: autonomous maritime operations will eventually create more jobs than it eliminates.

Separately, this month's featured *INSIGHTS* executive, Sea Machines founder and CEO Michael Johnson had some equally sage advice. *"Our country has been investing in automation for about 75 years yet today we have an unemployment rate of 3.7%. Almost everyone that wants to work in our country is working. I understand the concerns of longshoremen but they like everyone else work in an ever changing industry and have lived through change. Progressive change is good; it drives our ever increasing standard of living and standards of the workplace."* I'm reluctant to steal any more of his thunder, but you can skip ahead to page 14 to see the entire discussion. It won't disappoint.

The overriding message is that no one need be left behind. Change is coming, but only that which can be supported by a robust business model. Moreover, there's still plenty of work to do once you've taken last line with that new autonomous vessel. That work won't look much like it does today, so mariners, longshoremen, and managers need to get on board and embrace what comes next.

It is quite simple: *they can sail with the ship or be left behind at the dock.* Traditional roles will be disrupted. The bridge team will be particularly impacted. Interestingly, shortsea shipping is driving much of the interest in autonomy in Norway – and it is about being environmentally friendly. Some say the real reason for autonomy is the environment itself. That said; safety is the number one driver of this bus.

Autonomy makes real sense when it comes to smaller vessels, where crew cost is everything – as much as 60-70% of OPEX. And, shorter trips will facilitate more and cleaner electrical propulsion. Small and short – that's where both the money and the opportunity reside. And since 99% of U.S. merchant hulls can be defined as small, shallow draft coastwise and shortsea assets, it stands to follow that ***MarineNews*** readers are right now sitting atop a very rich gold mine of opportunity. *Who knew?*



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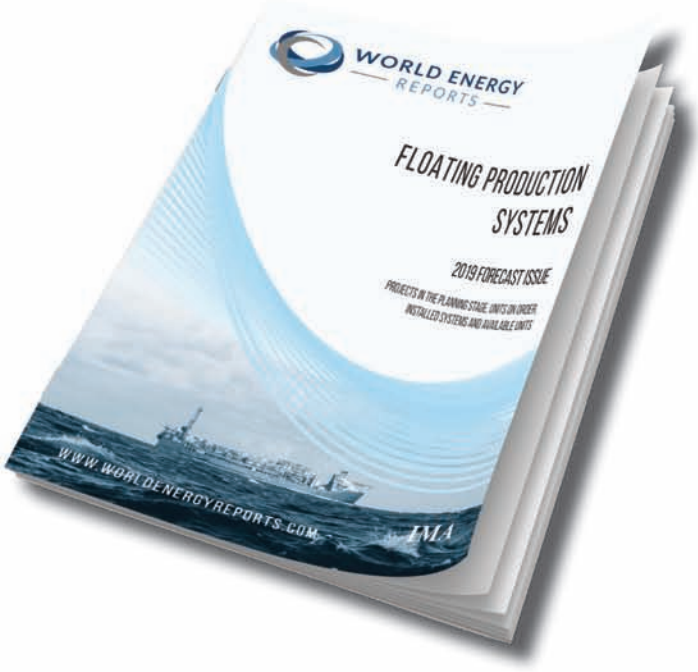

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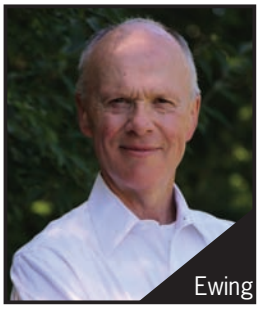
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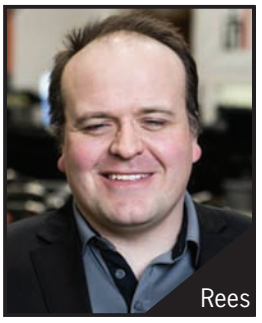
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U.S. Coast Guard's 2018 Recreational Boating Statistics

The U.S. Coast Guard recently released its 60th annual (2018) Recreational Boating Statistics Report, revealing that there were 633 boating fatalities nationwide in 2018, a 3.8 percent decrease from 2017. And, from 2017 to 2018, overall recreational boating injuries also decreased 4.5 percent (2,629 to 2,511), and the total number of accidents decreased 3.4 percent (4,291 to 4,145). This year's numbers follow an equally encouraging 2017 report which showed that boating fatalities in 2017 (658) also showed a 6.1% decrease from 2016. Boating injuries also decreased 9.4% and accidents dropped 3.9%. The numbers are encouraging, but not necessarily a linear indication that the boating public is getting any safer. Beyond that, ***MarineNews*** readers might want to ask, *"What's this got to do with commercial workboat operations?"* As it turns out; plenty.

***By-the-Numbers*, Recreational Boating in 2018 looked something like this:**

1: *the number one leading known contributing factor in fatal boating accidents is Alcohol.*
5.3: *The fatality rate per 100,000 registered recreational vessels.*
19: *Percent of accidents involving personal watercraft – a growing problem – up from last year.*
19: *Percent of fatal boating accidents where alcohol was the leading contributing factor.*
46: *Millions of dollars in property damage.*
50: *Percent of accidents involving motorboats of any kind.*
77: *Percent of fatal boating accidents where the victims drowned.*
74: *Percent of deaths occurring where the operator did not receive boating safety instruction.*
84: *Percent of drowning victims who weren't wearing a life jacket at the time of the incident.*
2,511: *Number of Recorded Injuries – down for the second year in a row.*
4,145: *Number of recorded accidents – down for the second year in a row.*
108,599: *The net contraction (number of hulls) from the nation's recreational boat fleet in 2018 (from 2017).*
11,852,969: *Number of registered U.S. recreational boats reported in 2018.*

Only 18% percent of deaths occurred on vessels where the operator had received a nationally-approved boating safety education certificate. For its part, of course, the Coast Guard recommends that all boaters take a boating safety course that meets the National Boating Education Standards prior to getting out on the water.

The easy conclusion to make is that some sort of mandatory training courses for all would go a long way to preventing recreational accidents, but that hasn't necessarily proven to be true in the commercial and/or military sectors. And, implementing such a mandatory scheme would likely be met with robust resistance. Retired Coast Guard Commandant Thad Allen (perhaps) put it best when he said – a long time ago – that the biggest issue with recreational boaters was that *"the general public understands that driving an automobile is a privilege, but at the same time, they consider being able to drive a boat as a basic right."* Unfortunately, this hasn't changed much, over time.

We all have work to do. For military mariners, for example, the collision involving the USS Fitzgerald and a commercial boxship in clear weather in June 2017, south of Tokyo Bay, immediately comes to mind. Just one of many recent U.S. Navy mishaps, this incident exposed the inadequacy of the Navy's preparation of younger surface warfare officers prior to being turned loose in the fleet.

On the commercial side of the ledger, the catchphrase *"Standards of Training, Certification, and Watchkeeping"* or STCW has become, at least for the IMO and U.S. Coast Guard regulatory regime(s), the panacea for improving safety underway. The costly and time-consuming training regimen is never ending and viewed by many as an overhyped and underperforming solution. Today, the overreliance on electronics and technology has led to a degradation of watchkeeping skills. That's a fact.

On the other hand, if anything has been proven to work – and work well – to promote safety and reduce accidents, it has been the Coast Guard's 30-year quest to eliminate drug and alcohol abuse by professional mariners. And, predictably, alcohol continued to be a leading contributing factor in fatal recreational boating accidents in 2018, accounting for 100 deaths, or 19 percent of total fatalities. And yet, current rules allow certain crewmembers on board commercial fishing vessels to escape random testing – the one thing that the undisputable statistics has proven to work. The Coast Guard and Congress are working to close these loopholes, but an anti-regulatory climate and a 'rules freeze' inside the Beltway may serve to slow this progress. Let's hope not.

Separately, large swaths of domestic recreational boaters also have no formal training. While testing and training methods are slowly becoming standardized, there is a long way to go. Working to close the recreational training gap is the National Association of State Boating Law Administrators (NASBLA), a national nonprofit, 501(c)3 organization that works to develop public policy for recreational boating safety. NASBLA represents the recreational boating authorities of all 50 states and the U.S. territories, bringing standardized marine education to the recreational boater. That's important, because boating education standards on a state-by-state basis are sadly

lacking. Perhaps the most recent safety numbers means that they are making progress. Let's hope so.

As it continually addresses the issue of boating safety, the Coast Guard's Mission and Strategic Plan (2017-2021) of the National Recreational Boating Safety Program (RBS) is "to ensure the public has a safe, secure, and enjoyable recreational boating experience by implementing programs that minimize the loss of life, personal injury, and property damage while cooperating with environmental and national security efforts." The Plan can be viewed at: www.uscgboating.org/content/strategic-plan.php

Is the recreational waterfront getting safer? Depends on how you look at it. Even one injury, death and/or accident is too many. But, the linear numbers say that safety is increasing, faster than the number of domestic recreational hulls is declining. That analysis comes with caveats, however, because (*) on July 2, 2001, the Federal threshold of property damage changed from $500 to $2,000. That means that the need to report a 'fender bender' became a little less stringent, in terms of dollar amounts. That said; the USCG rule change was largely a function of recognizing inflation costs. But, the decrease in accident reporting no doubt figures into safety numbers, as well. Maybe the average boater is reluctant to report all but the most serious accidents, for fear of being cited by the USCG.

Since 2001 – the high water mark for registered domestic recreational hulls – the number of boating deaths has decreased about 7% on an annual basis. But, then, the hull count is also down 8% during that same time frame. Are we any safer? **You make the call.**

	Injuries	Deaths	Accidents (*)	Number of Hulls
2001 (High Year)	4,274	681	6,419	12,876,346
2018 (present #'s)	2,511	633	4,145	11,852,969
Difference (change)	(1,763)	(48)	(2,274)	(1,023,377)
PCT Change	-41%	-7%	-35%	-8%

(*) In 2001, a rule change increased the threshold of when an accident needs to be reported, and when it does not. Source: U.S. Coast Guard

What's all this got to do with me, professional mariners (might) ask? For starters, the typical U.S. workboat operator will be navigating (often) in close proximity to these almost 12 million recreational hulls. But, if you need further incentive, the root (Top Five) causes of most recreational accidents include operator inattention, improper lookout, operator inexperience, machinery failure, and excessive speed. Alcohol use follows closely in sixth place. And, those are six very good reasons to sharpen your bridge watch, post another lookout and make sure the Radars are working correctly. While you are at it, glance up from the video displays and look out the window once in a while. Yes, that's the ticket.

Top 10 Boat Registration States & Fatality Rates

	2018		2017		2016	
State / Totals	Boats Registered	Deaths	Boats Registered	Deaths	Boats Registered	Deaths
United States	11,852,969	633	11,961,568	658	11,861,811	701
Florida	925,141	57	918,255	66	905,298	70
Michigan	795,374	22	798,544	20	794,137	38
Minnesota	819,317	14	825,658	14	817,560	17
California	670,102	34	745,641	50	697,412	47
Wisconsin	614,750	21	624,353	25	611,240	20
Texas	562,424	38	565,422	63	573,425	53
South Carolina	551,477	16	534,726	13	518,269	23
Ohio	573,050	17	541,898	20	505,082	12
New York	444,103	20	444,710	22	448,480	22
North Carolina	359,361	30	358,171	15	367,225	23
AVG (Top 10)	631,510	~ 27	635,738	~ 31	623,813	~ 33
TOTALS / PCT	6,315,099 (53%)	296 (47%)	6,357,378 (53%)	308 (47%)	6,238,128 (53%)	325 (46%)

Source: U.S. Coast Guard (2016 - 2018 data)

View the 2018 Recreational Boating Statistics at:
http://uscgboating.org/statistics/accident_statistics.php

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All stats from 01/23/2019

President & CEO, Sea Machines Robotics

Michael Gordon Johnson is a marine engineer, an accomplished entrepreneur and sector leader with a primary goal of building progressive and sustainable innovation for modern society. He is the founder of Sea Machines, a Boston-based tech company that is a leading provider of autonomous control and intelligent perception systems for marine vessels. Johnson earned a marine engineering degree from Texas A&M University before starting a career focused on complex projects in offshore oil and gas, marine transportation and salvage. Prior to starting Sea Machines, he was a vice president at Crowley Maritime Corp. and their affiliate company, TITAN Salvage.

Johnson and his fledgling Sea Machines firm today find themselves at the leading edge of that which will soon (perhaps) become the biggest disruptive event on the commercial waterfront in more than a century. Autonomous marine vessels promise an unprecedented era of safety, increased efficiencies, and the introduction of myriad skill sets to a previously conservative industry with a reputation of being anything but an early adopter. For many years, progress on the waterfront was measured in metrics such as ever larger deadweight tonnage and the increase in vessel length, breadth and draft that drove that change. What comes next will be entirely different. Michael Johnson and Sea Machines will be there when it happens. *This month, listen in as Johnson leads the evolving discussion that will change the marine industry forever.*

SEA MACHINES

Your firm was found in 2015. Give us a sense of just how far you have come, since then.

In January 2015, Sea Machines was an idea and one person with a shared office in Cambridge and working with a company called Jaybridge Robotics on our first prototype autonomy system. We bought a 25' steel twin-screw azimuth German tug and opened a shop in Boston Harbor Shipyard. We started with developing wireless remote control, fumbled with various types of low-level automation systems until we settled on Siemens PLCs. After trying various types of autonomous control techniques we settled on the current SM300 architecture in May of 2017 (two years after founding) and began the 'productization' process of the systems. In late 2016, we were accepted into a start-up accelerator called MassChallenge where we emerged one of the winners and received our first bit of outside funding. We then recognized that it was time to pursue venture capital. We closed our first round of $1.5M in funding early 2017 and a second round of $10M in late 2018. We now have industrial marine-grade autonomy and remote control products on the market and have grown to a team of 35 with offices in Boston, MA and Hamburg, Germany. I now hear many refer to Sea Machines as a leader in this space.

Give the readers a quick overview of your product offerings.

We sell both the SM200 and SM300. The SM200 is a wireless control system; it puts the helm and payload control of the vessel onto a personal belt-pack controller which is a joystick control station that belts comfortably around a person's waist. The SM200 allows a vessel operator the freedom to control a vessel and it's auxiliaries from outside the pilot house and frankly anywhere within 1 to 2km of the vessel. Operators are purchasing the SM200 to alleviate pilot-house blind spots, enable the vessel to be controlled from the load (barge) or from a better vantage point of where the vessel is to make contact or being made-up such as ATB pin connections. The SM200 has passed all testing by Bureau Veritas

and by time of this article should have received ABS and U.S. Coast Guard acceptance for installation on specific classed U.S.-flag vessels. The SM300 is our flagship autonomous control system which enables man-in-the loop autonomous control of workboats. The system is being deployed on commercial and security related operations where autonomy empowers the vessels to operate safer, longer, with greater precision, predictability, and productivity. This can be bathymetric survey or data collection, dredging, oil spill response, fire fighting, long duration surveillance or escort operations. The SM300 can work alongside an on board crew or enable the vessel to operate unmanned within a monitored domain.

Have you sold any systems into the marine markets, as yet? If so, where and for who? Is that system on the water in service yet?

Yes, we have sold Sea Machines systems in multiple markets both domestically and internationally. Due to the nature of commercial vessels and their operational vs. refit schedules, we are seeing 4 to 8 months between order and actual deployment the units. By the end of this year, there should be more than 25 units purchased and 10 units deployed and in use globally. We will announce those that we can; to date we've told the world about an SM300 purchased by Hike Metal in Canada for the SAR market as well as an SM300 purchased by MARAD and installed on an MSRC Kvichak oil skimmer boat.

The autonomous market for the maritime industry targets 'dull, dirty and dangerous tasks.' Tell us what your market focus will be for the near term. Blue water or brown? Commercial or military? Mission descriptions?

Indeed, advanced robotics in almost all markets is quick to find value in the dirty, dull, and dangerous tasks. In our market, we qualify long duration tasks requiring continuous attention but little dynamic change as DULL and in the marine domain many operations fall into that category, but narrowing it further our current tech is not yet validated for complex traffic situations so we are selling to coastal and open water operators that are focused on tasks such as survey, oil spill response, aquaculture, security or inland operations that are working in a controlled or semi-controlled domain

such as dredging. We are selling to both commercial and government markets.

Where do you see the greatest opportunity for autonomous waterborne operations? What's the next big thing? Why?

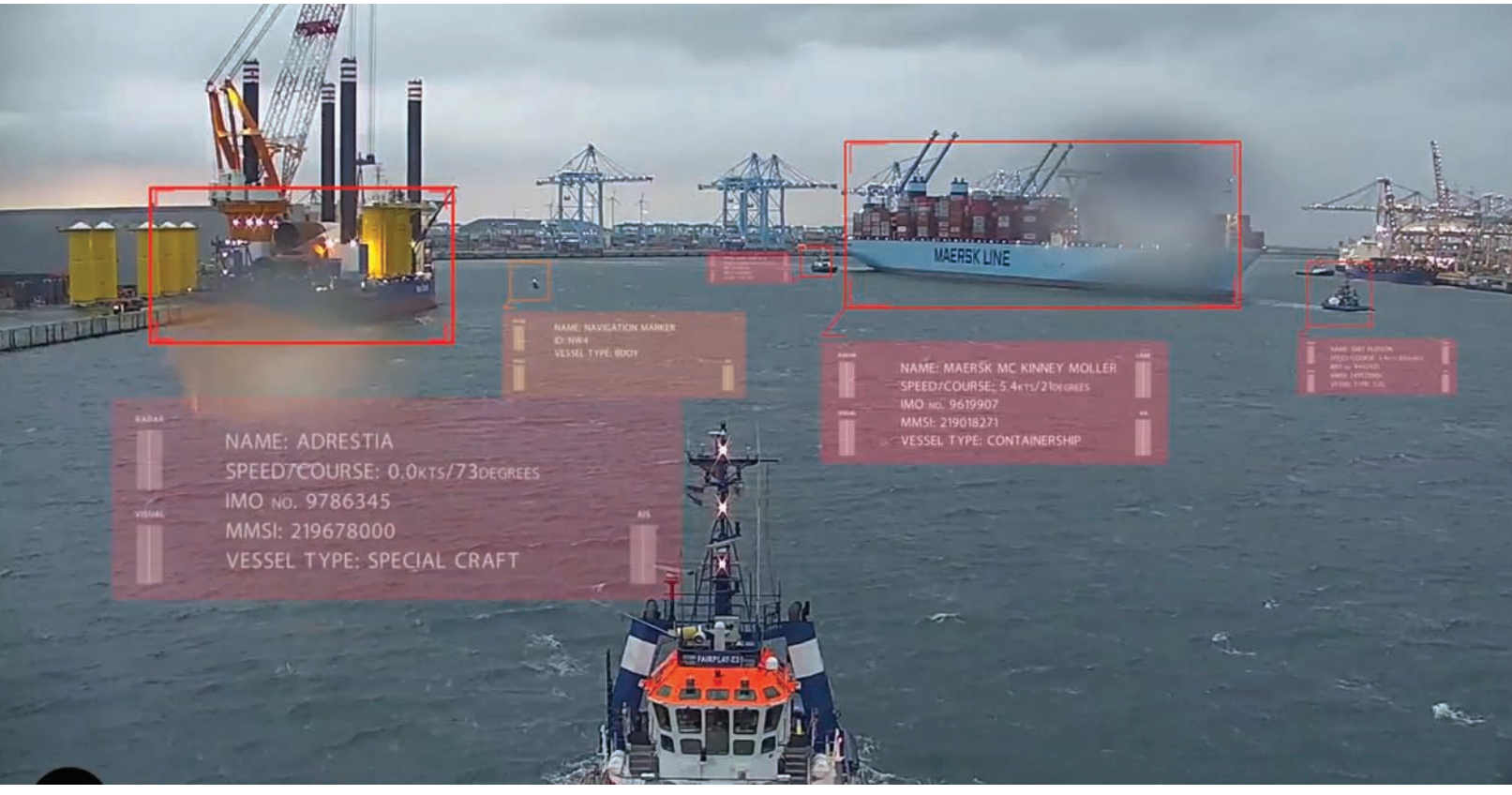
Autonomous Navigation & Advanced Situational Awareness; these are the next big things and why we are focused on them. I say "next" even though we offer them now because today it's the innovators and very early adopters that are trying the technology but within the next few years there will be a tipping point of demand and these technologies will be on the road to becoming a standard part of all vessels. Why?, because of the leap in productivity, performance, and safety offered by these systems, moving marine operations up the ladder of modernity to reduce our annual accident rate, both in commercial and recreational, improve on-time performance, and reduce operational expenses. Ultimately, this will enable new types of operations and business on water that are impractical with established technologies.

It has been said that the dirty little secret behind autonomous marine operations is that autonomous doesn't mean unmanned. Would you agree with that assessment? Why, or why not?

We agree, autonomous does not mean unmanned. Autonomous is an aspect of an advanced vessel control system. Manned, reduced manning, or unmanned is an operational decision. We build the technology that enables safe and productive machine-driven navigation and control of the vessel, but a human operator remains in command, meaning that they plan the missions and monitor as necessary. That operator can be on board or remote from the vessel.

What is the greatest distance today that one of your autonomous systems can be controlled by another vessel/person? Must that control be 'line-of-sight?'

For demonstration purposes we've conducted a number of transcontinental and transoceanic operations (meaning that the human operator is one side of the continent or ocean with the autonomous vessel on the other side – California/Boston, or Denmark/Boston); however, in most current actual applications the operator will be located within a few miles. Most of the systems that we sell are integrated with IP radio for line-of-sight as well as 4G communications so as long as the vessel is within 4G range the operator can be anywhere with connectivity.



Sea Machines Robotics recently announced a new partnership with Hike Metal, a manufacturer of workboats based in Ontario, Canada. You'll integrate Sea Machines' SM300 autonomous vessel control system aboard commercial vessels tasked with search-and-rescue (SAR) missions. Tell us about how this will help SAR ops.

SAR vessels are limited in capacity and by using an autonomy system to effectively pilot a vessel from point-to-point or on a grid/sweep pattern over an area, you can pull a crew member away from the task of manual driving and put them to work scanning the waters or helping respond to persons in need. Let the technology do the repetitive work and utilize a human for more complicated and unique tasks.

Sea Machines started out with close ties to Denmark-based boatbuilder Tuco Marine. Are you still partnering with them on projects?

Indeed, we love Jonas and his team at Tuco. He's actively selling vessels into the offshore wind and aquaculture markets, and we are in discussions with multiple operators there. So, we should see results of our collaboration with Tuco soon.

You've said that "when it comes to command and control systems, data communication, collection and interpretation – advances in these areas will push forward a new era of marine and maritime operations." Flesh that out a little for us – what does it really mean?

In today's marine world, command and control remains so very 20th century. Big advances last century were auto-pilot, RADAR, AIS, automation/unmanned engine rooms, ECDIS, GMDSS. But even in today's newest ships, our command and control remains very human-manual, meaning that all piloting decisions come from the minds of those controlling the bridge. As an industry we tout modern networked logistics platforms or the advances we've made in weather routing, even some of the latest situational awareness systems from the big European OEMs, but these cutting edge technologies in almost all situations output their intelligence via an email or PDF file to an officer in command that then needs to make navigational decisions based on the

information, much as humanity has been doing since the first ships were put to sea. What we are building is what the operators are aiming toward, moving the human up the ladder and away from direct and continuous control decisions, and empowering the vessel to control itself with exacting precision and productivity. For example, collision avoidance that detects and tracks all items within the operating domain even when navigating through busy fishing areas, the logistics platform which sees a cargo delay in an upcoming port of call due to high winds then communicates to the vessel that is currently crossing the Atlantic to slow by 1 knot, or having a vessel make navigational decisions based on weather forecasts. This technology will open a new era of less accidents, increased predictability and productivity that is beyond a level that can be achieved in a human-direct controlled world.

When we last visited your Boston-based operations, you were testing on the waters of Boston Harbor – where do you stand now in terms of products ready for the market?

Sea Machines products are on the market, but we continue to advance the technology and with our current test fleet of 3 vessels and 3 full time captains, you can see us in Boston harbor and offshore daily.

You started out with a test hull – a German-built Bodan-Werft river/coastal tug with twin Schottel Z-drives. You chose the boat because many workboat operators now deploy Z-drives and because you wanted to prove to yourselves and others that you could readily convert a completely analog/mechanical control boat to electronic fly-by-wire remote command. What were the biggest challenges with the refit?

The biggest challenge in that conversion, which was our first, was our attempt to build our own electrical-mechanical steering system for the mechanical-manual Z-drives. It was okay for a while and it convinced us that we do not want to be a company that builds new hardware. We build new software that is deployed on systems that we've assembled using proven off-the-shelf hardware that has been built and tested by other leading companies. That German Bodan-Werft tug now is hard at work making money for a company in Gloucester.

Significantly, you've raised a fair amount of venture capital – people obviously believe in what you are doing. These firms include Launch Capital, along with Accomplice VC, LDV Capital, the Geekdom Fund, Techstars and others. What has this funding done for you now that you couldn't accomplish before?

You can add Toyota, Brunswick, Eniac VC, and NextGen to that list. This funding has enabled almost everything we've accomplished since 2017, such as building a leading advanced product development team, acquiring the assets for testing and validation, and expanding our presence in Europe.

In the first quarter of 2019, Sea Machines was to initiate testing of its perception and situational awareness technology aboard one of A.P. Moller-Maersk's new-build ice-class container ships. How has that testing progressed?

Yes, we officially powered up the prototype system on the Vistula Maersk in March of this year. Testing and iteration of the technology is progressing nicely.

The Maersk collaboration is significant in that many stakeholders feel that, while brown water autonomy is certainly viable (and happening in increasingly large numbers of hulls), blue water operations are quite a bit further out. What's your take on all of that?

From a technical complexity standpoint of autonomous tech, blue water and coastal gets to market before brown water (rivers and canals). Brown water is a more complex operating environment with respect to obstructions and traffic.

You've got two primary offerings at this time – the SM200 and the SM 300 – and another, the SM400. What's unique about each and which sector is each targeted for?

SM200: Industrial-grade wireless remote control for tugs, daughter craft, or tenders.

SM300: Industrial-grade autonomous control for surveying, oil spill response, dredging, surveillance, aquaculture.

SM400: Advanced situational awareness for merchant ships.

What is the single largest impediment to autonomous operations on the water today? Is it local and/or flag state regulations, resistance from existing stakeholders, cost, or a combination of the three?

The single largest impediment is finding those dynamic progressive operators that are willing to look beyond the proven conventional and seriously try new technology in an attempt to prove the value in their operations. This impediment (or challenge) is not unique to our space. How many trucking or taxi companies do you see with autonomous operations? Cargo jet operators? Long distance trains? The

fact is that our domain and type of operations is suited for autonomy and remote operations and so it makes sense that we are deploying the tech in certain marine sectors ahead of those other industries. But still, big changes require effort, commitment, and time.

Autonomous and/or robotic operations – whether in port or on board vessels – are being met with fierce resistance by at least one sector – maritime/longshore labor. But, autonomy and robotics arguably don't eliminate jobs; they act as a force multiplier while often increasing headcount. Would you agree?

Yes, on the macro level, I agree. Our country has been investing in automation for about 75 years yet today we have an unemployment rate of 3.7%. Almost everyone that wants to work in our country is working. I understand the concerns of longshoremen but they like everyone else work in an ever changing industry and have lived through change. Progressive change is good; it drives our ever increasing standard of living and standards of the workplace. I bet most longshoremen would choose to work in their highly automated gantry crane of today over the cranes of 30 years ago, or stick booms, pallets, and cargo nets of 50 years ago.

You've said that there are definite defense applications for autonomous marine systems, but that at the same time, you remain focused first on the commercial market. Is that still true?

We view the commercial space as a healthier free competitive market. It's where we feel the most comfortable and the place for truly focused high-tech start ups. There are folks in the defense market that see the value in commercially-built technology and we are happy to serve them.

Do you hold any patents in this space? If so, tell us about those technologies / devices.

Yes we recently had one issued for the utility of autonomous vessel towing. We have many applications that are in process.

What's been you biggest success so far for your relatively young firm? And, the biggest challenge? Are they one in the same?

Our biggest win and challenge is bringing the products to market in a standardized format. Most other autonomy providers build customized solutions for vessels whereas we offer systems that can be installed across your fleet of different vessel types.

Farm Facts:

USDA Study Underscores Value of Inland Waterways to U.S. Agriculture

By Michael J. Toohey

Toohey

On August 28, U.S. Secretary of Agriculture Sonny Perdue and Assistant Secretary of the Army (ASA) for Civil Works R.D. James toured Mel Price Locks and Dam in Alton, Illinois, and held a Town Hall Meeting to discuss the importance of the waterways, agriculture and the U.S. economy. At the event, Secretary Perdue briefed agricultural and waterways stakeholders on a newly released study – Importance of Inland Waterways to U.S. Agriculture – from the U.S. Department of Agriculture (USDA) highlighting the impact of inland waterways systems to agriculture in the United States and the economic impact of investing in modernizing the nation's inland system.

At the event, Secretary Perdue, a farmer himself, said, "Logistics and transportation are some of the most important aspects to farming and America's superior inland waterways are critical to our overall agricultural system. Water transport is the most efficient, cost-effective transportation for our producers, and our waterways keep the American exporter the most competitive in the world. President Trump has made it a priority to revitalize our nation's infrastructure and invest in our rural communities, and his goal to reestablish America's economic prowess on the global stage can be furthered by rebuilding our waterways to support agriculture exports. We must continue to invest in modernizing our lock and dam infrastructure that flows through the heartland of agricultural production."

ASA James added, "This Nation's inland waterways are vital to our economy as they provide cost-effective transportation to producers and manufacturers throughout system while reducing pressure on our overburdened interstate highways. Our inland waterway system is the largest in the world and provides jobs that strengthen American communities and the nation as a whole. This invaluable system is aging; the Corps of Engineers diligently addresses the systems maintenance needs with resources provided to ensure efficient shipment of goods, while continuing to expand partnerships and build new alliances in order to maintain America's competitive edge in global markets."

Produced for USDA's Agricultural Marketing Service, the study utilized economic modeling to forecast impact to farmers and to U.S. competitiveness of varying levels of investment in our inland waterways system over a 10- and 25-year period.

Also, efficiencies gained by dredging the lower Mississippi River from Baton Rouge through New Orleans and the Southwest Pass into the Gulf of Mexico would alone result in a 12- to 13-cent-per-bushel improvement on the price of corn and soybeans.

At the Town Hall meeting, Waterways Council, Inc. (WCI) commended Secretary Perdue and USDA for this study that quantifies cost-savings and competitive advantages that would accrue from long-delayed improvements to inland waterways locks and dams on the Upper Mississippi and Illinois River system. WCI later issued a press release with the National Grain and Feed Association (NGFA) and highlighted other parts of the study:

- *U.S. farmers enjoy a competitive advantage in global export markets in large part because of the nation's robust, resilient transportation and infrastructure network that moves corn and soybeans, the nation's highest yielding crops.*
- *Because of its efficiencies and lower costs, the inland waterways save between $7-$9 billion annually over the cost of shipping by other modes.*

Credit: AdobeStock © Igor Strukov

- *Every dollar of waterways activity output results in $1.89 in additional U.S. economic activity directly related to the waterways.*
- *Compared to the status quo, increasing inland waterways investment by $6.3 billion over 10 years (through 2029) and $400 million/year through 2045 cumulatively would grow the waterways' contribution to U.S. GDP by 20 percent (to $64 billion) and increase waterways-related employment by 19 percent – to 472,000 jobs. The study says this option would more than offset the cost of completing all proposed projects, and increase market value of U.S. corn and soybeans by $39 billion. Conversely, reduced investment would decrease market value of those commodities by $58 billion.*
- *The inland waterways' infrastructure is aging and needs major rehabilitation and construction to restore its full capability, forestall major disruptions and provide opportunities for growth. Most Upper Mississippi and Illinois River System locks have far exceeded their projected 50-year lifespan. Delays can cost operators and shippers more than $44 million annually. For corn, Mississippi River delays could have up to a $0.24 per bushel negative impact.*
- *While the U.S. currently has a $5.35 per metric ton advantage over Brazil when shipping soybeans on the inland waterways (Davenport, Iowa, to Shanghai, China), aging U.S. waterways infrastructure will increase the price to the end-user, lower demand for U.S. grains and soybeans, and make them less competitive in global markets.*

USDA's study underscores the inland waterways as a conduit to agriculture competitiveness, but WCI also believes it makes the case to expedite the Navigation and Ecosystem Sustainability Program (NESP) to modernize five locks on the Upper Mississippi River and two on the Illinois Waterway. NESP readies our Nation to be ready to capitalize on predicted grain shipments, while also improving the health of our marine ecosystems and habitats. Authorized in 2007, NESP awaits Pre-Construction Engineering and Design (PED) funds to be shovel-ready for these locks.

In the WCI-NGFA press release, NGFA President/CEO Randy Gordon said, "We appreciate the leadership of Secretary Perdue and USDA in once again spotlighting the importance of the U.S. inland waterways transportation system to U.S. agriculture's global competitiveness and farmers' bottom lines. Very importantly, this study quantifies the significant cost of further delays in rebuilding America's inland waterway infrastructure, and it's not a pretty picture. Foreign competition from countries like Brazil is only increasing given current trade disruptions, and China is investing aggressively in South America's transportation infrastructure to the United States' detriment. The United States simply can't afford to lag behind any longer. This study is a wake-up call to the White House Office of Management and Budget and Congress to make the PED funding for NESP available this year, and to ensure growing investments are continued and expedited in the tremendous natural resource that America's inland waterways represent."

NESP NOW!

Find the report HERE: https://www.ams.usda.gov/services/transportation-analysis/inland-waterways-report

Michael J. Toohey *is President and CEO of the Waterways Council, Inc.* ***www.waterwayscouncil.org***

Shock Mitigation: Size Matters

When it comes to shock-mitigation, bigger is truly better.

By Dr. Tim Rees, Ph.D.

Rees

Let's consider a thought experiment: You must take the wheel of one of two cars speeding along straight tracks with no exits. Both cars are traveling at 100 km/hour, but the first is 100 meters from a brick wall while the second is only 10 meters from an identical wall. There is nothing to do but decelerate before the crash, and assuming your decision is guided by self-preservation the choice is obvious. Why? Because even the best tactical driver can't overcome physics, and even if the second car can be stopped before the wall it must undergo severe decelerations. In fact, the second car can be expected to see ten times the accelerations felt in the first car if both are handled perfectly. We can prove it mathematically, but you don't need any equations to appreciate just how great a luxury stopping distance is when it comes to decelerating a moving body. We will return to this theme, but first let's take a look at acceleration in the bigger picture.

Defining the Challenge

As you might expect, problems of acceleration (and deceleration) pose many difficulties in engineering design. This is especially true in a dynamic environment. Acceleration is related to force through Newton's second law, so it constrains design decisions. Acceleration imposes strict limitations on safety, and under severe exposure humans and hardware can quite literally break. Acceleration is often measured in units of "g", with 1 g equal to what is experienced due to gravity at earth's surface (9.8 m/s^2).

The human response to acceleration is an interesting and colorful topic. G-LOC, redding-out, and greying-out

are among the possibilities, and in addition to endangering rigid skeletal structures, prolonged exposure can affect circulation and rupture blood vessels. For reference sake, astronauts sustain something like 3 to 4 g during launch, but the limits of human tolerance depend on multiple factors, including magnitude, direction and rate of change. Like force, acceleration is a vector, so direction really does matter, and what a person can withstand in the forwards-facing direction might be entirely different from what they will tolerate in the vertical.

With that in mind, let's talk about impacts, and more specifically, wave impacts involving boats on rough water. These impacts come in at all angles creating bursts of acceleration. They may be erratic and unpredictable and can include rotational components. These impacts are a form of mechanical shock. They are transient acceleration events exemplified by their abrupt onset and severity. These impacts have pulse durations on the order of 100 milliseconds, which is brief in comparison to a shuttle launch, but the abrupt transitions in a wave slam only makes it more brutal. And wave slams can be surprisingly intense. For military-use in fast boats testing at up to 10 g is required.

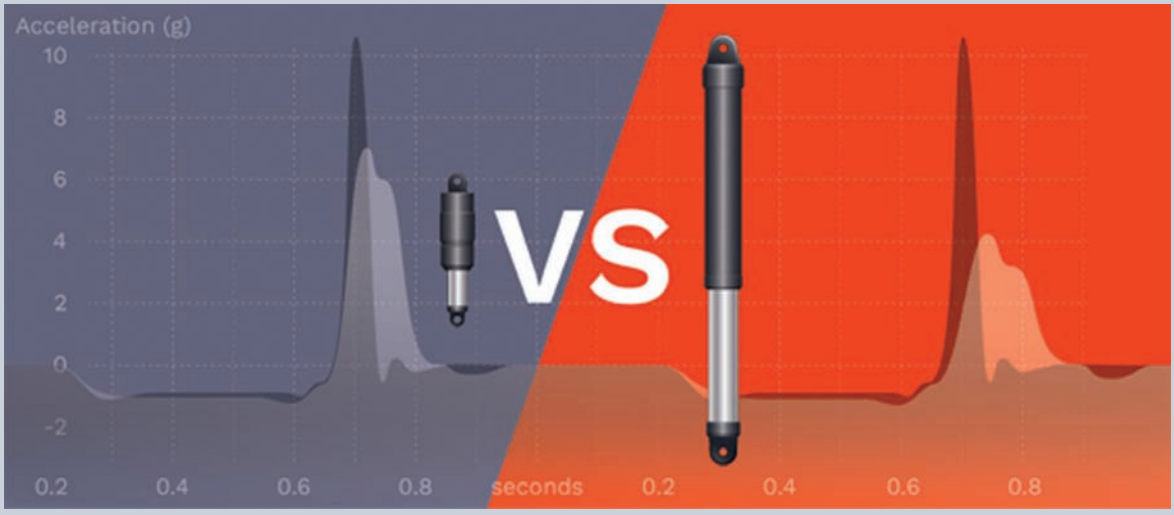
Suffice it to say that the combination of factors can make for an unpleasant or even dangerous ride, and a shock-mitigation industry has grown in response.

The Solution: Shock-Mitigating Safety Gear

At its core, shock-mitigating safety gear consists of a medium or mechanism separating an input surface, such as a boat's deck, and a person seeking to reduce their exposure. When all goes well, an impact is attenuated as it passes through the mechanism, resulting in a gentler motion for the person using it. But how is the attenuation achieved? The answer, in all but the most exotic cases, comes down to a compression or material deformation of the underlying device, with energy dissipated as heat. And just like the cars speeding towards a brick wall, the ability of a shock-mitigating device to lessen an impact and ensure a smooth ride is tied to its stopping distance.

We gain further insight by considering the definition of acceleration, and it is formally defined as the rate of change of velocity with respect to time. When a boat collides with a wave it undergoes a velocity change due to its motion relative to the water's surface, and so the acceleration will

"For military-use in fast boats testing at up to 10 g is required. Suffice it to say that the combination of factors can make for an unpleasant or even dangerous ride, and a shock-mitigation industry has grown in response."



depend on the size of that change and inversely depend on the time over which it occurs. This suggests the two main approaches to lowering impact severity: reduce the impact velocity or increase the time duration of the event.

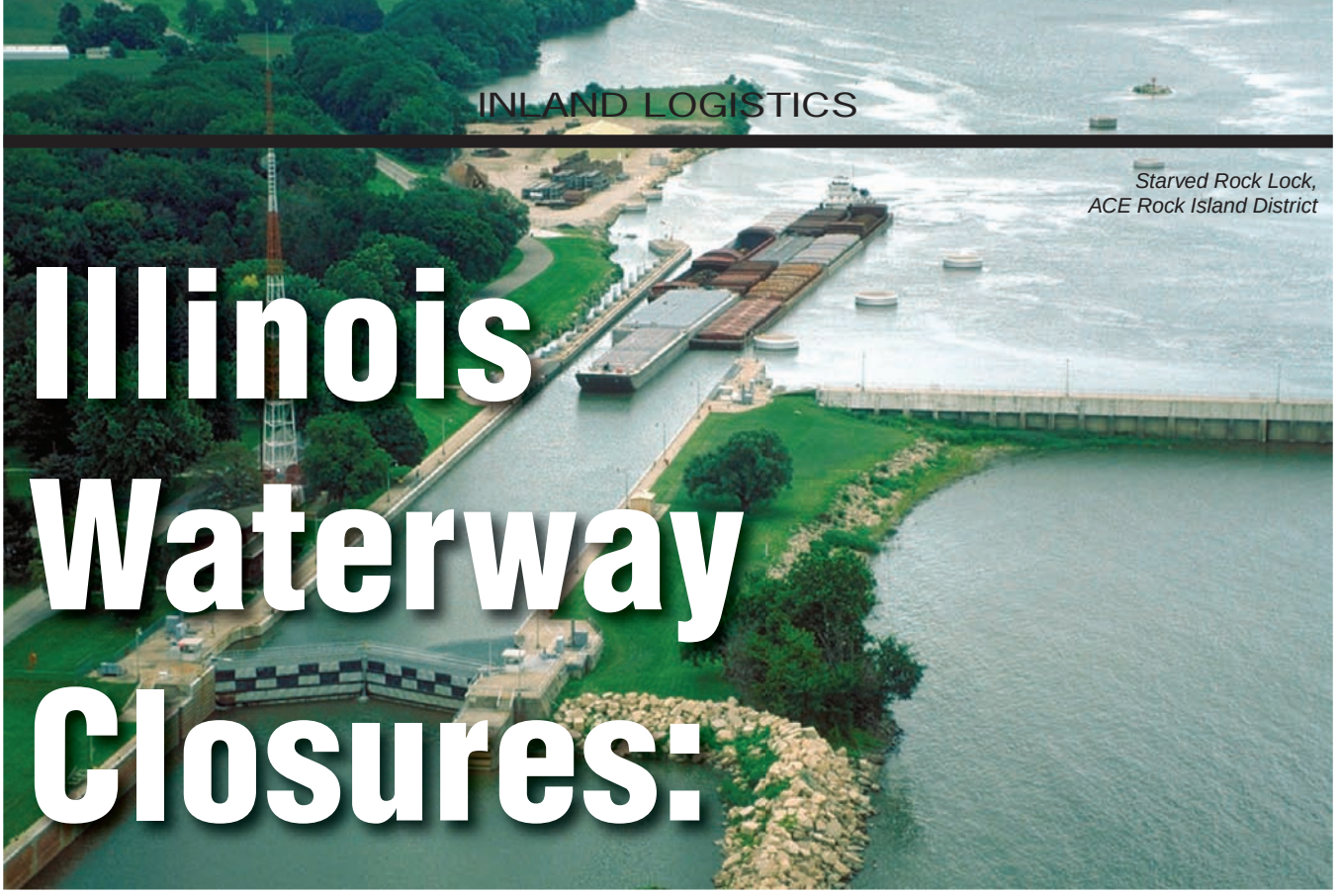
On the water, a boat's hull-design, speed, and the sea-state are the dominant factors that dictate the velocity change during a wave slam. This change is thus reduced by improved hull design, slowing down, and avoiding poor conditions. These preventative measures lie at the heart of any shock-reduction strategy, and in our car analogy they correspond to reducing each car's initial speed. But impacts cannot be eliminated entirely. In certain cases, speed cannot be reduced, waves cannot be avoided, and even the savviest operator can be caught off-guard. This is where shock-mitigating gear comes into play, and it fulfills its purpose by increasing the time duration of each impact, smearing it out temporally so that it is less severe. The longer it takes to undergo the impact velocity change, the smoother the ride will be, and adding suspension travel to a shock-mitigating device is a sensible way to achieve this. It's akin to giving our imaginary cars more braking distance before the wall.

With only basic calculations we can show the average force (and acceleration) required to bring a moving body to rest is inversely proportional to the stopping distance. Of course, the stopping distance must be used effectively, just

as a car's driver must skillfully apply the brakes. But if it is correctly used there is no way around it, a longer deceleration leads to lower average forces. This explains why a 1" thick slab of vibration-muffling foam can't compete with a tuned 4" travel suspension system when it comes to mitigating shocks. Likewise, a 4" travel suspension will be easily outgunned by its 10" rival. The argument generally holds for suspension seats, matting materials, and any mechanism that mitigate shocks through mechanical deformations. The principle applies to impacts in any direction, including the lateral. If only a short travel distance is provided, only a modicum of shock-mitigation can be expected.

This is not to say that suspension travel distance is the only consideration. Far from it, there are space and weight limitations on boat, and ergonomics must be a top priority. Operators have to interact with controls, maintain a low profile, and not sacrifice their sightlines. But when it comes to shock-mitigation, bigger really is better, and long-travel suspensions will yield the best results.

Tim Rees *is the Chief Scientist at SHOXS Seats. He holds a Ph.D. in Applied Mathematics with a specialization in fluid dynamics and computational methods. Since joining SHOXS in 2015, Tim has focused on the design and optimization of suspension systems for the marine impact environment, and he was involved in an ISO effort to develop a shock-mitigating seat performance test standard. Tim remains active in the development and evaluation of suspension systems and testing methods, and he can be reached at TimRees@shoxs.com.*



Starved Rock Lock, ACE Rock Island District

Credit: USACE

Illinois Waterway Closures:

Look for the Workaround.

By Tom Ewing

Credit: USACE

Brandon Road Lock and Dam

A set of complicated lock-and-dam projects on the Illinois Waterway, from Chicago to the Mississippi, has yellow lights flashing throughout the Midwest freight industry. In effect, the entire Waterway will be shut down next summer as the Army Corps of Engineers, Rock Island Division, starts some hefty replacement and maintenance projects, from LaGrange to Brandon Road locks and dams.

Officials advise maritime, freight and agricultural businesses to look ahead now, to prepare a logistics scenario that will be ready by July 1, 2020. Rock Island District anticipates the navigation industry could need two or more years to fully recover from the closures. It's a good news/bad news story for the inland industry. Stakeholders have long complained that the work needed to be done, but the money wasn't there. Now, it is.

The Illinois Waterway typically carries more than 29 million tons of cargo each year, including about 10 million tons of agricultural products and 4 million tons of fertilizer, according to the Illinois Soybean Association (ISA). About 60% of the soybeans grown in IL are exported. Waterways and barges offer two basic transportation advantages – low costs for bulk commodities and reliability. It goes without saying that those advantages will be under great pressure in 2020.

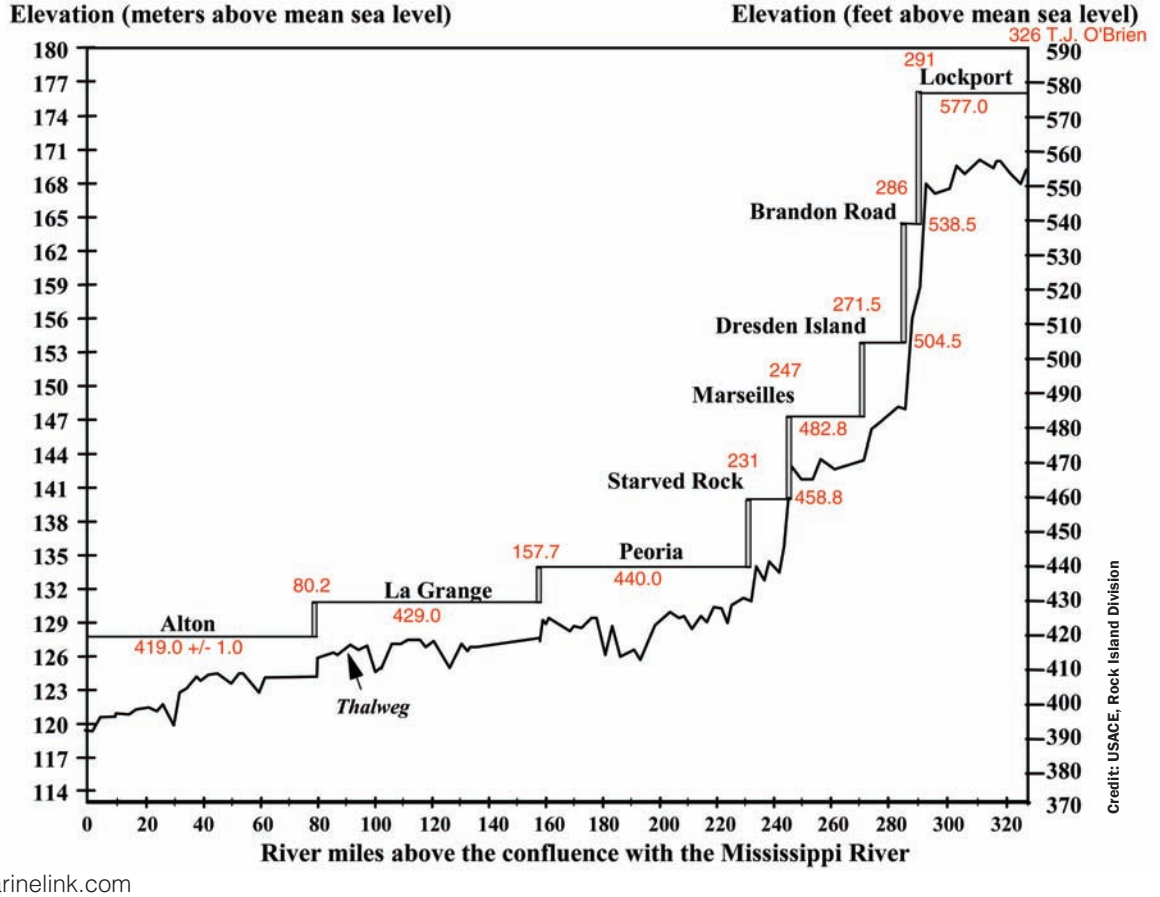
Ready or Not …

Maritime operators got an advance look at dealing with full closure last month, starting September 21, and scheduled to last until October 5. That's when work starts at the Starved Rock and Marseilles locks to install sill beams across the bottom of the lock chambers. In addition, also at the same time, the navigation lock at Lockport, IL, about 30 miles from Chicago will be closed due to unanticipated miter gate repairs.

Importantly, the Waterway between the dams and locks will be open and fully accessible. It's full transit that will be severely restricted.

The Illinois Waterway is old infrastructure, some might say ancient. The first phase of the Waterway project opened in 1933, with Lockport construction and the locks and dams at Brandon Road, Dresden Island, Marseilles and Starved Rock. All those facilities are in the queue for upgrades in 2020. Most work concludes next summer, but some remaining work is planned out until 2023 – 90 years after ribbon-cutting. The upcoming work should extend Waterway assets for another 25 years.

Concurrent timing is a deliberate part of the Corps' work schedule, an approach with maritime and freight industry support. Officials are taking the stoical view about



"If you (the Corps) err on over or under-communicating, err on overcommunicating. If you know you're behind, let us know."

– Mike Steenhoek, Executive Director, Soy Transportation Coalition

Credit: Illinois Soybean Association

A Barge at Starved Rock. An average of 16 million tons of soybeans move through locks on the Illinois Waterway each year. While much needed repairs are underway, Illinois farmers will need to navigate lock closures in 2019, 2020 and 2023.

getting all of the work, or at least most of it, done at once. The general thinking is that, yes, expect headaches next summer and fall but it's better to get this over with rather than drag on for years.

Around the Next Bend

Work at Marseilles and Starved Rock, requiring full closure, runs from September 21 to October 5. There are early lessons here already. One, the work was delayed from its original August start date because flooding made it impossible for USACE crews and equipment to properly access the sites. It is hoped that 2020 flooding will not be as severe. Secondly, maritime industry officials asked for the delay so that they could clear the waterway, so to speak, allowing freight to get to Chicago and still have time to return barges past Marseilles and Starved Rock. Importantly, after the locks reopen on October 5, the waterway will be open in time for harvest season.

The Summer of 2020 promises additional activity:

- ***July 1 is the projected start for the $117 million LaGrange Lock Major Rehabilitation project requiring a 90-day full closure to install new miter gate machinery. The Corps refers to the start at LaGrange as "the driving factor" for starting work at other sites.***
- ***Starved Rock will also close on July 1 for 120-days, until October 30, for upper and lower miter gate installation and significant sill and anchorage modification.***
- ***Marseilles, too, will close July 1 for 90 days for upper miter gate installation.***
- ***With the Waterway "closed" (the Corps' word) bulkhead work will start at Dresden Island and Brandon Road, requiring 14-day closures and 90-plus day partial closures; dates are not yet set.***
- ***Peoria Lock will close for 60 days for routine inspections and minor repairs; again, exact dates are not set.***

Looking farther out, to 2023, the Corps plans to return to Dresden Island and Brandon Road for miter gate installation, again requiring 90-day closures. But, importantly, this work is not yet confirmed, and remains contingent on a number of factors, including funding. Even after the bulk of the work is done in 2020, and after the Corps' calculated two-year work break, significant work remains, although at a lesser scale.

Still, it's not hard to wonder: how will millions of tons of agricultural products move to markets next fall with a fair number of barges sidelined? And, will the rail and trucking sector be able to take up the slack when demand spikes?

Getting Ready … or not

Interestingly, each September, the federal Surface Transportation Board schedules a meeting of the National Grain Car Council, established in 1994 as a working group to facilitate private-sector solutions and recommendations on "matters affecting rail grain car availability and transpor-

"Shippers already route freight to the St. Louis region where the exceptional freight network means they benefit from lower distribution and logistics expenses and shorter travel times. We should have the capacity to take on more and be a part of the solution for those who will be impacted, if the planning starts early."

– Mary Lamie, Executive Director of the St. Louis Regional Freightway

Credit: USACE

tation." This year, the Council met on September 12, in St. Louis. The purpose of the meeting was to discuss rail carrier preparedness to transport yearly harvests.

Despite widespread awareness of the upcoming Illinois challenges, the Waterway shutdown is not on the Council's agenda. People familiar with the Council's meetings said that the Illinois waterway might be raised within an impromptu discussion, but it's not a topic that would establish a closer look or expected next steps.

In 2014, the Surface Transportation Board opened hearings in response to complaints from farmers and the agricultural industry about poor rail service in western states, from Minnesota to Montana, a region where rail is the singular industrial carrier. Without competition, concerns about markets and prices are filed with the Board, where petitioners seek relief.

For farmers, 2014 rail service issues were serious and extensive; this was largely about failed service. One grain elevator, for example, expected to have 800 railcars per month for shipments, but just 300 cars were made available. Cars sat on tracks for up to 10 days. Overall costs increased due to rail non-performance. Some trains ran 20-30 days late.

The situation in IL next summer is not exactly analogous to the situation experienced in the western states – except for one important way: there won't be much freight intermodal competition in 2020 in IL, at least for bulk freight shipments. Barges will be sidelined. Will rail provide what farmers expect and need in 2020? Look into that question now.

Likely, shippers will need to move commodities more frequently, in separate, shorter trips to finally reach a port that can accept material for shipment to St. Louis, say, or New Orleans. Or, a farmer between the Illinois Waterway and the Mississippi may arrange to work with a port on the Mississippi rather than the Illinois, despite a longer travel time.

Mike Steenhoek is the Executive Director of the Soy Transportation Coalition, which is comprised of thirteen state soybean boards, the American Soybean Association,

and the United Soybean Board. The thirteen participating states encompass 85% of total U.S. soybean production.

Next summer's Waterway work "is very much on our radar," Steenhoek said when asked about his advice to members for dealing with the closures. One basic concern is that these transport issues are one more headwind for farmers.

Steenhoek and his team have met with the USACE many times to discuss the lock-and-dam work. Communication will be key. Steenhoek's message: "If you (the Corps) err on over or under-communicating, err on overcommunicating. If you know you're behind, let us know." Steenhoek said shippers will move product to other waterways. He said farmers could sell to a local cooperative or find another market – a biodiesel facility, for example. In some instances, shippers will use trucks to bypass one site to get to a port unimpeded by the closed Waterway.

Steenhoek noted freight data showing a 200% increase in rail transport to New Orleans when flooding prevented barge service. People will adapt, Steenhoek said, and hopefully those alternatives will meet budgets and timing, especially, of course, with perishable commodities that surge into the system all at once, or close to it.

Separately, the St. Louis Regional Freightway is also closely monitoring the Illinois projects. The Illinois River meets the Mississippi about 50 miles south of the LaGrange lock and dam; the Rivers converge about 30 miles north of St. Louis. In a May press release, the Freightway noted that while industry is used to working around river closures on some rivers, it called the upcoming Illinois closures "unprecedented."

In a prepared statement, Mary Lamie, executive director of the St. Louis Regional Freightway said, "It's vital that industry members are aware of the plans, the timing and any steps they need to take in advance of the closures to help minimize the disruption to their operations or, to potentially be a part of the solution." She added, "Shippers already route freight to the St. Louis region where the exceptional freight network means they benefit from lower distribution and logistics expenses and shorter travel times. We should have the capacity to take on more and be a part of the solution for those who will be impacted, if the planning starts early."

Mike Toohey, President and CEO of the Waterways Council, Inc., perhaps said it best when he advised stakeholders, "Plan, be flexible and be ready."

Tom Ewing is a freelance writer specializing in energy and environmental issues.

All the Right Moves *(Finally)*

Marine Highways Gain Traction in the Intermodal Supply Chain

By Barry Parker

In the United States, landside infrastructure is at a crisis point. Congestion at the big hub ports, exacerbated by imperfect intermodal interfaces with surface transport serving cargo hinterlands is at the heart of the matter. As politicians bicker over a possible infrastructure package, the Highway Trust Fund, funded by taxes on gasoline and diesel fuel, has continued its downward journey towards further deficits (now $144 billion). And, where countless U.S. ports have reported record TEU volumes, an October 2018 report by the American Transportation Research Institute pegged the annual cost of congestion to the U.S. trucking industry at $74.5 billion in 2016.

These issues are not lost on transport planners; attention is increasingly moving to the water though coastal shipping must compete with surface transport modes. The trucking and rail lobbies are powerful and well funded, long entrenched with cargo owners. Eventually, when the discussion turns to shortsea shipping, container-on-barge and/or the uniquely American 53' roll-on/roll-off modes have emerged as the preferred choices to improve efficiencies.

(HANDICAPPING) THE SHORTSEA EFFORT

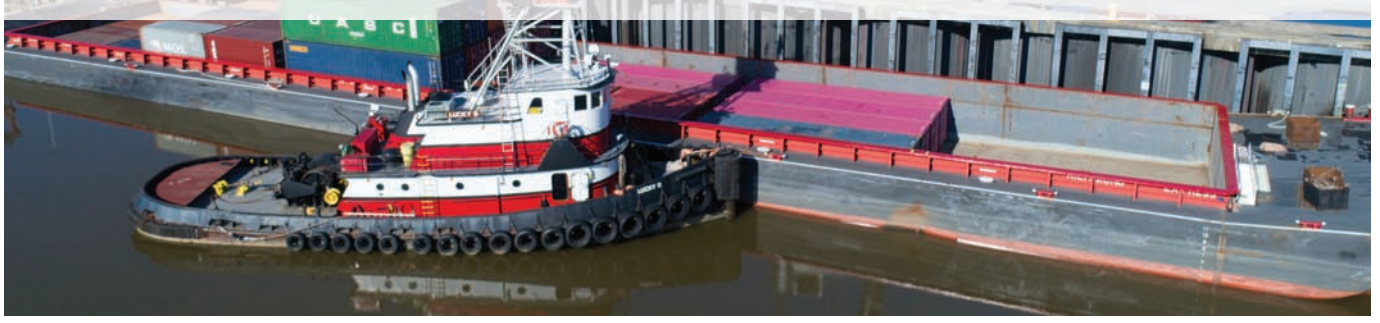
Coastwise transportation in the United States requires American built tonnage. The projected costs of building a coastwise feeder vessel, handling containers delivered to deep draft ports and delivering for the final short leg to smaller niche ports, would drive the cost of (coastwise) waterborne transport to levels uncompetitive with truck or rail. Add to that the double whammy of the Harbor Maintenance Tax (HMT) when handling that container twice, and the formula has been shown to have no sea legs.

Separately, more than a decade after its inception, the U.S. Maritime Administration's shortsea shipping initiative, the so-called Americas Marine Highway program, is finally gaining traction. The DOT's initial justification for shortsea shipping was to reduce road congestion, but its mandate has now broadened to include environmental concerns and a more efficient supply chain.

Today, the federal government is finally giving the issue more than lip service. With freight levels expected to increase by more than 40% over the coming decades (Marad projections), a series of 2019 Marad grants saw $6.8 million awarded for three shortsea projects. $3.2 million went to a project sponsored by the Port of New Orleans, for continued buildout of a container-on-barge service that runs between Baton Rouge and New Orleans (route M-55). Another container-on-barge run, the Port of Virginia (and Norfolk Tugs), received $1.8 million to expand an existing service (M-64) between Richmond and Hampton Roads terminals. A similar amount, $1.8 million, went to Harbor Harvest, a newly launched service linking Long Island with southern Connecticut (circumventing the worsening I-95 and I-495 snarl in the NYC metro area.

"We are investing $700 million to expand the capacity at The Port of Virginia and it is important that we grow our barge capabilities in parallel."

– John Reinhart, CEO and Executive Director of the Virginia Port Authority (VPA)



The three programs mentioned above, today small in actual volumes, represent important nodes in the broader supply chain. For example, cargo loaded at Baton Rouge actually originates further up the river system. Seacor AMH, operator of the M-55 lower Mississippi River service, gathers empty containers out of Memphis (a junction point for Class 1 railroads), and barges them down to Baton Rouge. On the export side, increased petrochemical activity has led to an uptick in exports of cargo, notably polymer resin out of Louisiana. The containers are then loaded up and sent down to New Orleans.

In 2018, more than 27,000 boxes were moved in this way, off the highway, in a more efficient and environmentally correct fashion. Local entrepreneurs are even aggressively pushing for the construction of fit-for-purpose, self-propelled inland tonnage to greatly expand the effort between St. Louis and the GoM.

Separately, shortsea shipping expert Bob Kunkel and his nascent Harbor Harvest operation envision collaboration with trucking companies to obviate the metro area highway bottleneck delays. Harbor Harvest benefits from a subtle but important change in criteria necessary to obtain designation as a Marine Highway; services hauling palletized or individually packaged cargo are now eligible. This broadened mandate comes as transport paradigms for local distribution are shifting, with greater emphasis on the 'last mile' delivery.

THE BIG PICTURE: SHOW ME THE MONEY

Previously a matter of congestion, efficiencies and the environment, shortsea shipping has finally caught the attention of the bankers. Edward M. A. Zimny, President and CEO of investment bank Seabury Maritime LLC recently weighed in with ***MLPro***, saying, "With hub ports increasingly backed up on the landside, the big ports will need to work closely with their regional and complimentary regional ports. The new ecosystem will see multi-modal links on the landside, for cargo originating inland, but will also finally experience a viable coastal ocean alternative transportation, likely taking the form of container or trailer on barge, as a vital connector to out ports." Asked to elaborate, he explained, "Examples of these feeds are the Delaware River ports, in between New York and Norfolk, and New London, on up the coast from New York/New Jersey. We've have been fortunate to be involved in a recent transaction advisory with both of these, and a regional offering is key to the value proposition to the two and their respective business cases."

Ongoing projects funded by DOT's marine highway program also include a cross-harbor container barge in New York- linking the container ship docks in Port Newark, New Jersey with the waterfront in Red Hook, Brooklyn. The project sponsors, New York City's Economic Development Corporation and the Port Authority of New York and New Jersey (PANYNJ), received almost $300,000 in the late 2018

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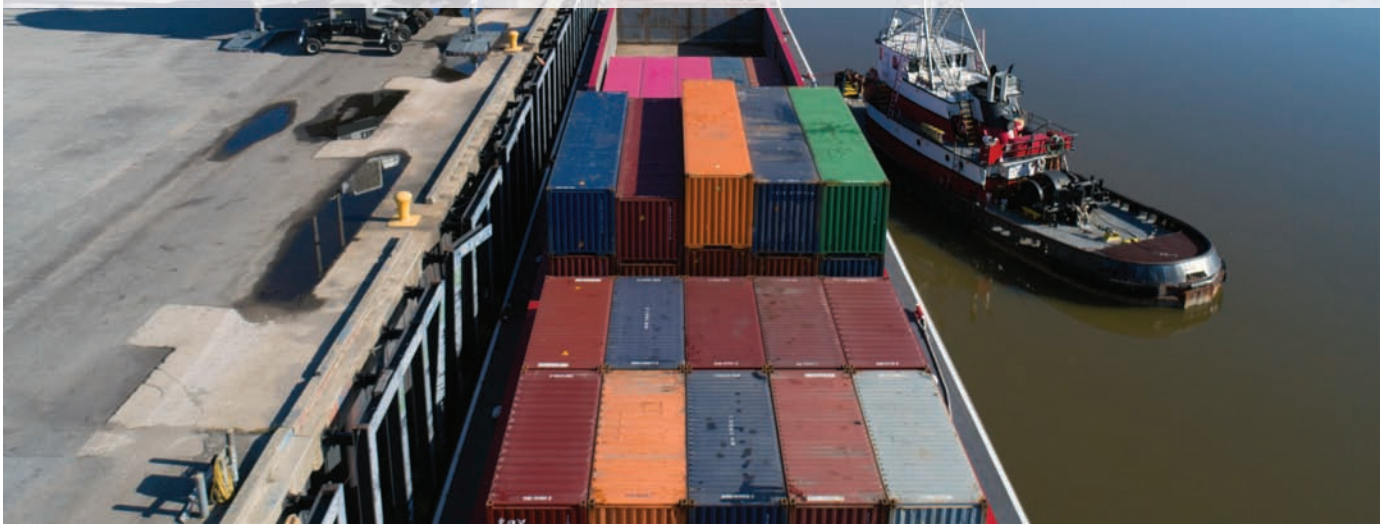


AMH funding round. In turn, they hope to further expand this service, linking to mid Atlantic and Northeast ports.

One project in the works, which has already garnered AMH funding after receiving Marine Highway designation is a potential barge service linking the Brooklyn docks in New York Harbor with Davisville, RI, on Narragansett Bay. In late 2018, $855,000 from Marad was earmarked for the purchase of dockside equipment in Rhode Island. Marad, in a prepared statement, said, "The barge service will include a dedicated run twice a week utilizing one 800 TEU capacity deck barge transporting north and south bound import and export cargo via the East River, Long Island Sound, Block Island Sound, and Narraganset Bay."

If and when money becomes available, Marad could make more AMH awards in late 2019, twice in 2020 and 2021, and in early 2022. But Marad is not the only funding source; short sea services have benefited from regional funding sources. In New York, the EDC has issued a Request for Proposals seeking terminal operates who would contract barge operators to distribute food and produce presently moving through the Hunts Point market by truck. As contemplated, the EDC would re-purpose landside warehouses into a marine terminal, adjacent to the East River in the Bronx. This marine effort is part of a broader 'Freight NYC' initiative, described as a $100 million plan.

The EDC and the PANYNJ, working jointly, have also spearheaded formation of a new working group, the North Atlantic Marine Highway Alliance, which will identify cargo and explore barge transportation from Maryland to Maine. The new group's mandate is support the realization of a financially viable, regional barge network.

Marad, in describing the nearly $300,000 award mentioned above, explained, "The grant will assist with funding a planning study to look at how marine highway services can be expanded throughout the Northeast region from New York Harbor to other points. The study will provide the data necessary to establish the business case to support shipping container movement by barge between terminals and beyond."

TWO STEPS FORWARD; ONE BACK

Not all short sea projects have been successful. A barge

service linking Stockton, California with the deepsea container docks at Oakland saw more than $10 million in funding from DOT Tiger grants for cranes and other equipment. In 2015, after failing to attract even modest amounts of container traffic, the service was shut down. Various reasons were cited for its failure, among them the failure to cement a tie-up with a major ocean carrier. In the end, bad timing may have played a bigger role. Around that time, the cost of fuel had dropped precipitously, which worked in favor of surface alternatives.

Even the Richmond Express in Virginia took a decade to get on its feet, at no small cost. Maritime consultant Donald Frost, a Connecticut Port Authority board member, weighed in on the difficulties which face shortsea startups. "All short sea shipping proposals focus almost entirely on reducing highway traffic; nobody works with the cargo shippers," he insists, adding, "The Gold Coast of Connecticut is too close by road to New York City, so the very competitive consumer goods sector opts for trucking. Certainly for consumer goods, in this age of Amazon Prime and just in time inventory, barges are too slow."

Mr. Frost's remarks hit home for this nascent but promising market. Consider that Port of Virginia CEO John Reinhardt brings an intimate knowledge of the industry and its influencers. He was previously the top man at Maersk's U.S. subsidiary. Hence, it is probably no accident that fourteen ocean carriers offer bills of lading with RMT as the final destination or point of origin for cargo. The Richmond terminal also coordinates with Columbia Coastal Barge, a long established service in the mid-Atlantic with scheduled container on barge runs linking Norfolk, Baltimore and Philadelphia. As is the case with successful short sea runs in Europe, the waterborne route from Norfolk into Baltimore is actually shorter than a comparable highway run. After receiving 2019 AMH funds, Reinhart offered, "We are investing $700 million to expand the capacity at The Port of Virginia and it is important that we grow our barge capabilities in parallel." And grow, it has: the service in 2018 moved more than 31,000 boxes between Richmond and Norfolk.

Like the James River run, the Seacor AMH service in Louisiana is a key part of petrochemical supply chain there. Scheduling is closely coordinated with ocean carriers, including CMA CGM, on the export side. To Mr. Frost's point, congestion mitigation is a component of short sea success – but, not the only one.

Brent Dibner of Boston-based Dibner Maritime Consulting, told ***MLPro***, "Sometimes, the simple economics of trucking cargo may defeat a well intentioned barge service. Where cargo is to be barged, there may well be a truck component, in the form of drayage costs and waiting time around a terminal. These can substantially increase the cost." He continued, "In some cases, it's very hard to compete with the truck economics." At Richmond, VA, the barge terminal is very near to I-95, helping to make the barge competitive because of the convenient road/waterfront interface.

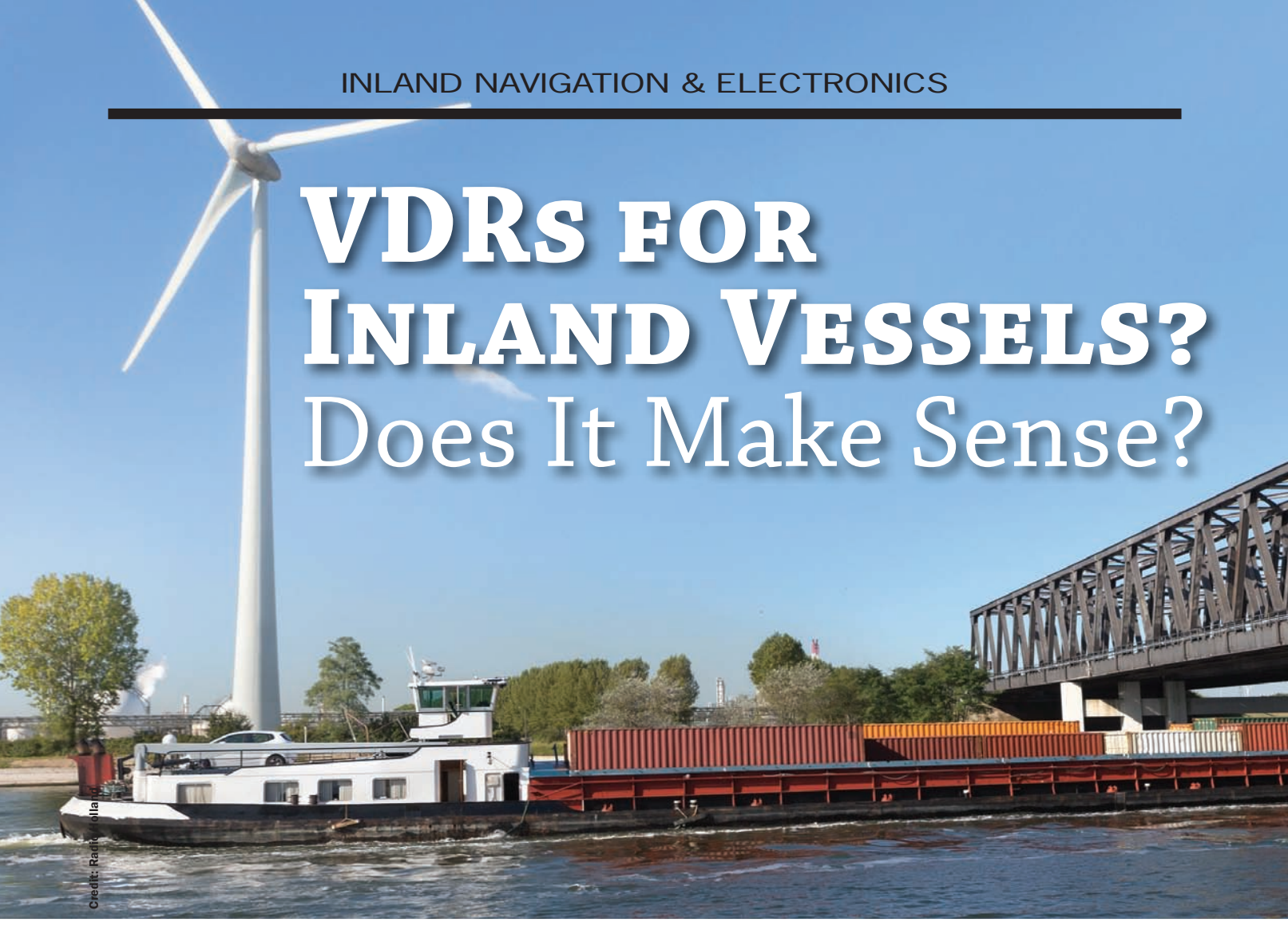
LESSONS LEARNED

"Build it and they will come" does not apply when it comes to shortsea shipping. Rather, and as the concept evolves, it will be driven by the crushing increases in freight that Marad says will soon overwhelm domestic highways and rail. Similarly, the realization that largely under-utilized rivers and coastal waterways – what the Waterways Council, Inc. (WCI) calls the 'silent R' in our intermodal equation – deserve the same consideration as every other aspect of the greater supply chain, will yield yet another gem of wisdom.

The supply chain is only as strong or as bad as its weakest link. At the moment, that weak link is the inefficient interface between ports and the hinterland. And, that's got to change. Shortsea shipping can get us there.

Barry Parker, *bdp1 Consulting Ltd provides strategic and tactical support, including analytics and communications, to businesses across the maritime spectrum. The company can be found online at www.conconnect.com*

VDRs for Inland Vessels? Does It Make Sense?



It just might. And, you've got options.

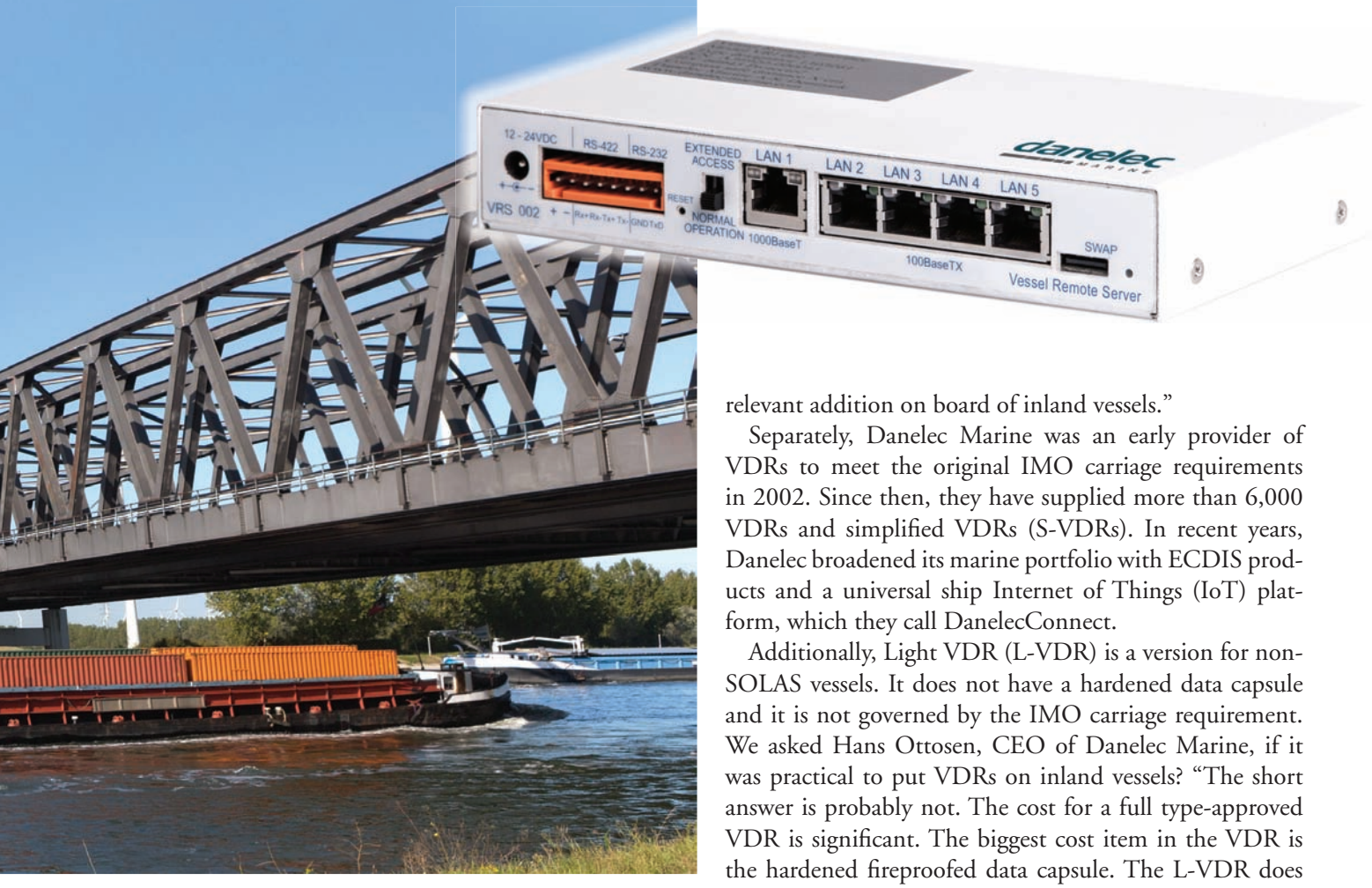
By Joseph Keefe

The Voyage Data Recorder (VDR) carriage requirements apply to all passenger ships regardless of gross tons or year of build, and to all cargo ships 3000 gross tons or larger built after 2002. A simplified VDR (S-VDR) is allowed on older ships built before 2002. The performance standard was updated in 2014. That said; a full type-approved VDR is not a requirement for inland vessels under 3,000 GT. Nevertheless, a good case to be made for installing a (less costly) data recording device on such vessels, ideally with remote access and reporting as part of an Internet of Things (IoT) solution to monitor the vessel and its installed equipment. Both Danelec and Orolia (who collaborates with Radio Holland in its offering) offer such capabilities.

On the Market, Available Now

Orolia recently announced a partnership with Radio Holland that includes the development of a Voyage Data Recorder (VDR) specifically designed for inland shipping. This solution is designed to enhance safe navigation and vessel performance and provide tools for understanding the cause of incidents. Radio Holland will also be installing Orolia's Netwave VDR NW6000 series as its preferred global VDR solution for retrofit and new build projects, while Orolia will utilize Radio Holland's established global network as one of its globally preferred service partners.

The architecture of Orolia's renewed Netwave NW6000 VDR system, which has a global install base of more than 6,000 vessels, is based on latest ethernet



technology, making full use of so-called PoE (Power over Ethernet) solution. This leads to reduced need for cabling saving in installation time – and it saves space on workboats which typically have a limited physical footprint for any additional equipment. As an increased number of navigation and communication equipment with ethernet output will become available on board of ships, the NW6000 VDR can provide additional tooling for performance measurements. Next to the standard VDR function, the NW6000 VDR can be used for optimizing ship performance.

Paul Smulders, CEO Europe for Radio Holland explains, "we partnered with Orolia on the new and unique Inland NW6000R VDR, which registers all movements and communications on and around the inland vessels. The VDR is obligatory in Deepsea Shipping, but for inland shipping it is also a relevant tool to enhance safety and ship performance. The NW6000R VDR is perfectly suitable to monitor, measure and improve the performance of the ship. Based on the interest we have found with inland ship owners; we believe this innovative product is a relevant addition on board of inland vessels."

Separately, Danelec Marine was an early provider of VDRs to meet the original IMO carriage requirements in 2002. Since then, they have supplied more than 6,000 VDRs and simplified VDRs (S-VDRs). In recent years, Danelec broadened its marine portfolio with ECDIS products and a universal ship Internet of Things (IoT) platform, which they call DanelecConnect.

Additionally, Light VDR (L-VDR) is a version for non-SOLAS vessels. It does not have a hardened data capsule and it is not governed by the IMO carriage requirement. We asked Hans Ottosen, CEO of Danelec Marine, if it was practical to put VDRs on inland vessels? "The short answer is probably not. The cost for a full type-approved VDR is significant. The biggest cost item in the VDR is the hardened fireproofed data capsule. The L-VDR does not have a data capsule and is a good deal less expensive," he replied, adding quickly, "First and most importantly, there is the obvious safety consideration. The L-VDR records and stores data from the vessel's navigation and control systems and voice recordings from the pilothouse. This information would be extremely helpful in investigating accidents and near misses, to determine causation and develop remedial training for watch standers."

Beyond that, he explained, there is considerable commercial benefit to be gained from monitoring the performance of the vessel and its critical equipment. The IoT connectivity revolution is sweeping through all industrial sectors, including marine transportation as a key tool for increasing visibility into the full value chain. Increasingly, manufacturers of modern engines, auxiliary machinery and electronic systems are designing remote access capability into their equipment, so service technicians can log into the machine for trouble shooting, uploading new software versions, etc.

Ottesen continued, "The problem for the vessel owner is that these different systems from multiple manufacturers

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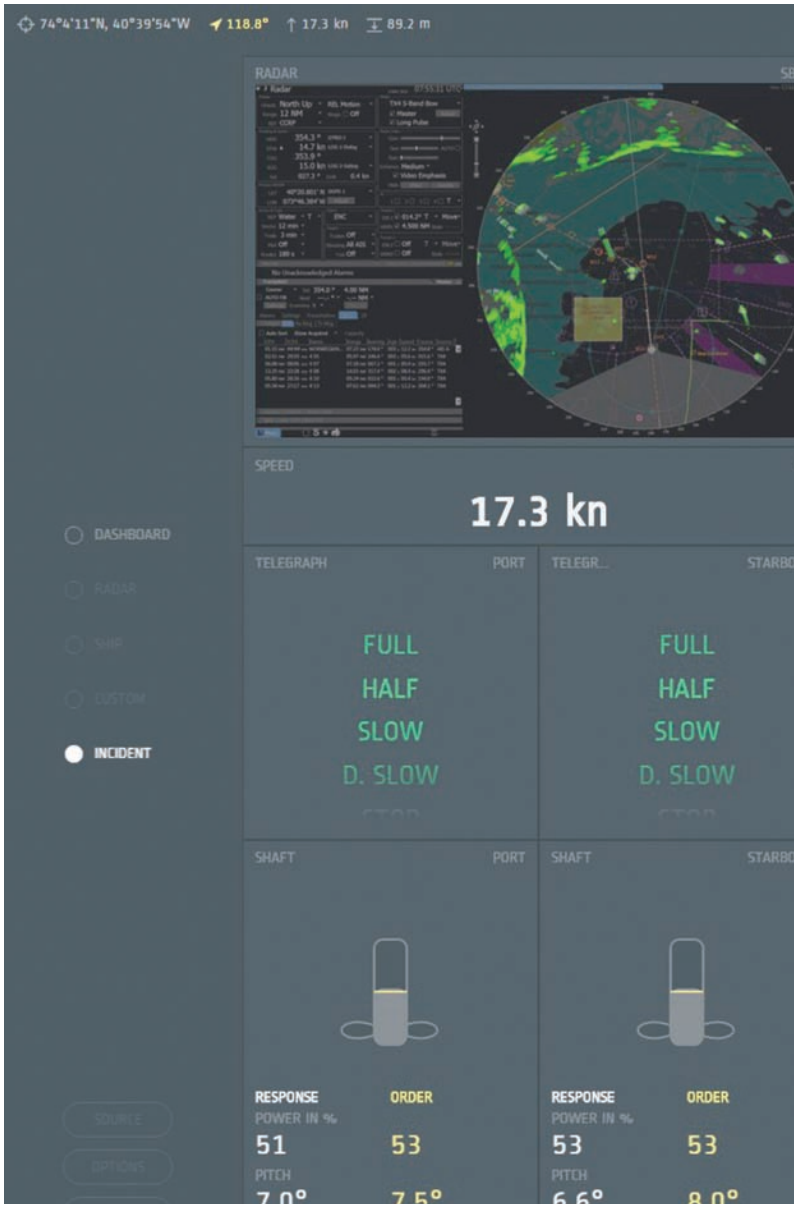


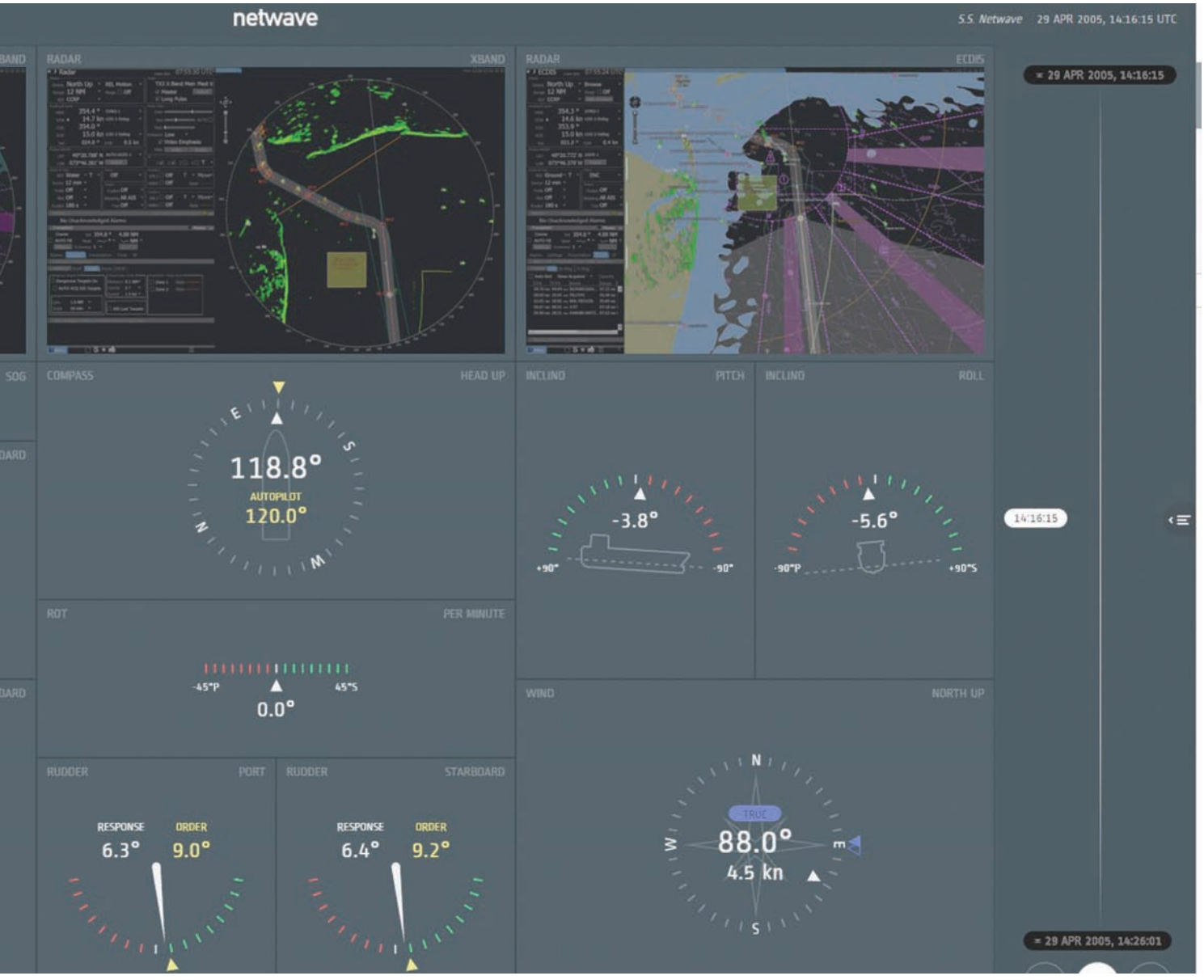
may have totally different data output formats, and it would not be cost effective to install separate remote connectivity interfaces for each of them. What's needed is a universal onboard device that accepts data in all different formats and makes it available for download at shore offices."

The Case for VDR's

The original performance standards for VDRs came into force in 2002. Ten years later the Maritime Safety Committee of the IMO adopted a revised recommendation for new VDR performance standards. The new requirements are defined in MSC.333(90) and apply to all full VDR systems installed on or after July 1, 2014.

According to Hans Ottesen, when Danelec set out to develop next-generation VDR to meet the new performance standards in 2014, its second-generation DM100 was a total redesign, with special attention given to selective remote access features. That's because, he says, Danelec recognized that the data stored in the ship's VDR could have value to the vessel manager beyond the primary safety requirement. He explains, "It could give shore staff greater visibility into what's happening with onboard systems in near real-time. So, we developed a new separate IoT hardware module, DanelecConnect, to serve as a 'clearing house' for data flowing from the various shipboard systems.

The DanelecConnect device accepts data in analog, digital or serial formats from sensors and systems throughout the vessel – including the engine room. The DanelecCo-



nnect box outputs the data to the vessel's existing communication infrastructure (satellite or terrestrial wireless) for transfer through a cloud-based server to the operations center ashore."

DanelecConnect with 'mini-VDR' functionality would cost about 10 percent of a full type-approved VDR. And like Orolia and Radio Holland, Danelec has also been in the VDR game for a while, supplying L-VDRs for inland operators since 2011. Ottesen told ***MarineNews***, "One of our earliest customers was Crowley in the United States. We continue to have steady demand for this solution, and we see increased interest worldwide in our new dedicated and very cost-efficient DanelecConnect solution with extra ship-to-shore features."

VDRs serve a very important role in safety at sea – just like the flight data recorders (black boxes) on commercial aircraft. ***MarineNews*** readers are of course familiar with the loss of the El Faro with all hands in 2015. The ship had a Danelec S-VDR on board. The data storage capsule was retrieved in 2016 from a depth of nearly three miles, and the data, including bridge voice recordings, were recovered. Without the S-VDR data, the accident investigations would have necessarily been based on conjecture and not facts.

And, even if your workboat isn't required to have a VDR on board for the usual reasons, there are dozens of reasons why an inland fleet operator might choose to install one. If you do, it's good to know that you have options.

Autonomous Shipping – Cyber Hazards Ahead

If autonomous vessels are the future of maritime shipping, then cyber threats may be its Achilles heel.

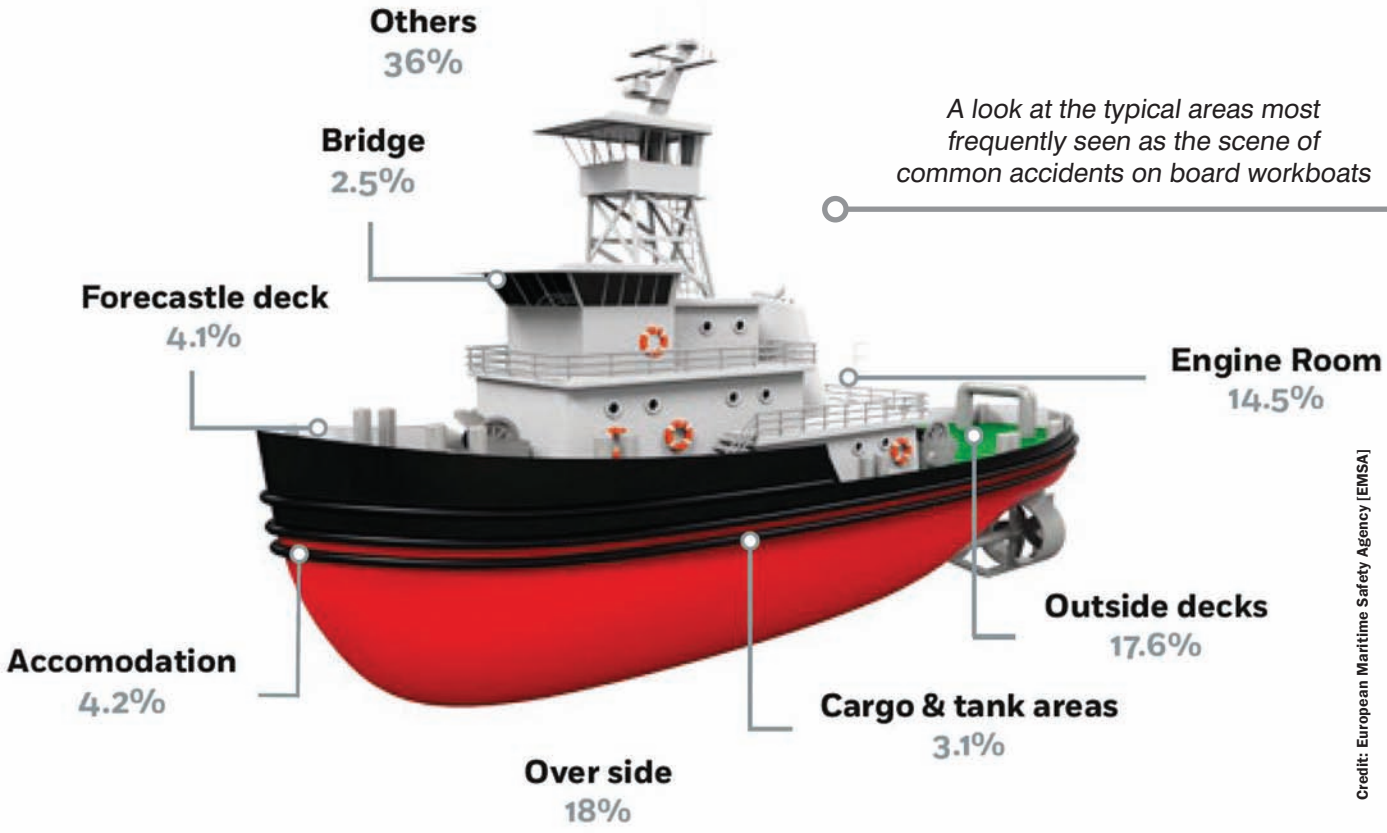
By Jeffery Mayger

Mayger

Congested shipping, restricted visibility, limited maneuverability, and intensive docking activities all contribute to port hazards – 42 percent of EU reported marine accidents (injury/death/damage to ships) took place in port areas and 44 percent of workboat fatalities occurred on Tugs. Autonomous shipping should provide numerous benefits including increased safety by relieving crewmembers of unsafe and repetitious tasks. Yet, with cyberattacks threatening every industry, this nascent technology is a large target. If autonomous vessels are the future of maritime shipping, then cyber threats may be its Achilles heel.

Rolls-Royce has demonstrated an automated tug. Systems provider Wärtsilä is testing automatic port arrival solutions. Cybersecurity is integral to both designs. Chris South, senior underwriter for insurance provider West of England P&I, states that four factors are driving maritime cybersecurity:

- *Automation – machinery is increasingly controlled by software;*
- *Integration – multiple shipboard systems are connected together;*
- *Remote Monitoring – corporate land-based offices use ship-to-shore communication to continuously monitor shipboard equipment;*
- *All these systems are connected to the internet.*



A look at the typical areas most frequently seen as the scene of common accidents on board workboats

Credit: European Maritime Safety Agency [EMSA]

Considering Risk

This presents considerable risk to shipowners, port operators, and their underwriters in the event of failure or if cybersecurity is mismanaged. Risk, the potential for damage (in this case, from a cyberattack), exists not only in office environments, but can also affect physical assets marine companies use. Attacks against physical assets are not without precedence. In 2015, Russia purportedly attacked Ukraine's electrical grid leaving 225,000 people without power. The cyberattack subverted the SCADA distribution management system used to monitor and control power substations. A marine cybersecurity attack could similarly exploit a ship's monitored distributed control system (DCS) interacting with propulsion engines, a port's automated cranes moving cargo, and other vulnerable systems.

The damage of an attack can affect a company's reputation, its brand, interrupt business, physically injure employees, or have financial and legal consequences. When direct, indirect, and opportunity costs associated with cybercrime (criminal activity conducted on the IT infrastructure) are considered, consultancy Accenture states the average cost to an organization is $13 million. An attack resulting in personnel injury or death could cost more.

In considering risk, company management determines what could go wrong, the likelihood of such events occurring, the impact if they do occur, and actions to mitigate or minimize both the likelihood and the impact to an acceptable level. Unfortunately, there are too many cases where executives have been overconfident or misjudged their ability to mitigate threats. Because cybersecurity not done right causes enormous problems, risk averse and prudent companies typically hire outside cybersecurity experts to validate strategy or help determine a security target state. It is money well spent.

Navigating Human Error

Human error is the leading cause for accidents at sea. Vessel maneuverability factors have a negative effect, but it's not causal … people are mostly at fault. Unfortunately, accidents happen. And, yes, autonomous shipping can reduce the risk of human error. But consider a cyberattack on a vessel's automation system to manipulate navigation, steering, or propulsion systems. The consequences would be grave – ship collisions, groundings, and plausibly instances rendering shipping channels impassable.

Three navigation-critical systems involved autonomous shipping have proven to be vulnerable:

- *Global Navigation Satellite System (GNSS) – provides exact vessel location, but can be manipulated to deceive the crew into changing course;*
- *Electronic Chart Display & Information System (ECDIS) – digital repository charts and routes, but if hacked and fed false information can cause the crew to plot the wrong course;*
- *Automatic Identification System (AIS) – monitors surrounding traffic for collision avoidance, but can be intercepted and fed false vessel information (location, movement or identity).*

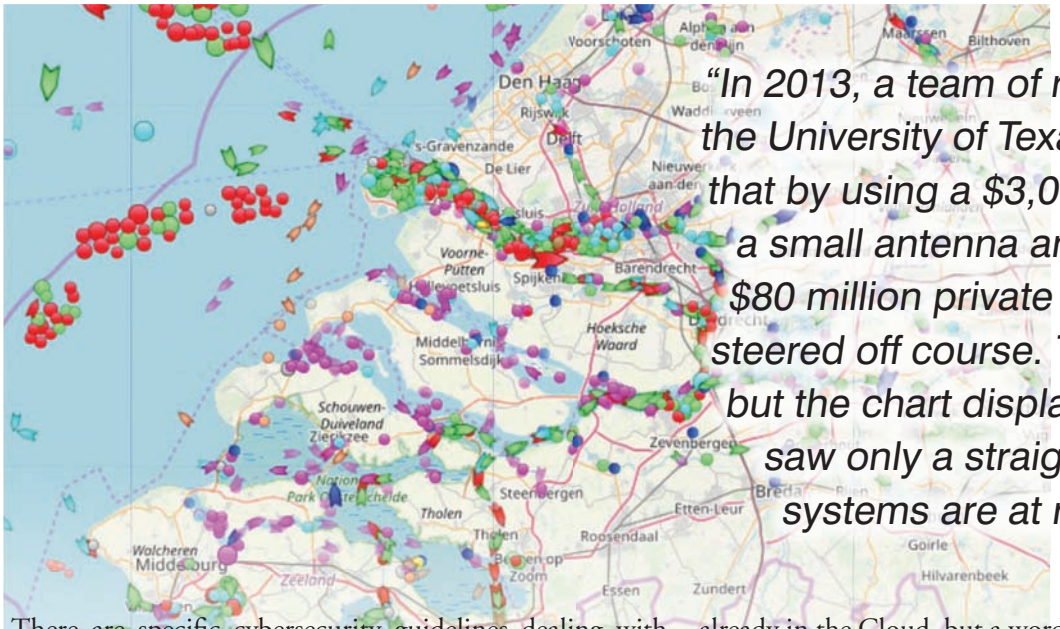
GNSS spoofing has gone main stream. It's used to cheat at Pokemon Go, and dishonest for hire transport providers have used GNSS spoofing to appear nearby awaiting customers while parked at home, miles away. In 2013, a team of researchers from the University of Texas demonstrated that by using a $3,000 GPS spoofer, a small antenna and a laptop, an $80 million private yacht could be steered off course. The ship turned, but the chart display and the crew saw only a straight line.

Other systems are at risk as well. The International Chamber of Shipping lists these exploitable shipboard systems:

- *Cargo management systems used to control cargo and may connect with port terminal systems;*
- *Bridge systems used in navigation and for propulsion maneuvering;*
- *Propulsion and machinery management and power control systems which monitor and control onboard machinery, propulsion and steering;*
- *Access control systems for ship and cargo physical safety, surveillance and alarm systems;*
- *Passenger servicing and management systems which may hold valuable passenger related data;*
- *Passenger facing public networks connected to the internet and used by passengers;*
- *Administrative and crew welfare systems for internet access and email;*
- *Communication systems for internet connectivity via satellite/wireless communication.*

The danger occurs when systems are exposed to uncontrolled networks or have direct connectivity to the internet. Ships create vulnerabilities when they network both their IT systems and operational equipment and then connect both to the internet for shoreside monitoring. A hacker, who penetrates the IT perimeter, has full access to even the most critical onboard systems. Because Operational Technology (OT) interacts with critical and sensitive devices and processes, OT requires special security considerations.

Under no circumstances should OT have direct internet access. This includes systems used for autonomous control.



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There are specific cybersecurity guidelines dealing with OT systems such as NIST 800-82, a security framework for industrial control systems. Unfortunately, maritime companies have a legacy of low cyber awareness and cybersecurity capability. But, even being 'average' in terms of cyber security is not good enough. The danger is too great.

Cybersecurity experts all agree that layered defenses and multiple security defenses within the layers are best practices against intrusions and breaches. While nothing guarantees immunity, significantly lower risk is achievable with Zero Trust, which relies on the concept of 'never trust and always verify a connection.' Zero Trust employs micro-segmentation and granular perimeter enforcement based on users, their locations and other data to determine whether to trust a user, machine or application seeking access. Zero Trust might have minimized, perhaps prevented the well-publicized Maersk event.

The Regulator's Role

Regulators are taking an activist role in cybersecurity. The EU's General Data Protection Regulation (GDPR) gives regulators extra-territorial reach and the ability to levy fines up to 4% of annual global turnover or Euro 20 million – whichever is greater – for any company infringing on the data privacy of EU citizens. The International Maritime Organization, the United Nations agency with responsibility for the safety and security of shipping, is examining how to address autonomous shipping in its regulatory framework. A cyberattack against marine shipping could face the wrath of multiple regulators.

Some marine stakeholders are building cloud-based autonomous shipping platform. Many onshore industries are already in the Cloud, but a word of caution: the migration of applications to the Cloud adds new layers of complexity and threat surfaces.

An insecurely configured AWS Web Application Firewall (WAF) permitted an insider to steal 106 million personal records from a large bank. The devil is truly in the details. In cybersecurity, getting the details right is an absolute.

Cybersecurity is more than just a means for defense. It is a business enabler and reputation booster, enhancing the loyalty and trust of security-minded customers and partners. It can drive new business and be a competitive differentiator if cybersecurity is baked-in, part of the design. Forbes contributor William Saito said it well when he compared cybersecurity to the brakes of the very swift Japanese bullet train, that the brakes permit speed. "The brakes aren't there to act as a drag on the bullet train's performance – they allow it to travel faster than conventional trains because they put the train drivers in control of its speed. To go really fast, you need really good brakes."

Mr. Jeffery Mayger *provides cyber security advisory services at Concord, a consultancy for information technology integration and security services. His cybersecurity background includes Chief Information Security Officer (CISO) for global mining company Sibelco and information security services to upstream oil/gas customers. In addition to his B.S in Mechanical Engineering, Mr. Mayger also holds a Master of Business Administration (MBA) from the University of Texas. His Information Security background includes designations as Certified Information Security Professional (CISSP) and Certified SCADA Security Architect (CSSA). Mr. Mayger can be contacted at jeffery.mayger@concordusa.com.*

Credit: The Sherwin-Williams Company

Copper-Free Antifouling Coating Keeps MSC Moving Full Speed Ahead

USNS Millinocket Application Validates Effective Use on High-Speed Vessels

By Michael Manetta and Mark Schultz

Ensuring that vessels maintain operational efficiency is important to the U.S. Navy's Military Sealift Command (MSC). Actually, it is important to ANY boat operator; big or small. In the service's continuous shipbuilding and maintenance operations, effective biofouling control is a critical aspect of that mission. A recently tested antifouling coating innovation from Sherwin-Williams Protective & Marine Coatings may help the MSC maintain advantages by effectively preventing biofouling organisms from attaching to hulls and thereby hindering vessels' hydrodynamics.

It turns out that speed is especially important for the MSC's Spearhead-class expeditionary fast transport (EPF) vessels, which provide rapid transport of cargo and personnel. Capable of reaching speeds of 35-45 knots, EPFs can carry company-sized units of the U.S. Army and Marine Corps, including equipment and vehicles, and even full infantry battalions.

The USNS Millinocket is the MSC's third Spearhead-class EPF, launched in June 2013. The 338-foot-long EPF is a twin-hull catamaran with four diesel engines, boasting a flight deck for helicopter operations and capable of carrying around 600 tons of troops, vehicles and supplies. To save weight and enhance maneuverability, the topside of the Millinocket isn't painted; instead, the vessel features a corrosion-resistant aluminum exterior finish. However, its underwater hull, waterjet tunnels, generator exhausts and other submerged and splash zone areas require protective coatings to maintain the vessel's integrity. This includes coatings that offer long-term corrosion protection, as well as antifouling coatings, which prevent sea life such as algae, barnacles and mollusks from attaching to the vessel.

Ablative antifouling coatings are designed to release biocides over time to prevent marine biofouling settlement and growth. By minimizing this attachment, the coatings help to keep vessel hulls smooth and enable greater fuel efficiency. When evaluating underwater hull coatings for the Millinocket, MSC opted to test Sherwin-Williams' SeaVoyage Copper-Free Antifouling Paint to ensure the biocide would deliver the expected performance on the high-speed EPF vessel. Following drydocking maintenance after nearly four years at sea, MSC has verified the coating's performance on the Millinocket and confirmed its suitability for other vessels of this class.

High Expectations for Coatings

The unique characteristics of EPFs – their aluminum exterior finishes and high-speed, shallow-draft performance – require specific maintenance techniques and products. In 2015, MSC wanted to test newer copper-free ablative coatings to ensure they would offer improved durability and a lengthy service life, particularly on high-speed vessels. The desired coating needed to be suitable for aluminum-hulled vessels like the Millinocket and other Spearhead-class EPFs. The key advantage of a copper-free coating on an aluminum hull is that it eliminates the risk of galvanic corrosion, which occurs between copper and aluminum. When copper contacts aluminum, the aluminum corrodes preferentially to protect the copper; a copper-free antifoulant avoids this reaction on an aluminum hull and provides a more durable long-term solution.

MSC sought to determine whether copper-free ablatives would maintain the vessel's underwater hull more reliably in a smooth, fuel-efficient condition, with less dependence on cleaning the vessel while at sea. When the Millinocket underwent drydock maintenance in early 2019, MSC verified that Sherwin-Williams' SeaVoyage Copper Free met the expectations for the Millinocket's requirements.

Proactive Removal of Copper from Antifouling Coatings

When the International Maritime Organization (IMO) first instituted a ban on coatings containing tributyltin (TBT) due to its adverse effects on marine life, the U.S. Navy proactively anticipated the need for an antifouling coating that was entirely free of copper, which was a common biocide alternative to TBT. As a result, Sherwin-Williams developed SeaVoyage Copper Free in 2008 as a solvent-based, copper- and tin-free ablative coating that protects against both soft and hard fouling. Its unique technology includes organic biocides that are non-persistent in the environment, while the coating's low level of volatile organic compounds (VOCs) ensures compliance with stringent environmental regulations.

The copper-free coating provides an immediate environmental benefit: when coatings containing TBT or copper are polished, the metals leach off in the port and may adversely affect marine life. The biocides in the SeaVoyage Copper Free coating do not present similar environmental threats, while still protecting against a broad spectrum of fouling organisms. They simply degrade into non-toxic components in 24 hours in seawater, making the coating useful for regions where maintaining water quality is a high priority.

Sherwin-Williams qualified SeaVoyage Copper Free to the U.S. Navy MIL-PRF-24647 Type I performance specification as a copper-free antifoulant in October 2008 for a three-year life cycle. After further testing, the company also qualified the coating for use on high-speed vessels that travel in excess of 40 knots, as well as increased its expected performance cycle to seven years. Another benefit of this technology is the coating's lower weight, which is two-thirds the weight of traditional copper-based antifoulants. This lower weight provides improved fuel efficiencies for the Millinocket beyond what the coating already delivers with its antifouling performance.

Total Protection Delivered

The USNS Millinocket entered a shipyard for drydock maintenance in January 2019. The shipyard and MSC inspected the vessel's underwater hull areas for damage, and the vessel was approved for minor spot repairs, followed by touchup coats of protective and antifoulant coatings and a full cosmetic antifouling coat on the underwater areas. Over the course of four weeks, crews applied a variety of Sherwin-Williams coatings.

The primary epoxy anticorrosive coating applicators used on the underwater hull of the Millinocket was SeaGuard 5000HS Epoxy. The coating is a high-performance, high-solids, low-VOC epoxy with outstanding adhesion. It's qualified to MIL-PRF-24647 for use on underwater hulls and designed to support anticorrosive systems in marine applications. The coating is typically applied in two coats to ensure full corrosion protection. In addition to the underwater hull, applicators used the epoxy on the vessel's sea chest strainers, pump room strainers, waterjet tunnels, engine exhausts and ride control fins.

For added durability in the high-wear areas of the Millinocket's four waterjet tunnels, MSC selected Nova-Plate UHS Epoxy, an ultra-high-solids epoxy novolac amine developed for immersion service. The coating offers superior protection compared to conventional epoxies, based on the coating's advanced high-build, edge-retentive properties. Applicators first applied Nova-Plate UHS Epoxy to the waterjet exhaust areas, followed by the anticorrosive SeaGuard 5000HS Epoxy and the antifouling coating.

As the final restoration steps, applicators applied SeaVoyage Copper Free to the vessel's entire submerged and splash zone areas, including the underwater hull, sea chest strainers, pump room strainers, waterjet tunnels, transom plate, engine exhausts and ride control fins.

A Win-Win Solution

The SeaVoyage Copper Free Antifouling Paint checked all the boxes for MSC. The coating's low weight and effective antifouling capabilities preserved the performance of the critical transport vessel, while also delivering durable performance for a seven-year drydock interval. SeaVoyage Copper Free also provided substantial environmental benefits due to its copper- and tin-free formulation.

The MSC's need for speed doesn't just apply to its maneuvers at sea. Sherwin-Williams Protective & Marine Coatings supported a tight timeline, enabling the USNS Millinocket to return to service quickly and freeing up the shipyard for other assignments. Offering expertise related to specifications, delivery and coating services, Sherwin-Williams helped MSC meet its turnaround goals. As the Millinocket continues its mission of transporting critical personnel and equipment around the globe, it does so with confidence in the quality and durability of its underwater coatings.

Michael Manetta *is Global Market Director – Rail, Marine and Power Generation for Sherwin-Williams Protective & Marine Coatings. He has 15 years of experience in the coatings industry with several sales and marketing roles within multiple end use segments. He is a NACE Coatings Inspector Program (CIP) level III inspector. He can be reached at michael.manetta@sherwin.com.*

Mark Schultz *is Government Marine Project Development Manager for Sherwin-Williams Protective & Marine Coatings. He has 25 years of experience in the protective and marine coatings industry. He is an SSPC Protective Coatings Specialist, a NACE Course Instructor for Coatings Inspector Program (CIP) Level I and Level II, and a NACE Certified Coatings Inspector Level III. He can be reached at mark.a.schultz@sherwin.com.*

"Minor" Incident Sends Mariner Down S&R Rabbit Hole

By Randy O'Neill


O'Neill

It was early afternoon on a late summer day in a busy commercial and fishing port in coastal New England. The captain of an offshore supply vessel was returning to his company's dock and was lining up to transit past the harbor's fixed storm mitigation gate when he decided to 'bail out' on his approach because the tide was ebbing and the outbound current of approximately two knots was offsetting his vessel to the east. No stranger to these waters, having made the same passage dozens of times previously, he turned around and started his approach again.

As the OSV was just clearing the gate on the east side, it encountered a strong current to the east. As the vessel's bow started to fall off, the captain took corrective action to counteract the unexpected current. Unfortunately, the current intensified further and the OSV's starboard bow allided with the fixed gate's concrete base. While the vessel's fenders absorbed most of the impact, the OSV received damage to the starboard bow, the port aft stern, and the gate structure itself, which received minor damage to its concrete base.

The Investigation

Wisely, the captain promptly notified the Coast Guard and his company of the incident. He also contacted his license insurer which immediately assigned him a local maritime attorney to counsel him and help him prepare and submit a marine casualty report (2692). And then, of course, he went with his first mate to take a post-casualty drug test. Concurrently, the local harbor patrol inspected the allision site, visited the OSV's dock and, ultimately, completed its own report of the incident.

The Coast Guard investigation of the incident was assigned to the closest MSO which was located in a neighboring state. Upon completing its investigation the New England-based MSO forwarded the report to her counterpart in the southeast state where the vessel's captain had subsequently returned to his primary residence.

A little more than two months later, the MSO who received the investigative file and recommendations from the USCG's New England office informed the captain that it had initiated an administrative proceeding against his credentials/license and instructed him to attend a 'meeting' with the USCG office in his hometown.

The Hammer Comes Down

The captain's license insurer promptly assigned its policyholder with a second local maritime attorney from its nationwide network. The new attorney was instructed to contact the New England attorney originally assigned to the license-insured mariner to discuss the particulars of the incident and to access his notes related to the incident in order to properly prepare for the meeting with the Coast Guard.

Surprisingly, when the captain and his attorney reported to the meeting expecting to provide an oral statement regarding the now two-month-old incident, he was served with an official Complaint charging Negligence, proposing a six-month outright license suspension. Cited was the presumption of negligence of the captain for the allision with a fixed object [as described by 46 U.S.C. & 7703(1)(B) and defined by 46 CFR & 5.29]. The Coast Guard also proposed a Settlement Agreement to preclude proceeding to an Administrative Court trial. The offer was for the captain to either surrender his license voluntarily for a three-month outright license suspension, or to surrender it for a two-month outright license suspension, accompanied by his satisfactory completion of a bridge management resources (BRM) course.

The shaken mariner was given 21 days to make his decision on how he would prefer to proceed.

While the captain's new local attorney was familiar with and had a good working relationship with the Commanding Officer (CO) of the Southeastern port city's USCG Prevention Department, he suspected the chances were slight that the CO would be able to resolve an issue driven by recommendations made by the Prevention Department in New England which had conducted the onsite investigation of the incident and prepared the file upon which the negligence charge and settlement options were based.

His suspicions were quickly confirmed when the USCG officer in New England informed that she would not consider any mitigation of the sanctions sought either to a

"As the OSV was just clearing the gate on the east side, it encountered a strong current to the east. As the vessel's bow started to fall off, the captain took corrective action to counteract the unexpected current. Unfortunately, the current intensified further and the OSV's starboard bow allided with the fixed gate's concrete base."

probationary suspension or Letter of Warning (LOW). She further explained that she could not change her sanction recommendations because the Complaint was already on record and both it and the proposed sanction had been approved by her superior.

She also mentioned the USCG was concerned about a prior non-work-related DUI on the captain's record, particularly because he did not report for his post-casualty alcohol screening until 24 hours after the allision incident. Coast Guard regulations provide for a stricter sanction if a charged mariner has had a 'prior'.

A Hobson's Choice

While deciding how best to proceed, the two maritime attorneys working the case considered answering the Complaint and requesting a meeting with the attorney from the National Maritime Center (NMC) assigned to the case … provided the captain was onboard with that approach. They also discussed contacting eyewitnesses to the incident and expert witnesses with knowledge of the tide conditions at the allision site in the event that the case wound up in an Administrative Law courtroom for trial.

With the captain's consent, the decision was made for the local attorney to Answer the Complaint and Negligence charge, informing the USCG that the captain/respondent chose to proceed to trial but, because of the need to prepare his client, witnesses and expert for same, he would also need to conduct discovery regarding the matter prior to the hearing. As a result, the Coast Guard rescheduled the pre-hearing conference 30 days later than its original date.

At that meeting, a full five months after the allision, a Scheduling Order was proposed as expected, but what was not expected was the attorney for the Coast Guard making an 'ore tenus' motion to transfer venue back to New England. The captain's southeast-based attorney vigorously opposed the motion, arguing that it would be unfair to the captain (and his insurer) to incur the financial and logistical burdens of changing counsel (again) and traveling to New England for the hearing. The Court advised that it would take the venue transfer request under advisement and instructed the Coast Guard to submit a written motion for same.

Less than a month after that meeting, the Court conducted a telephone hearing on the motion to transfer venue and denied the USCG's request. More importantly, the Coast Guard reiterated its position regarding sanction, minimally demanding a two-month outright license suspension with the satisfactory completion of a bridge management resources course.

Concluding with his attorneys that that offer was likely the best option available to him and expressing a strong desire to put the whole issue behind him, he decided to accept the Settlement Offer as proposed: "if the Respondent fails to satisfactorily complete the suspension period two months hence, then the Respondent's Credentials will be suspended outright for three months," or "if the Respondent successfully completes the conditions to the satisfaction of the U.S. Coast Guard, then the Respondent's Credentials will be suspended outright for two months."

Tangential Issues

Fully supported by his then (and current) employer throughout the six-month ordeal, the OSV captain endured a series of regulatory enforcement, prior history and venue squabbles that truly tested his and his attorneys' patience and resolve. In the end, while a probationary suspension would have been preferred given the facts of the relatively minor allision incident, the licensed-insured mariner was at least spared the over $32,000 six-month cost of his legal representation which was fully paid by his license insurance policy.

Once again proving that, while the twists and turns of any marine casualty investigation and prosecution can indeed be very unpredictable, what is predictable is the potentially crushing cost to defend your license, livelihood and professional reputation without the benefit of your own counsel provided by a time-tested license insurance policy.

Randy O'Neill *is Senior Vice President with Lancer Insurance Company and has been Manager of its MOPS Marine License Insurance division since 1984. Over the past 29 years, Mr. O'Neill has spoken and written on many occasions on the importance of USCG license protection. He is a regular contributor to* ***MarineNews*** *magazine and the opinions expressed in this article are his alone. He can reached at:* ***roneill@lancerinsurance.com***

MIT's Autonomous Boats Can Shapeshift

New capabilities allow "roboats" to change configurations to form pop-up bridges, stages, and other structures.

Credit:MIT

MIT's fleet of robotic boats has been updated with new capabilities to "shapeshift," by autonomously disconnecting and reassembling into a variety of configurations, to form floating structures in Amsterdam's many canals.

The autonomous boats – rectangular hulls equipped with sensors, thrusters, microcontrollers, GPS modules, cameras, and other hardware – are being developed as part of the ongoing "Roboat" project between MIT and the Amsterdam Institute for Advanced Metropolitan Solutions (AMS Institute). In the future, Amsterdam wants the roboats to cruise its 165 winding canals, transporting goods and people, collecting trash, or self-assembling into "pop-up" platforms – such as bridges and stages – to help relieve congestion on the city's busy streets.

In 2016, MIT researchers tested a roboat prototype that could move forward, backward, and laterally along a preprogrammed path in the canals. Last year, researchers designed low-cost, 3D-printed, one-quarter scale versions of the boats, which were more efficient and agile, and came equipped with advanced trajectory-tracking algorithms. In June, they created an autonomous latching mechanism that let the boats target and clasp onto each other, and keep trying if they fail.

In a new paper presented at the last week's IEEE International Symposium on Multi-Robot and Multi-Agent Systems, the researchers describe an algorithm that enables the roboats to smoothly reshape themselves as efficiently as possible. The algorithm handles all the planning and tracking that enables groups of roboat units to unlatch from one another in one set configuration, travel a collision-free path, and reattach to their appropriate spot on the new set configuration.

In demonstrations in an MIT pool and in computer simulations, groups of linked roboat units rearranged themselves from straight lines or squares into other configurations, such as rectangles and "L" shapes. The experimental transformations only took a few minutes. More complex shapeshifts may take longer, depending on the number of moving units – which could be dozens – and differences between the two shapes.

Collision-Free Trajectories

For their work, the researchers had to tackle challenges with autonomous planning, tracking, and connecting

MIT's fleet of robotic boats has been updated with new capabilities to "shapeshift," by autonomously disconnecting and reassembling into different configurations to form various floating platforms in the canals of Amsterdam. In experiments in a pool, the boats rearranged themselves from a connected straight line into an "L" and other shapes.

groups of roboat units. Giving each unit unique capabilities to, for instance, locate each other, agree on how to break apart and reform, and then move around freely, would require complex communication and control techniques that could make movement inefficient and slow.

To enable smoother operations, the researchers developed two types of units: coordinators and workers. One or more workers connect to one coordinator to form a single entity, called a "connected-vessel platform" (CVP). All coordinator and worker units have four propellers, a wireless-enabled microcontroller, and several automated latching mechanisms and sensing systems that enable them to link together.

Coordinators, however, also come equipped with GPS for navigation, and an inertial measurement unit (IMU), which computes localization, pose, and velocity. Workers only have actuators that help the CVP steer along a path. Each coordinator is aware of and can wirelessly communicate with all connected workers. Structures comprise multiple CVPs, and individual CVPs can latch onto one another to form a larger entity.

During shapeshifting, all connected CVPs in a structure compare the geometric differences between its initial shape and new shape. Then, each CVP determines if it stays in the same spot and if it needs to move. Each moving CVP is then assigned a time to disassemble and a new position in the new shape.

Each CVP uses a custom trajectory-planning technique to compute a way to reach its target position without interruption, while optimizing the route for speed. To do so, each CVP precomputes all collision-free regions around the moving CVP as it rotates and moves away from a stationary one.

After precomputing those collision-free regions, the CVP then finds the shortest trajectory to its final destination, which still keeps it from hitting the stationary unit. Notably, optimization techniques are used to make the whole trajectory-planning process very efficient, with the precomputation taking little more than 100 milliseconds to find and refine safe paths. Using data from the GPS and IMU, the coordinator then estimates its pose and velocity at its center of mass, and wirelessly controls all the propellers of each unit and moves into the target location.

In their experiments, the researchers tested three-unit CVPs, consisting of one coordinator and two workers, in several different shapeshifting scenarios. Each scenario involved one CVP unlatching from the initial shape and moving and relatching to a target spot around a second CVP.

Three CVPs, for instance, rearranged themselves from a connected straight line – where they were latched together at their sides – into a straight line connected at front and back, as well as an "L." In computer simulations, up to 12 roboat units rearranged themselves from, say, a rectangle into a square or from a solid square into a Z-like shape.

Scaling Up

Experiments were conducted on quarter-sized roboat units, which measure about 1 meter long and half a meter wide. But the researchers believe their trajectory-planning algorithm will scale well in controlling full-sized units, which will measure about 4 meters long and 2 meters wide.

In about a year, the researchers plan to use the roboats to form into a dynamic "bridge" across a 60-meter canal between the NEMO Science Museum in Amsterdam's city center and an area that's under development. The project, called RoundAround, will employ roboats to sail in a continuous circle across the canal, picking up and dropping off passengers at docks and stopping or rerouting when they detect anything in the way. Currently, walking around that waterway takes about 10 minutes, but the bridge can cut that time to around two minutes.

If successful, the effort would culminate in the world's first bridge comprised of a fleet of autonomous boats. The bridge would eliminate the need for a much more expensive permanent structure, connecting two sides of canal [by using] autonomous boats that become dynamic, responsive architecture that float on the water.

To reach that goal, the researchers are further developing the roboats to ensure they can safely hold people, and are robust to all weather conditions, such as heavy rain. They're also making sure the roboats can effectively connect to the sides of the canals, which can vary greatly in structure and design. ***Source: Rob Matheson, MIT News Office***

RALAMANDER 1600

UNCREWED RAPID RESPONSE FIRE FIGHTING FOR MODERN PORTS

Credit: RAL

Explosion and toxic smoke risks from container and petrochemical fires in ports can threaten lives and shut down port operations. Rapid response, close-in firefighting capability is critical to managing these threats. A new 16 meter uncrewed fire-fighting vessel in the Robert Allan Ltd. RALamander series is designed to attack fires quickly & powerfully in busy ports without risking crews.

With high speed capability and pumping capacity rivaling larger fireboats, RALamander 1600 can be brought into action quickly with water and foam to suppress a fire and establish a defensive line while fire crews remain safely outside the danger zone. Like its larger RALamander 2000 cousin, it can be operated from another vessel of opportunity or from a shore-based position. Sophisticated automatic piloting and station-keeping features leave the operator free to focus on fire-fighting. Without crew on board, RALamander can be positioned closer to a fire than possible with conventional fire boats, not only to combat the fire effectively but also to relay video and thermal imaging information on the fire origin to incident commanders in real time.

A helm station on board makes it possible to drive RALamander 1600 to an incident under direct manual control in busy waterways. Once on scene, the operator can transfer to shore or another vessel to conduct remote operations using a portable controller or shore-based console. This versatility means that RALamander 1600 can be operated in different ways to respond effectively to the port fire emergency. If necessary, control can be switched between multiple operators with different vantage points on the incident.

With self-rescue arrangements on both sides, RALamander 1600 can be sent into dangerous situations to serve as a life raft where an explosive or toxic environment prevents conventional rescue craft from reaching people in the water. With waterjet propulsion, there is no exposed propeller to harm people or marine life. The twin jet arrangement gives precise steering control and side-stepping capability.

For those responsible for port safety, RALamander 1600 is a versatile and cost-effective solution for scaling up fire fighting capability and reducing response time. The experience of present port fire-fighting crews can be brought to bear in directing operations with less risk to personal safety. RALamander 1600 can work alongside other fire-fighting vessels or can be operated on its own. With a long track record of customized fireboat designs to suit client requirements, Robert Allan Ltd. will also tailor fire fighting equipment, powering systems, sensors and control systems of the RALamander 1600 platform to best meet the specific emergency response requirements of the port.

Remote controlled response vessels aren't coming – they're already here, tackling the three D's of Dull, Dirty and Dangerous tasks.

Lake Assault River Rescue Vessel for Pittsburgh

The City of Pittsburgh River Rescue Unit has selected Lake Assault Boats to construct a 30-foot EMS river rescue vessel. The craft's primary mission is to perform rescues in response to water emergencies, administer advanced life support (ALS) services, assist firefighting operations, and provide security for the nation's second largest inland port. The craft will be delivered in fall 2019. The boat's Catamaran style hull is engineered for enhanced stability and maneuverability, and it is powered by two state-of-the-art Yamaha 425 hp outboard engines for maximum response time. Slow speed maneuvering is controlled by Yamaha's Helm Master joystick steering and digital anchoring system. The vessel features a 74" hydraulically operated bow door, a heated front deck, dive step cutouts; and it can deploy a SWAT team and its equipment, including an ATV vehicle. Its 10-foot long, fully enclosed pilothouse has an 80-inch interior clearance height, with ample room to treat patients in space protected from the elements.

C&C Marine and Repair Celebrates a Milestone

Just nine months after opening their Robotic Paint and Blasting facility, C&C Marine and Repair has blasted its 100th barge. The 83,350 square foot facility can accommodate barges up to 320'x75' and has the capability to blast and paint a standard 30,000 Barrel Tank Barge or two 10,000 Barrel Tank Barges in 7 to 10 days. The fully enclosed, climate-controlled facility allows for uninterrupted 24/7/365 operations. As a result of the speed and efficiency of the fully-automated robotic blasting system, the time to blast two standard inland hopper barges takes 36 hours. Re-usable steel grit blast medium, used in lieu of disposable single-use medium coal slag, provides a much cleaner

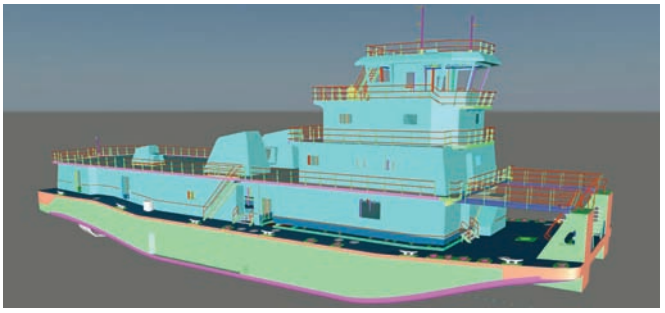
blast finish. This results in an exceptional surface profile for improved paint adhesion to steel, and ultimately results in fewer required paint jobs during the life of the barge.

Robert Allan Ltd., MTU Team Up on LNG Fueled Pushboat

Robert Allan Ltd. and MTU have developed the first natural gas fueled shallow draft pushboat design – the RApide 2800-G pushboat. This challenging project is based upon the proven shallow draft RApide 2800-Z2 pushboat that currently operates on the Amazon River. The design was modified to suit a complete LNG propulsion system with two 746 kW MTU 8V4000M55R-N Tier III gas safe main engines. Additional to the engines, MTU also acts as the system integrator, which means that MTU will also provide the complete LNG tank system and an integrated ship monitoring, LNG control and safety systems. The project complies with the rules for the gas system hazardous zones of a compact 28 meter tug. To ensure redundancy there are two independent tank connection spaces attached to the LNG tank, one for each engine.

Class: DNV-GL	Beam, moulded: 10.5 meters	Draft, maximum: 2.5 meters
LOA: 28.0 meters	Depth, mould: 3.2 meters	LNG Capacity (gross): 70.0 cubic meters

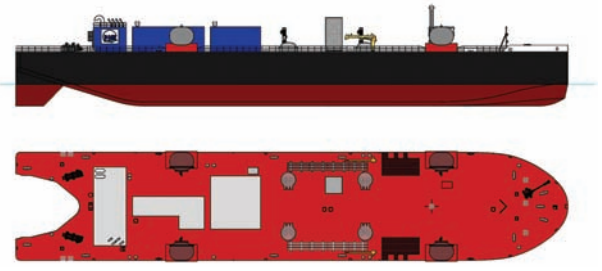
Conrad Starts Production on Second 6000 HP Towboat



Conrad Shipyard of Morgan City has started production on a second 6000HP Inland Towboat designed by MiNO Marine of New Orleans. The 166-foot long Subchapter M compliant vessel is powered by Tier IV compliant engines. Conrad has orders from two customers for the vessels. Conrad worked closely with MiNO Marine, who developed the design based on regulatory requirements and current market demands. The vessel has an optimized hull form for improved performance, and the design is intended to be flexible to accommodate different propulsion drive-trains. The vessels currently under construction each utilize different engines; one equipped with GE engines, and the other with EMD engines.

NorthStar Midstream to Form LNG Marine Transportation Company

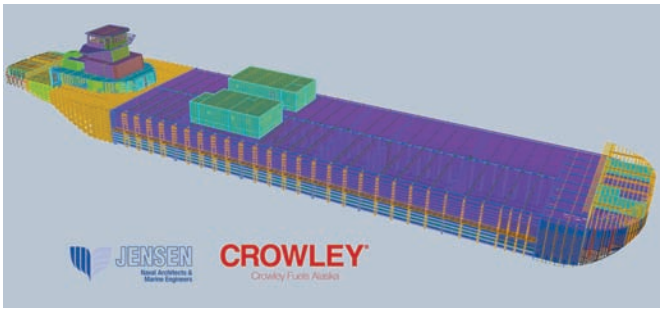
NorthStar Midstream announced the formation of Polaris New Energy (PNE), a new firm focused on the transportation and distribution of LNG in domestic coastal and inland waterways. NorthStar has executed an agreement with Fincantieri Bay Shipbuilding to build a barge, with the ability to potentially construct two sister barges, for coastwise transportation of LNG. Utilizing a suitable tugboat, the barge will operate as an articulated tug and barge unit that will initially run along the East Coast of the United States providing LNG bunkering solutions to NorthStar's customers. PNE will be sourcing LNG from



JAX LNG, a new state-of-the-art LNG production facility in Jacksonville, Florida created through a partnership between NorthStar and Pivotal LNG.

LOA: 340 feet	Cargo handling system: Wartsila	Depth: 32 feet – 10 inches
Beam: 66 feet	Cargo Capacity: 5,400 cubic meters	Class: ABS

Crowley Plans New ATB for Enhanced Western AK Services



Crowley Fuels has signed construction contracts to build an articulated tug-barge (ATB) that is specifically designed to serve the Western Alaska market with delivery of clean fuel products. The 410-foot ATB will have enhanced features for the demanding conditions of Western Alaska, an area that has a short open-water season and river terminals with limited water depths. The tug will be constructed by Master Boat Builders of Bayou La Batre, Alabama. The barge will be built by Gunderson Marine LLC in Portland, Oregon. The ATB is expected to be delivered in January 2021. The ATB will meet ABS Ice Class and IMO Polar Code requirements. Additionally, the ATB will feature the capability to perform nearshore ship-to-ship cargo transfers. To provide off-ship firefighting capabilities to the barge, the tug is equipped with a fire monitor and foam proportioner.

Engines: (2) GE 6L250 Tier IV	Designer: Jensen Maritime	Barge Capacity: 55,000 barrels
Barge LOA: 350'	Coupler system: Intercon C-series	Spill Gear: 2,000 feet of boom


USMMA Advisory Board

Chao Marcus Fitzgerald Cedeno


Frostad


Pickel


Toomy


King

U.S. DOT Secretary Names USMMA Advisory Board

U.S. Transportation Secretary **Elaine L. Chao** announced the appointment of seven new members to the United States Merchant Marine Academy (USMMA) Advisory Board. The USMMA Advisory Board serves as an independent body that examines the course of instruction and management of the Academy and other similar functions. Advisory Board members must be distinguished in education, industry and other fields related to the Academy's mission. The seven USMMA Advisory Board members must include a recent USMMA graduate. The new members include **Dr. Henry Marcus**, Chair (Professor Emeritus, MIT, **Dr. Martha Grabowski**, KP '79 (Professor, RPI and Le Moyne College), **John Noonan**, KP '78 (President and CEO, Binnacle Maritime LLC), **Brian Starer**, Esq. KP '67 (Senior Partner, Squire, Patton Boggs), **Benjamin Inouye** KP '10 (Manager, MAN Diesel and Turbo), **Allison Cedeno**, KP '08 (Founder and CEO, Women Offshore LLC) and **Raymond Fitzgerald** (President and CEO, Wallenius Wilhelmsen Solutions).

Navico Appoints Frostad President and CEO

Navico, parent company to the Lowrance, Simrad, B&G and C-MAP brands announced that it has appointed **Knut Frostad** as President and Chief Executive Officer – assuming the role of outgoing chief executive, **Leif Ottosson**. Knut Frostad's day-to-day leadership of Navico will begin immediately.

AIWA Prepares for 20th Anniversary Annual Meeting

Brad Pickel, Executive Director of the Atlantic Intracoastal Waterway Association (AIWA) announced the opening of online registration for the AIWA's 20th Anniversary Annual Meeting in Savannah, GA on November 21-22, 2019. The meeting will be at The DeSoto Hotel and will include a celebration of 20 years as the Unified Voice for the Atlantic Intracoastal Waterway (AIWW). The conference website can be found at https://atlanticintracoastal.org/annual-meeting

Toomy appointed to Board of Commissioners of Port of New Orleans

Gov. John Bel Edwards has reappointed **Joseph F. Toomy** to the Board of Commissioners of the Port of New Orleans. Toomy will serve a five-year term succeeding **Laney J. Chouest** as one of two Jefferson Parish representatives on the regional board. He previously served on the Board of Commissioners from 2009 to 2014 and served as chairman in 2013. Toomy represented Dist. 85 in the Louisiana State Legislature from 1984 until 2008 and earned his Bachelor's degree in economics and a Master of Business Administration from Tulane University.

EBDG Appoints King as President

Elliott Bay Design Group (EBDG) has appointed **Brian King** as President, Chief Engineer. Brian will have direct supervision of the business and affairs of the company. He will be responsible for advancing EBDG's major strategic objectives while leading the team on planning, business management, engineering, personnel development and sales. Since joining the company in 1988, Brian has worked with EBDG's clients, serving as Principal, Project Manager, Chief Engineer and Project Engineer. King is a licensed Professional Engineer (PE) and received his BS in Marine Engineering from the US Merchant Marine Academy. He is a licensed Chief Engineer with the United States Coast Guard.

Pacific Green Announces Carmichael's Retirement, Names New CEO

Pacific Green Technologies has appointed **Scott Poulter**, its current Executive Director, as its new Chief Executive. **Dr. Neil Carmichael** has retired from the Chief Executive position and will be taking on the role of non-executive Director where he will assist in mentoring the group's management. Pacific Green Technologies is an exhaust gas scrubber manufacturer. The firm's order book exceeds $200m for marine scrubbing systems and recently announced a major order of 103 systems.

DNV GL Launches Renewables Certification Ops

DNV GL has established a Renewables Certification office in the United States to meet the growing demands


Poulter


Maloney & Mørk


Port of Oakland

Butner Wan


ILAMA

Klaverstijn Parslow


Baczkowski


Johnson

for certification services for the nascent offshore wind industry. DNV GL selected its Medford, Mass. office as base for its U.S. Renewables Certification group, given its proximity to both Boston and New York City. The U.S. operations will be managed by **David Maloney**, who first served as Certified Verification Agent (CVA) on the Cape Wind Project in 2012. "By establishing a presence for Renewables Certification in the U.S., DNV GL can be more responsive to the localized needs of the industry as it grows while drawing upon our thirty years of experience in offshore wind globally," said **Kim Mørk**, EVP, Renewables Certification at DNV GL Energy.

Port of Oakland gives Butner Third Term

Cestra "Ces" Butner will serve a third term as President of the Port of Oakland Board of Port Commissioners. The Board re-elected President Butner and **Andreas Cluver** as First Vice President and chose first-year Commissioner **Barbara Leslie** as Second Vice President. At the same meeting, Commissioners formally selected Port Attorney **Danny Wan** as Acting Executive Director. Both Butner and Wan first joined the Board in 2012. Wan is a former member of the Oakland City Council.

New ILAMA Chair and Vice-Chair to Tackle Safety Challenges

The International Lifesaving Appliance Manufacturers' Association (ILAMA) appointed **Harry Klaverstijn** and **Dave Parslow** as its new chair and vice-chair respectively. Together, they bring over 70 years of experience and expertise in the marine and offshore safety industries to their roles. Klaverstijn has represented Palfinger Marine in ILAMA since 1998. Parslow represents Survitec Zodiac at ILAMA and has acquired many years of experience in the design and manufacture of Rigid Inflatable Boats, liferafts, rescue boats and escape systems.

VT Halter Marine Wins $2.9M U.S. Navy Program Study

VT Halter Marine has won a contract worth nearly $2.9 million by the Naval Sea Systems Command. VT Halter Marine was one of four U.S.-based companies awarded a contract under the Common Hull Auxiliary Mission Platform – called CHAMP. In 2018, the Navy implemented the CHAMP study to find a replacement for several types of auxiliary ships that are rapidly approaching the ends of their service lives – hospital ships, command and control ships, submarine tender and aviation logistics ships, and sealift ships." We are extremely honored to receive this newest Navy award and appreciate the confidence that the U.S. Navy shows toward VT Halter Marine," said **Ronald Baczkowski**, Chief Executive Officer of VT Halter Marine.

Sea Machines Demonstrates First Autonomous Spill-Response Vessel's Capabilities

As a part of its cooperative agreement with the U.S. Department of Transportation Maritime Administration (MARAD), Boston-based Sea Machines Robotics last month demonstrated its autonomous systems in action on board a Kvichak Marco skimmer boat during events held along the Portland harbor. Sea Machines' technology opens a new era of capability for the marine industry, and today the company demonstrated its ability to increase the safety, productivity and predictability of response for marine oil-spill operations. The on-water demonstrations took place aboard the world's first autonomous spill response vessel, owned by Marine Spill Response Corp. (MSRC), before a live audience of MARAD, government, and other industry stakeholders. "Our operation of the world's first autonomous, remote-commanded spill-response vessel is yet another significant industry first for Sea Machines," said **Michael G. Johnson**, founder and CEO, Sea Machines.

The Carlyle Group, Stellex Capital Management to Acquire, Merge Vigor, MHI Holdings

The Carlyle Group and private equity firm Stellex Capital Management announced an agreement to acquire and merge Vigor Industrial LLC and


Foti


Petters


deBruyne


Buzby

MHI Holdings LLC. The combined company will create a bicoastal leader in critical ship repair services and commercial and defense-related fabrication services. Key customers include the U.S. Navy, U.S. Coast Guard, Military Sealift Command, Boeing, cruise lines, fishing fleets, barges and ferry services for local and state governments, and other key commercial and defense customers. The transaction, subject to customary closing conditions is expected to close by the end of the third quarter 2019. Financial terms were not disclosed. **Frank Foti**, President and CEO of Vigor, said, "Through this transaction, Vigor gains responsible, forward-thinking investors who will seek to build on our current platform while maintaining a values-driven culture."

Bludworth Marine Relocates HQ to Galveston

Bludworth Marine, LLC has relocated their corporate headquarters to Galveston, Texas. The new location, at 320 77th Street, is minutes from the Bludworth Marine 100' x 300' graving dock location and the Port of Galveston Pier 38 dockside location. This proximity will allow quicker response and service to the continually increasing marine repair service business in Galveston and surrounding areas. The new 3.5-acre site location also includes a 75' x 150' high bay fabrication shop with a 10-ton overhead crane, a complete machine shop, full blast and paint building, a carpenter's work shop, and outside machinist shops for rotating equipment and pump repairs.

HII Awards 178 Scholarships for the 2019-2020 School Year

Huntington Ingalls Industries announced that the HII Scholarship Fund has awarded 89 scholarships for the 2019-2020 school year. Additionally, the fund renewed 89 previously active scholarships. The HII Scholarship Fund was formed to provide financial assistance to qualified, selected dependent children of HII employees who are pursuing a post-secondary college or technical/vocation degree and to dependent children who are enrolled in quality pre-kindergarten school readiness programs. For the fourth year in a row, HII President and CEO **Mike Petters** declined all but $1 of his annual salary to fund the program that has helped provide educational opportunities to 362 children of employees across the HII enterprise.

Helm Operations announces tie up with the ACTion group

Helm Operations and the ACTion group have signed a new partnership agreement to help inland marine companies address the challenges of SubM and implement new software to reduce the costs of compliance. The ACTion group will begin offering safety management services via Helm CONNECT and provide consulting and training to companies moving to the industry standard platform. "The ACTion group has been at the forefront of the industry for 20 years, and it's fantastic to be able to work alongside them to help support our industry as it moves forward." says Helm Operations CEO and founder **Ron deBruyne**.

Marad Announces $19 Million in Small Shipyard Grants

The U.S. Department of Transportation's Maritime Administration (MARAD) announced $19.6 million in grants to support capital improvements at 28 U.S. small shipyards as a part of its Small Shipyard Grant program. Provided through MARAD's Small Shipyard Grant program, the funding supports employee training and related improvements that foster increased efficiency and economic growth. "Small shipyards are an irreplaceable aspect of America's shipbuilding industry," said Maritime Administrator **Mark. H. Buzby**. "They are a key component to national security and our economic viability as a whole; providing good jobs for hardworking Americans." A complete list of the latest grant recipients includes All American Marine, Biblia, Inc., Detyens Shipyards, East Coast Repair & Fabrication, LLC, Eastern Shipbuilding Group, Heartland Fabrication, Hughes Bros., J. Goodison Company, JAG Alaska, Inc. Seward Shipyard, LaShip, Marinette Marine Corporation, MBLH Marine LLC dba Vessel Re-

Fusion Marine Technology


Volvo Penta


Ed Watkins Marine

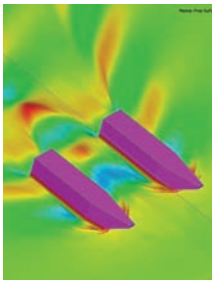
pair, Mike's Inc., Moose Boats, Moran Iron Works, Norseman Shipbuilding and Boatyard, Northern Enterprises Boat Yard, Paducah Barge, Port Bolivar Marine Service, Port of Toledo of Toledo, OR, Rhoads Industries, Rockland Marine Corporation, Shark Tech, St. John's Ship Building, Thoma-Sea Marine Constructors, TPG Chicago Dry Dock LLC, VT Halter Marine, and Yank Marine Services.

Equinor Offshore Wind Wins in NY State bid

New York Governor Cuomo announced Equinor's Empire Wind as a winner in the State's first large-scale competitive offshore wind solicitation. The 816 megawatt offshore wind project will bring renewable energy to New York consumers, contribute to the State's ambitious renewable energy development goals, and provide significant economic benefits to New York. This selection also represents an important milestone for Equinor's ambition of building an offshore wind core area on the U.S. East Coast. The project is expected to be developed with 60-80 wind turbines, with an installed capacity of more than 10 MW each. Total investments will be approximately $3 billion, and the project will be able to power over 500,000 homes in New York, with an expected start up in late 2024.

FMT Opens Kodiak, AK Office

Fusion Marine Technology has opened their newest office in Kodiak,



BHGI

Lapeyrouse

VT Halter Marine

Alaska. This expansion into Kodiak provides local marine electronics and electrical systems support in one of Alaska's largest fishing ports. Conveniently located, vessel operators now have easy access to FMT's dedicated team providing technical sales, repairs and installations. Fusion's Kodiak location will maintain a fully stocked warehouse with navigational electronics, marine communications, replacement parts, AD/DC electrical supplies, cables and consumables.

Volvo Penta, ABB and Chalmers in 'Fast Charging-at-Sea' Study

Volvo Penta has announced that it is to complete a feasibility study together with ABB in Sweden and Chalmers University of Technology in Gothenburg to evaluate technology concepts that can meet the challenge of providing fast charging of electric vessels. Upon completion of the feasibility study, it is envisaged that the fast charging technology will be incorporated into Gothenburg's Marine Demo Arena and become part of the ElectriCity public transport network. The study will assess if similar technology could be adapted for marine applications.

Lake Assault Boats Names Ed Watkins Marine as NC Service Center

Lake Assault Boats announced that Ed Watkins Marine of Denver, North Carolina is now the service center for Lake Assault Boats vessels in North Carolina. Ed Watkins Marine will provide a wide range of support services for first responders in the region.

BHGI Completes Tailrace Buoy Design for NYPA

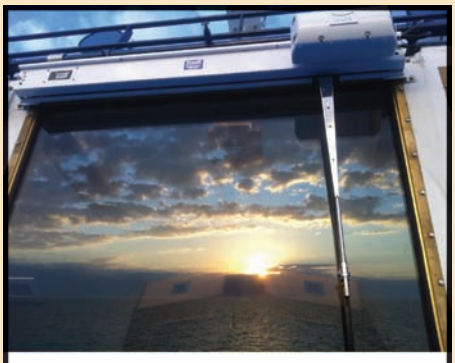
Bristol Harbor Group, Inc. (BHGI) was contracted by the New York Power Authority (NYPA) to provide naval architecture and marine engineering services to review and analyze a Canadian Coast Guard buoy for required internal ballast and mooring in order to secure the buoy moorings in tailrace waters. BHGI produced a new tailrace buoy design, incorporating details of the Canadian Coast Guard buoy desired by NYPA. Computational Fluid Dynamics analyses were conducted on the new design to confirm the desired performance once deployed.

AEU Announces 2018 Safety Award Winners

The American Equity Underwriters (AEU) announced winners of the 2018 AEU Safety Awards this week in Colorado Springs, Colorado, at the company's annual conference. "We believe a strong commitment to safety should be a core value of every employer in the maritime industry," said **Michael Lapeyrouse**, president and CEO of AEU. Eligibility for the awards is based on the frequency and severity of workers' compensation accidents for the prior calendar year, as well as safety-related metrics determined by AEU's loss control team. The 2018 AEU Safety Award Winners included Canton Port Services, LLC, Conrad Shipyard, JB Marine Service, and Marine Group Boat Works.

PortX, Helm Operations bring AI Assistance to Harbor Towing

PortX of Rotterdam, Netherlands and Helm Operations announced that they have signed a new strategic partnership agreement to combine PortX's cutting-edge AI-based port dispatching system, OptiPort, with Helm CONNECT, the world's leading harbor dispatching and operations software. Already used in a number of ports around the globe, OptiPort dramatically improves the scheduling of harbour towage operations by using artificial intelligence to optimize vessel dispatch based on crew working hours, currents, tides, vessel characteristics, fuel consumption, and availability. Depending on the port, pilot studies using OptiPort have shown savings of greater than US$1 million annually per port by reducing fuel consumption and crew overtime while optimizing vessel dispatch to reduce chartering of third-party tugs. Together, these factors allow for a savings of up to USD $200,000 per tug annually.



In-Mar Solutions: Wynn Marine Type C & Type D, Heavy Duty Straight Line Wipers

Wynn Type C (internal motor) and Type D (external motor) Straight Line Wipers offer the most advanced design of linear action window wiping systems for marine and other specialized applications. Optimum window coverage can be achieved and enhanced by utilizing a twin-bladed or dual-arm/blade design.

www.inmarsolutions.com

Survitec Liferaft in Successful Fishing Boat Evacuation

Two fishermen whose boat caught fire off the coast of UK, successfully evacuated into a Survitec liferaft and were taken ashore by local Coastguard. The pair activated the Survitec Seasava liferaft and abandoned the vessel when it caught fire. The vessel was equipped with a SOLAS-approved Seasava Pro-ISO liferaft, developed for smaller vessels with limited deck space and is required to be serviced at three-year intervals.

www.survitecgroup.com

Morbern Marine Gains IMO MED Approvals

Morbern's newest marine vinyls, Surf and Bayside, have received the International Maritime Organization Marine Equipment Directive Wheelmark (IMO MED Wheelmark) certification. The IMO MED Wheelmark is a quality management system which sets performance and testing standards for marine equipment placed on vessels in international waters. The certification remains valid for five years. Surf and Bayside are designed to handle all challenges that exposure to sun and water bring.

www.Morbern.com

GFCI Receptacle Protects Against Shock

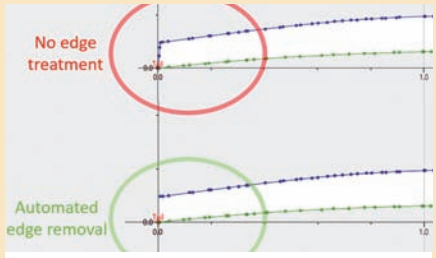
Hubbell Marine's UL-Listed GFCI Duplex Receptacle is designed to protect against line-to-ground electrical shock hazards. The GFCI Duplex Receptacle complies with 2015 UL 943, automatically monitoring circuit functionality every three hours. The receptacle's status is relayed by an illuminated indicator (green while operating, solid red when tripped and flashing red at the device's end of life). It meets National Electric Code and ABYC standards.

www.hubbell-marine.com

Mastry's Maspower Portable High Pressure Pump

Mastry Engine Center's YANMAR engine-driven Maspower MPW2.5PE Portable High Pressure pump for dockyard repair work and marine construction applications is a compact engine-driven set delivering high volume and pressure in marine construction and dock repair applications. Ideal for dockyard repair work, cleaning barges and equipment, and jetting-in pilings on marine construction jobs, the new pump set is the latest addition to the Maspower Pump range.

www.mastry.com



HydroComp PropCad 2019 Released

HydroComp PropCad 2019 includes several new exciting additions to make PropCad more effective and easier to use. Whether extracting data from full 3D CAD files or inputting custom distribution data, these features greatly improve workflow process for propeller designers, manufacturing engineers, and marine researchers. To support the continuing trend of larger screens and multiple monitors, PropCad now supports a dockable and fully sizable display window.

www.hydrocompinc.com

HydroHoist and ShoreMaster Announce Merger

ShoreMaster, LLC and HydroHoist Marine Group announced the merger of their businesses. The combined product offering of these industry-leading brands covers the broadest spectrum of boat types, sizes and marine environments in the industry across all major product categories in the dock, boat lift and accessories market. The combined enterprise will be the largest dock and boat lift player in North America.

www.ShoreMaster.com

Seaspans Opts for SCHOTTEL Again

SCHOTTEL has been chosen as propulsion supplier for two new build Ro-Ro ferries ordered by Canadian Seaspan Ferries Corporation will be propelled by two SCHOTTEL Combi Drives and two SCHOTTEL Transverse Thrusters. The new ferries will join the company's first two hybrid vessels, which were commissioned just over two years ago. Seaspan operates a fleet of seven ferries out of four terminals in BC, Canada.

www.schottel.de/marine-propulsion/

Mechanized Torch Package Available for Cutmaster 60i

Thermal Dynamics' new Cutmaster Black Series of enhanced performance plasma cutting consumables extend operating life by 60 percent compared to standard electrodes. They are featured on the SL60QD 1Torch, which comes with the Cutmaster 60i handheld air plasma cutting system. The new electrode design increases the unit's rated cut and piercing capacity to ¾", a 16.6% improvement. The Cutmaster 60i can sever metal up to 1-1/2".

www.esab.com

Beele Engineering's New Website Shines

Beele Engineering has fully renovated and expanded its website. The company, in the field of innovative, fire-resistant and gas, smoke and watertight sealing systems, presents itself as expert in the field of sealing technologies. Clients now find their way more quickly to the desired application or selected products and systems. Clear descriptions, as well as key characteristics of each product are posted.

www.beele.com

New XF Series Joystick Ideal for Marine Watercraft

APEM's XF series is a ruggedized finger operated joystick controller engineered and designed to ISO 25197 standards for throttle and dynamic position control systems on marine watercraft up to 24m LOA. The XF series is rated to withstand 80lbf pull force across the X/Y axis and over 5Nm torque in the Z axis. A shallow mounting requires minimal console space, ideal for applications where ergonomics and comfort are paramount.

www.apem.com/us/xf-series-498.html

Marine Travelift Opens Mid-Atlantic Office

Marine Travelift is expanding with the addition of Marine Travelift Mid-Atlantic, located in Ashland, Virginia, now offering boat handling equipment support from N to SC. Marine Travelift Mid-Atlantic local parts and service mean that trusted factory service technicians and equipment are now readily regionally available. In the near future, there will also be a significant stock of parts at the location, resulting in faster shipping and customer cost savings.

www.marinetraveliftatlantic.com

Luminultra's GeneCount Identifies Invasive Species

GeneCount, a new suite of DNA-based monitoring tools from Canadian microbiology specialist LuminUltra Technologies, uses technology that quickly and easily identifies the type of organisms found in all types of water systems. While ATP kits determine total microorganism quantity and therefore can confirm water treatment efficacy, GeneCount reveals the specific species found and, importantly, what these organisms are doing.

www.luminultra.com

Starrett Salutes 'Made in America'

The L.S. Starrett Company has recently released an engaging special-edition brochure that heralds the company's history and commitment to American Made quality and innovation. The attractive,18-page brochure includes overviews of Starrett's five U.S.A. manufacturing facilities where thousands of Starrett Precision Tools, Metrology Systems, Gages, Shop Tools and Saw Blades are made. A digital flip-book of the brochure can be viewed at the same link.

www.starrett.com

ESAB's Suite of Data Management Solutions

ESAB Welding & Cutting Products has migrated elements of its ESAB Digital Solutions offering to a unified platform powered by Microsoft Azure IoT and utilizing the ThingWorx Industrial Innovation Platform from PTC. This provides a seamless customer experience and links plate optimization, cutting, welding, gas management and quality assurance to drive continuous improvement in traceability, documentation, asset management, productivity and quality.

www.esab.com

NOFIRNO's Fire Tested Manhole Gaskets

Manhole gaskets are used to ensure that the steel sealing plates reliably seal off the manhole. NOFIRNO gaskets comply with the FTP Code 2010 and the fire rating was established at 60 minutes A-0. Combined with BEBOLTITE bolts they ensure that with a low tightening force of 6 Nm a maximum seal of up to 6-15 bar is created. Once tightened, the gaskets provide a durable seal.

www.beele.com

Superior Industries' Lifetime Warranty on Patriot Cone Crushers

Superior Industries Inc., a U.S. based manufacturer and global supplier of bulk material processing and handling systems, announced that a limited lifetime warranty now comes standard with new Patriot Cone Crushers. One-of-a-kind in dry bulk crushing, the no cost extended warranty covers the cone's major components including the adjustment ring, bowl, eccentric, head, mainframe and main shaft.

www.superior-ind.com

ZF Retractable Azimuth Tunnel Thrusters

The R/V Roger Revelle, during an extensive mid-life refit, will receive an 1100 horsepower ZF Marine ZF AT 5011 RT TT-FP L-Drive Retractable Thruster. The telescoping design allows it to extend downward from the hull, where it can operate as an azimuth thruster, rotating 360 degrees. When retracted, it operates as a standard tunnel thruster. This a multi-functional solution, providing traditional bow maneuvering in port and station-keeping at sea.

www.zf.com

ASSISTANT STOREKEEPER
Military Sealift Command
Salary: $33,295 Per Annum Full Time

Description:
Announcement #: 19-852-02EXOC Title, Series, Grade (Code) Assistant Storekeeper, WM 9994-15 (852) Base Salary: $33,295 Per Annum Type of Appointment: Excepted Service Career-Conditional Opening Date: February 11, 2019 Closing Date Open Continuously With Periodic Cutoffs Location: Military Sealift Command (MSC) Vessels Worldwide Who May Apply: All United States citizens and current Military Sealift Command Civil Service Mariner (CIVMAR) eligible to apply under the Veterans Employment Opportunities Act (VEOA). Active Duty Service Members (ADSMs) must submit a certification (i.e., statement of service) at the time of application which certifies that the service member is expected to be discharged or released from active duty service under honorable conditions not later than 120 days after the date the certification is submitted.
Duties: The Assistant Storekeeper is a Civil Service Mariner (CIVMAR) employed by the Navy to serve the Military Sealift Command (MSC) onboard naval auxiliaries and hybrid-manned warships worldwide, in peace and war. MSC exists to support the joint warfighter across the full spectrum of military operations. MSC provides on-time logistics, strategic sealift, as well as specialized missions anywhere in the world, in contested or uncontested environments.
The Assistant Storekeeper is responsible to the Supply Officer/Junior Supply Officer for performing Supply Department functions assigned in accordance with COMSCINST 3120 and 4000.2 series directives and Program Specific Directives. Follows procurement, receipt, storage, Quality Assurance (QA) and expenditure procedures for all types of material. This includes proper material identification, handling, inventory management, warehousing, packaging, and transportation.
Procures all shipboard requirements using Government/Commercial sources. Assists with configuration validations; processes and updates Allowance Change Requests (ACRs), Fleet COSAL Feedback Reports (FCFBRs) and Configuration Change Reports (CCRs) as directed. Assists with handling of Hazardous Material (HAZMAT) as directed. Also assists in the Supply Department requirement of monthly Financial Improvement and Audit Readiness (FIAR) inventories and their submission to Global Stock Control(GSC). Assists in the proper use of Supply automated programs.

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NEW PRODUCTS

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5	CWF Hamilton Jet	www.hamiltonjet.com	(425) 527-3000
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31	Gladding Hearn	www.gladding-hearn.com	(508) 676-8596
21	H.O. Bostrom	www.hobostrom.com	(262) 542-0222
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1	KVH	www.kvh.com	(401) 847-3327
55	McDonough Marine Services	www.mcdonoughmarine.com	(504) 780-8100
C2	Metal Shark Boats	www.metalsharkboats.com	(337) 364-0777
23	PYI Inc.	www.pyiinc.com	(425) 355-3669
C4	R.W. Fernstrum & Company	www.fernstrum.com	(906) 863-5553
19	Scania, USA Inc.	www.scaniausa.com	(210) 403-0007
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Photo courtesy of Eastern Shipbuilding Group

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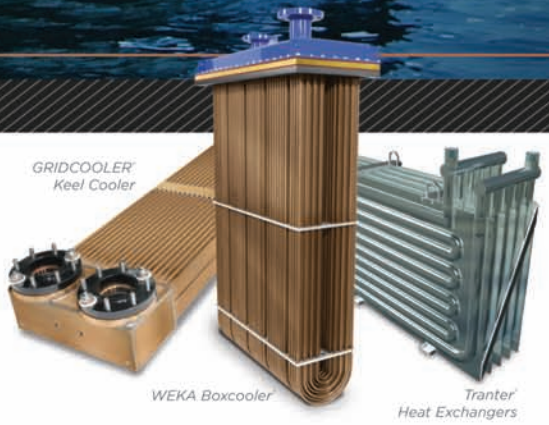
R.W. Fernstrum is committed to providing long-lasting, quality cooling systems. Our sales and engineering team will work with you to custom design a solution that meets the needs of your vessel and operating conditions.



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