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November 2017

CROWLEY IN COMMAND

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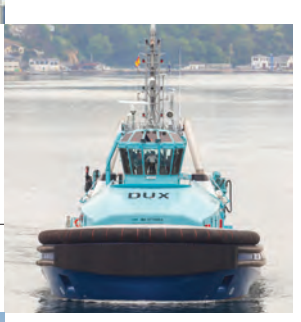

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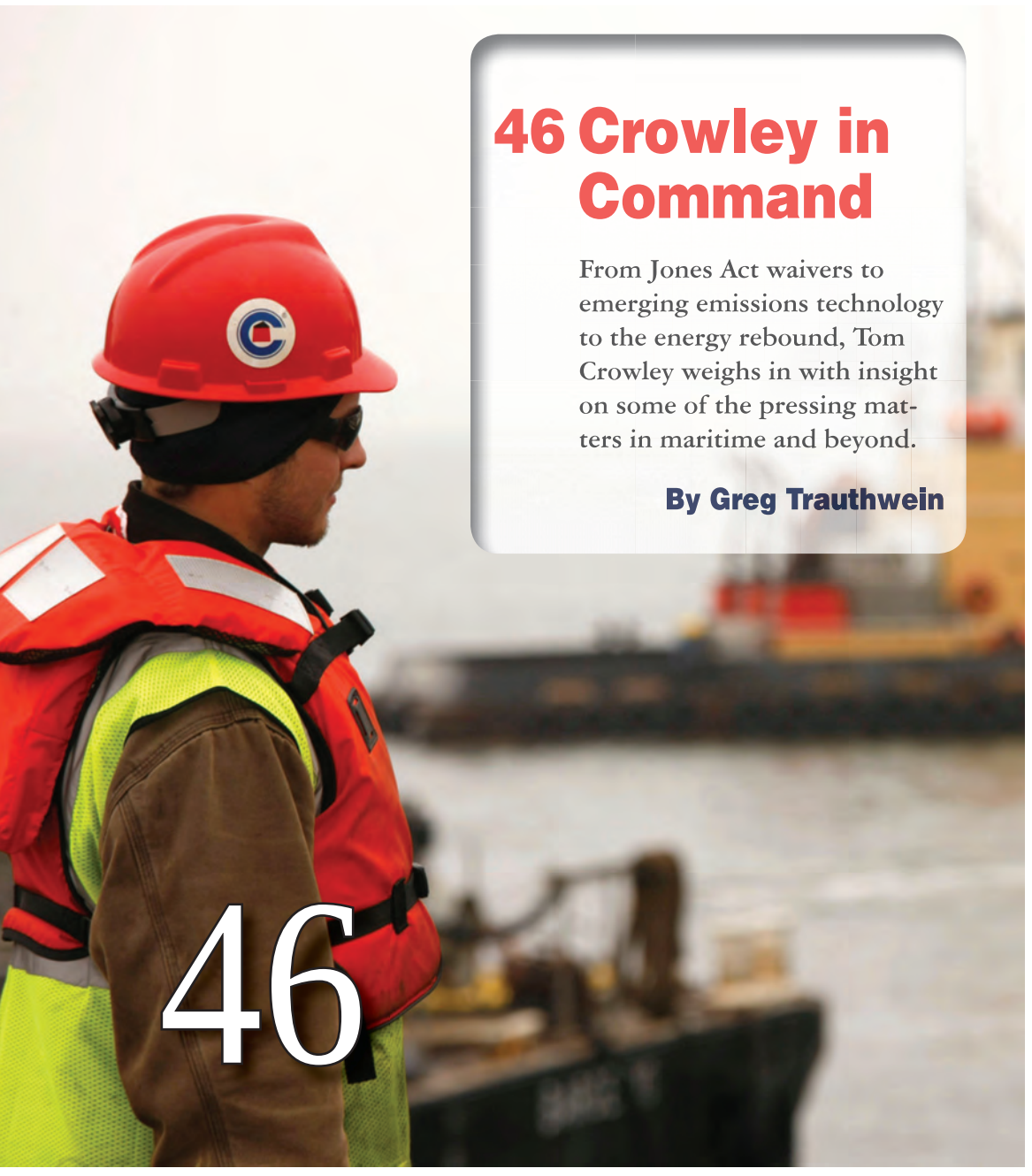
THE COVER

Crowley in Command
With a history stretching one and a quarter centuries, the Crowley name is synonymous with maritime. But the company has come a long way since Thomas Crowley effectively started the company in 1892 with an $80, 18-ft. Whitehall boat, growing to be a maritime, transport and logistics giant. We checked in with Tom Crowley last month, who provided scope and insight on a wide range of topics with his signature candor.
For the full story, please turn to page 46.

Photo: © Brian Moran



46 Crowley in Command

From Jones Act waivers to emerging emissions technology to the energy rebound, Tom Crowley weighs in with insight on some of the pressing matters in maritime and beyond.

By Greg Trauthwein

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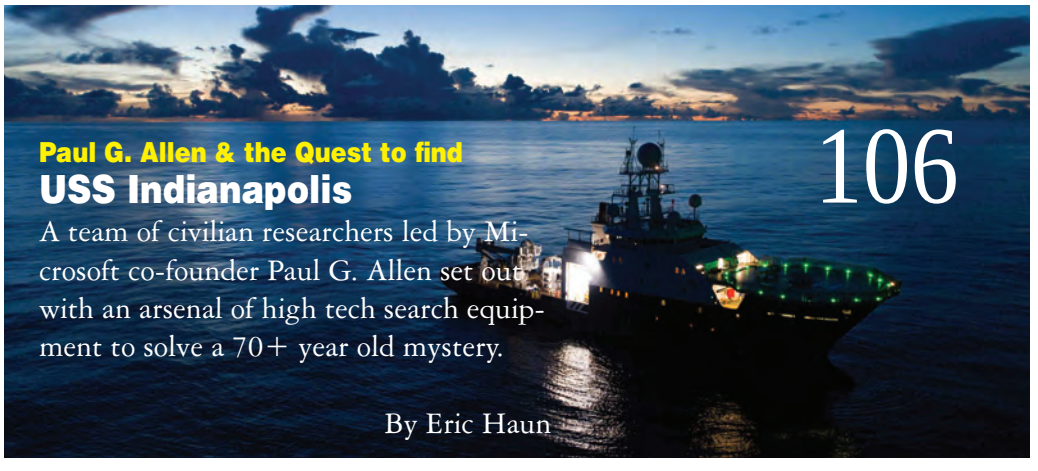

Photo courtesy of Paul G. Allen

Paul G. Allen & the Quest to find
USS Indianapolis

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A team of civilian researchers led by Microsoft co-founder Paul G. Allen set out with an arsenal of high tech search equipment to solve a 70+ year old mystery.

By Eric Haun

Image: Judy Patrick / © 2017 Crowley Maritime Corporation

Voices

In this edition

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I write this month's editorial sitting in my New York office when I should be writing it sitting on an airplane crossing the Atlantic on my way to Europort in Rotterdam. But I had the misfortune to book my flight to Amsterdam on Iceland Air, an airline which had a very bad couple of days in early November due to 'weather.'

I, like many of you, have traveled the world many times over, so flight delays and cancellations are hardly unusual. But this event on Iceland Air helped to expose the fragility of the global logistics chain in some regards, as when I arrived at John F. Kennedy Airport (a 4-hour wasted round-trip because the flight cancellation notification was not working) for my departure there were no Iceland Air employees to answer questions, the staff from another airline that was on hand to help could not book me on the next day's flight, which was 100% full; nor could they divert me to another flight; nor could they even issue a refund. I was simply handed an '800' number and a half-hearted 'good luck.'

But seeing the glass half-full is part of my genetic make-up, so this experience offered a perfect transition to this month's cover feature on Tom Crowley. The Crowley brand is well known in the U.S. and globally, a 125-year-old company that has evolved into a truly transcendent company. I've been covering this market for more than a quarter of a century, I've interviewed Tom Crowley before and I seemingly am in touch with the organization daily courtesy of its PR team which is one of the more prolific producers in this sector. But as it turns out I really didn't know Crowley as well as I thought.

The Crowley name starts with maritime, but digging deeper there is so much more, as the organization has evolved into a major logistics force with tentacles in nearly every sector of the transport chain. Tom Crowley, with signature candor and ease, weighs in with his thoughts on some of the biggest topics of the day – **Jones Act Waivers, emissions regulation, and competition from the 'disruptors'** – starting on page 46.

MarTID: The Survey is Open

Earlier this summer we announced the signing of an MOU with the World Maritime University and Marine Learning Systems to collaboratively produce a landmark survey geared to offering unprecedented insight into the world of maritime training practices. This has been a long-road with many hours invested by all parties, and with that I am very pleased to say that the survey – **MarTID: the Maritime Training Insights Database** – is online and ready for your insights. MarTID will contain anonymized and secure data on industry training practices, foci, and outcomes. It will continually grow in depth and value as a resource through the administration of an annual maritime training practices survey. This database will provide a global picture of maritime training that is not currently available anywhere.

While the effort to date has been substantial, the real value of the effort will only come from your participation – and in 'you' I mean senior training administrators at vessel operating companies or maritime training facilities – to take 20 minutes or so to take the survey and add to the global intelligence on this critical topic.

There is a full story on the initiative on page 10 of this edition, and I and the partners from MLS or the World Maritime University welcome your questions at: info@MarTID.org.

Please take
the MarTID Survey @
www.martid.org/survey

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MarTID

the Global Maritime Training Insights Database

By Michael Manuel, Associate Professor, Head - Maritime, Education and Training (World Maritime University);
Murray Goldberg, President and CEO (Marine Learning Systems); and Greg Trauthwein, Editor & Associate Publisher (New Wave Media)

There is broad agreement that as much as 80% of maritime accidents involve human factors causes. As such, top vessel operators and maritime training centers are pouring significant resources into creating best practice and innovative training programs.

This is good.

To a large degree, however, the industry as a whole, knows little about the training approaches and successes of vessel operators and training centers outside personal circles. This means that each training leader is left to his or her own devices to invent and design their best practice training approach. This siloed, rather than collaborative approach dooms each operator to find their own way and repeat the mistakes of others.

On a global scale, it means that we cannot benchmark our training approaches and learn from the successes of other industry players. It also means that industry training approaches will mostly advance by individual original effort, not by continually improving on the state of the art.

In a sense, this is surprising because as training experts, we should be hard-wired to learn from the experiences of others. Too often we are failing to do so.

With your help, this is *all about to change.* What is MarTID?

MarTID – the Maritime Training Insights Database, is a new non-commercial initiative collaboratively founded by the World Maritime University, New Wave Media and Marine Learning Systems. Its core principles include ethical integrity, objectivity and confidentiality. Each of these organizations is donating its time and resources to make this initiative possible. We are doing this because we believe that sharing information benefits the entire industry.

MarTID will contain anonymized and secure data on industry training practices, foci, and outcomes. It will continually grow in depth and value as a resource through the administration of an annual maritime training practices survey. This database will provide a global picture of maritime training that is not currently available anywhere. It will provide invaluable data on current and emerging training trends and techniques, staffing models, training focus areas, training tools, training resource allocation, assessment practices and so on. It will be an incredible resource to allow each organization to benchmark their own practices, and for governments and other regulatory agencies to be more informed and effective in their oversight and support of the industry. It will help highlight training issues and training successes, and disseminate that information quickly and broadly. The bottom line for training administrators is that it will allow each to make better decisions by benchmarking their own training practices against what is happening in the industry. This makes the industry safer and more efficient, benefiting everyone.

Every year following the survey, a series of reports will be published broadly. These reports will provide both high-level and deep-dive information covering both broad trends as well as deep coverage of emerging issues and successes. We believe that these reports will grow to be a highly anticipated source of information each year.

Your help can make *the difference*

Although this initiative has been founded and run by the three partner organizations, it requires community involvement to succeed. You will be hearing a lot about MarTID in the coming weeks and months, but right now, we need your help. Specifically:

- **If you work at a vessel operator or maritime training facility,** please make your senior training administrator aware of this important survey by sharing this article with them.
- **If you are a senior training administrator of a vessel operator or training facility,** we need you to complete a survey on behalf of your organization. Please send your contact information to **info@MarTID.org** and we will reach out to you early in November once the survey is launched.

We believe that the annual collection and analyses of training data will help the maritime community gain insights that can lead to enhanced policy-setting, decision-making, benchmarking and operational optimization by industry operators and regulatory authorities at all levels. We hope that the survey data and its analyses will become an important and authoritative source of knowledge for the global maritime community. Therefore, we thank you in advance for contributing to this important body of knowledge.

20 minutes of your time to share your experience can make a world of difference

Image © Ivelin Radkov / Adobe Stock

Your insights are needed. Please take the MarTID Survey @ **www.martid.org/survey**

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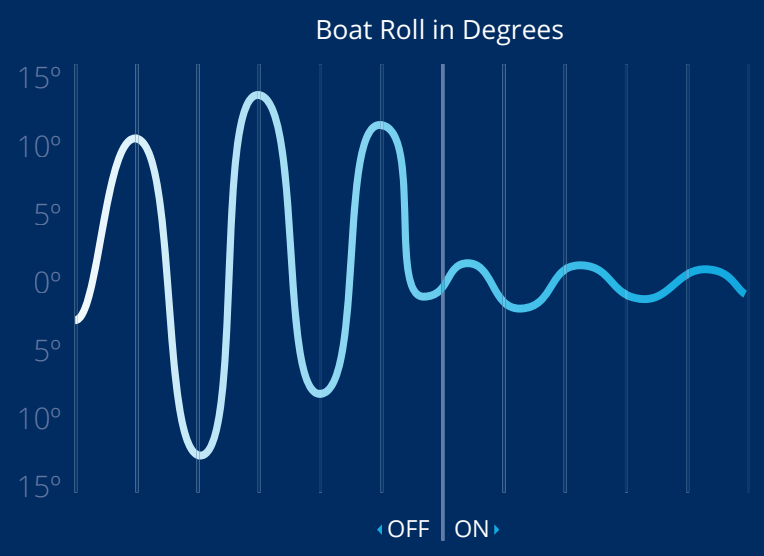

The challenge of Marine Asset Appraisal

While large shipping asset deals are often financed through the major capital markets, loans for most oilfield service marine equipment are funded with asset based lending. For such asset based lending, a domestic U.S. bank, with some exceptions, will be asking for an appraisal that is compliant with the Uniform Standards of Professional Appraisal Practice (USPAP).

Due to blatantly false appraisals that caused the collapse of the savings and loan industry in 1988, it became mandatory for real estate appraisers to provide transparent, verifiable, and unbiased appraisals of real estate. All major banks now request USPAP complaint appraisals for all assets, including marine equipment. The basic premise behind USPAP is that any appraisal report should be transparent as far as the process used for reaching a value, and that third-party readers of the report can understand the methodology used to reach a value opinion.

Professional appraisers in specialized fields, such as marine asset valuation, often also carry certifications from organizations, such as the American Society of Appraisers (ASA), which requires many years of training and experience. An accredited appraiser is committed to providing unbiased value opinions derived via a thorough, documented process. The appraiser will consider and use (or dismiss with cause) the three basic paths to value: the cost approach, the comparable sales approach, and the income approach.

Appraisals in Practice

Most people are familiar with the comparable sales or market approach as applied in the residential real estate industry. In the marine industry, this approach involves the identification of vessels that are similar to the subject vessel in terms of function, age, size, and other properties. The appraiser then accounts for variations in the chosen properties to produce a rational, easily understood value opinion.

Even more so than the real estate industry, the maritime field abounds with countless properties that have a staggering array of features, ages, and end-use applications. Also unlike the real estate industry, there is no readily available database of consummated marine vessel transactions – nor any incentive for buyers and sellers to divulge their sales price. So what happens when there are no viable sales numbers available?

This situation is common in marine appraisal. For example, through the OSV

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About the Authors

Harry Ward is the President of Dufour, Laskay & Strouse, Inc. Harry is a US Navy veteran and has spent much of the past decade in the maritime industry in sales, finance and general management. His goal is to build on the strong history and reputation of DLS and provide outstanding service to marine industry clients just as the company has done for the past 50 years.

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building boom of 2000 to 2008, there were no sales, as no one wanted to sell moneymaking vessels. From 2012 to the present, there are no sales as there are more boats than work and no one wants to buy another idle asset.

In the former period, when business was strong, appraisers could make the case for using the income approach, or discounted cash flow model. In this approach, the future cash flows of the vessel are evaluated against the risk of obtaining those cash flows, and a "net present value" is calculated. However, banks in this period were often wary, so risk models were challenging to construct. Lenders know how cyclical marine markets can be and it might be difficult to convince a banker that your 240' PSV with twenty-five years of remaining life is going to continue to make that a deliriously high 2007 day-rate for the rest of its economic life. While it is hard enough to estimate a vessel's expenses into the future, estimating even a gross income stream takes the appraiser and banker into a minefield of assumptions.

Under these conditions, where the market and income approaches are not highly reliable, the appraiser following USPAP looks to the cost, or "depreciated replacement cost," approach. The experienced appraiser will determine a vessel's replacement cost – the cost to build a similar vessel new today - and depreciate it over the expected normal useful life of the vessel. This is its designed life, which can vary by vessel type and service from approximately twenty to thirty-five years.

Depreciation

At the end of the vessel's normal economic life, there is usually some residual value. Be it a secondary use, salvage value, or scrap value, most vessels do not depreciate 100%. To avoid confusion with leasing terminology, we often refer to this residual value as a "terminal value." Having calculated an annual depreciation rate, the appraiser then looks at a vessel's remaining useful life, which gives a gross value, having only measured age, i.e., physical condition. The appraiser must then also look at "technical obsolescence." For example, does the vessel have Tier 2 engines and no dynamic positioning when the competing boats in the market are Tier 3 and have some level of DP certification? If so, the asset's value may be significantly degraded in the marketplace.

Finally, there is "economic depreciation" or "economic obsolescence." This is a loss of value or usefulness of a property caused by factors external to the property. In today's OSV market, the industry is awash in near new boats with state-of-the-art outfitting that may never find a buyer through no fault of the asset itself. In this case, economic circumstances in the market place can significantly affect the final appraised value.

These forms of depreciation - physical, technological, and economic - can be "curable" or "incurable." That is, does it make financial sense to do life extension work to remove physical depreciation? If so, it's curable. Does it make financial sense to repower or add a DP system to remove technological obsolescence? If not, it is incurable depreciation. Economic depreciation, often measured by the fall in day rates, may not be curable solely by a vessel owner as industry factors, like raw material demand, changing trade routes, or IMO or U.S. Coast Guard regulations, are beyond an individual owner's control.

Maritime asset appraisal is a challenging process that involves a delicate balance of art and science. Unlike in residential home valuation, a professional marine appraiser starts with no database of comparable sales, and he or she must have a deep understanding of the unique combination of terminology and market forces that comprise the marine market. On top of all this, the maritime industry is a global and highly regulated set of markets. An OSV in the North Sea is likely to be operated – and appraised – quite differently than a similar vessel in the Gulf of Mexico.

Certified marine asset appraisers following USPAP requirements play a challenging but exciting role in the maritime industry.

Harry Ward is the President of Dufour, Laskay & Strouse, Inc. Harry is a US Navy veteran and has spent much of the past decade in the maritime industry in sales, finance and general management. His goal is to build on the strong history and reputation of DLS and provide outstanding service to marine industry clients just as the company has done for the past 50 years.

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Inland Infrastructure Crisis

We often talk about what *could* happen. Now, we know.

On a recent morning in October, morning at Lock 52 near Brookport, Illinois, traffic was moving but still encountering massive delays. That morning, the U.S. Army Corps of engineers had locked 15 vessels in the previous 24 hours with an average delay of 65.29 hours. The queue gained 14 vessels during that 24-hour period; hence there were 39 vessels with 444 barges waiting their turn. Originally, Hurricane Nate created rising river levels and its closure, but Lock and Dam 52 was also closed for almost nine days in September due to an unscheduled maintenance issue.

For most folks, that kind of news gets a quick skim over coffee, not much else. That's probably why we find ourselves in a predicament which could be the harbinger of the worst infrastructure crisis of this century. We often talk about could happen. Now we know.

The latest inland problem came to light on October 2, when the Ohio River was closed to commercial navigation near Brookport after a hydraulic system at lock and dam 53 failed. At that point, a queue of more than 65 towboats was waiting to pass through the area. By the 16th of October, a total of 58 vessels with 658 barges were waiting to transit this Lock and Dam, the backup covering roughly a 20-mile stretch of river.

The unscheduled closure created a massive headache for farmers and shippers alike, as they tried to move newly harvested soybeans from Midwest farms to export terminals along the Gulf Coast. While that played out, U.S. barge freight rates spiked to new highs, in part because of the crisis. It goes without saying that the Mississippi River and its tributaries are the lynchpin for transporting grain to export markets with as much as 60 percent of all U.S. agriculture exports departing the nation's heartland via Gulf Coast gateways. A robust crop of corn and soybeans has increased export commitments, and as barges and towboats wait to pass, there is nowhere to store the grain and even less choices on the river.

The shipping woes come as U.S. farmers are ramping up the harvest of bumper corn and soybean crops and exporters are scrambling to secure more soybeans to meet foreign shipping commitments. With the river now open and supplies moving to market, the back-up caused by the river closure has created logistical problems ashore, as well. Storage space has quickly filled up, and shippers can't find enough barges to move the crop.

The closures bring to the full spotlight the critical, but aging, lock and dam infrastructure on the inland waterways system. As the U.S. Army Corps of Engineers attempted to fix the problems, the vessel queue at point stretched to 46 miles long. In service since 1928, Locks and Dams 52 and 53 on the Ohio River will eventually be replaced by the Olmsted Lock and Dam which was authorized in 1988, but will not open until next year. Once Olmsted is finished, Locks and Dams 52 and 53 will be removed. It is tempting to characterize this event as an isolated, one-time anomaly, but the truth of the matter is that the entire inland lock and dam system – the vast majority of it in any event – is more than 50 years old, and in desperate need of renewal.

In June, President Trump visited the Ohio River, where he said, "these critical corridors of commerce depend on a dilapidated system of locks and dams that are more than half a century old. And their condition, as you know better than anybody, is in bad shape. It continues to decay. Capital improvements of the system, which [are] so important, have been massively underfunded. And there's an $8.7 billion maintenance backlog that is only getting bigger and getting worse ... citizens know firsthand that the rivers, like the beautiful Ohio River, carry the life blood of our heartland."

The Administration has said that it will support a $1 trillion infrastructure initiative to repair America's infrastructure, but talk is cheap. In the meantime, much further to the south, the mighty Amazon River provides the same sort of transport artery for South American crops. Stretching from the Atlantic Ocean all the way to Peru, the second longest River in the world also boasts deep draft ports hundreds of miles from its mouth, and more than 20 feet of available draft as far inland as Peru. That river is being developed further in order to compete with U.S. farmers.

A few years back, I took a vacation in Peru which also included a three day river cruise out of Iquitos, Peru. It was an interesting trip, especially in terms of seeing both the volume of commercial traffic and the size of the vessels easily able to transit the area. The vast river basin consists of South America's version of the bread basket, and these farmers aim to compete with the United States on the global stage. In fact, they're already shipping corn to southeastern U.S. destinations, because apparently, it is cheaper to get it there from Argentina and Brazil than it is from the U.S. Midwest.

You can bet that farmers in Brazil and Argentina are watching with interest what plays out on U.S. rivers. But, don't worry: if we have a catastrophic, long lasting casualty on one or more of our major river arteries, the rest of the world won't go hungry. Argentina and Brazil will gladly feed them.

Our inland waterways include more than 25,000 miles of navigable waters and in fact may be the most important piece of our national infrastructure. This month, we saw hundreds of vessels backed up and idle at arguably the most inconvenient time of the year, both for shippers and operators alike. And, we often talk about what could happen if we don't take care of these river assets. Now, we know.

About the Author

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

It is tempting to characterize this event as an isolated, one-time anomaly, but the truth of the matter is that the entire inland lock and dam system – the vast majority of it in any event – is more than 50 years old, and in desperate need of renewal.

In 2014 crew members from St. Paul and Rock Islands districts install a temporary gate at Lock and Dam 5A, near Minnesota City.

Image: USACE

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Back to Basics

The U.S. Navy has a well-deserved reputation for seamanship in trying conditions. Recently though, the Navy has suffered a series of marine casualties, including the fatal collisions involving two destroyers of the Pacific Fleet.

On 17 June, USS Fitzgerald (DDG-62), an Arleigh Burke-class destroyer, was involved in a collision with the container ship ACX Crystal off Japan, resulting in the deaths of seven Navy crewmembers. The destroyer was severely damaged and is being returned to the United States via heavy-lift vessel for extensive repairs.

On 21 August, USS John S. McCain (DDG-56), another Arleigh Burke-class destroyer, was involved in a collision with the tanker Alnic MC in the South China Sea, resulting in the deaths of ten Navy crewmembers. Again, the destroyer was severely damaged.

These are the two most serious of an unfortunate series of recent marine casualties. Early analysis reveals that the Navy has been overworked, while being undermanned and under equipped. Personnel, particularly at sea, are working excessive hours, up to 100 hours per week. Training has been shortchanged. Maintenance is falling behind. All this, while the Administration is seeking to expand the fleet.

The international merchant fleet is subject to the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW Convention). Those vessels also have minimum manning levels. Safety Management Systems (SMSs) and other doctrines establish maintenance requirements. Vessels are subject to detention by port state control (PSC) inspectors, as well as remedial measures by flag states for deficiencies.

Training must be provided in an adequate and timely manner so that personnel can perform their duties in a competent manner. As the courts said years previously, it is insufficient for a shipowner to place an operating manual on the ship's bridge or in the library and expect the crew to absorb the necessary information.

Ships' operational schedules must be adjusted so that necessary maintenance can be performed. The owner cannot expect the crew to thoroughly maintain any ship while underway.

The Navy has already commenced making some of the necessary changes to right the ship of state. The US Naval Academy has reinstituted training in celestial navigation. Navy warships have been directed to activate their Automatic Identification Systems (AISs) so as to be more identifiable to merchant vessels sharing the same waters.

Further, though, it is important to get back to the basics of navigation and seamanship. Lookouts must be assigned at all times underway. Paper or electronic charts must be properly utilized, including the taking of regular position fixes. Closest points of approach (CPAs) must be determined for all vessels in range and then rechecked regularly.

Rudyard Kipling had the increased automation of ships in mind when he wrote the Forward to the selection of his prose and verse entitled "A Kipling Pageant" in 1935. That Forward, written as a Letter or Bill of Instruction from the Owner of the Motor Vessel Nakhoda to the Master, included the following:

This new ship here, is fitted according to the reported increase of knowledge among mankind. Namely, she is cumbered, end to end, with bells and trumpets and clocks and wires which, it has been told me, can call Voices out of the air or the waters to con the ship while her crew sleep. But sleep thou lightly, O Nakhoda! It has not yet been told me that the Sea has ceased to be the Sea.

Less attention must be paid to fancy electronic chart display and information systems (ECDISs) and other flashing lights, ringing bells, and tooting whistles, while more attention should be paid to ships in sight, weather, waves, the feel of the ship as it moves through the water, and whether the lookouts and other bridge personnel are alert and doing their jobs.

Going to sea is a privilege and should be a pleasure. If it isn't, sailors will vote with their feet and stay ashore. The Navy must do more to make a seagoing career a desirable choice, rather than a duty.

It is not recommended that warships be operated like merchant vessels, but it is important that warships, like merchant vessels, be manned, equipped, and maintained to similar high standards. Sailors, particularly deck officers, should be thoroughly trained in navigation and the regulations for prevention of collisions at sea. All personnel must be provided with adequate time for sleep and relaxation. Bone-tired sailors make bone-headed decisions.

The oceans are increasingly crowded, just like our highways. Sailors, like drivers, must drive defensively.

About the Author

Dennis L. Bryant is with Bryant's Maritime Consulting, and a regular contributor to Maritime Reporter & Engineering News as well as online at MaritimeProfessional.com. t: 1 352 692 5493
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The Arleigh Burke-class guided-missile destroyer USS John S. McCain (DDG 56) is loaded onto the heavy lift transport MV Treasure, Oct. 11, 2017. Treasure will transport John S. McCain to Fleet Activities Yokosuka for repairs.

U.S. Navy photo by Capt. Keith Lehnhardt/Released

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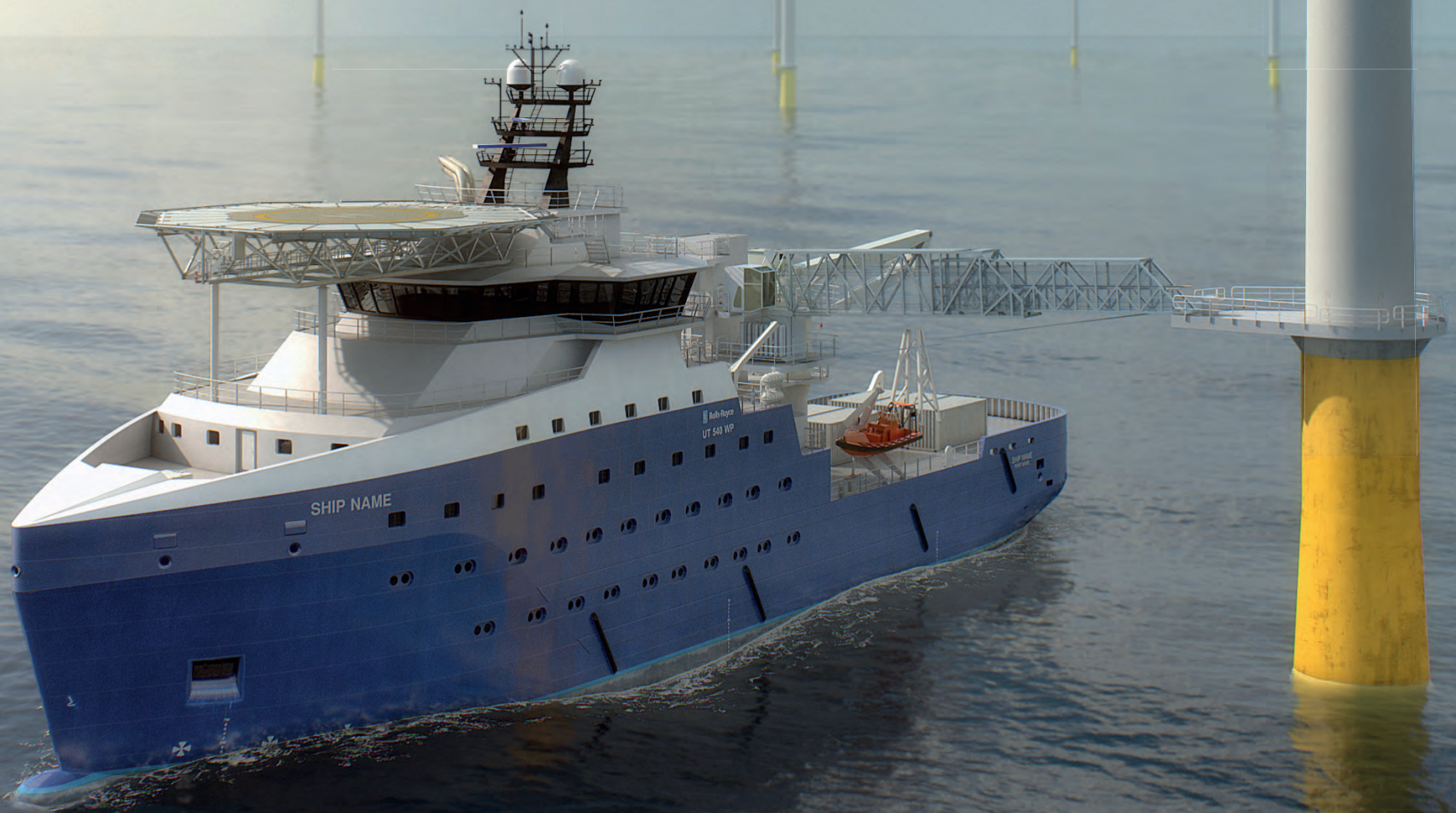

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The use of High Modulus Synthetic Fiber (HMSF) mooring lines, including Ultra High Molecular Weight Polyethylene (UHMWP) lines continue to make one of the most dangerous evolutions aboard ships safer. A 2017 UK Marine Accident Investigation Branch (MAIB) safety report, however, highlights critical areas where additional engineering review and crew training is required to help ensure overall crew safety.

MAIB Report no: 13/2017 dated June 2017, addresses the finding from the 2 March 2015 incident aboard the LNG tanker ZARGA, where the Officer-in-Charge of the forward mooring party suffered severe head injuries when struck by a mooring rope. Specifically, the report found that the officer was injured because he was standing in the snap-back zone of the spring line when it parted. The area where he was standing was designated as a safe area; this was because a thorough snap back assessment had not been carried out by the vessel operator and there was a perception that high modulus polyethylene ropes did not recoil on failure.

"The spring line parted due to tensile overload even though the load being applied to the line at the time was less than a quarter of its specified minimum breaking load. The predominant cause of the rope's loss of strength was found to be axial compression fatigue. Factors that contributed to this included high cyclic loading at exposed ports, repeated and prolonged bending around deck fairleads and radial compression exerted on the load bearing core by the rope's tightly bound jacket."

The report further makes excellent points about our, at times, overly simplistic review of the replacement of Steel Wire Mooring Ropes with new synthetic mooring lines:.

"HMSF ropes have been considered as an almost direct replacement for steel wire ropes, but without the negative aspects of steel wire".

The report does not state that HMSF Mooring Lines are unstable, but that additional evaluation criteria needs to be employed to help ensure that the proper type of line is chosen and that inspection and monitoring criteria are adequate. It is also important to remember that our diligence in evaluating proper line to use for mooring evolutions is not focused solely on purchasing the correct line, but to monitor it when in use. It is vital to ensure that proper inspections are carried out, including condition-based monitoring and that criteria for removing a line from service are clearly understood by the crew.

The report also examines another mooring line snap back incident as well as other episodes where inspection guidance and retirement criteria to identify worn ropes are attributed to a loss of life; this highlights the fact that constant vigilance is required to help safeguard the wellbeing of our crews. To note, one of the more striking findings illustrates how seemingly minor changes to the mooring configuration can have a profound impact on the overall operation of the vessel. In the case of the ZARGA, it was to replace the mooring lines' 11m polyamide tails with the 22m Euroflex tails. This changed the snap back characteristics of the spring line, demonstrating the complicated and interconnected nature of vessel mooring characteristics. As the report points out

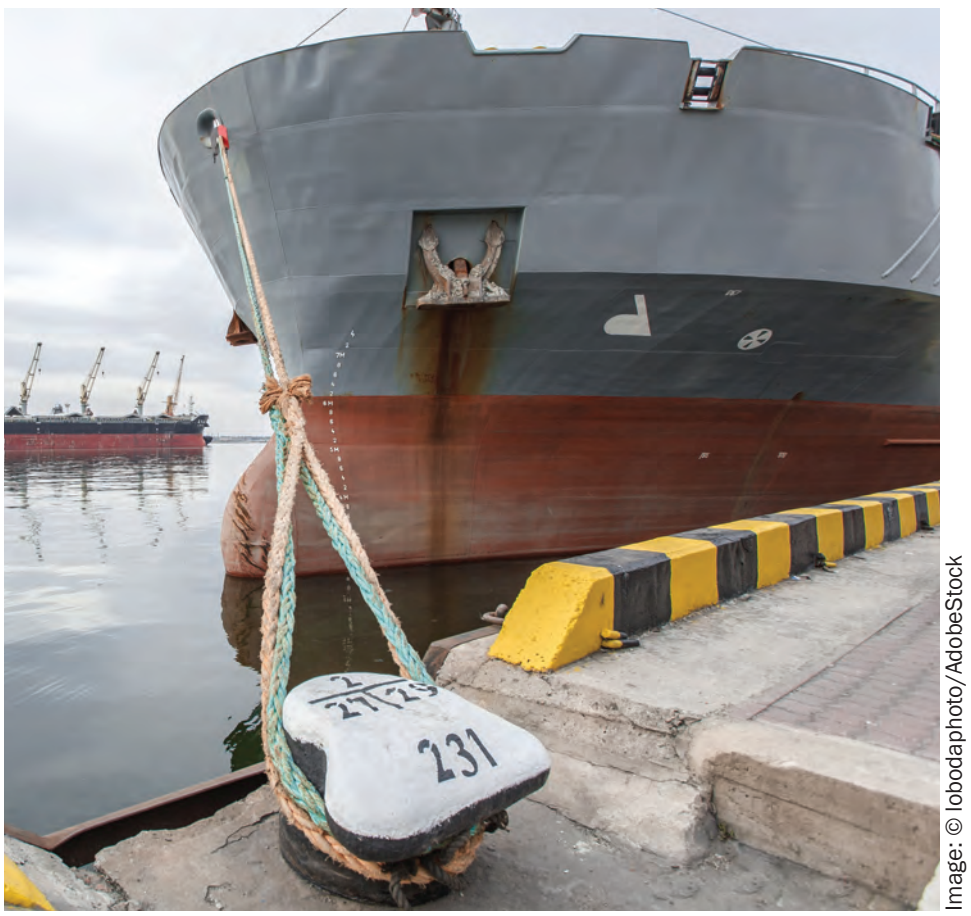
"As ships have increased in size, the identification of mooring deck danger zones has become more complex. Larger vessels require more ropes to hold them in position and, as a result, more deck winches, fairleads and bollards are needed. This increases the number and sizes of mooring line snap-back danger zones." To date we have not been able to design out the risk associated with mooring operations, but we can work to fully understand the forces at work and help ensure that we provide vessels with the best options to safely moor.

In closing, it is important to remember that no matter what type of mooring lines are employed; the parting of a mooring line under tension is one of the most dangerous occurrences onboard ships and happens all too often. The condition of all mooring lines needs to be monitored closely to ensure that they are retired and discarded prior to experiencing failure. It is also critical that we continue to train and educate ships crews in safe vessel operations, including the critical importance of proper communications.

About the Author

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

The spring line parted due to tensile overload even though the load being applied to the line at the time was less than a quarter of its specified minimum breaking load. The predominant cause of the rope's loss of strength was found to be axial compression fatigue.



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Meyer Werft shipyard, Papenburg, Germany

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Image: Klüber Lubrication

5 Stress Areas

Spotting Deck-Equipment Stresses Where New Lubricants Bring Relief

About the Author

Ben Bryant joined Klüber Lubrication in 2011 as the Marine Market Manager. He is a graduate of the Massachusetts Maritime Academy and holds a 1,600 ton Masters License with experience on oil tankers, offshore supply vessels, and tug and barge units. In 2009 he earned a Masters of Marine Policy from the University of Rhode Island and he holds a Masters in Business Administration from Boston College.

When you face various deck-equipment challenges, making the right lubricant selection can help lower labor costs, extend the life of the equipment, improve safety and more.

The key is to identify deck-equipment stresses, then apply the optimum lubricant solution. A trained lubricant specialist has the knowledge to relieve problems and significantly lower your total operating costs.

That's because selecting a specialty lubricant that can maximize the performance of a given deck application brings many benefits, including: minimizing wear and damage to moving parts, improving corrosion protection, reducing consumption of the lubricant, extending operating temperatures, increasing energy efficiency, and reducing lubricant disposal costs.

Here are five stress areas worth considering.

1. Equipment exposed to the elements on the deck of a vessel – such as anchor winches, slewing gears on cranes, and level winders – may look good when covered with a thick, consistent layer of grease. But appearances can be deceiving. In fact, several problems may be lurking below the surface of commonly used greases, namely:

a. Premature wear can occur if the grease is not up to the design loads and speed of the equipment.

o Today's deck equipment is being pushed much harder over a wider range of operations, resulting in higher loads on gears and bearings that are rotating faster. Advanced, high-performance grease formulations are designed to handle today's more demanding conditions.

b. Obsolete formulations can't match the advantages of new lubricants. For example:

o Commonly used thick asphaltic grease will slide off the vertical face of the slewing gear on deck cranes. Alternatives can provide a thin layer, which stays in place, improving longevity and safety on deck.

c. Improper selection of lubricants can occur in an automatic lubrication system. Consider these factors:

o Softer grease with the correct additives often performs better than older thicker types. Depending on the situation, the lubricant must either separate contact points with a film or deliver additives that maintain anti-friction benefits even when squeezed out at the point of contact.

o Temperature changes can affect grease performance; grease that is good for the tropics may not flow through the auto-lube system in northern climates.

d. Eco-friendly characteristics are required when lubricants eventually wash out to sea. This necessitates formulations that are as good in performance in deck equipment as they are for the environment.

2. Moving parts in gear boxes used in deck pumps, winches, and cranes are at the heart of any deck operation. The type and quality of the gear oil used to lubricate the moving parts will determine how long between gear box overhauls, how often the oil must be replaced, and even how much energy is needed to operate the machinery. Consider these factors:

a. When gears are improperly lubricated, damage can occur in the form of abrasion or wear, pitting caused by heat and welding together of the two surfaces, or micro pitting caused by metal fatigue. The proper gear-oil additives combined with synthetic oils can reduce wear and damage caused by metal-to-metal contact under repeated and extreme pressure.

b. Matching the correct viscosity to the manufacturer's specification is, of course, a good place to start. But knowing how well the lubricant maintains its viscosity over repeated use is also important.

c. Different types of additives and base oils can be matched to the type of gear set to minimize damage from rolling or sliding friction.

3. Hydraulic systems are another area to look for improvements based on the type of lubricant chosen. Selecting a hydraulic oil that has good resistance to oxidation and hydrolysis will lengthen the time between oil changes.

4. Chain drives are frequently used on vessels in rail systems and winch systems. Here the goal is to deliver the lubricant to the pin and bushing of the chain link while also preventing the lubricant from washing away during rain and heavy sea events. A highly viscous chain oil diluted with an evaporating solvent may prove to be your best lubricant system.

5. Systems exposed to harsh chemicals – such as LNG or refined petroleum products – may require lubricants created from PFPE base oils and thickeners. These products have very high resistance to thermal breakdown and are inert when exposed to harsh environments. Switching to a PFPE-type lubricant can increase the time between overhauls from months to years. The savings in labor and material can be substantial.

When assessing the requirements for a lubricant, a lubricant engineer will investigate the speed, temperature, size, pressure, and environmental conditions of the mechanical element in use. Based on this analysis, a lubricant can be selected to help achieve specific organizational goals, including: improving safety, reducing labor, extending overhauls to match shipyard periods, maximizing uptime, and, of course, minimizing costs. The belief that all lubricants are the same does not apply when you are focused on relieving stress and maximizing the performance of your equipment.

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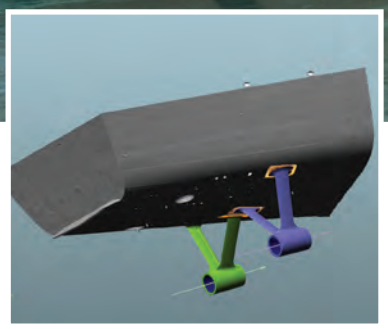

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5 Requirements for Safe Ops

A Safety Culture Starts with the CEO

Image: © Amarinj/AdobeStock

About the Author

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

As I write this article I am flying back to my home base in Canada from the 42nd annual Interferry conference in Split, Croatia. Interferry is an outstanding conference full of dedicated and passionate ferry operators and those who serve the industry. One presentation was delivered by Captain John Wright, a Master Mariner who has spent his career in the maritime industry in a variety of roles including vessel master, marine superintendent, chief executive and general manager. All of hi's roles have had a focus on safety and cultural change.

In Croatia Wright shared his knowledge as a trainer and has acted as a consultant on some very successful maritime safety culture transformations which have created dramatic improvements in accident rates. Interestingly, they have also created dramatic improvements in performance because, as Wright teaches, safety and performance are inextricably linked – you cannot improve safety without seeing an improvement in performance.

Wright's presentation covered what he sees as the cardinal requirements for achieving safe maritime operations. None are secrets, and every operator (ferry or otherwise) is capable of implementing them. But there is almost no point in trying to do so unless there is a real and unwavering commitment from the top of the organization. In the absence of this clear commitment from the top, operations will likely be generally safe most of the time, but will go very wrong at some point. It is just a matter of time. Listed below are the basics of what needs to be done to achieve safe operations according to John Wright. I have embellished most of John points here with my own thoughts as well – so if you disagree with something that is said, please feel free to blame me first.

Requirement #1: *Patience and Persistence*

It takes real time to implement safe operations and a strong safety culture. How long specifically? Easily five years, and maybe more. It depends on the level of commitment, and the starting state and nature of the organization.

But asking how long it requires to achieve safe operations somewhat misunderstands the process because once the journey has begun, it is never complete. It takes years to see real improvement, but even once those improvements are gained, effort must remain. John likens safety culture to a garden. Left untended it quickly becomes grown over. But with regular and consistent attention the garden will remain in a pristine state.

Requirement #2: *Ownership*

Safe operations and a positive safety culture are not things that can be imposed from the top. They are only ever achieved if every employee is bought in. And the only way an employee will be bought in is if he or she has ownership of the process.

What does this mean in a practical sense? It means that employees at every level of the organization, from the deck up, must be involved in defining success and identifying the best way to get there. Some need to be involved deeply – for example by leading or participating in working groups to identify unsafe practices and situations and to propose solutions.

Those people will be the champions among their peers. In addition to those who are deeply involved, every last employee needs to be involved in some way – even if it is simply to ask them to provide suggestions or provide feedback on how their roles can be performed more safely.

In the end, Wright made the strong point that we cannot achieve our goal without ongoing and meaningful involvement and contributions from all employees. If our employees have helped define the solution, they are certain to believe in it and implement it. That is what ownership is all about. It turns the conversation from "this is how you will be safe" to "help us understand how we can help you do your job in the safest way possible."

Requirement #3: *Communication*

Without frequent, honest and open communication, trust and teamwork cannot be achieved. Both of these are required for the organization to achieve success. On the path to safe operations there will be successes and failures. In the absence of open communication, the successes will mostly go unnoticed but the failures will be common knowledge (and made worse by speculation and lack of real information). It is the CEO's role to regularly address all employees on an ongoing basis. That communication should reiterate the organizational commitment and should champion the successes and identify those at all levels who contributed to those successes. It should be frank about the failures, using them as learning events. Reiterating the point that the entire organization is in this together, is working on this together, and benefits (or suffers) from this together creates trust, teamwork, and resilience from the occasional and inevitable failure.

It should also be remembered that effective communication requires that it be two-way. John made this point many times in his presentation. Listen to your employees and make sure the listening is active and organized where everything heard is reported on and reacted to – never ignored.

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Caring about safety simply is not sufficient to achieve safe operations. So how do we achieve consistently safe operations? **The answer is not complex, but it does take commitment** – especially on the part of the CEO or other management executive.

Image: © Amarinj/AdobeStock

Requirement #4: *Fair Blame*

Unless an accident or near miss is caused by gross or willful negligence, it is counterproductive to blame the employee(s) involved. First, can we absolutely say that they are solely responsible? Or could the cause have been broader – including shortcomings with equipment, training or procedures? Second, by assigning blame to the employee(s) involved, we are encouraging our employees to hide or misreport accidents and near misses. This robs us of the most powerful of learning opportunities. Blaming our employees for what are, in most cases, shared shortcomings guarantees that we will repeat the same failure over and over. This is the worst of all possible situations.

It takes a great deal of trust for an employee to report an issue they were at the center of. This is especially true in organizations which start from a position of being heavily blame oriented. It takes time, commitment, and communication to earn the trust of employees - enabling them to come forward to report an issue. The CEO's reaction to that first brave employee's report will set the stage and begin to build (or diminish) trust. Thus, a steadfast management commitment is required here, no matter how difficult it may seem.

Trust is hard won and easily lost, and that trust is a requirement for success.

Requirement #5: *Employee Commitment*

Safe operations essentially boil down to one thing – the commitment each officer and crew member brings to his/her company and job. As it is often said, safety is about "doing the right thing, even when no one is looking". That is a good definition of commitment in this context. That level of commitment cannot be demanded, and it can rarely be hired. It must be earned. And the only way to earn it is for the organization to lead by first committing to each employee. An employee who feels that the company is committed to their career and their development is one who reflects that commitment back to the organization.

How do we commit to each employee and demonstrate that commitment? In the view of many including myself, the most powerful demonstration of commitment to employees is ongoing employee development through best practice training. In a practical sense this means cooperatively crafting a career development plan for each employee and providing the training and experience necessary to advance according to the plan. This development plan should be visible, organized and structured - not informal. It should be reviewed regularly. Employees will know immediately whether the company commitment is meaningful.

Like the career development plan, the training that supports it should be structured and effective. The most effective and efficient training approach is blended learning where the training consists of carefully constructed on-line learning together with hands-on training. This approach is substantially more effective than other approaches. It also has the added advantage that the technology that supports it, the Learning Management System or LMS, is highly visible to employees in the form of an online company training website often referred to as the companies' "training academy" or similar.

Conclusion

The five items above constitute only the broad strokes. There is much more to it, but if an operator gets the above requirements right, almost all else will follow. Get advice from experts, both those who are external experts, as well as the experts you already have working as deckhands, engineers, officers, cooks, and in every other position in your company.

Implementing the requirements listed above may mean a lot of change for many organizations. I would argue, however, that the bigger the change required to achieve these, the more critically necessary it is to start making each one of those changes. That is where the commitment from the top comes in. Are you ready?

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Augmented Reality Technology

How Augmented Reality Technology Could Transform the Shipping Industry

Augmented Reality (AR) is predicted to be the next technology game-changer to improve business processes and employee performance and it's no wonder many companies are getting excited about its potential.

While virtual reality completely immerses people in a computer-generated world, AR overlays computer-generated images on the real world.

A great example of how AR combines the imaginary with the real world is in the hugely popular AR game Pokémon Go, where people search for and catch pocket monsters in the real world. This is one of the most downloaded games ever and analysts predict AR has the potential to have a similarly dramatic impact on businesses too.

According to PwC's 2017 Global Digital IQ survey 24% of executives will make a significant investment in AR in the next three years.

According to PwC, the benefits to be derived are the real-time delivery of relevant information to employees regardless of location, the fact it will enable greater flexibility, increased operational mobility and improved efficiencies.

AR has multiple uses for businesses across virtually any industry. These include the ability to connect employees in different global locations, deliver training and education or for companies to use the technology to increase the efficiency of product repairs or do demonstrations.

The appetite for AR technology is growing. Data from the International Data Corporation (IDC) estimated that augmented and virtual reality headset device shipments will reach almost 100 million units in 2021, up nearly 10-fold from the 10.1 million units shipped in 2016.

Fuelling this demand are the new devices being launched, the lower price points for devices and the expanding content now available for consumers and business users, according to IDC. We believe AR will have a revolutionary impact on the shipping industry and that it will be the next step on the industry's digitalization journey.

While shipping companies have traditionally been slow adopters of technology many are now embracing technology to optimize fleet management, automate their processes and improve communication between staff on ships and on shore.

Shipping companies won't want to be left behind as AR becomes the latest must-have technology to transform business. But what benefits can companies expect?

Benefits of Augmented Reality

Augmented reality, like any other cutting-edge technology, can help shipping companies to accelerate and simplify their processes. It is comparable to switching from pen and paper to a computer and will provide new tools to execute tasks faster and more intelligently.

It will also improve the performance of workers. For example, in the aviation industry it was reported that the use of an AR headset to help a technician wire a wind turbine's control box improved a worker's performance by 34% on first use.

Rather than immersing us in an alternate universe as virtual reality does, devices that use augmented reality enhance our actual surroundings by adding holograms into our field of vision to interact with. Augmented reality makes it possible to merge the real and the digital world, creating a mixed reality.

There are nearly unlimited possibilities, especially as the technology progresses. For example, instead of looking at a GA plan on a screen, workers could look at the entire ship in 3D on a table in front of them. They could look at it from all angles, virtually highlight certain areas or display the main engine making the interaction feel more natural instead of looking at a screen.

Using AR-devices means screens and monitors could also become obsolete, with employees able to access cloud-based data wherever they are working. Additionally, it will render a lot of hardware redundant. Just as the smart phone included the functionality of a lot of gadgets such as camera, telephone, calendar or calculator, AR devices are one more step forward.

About the Author

Alexander Buchmann was inspired by the release of the first iPhone to develop a software that would facilitate the complex processes managed by shipping companies. He founded Hanseaticsoft in 2009 and developed Cloud Fleet Manager. Since March 2017, Lloyd's Register one of the world's largest ship classification societies, holds a share in the software company.

Using AR-devices means screens and monitors could also become obsolete, with employees able to access cloud-based data wherever they are working. *Additionally, it will render a lot of hardware redundant. Just as the smart phone included the functionality of a lot of gadgets such as camera, telephone, calendar or calculator, AR devices are one more step forward.*

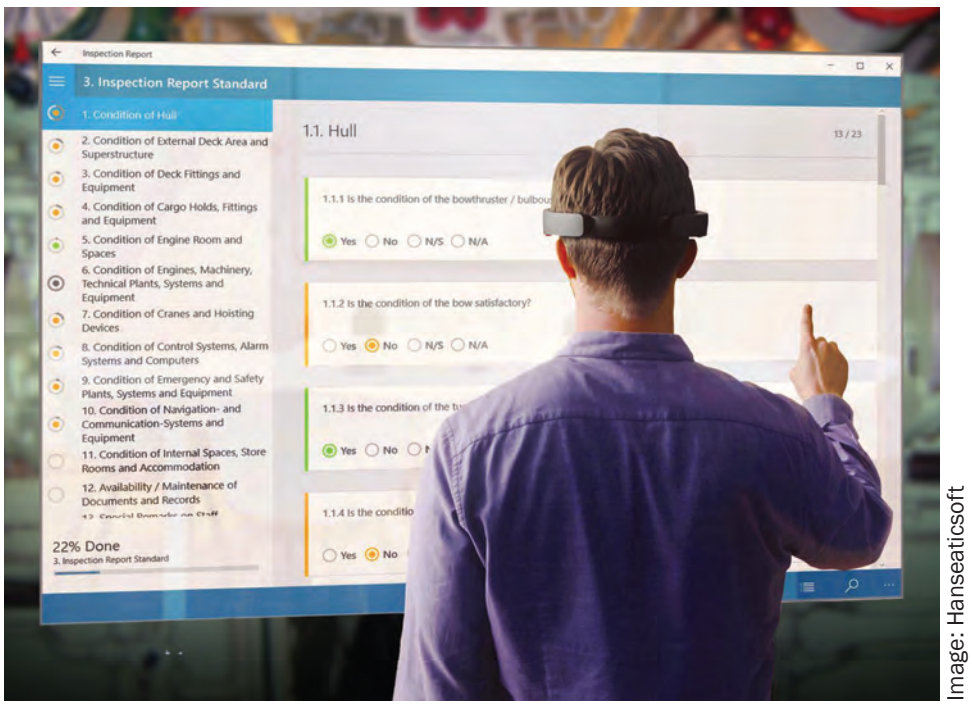


Image: Hanseaticsoft

a lot of hardware redundant. Just as the smart phone included the functionality of a lot of gadgets such as camera, telephone, calendar or calculator, AR devices are one more step forward.

For ship inspections for example, inspectors will no longer need to take additional equipment with them because the questionnaire could be displayed directly in the room and pictures could be taken with the camera within the device. A report from analysts Forrester says there are tangible benefits to using an AR headset over a phone or tablet camera feed to obtain information, with the added advantage of the worker's hands being free.

There are also communication benefits. The industry is already working on projects that make it possible to have virtual meetings. Holoportation is a new type of 3D capture technology that allows high-quality 3D models of people to be reconstructed, compressed and transmitted anywhere in the world in real time.

When combined with mixed reality displays such as HoloLens, this technology allows users to see, hear, and interact with remote participants in 3D as if they are in the room. Communicating and interacting with remote users will become as natural as face-to-face communication.

Who will benefit most?

Initially, it's likely that management teams will benefit most from AR technology because of the possibilities it offers to display all kinds of operational data, such as the movement of fleets.

It will probably have the biggest impact on productivity and training expenses, since it's possible to display instructions right next to an engine to execute maintenance tasks or provide general information that is essential for the staff. But engineers can also benefit by displaying machine parts and simply highlighting certain areas by gesture, for example for maintenance purposes. The further the technology advances, the more areas of application will be found.

Companies may have concerns that AR will be complicated, and that staff will require extensive training to use it, however, this isn't necessarily the case. Younger generations tend to be digitally savvy so are unlikely to have any difficulties getting started.

Other users might need an introduction to get used to the headset. Apart from the headset, the technology relies on software – so it's simply a question of understanding how it works and getting used to wearing it.

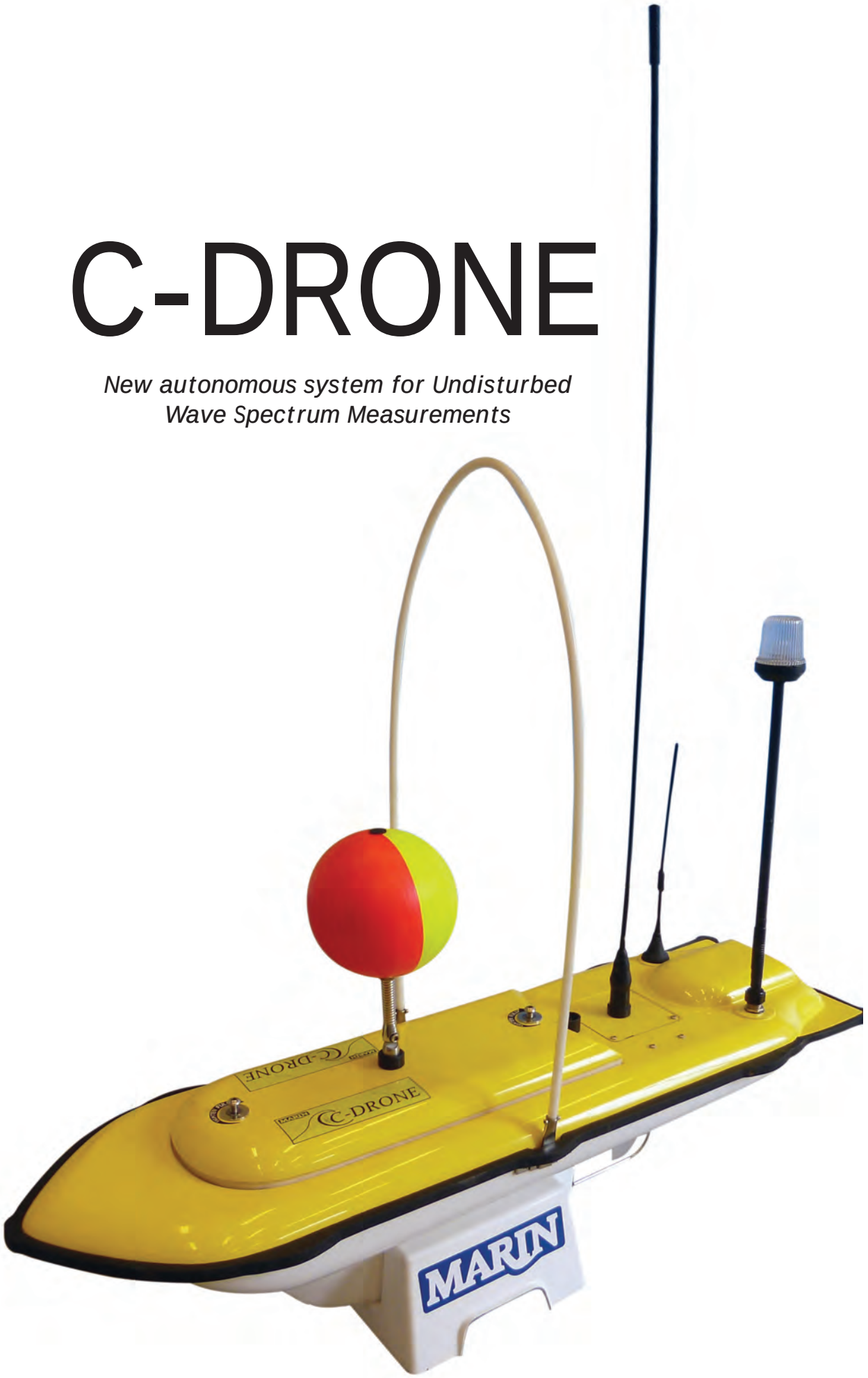
We have been working with Microsoft HoloLens to make this a reality for the shipping industry and we already implemented ways to visualize data from our software using this device.

The HoloLens device is the first self-contained, holographic computer which allows the user to project and interact with holograms and recent research from analyst firm, CCS Insight predicted that mixed reality devices like Microsoft's HoloLens will start gaining sales come 2019, and that 2018 will mark the start of growth in adoption of AR devices.

We are perhaps still two to five years away from AR devices being rolled out across the shipping industry, however, companies should start to investigate and learn about the possibilities, as we believe this technology will revolutionise the way they will work in the future.

C-DRONE

New autonomous system for Undisturbed Wave Spectrum Measurements



Images: MARIN

About the Author

Thijs Hasselaar is Project Manager at the Business Unit Trials & Monitoring at MARIN, the Maritime Research Institute Netherlands.

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During trials the correct measurement of metocean conditions is crucial for reproducibility, performance prediction and to avoid disputes between different stakeholders. MARIN believes its new C-DRONE can make it much easier to obtain accurate measurement data. MARIN has several systems in use to measure wave height and period. The most direct and accurate way to measure the wave characteristics is the use of a wave buoy. Yet, a buoy is rarely requested during trials because the retrieval process requires a separate support boat that can easily manoeuvre and pick up the buoy. And this is often too costly.

To overcome this problem, MARIN evaluated airborne drones for the measurement of wave characteristics. Airborne drones have become widely available over the past few years, have increasing reliability and have lowered in price. However, for wave elevation measurements under strong, gusty wind conditions in a harsh marine environment their applicability and reliability is limited. Moreover, commercial deployment of flying drones requires expensive certification and training. This led us to develop the C-DRONE: an Autonomous / Remote Operated Vehicle which can be deployed and retrieved using a rope and hook to measure the undisturbed wave field away from a ship.

The C-DRONE is a small AOV equipped with a 6-DOF motion sensor and GPS. It can navigate autonomously in waves (top speed 3 m/s) at an undisturbed location ahead of the ship, and act as a wave buoy by drifting while measuring the wave spectrum. After a preset time it returns to the deployment location, where an operator on the ship can take over control to manoeuvre it alongside the ship and pick it up using a grappling hook. The C-DRONE is small enough to be carried as hold luggage in normal commercial airplanes, so that it can be used and deployed at short notice. In 2016 MARIN tested the Hexapod to evaluate the accuracy of the motion sensors under different combined irregular motions, amplitudes and periods. The accuracy of the extracted global heave motion was comparable to regular wave buoys. In 2017 trials will be performed in the North Sea to evaluate practical issues and performance in seas. After successful trials it will become standard equipment for speed and power trials.

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IMO Orders Fuels of the Future

The New Sulfur, Carbon Dioxide Limits Will Demand Precise Understanding by Ship Owners and Operators.

About the Author

James Morgan is a Director in Opportune LLP's Process & Technology practice. He has more than 17 years' experience in the energy industry, primarily focused in the trading and risk management area.

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> ***A Very Large Crude Carrier (VLCC) with an average fuel cost of $6.2 million in 2018 could see a fuel costs rising to between $8.5 and $12.5 million in 2020. An Aframax which would average $2 million in fuel costs for 2018 could see fuel costs over $4 million in 2020.***

Globally, new regulations are coming into effect governing the Sulfur Oxide (SOx) limits and CO2 emissions. The International Maritime Organization (IMO) has updated the maximum amount of SOx allowed in fuels and the European Commission is introducing new reporting requirements to monitor CO2 emissions. Understanding the impacts of these changes on ship owners and operators is critical given the market conditions for maritime services.

IMO 2020 and Bunker Fuel Pricing

As of January 1, 2020 the IMO will require a reduction in the sulfur content of fuel oil of all ships to a global sulfur limit of 0.50% m/m (mass/mass), from the current global level of 3.5% m/m. While this new limit will not change the lower limits in SOx Emission Control Areas (ECAs), it will cause a significant change in the demands for certain bunker fuels. By Jan 1, 2020, the IMO's new standards should reduce heavy fuel demand by more than 2 million barrels a day, according to industry consultant FGE. Separately, a Wood Mackenzie study estimates meeting the new fuel standards will cost the world shipping industry $60 billion a year.

Fuel Oil, high in sulfur content, has been the traditional bunker fuel for the maritime industry. With the new IMO regulations, ship owners are left with few options:

- Switch to a lower sulfur fuel, such as LSGO or MGO or refit to run LNG;
- Install scrubbers to enable them to continue using the higher sulfur fuels; however scrubber installation can run up to $6 million per vessel; and/or
- Or less ideally, ignore the regulations and hope they are not fined.

Changing fuels completely across the world will be difficult, as refiners aren't necessarily able to quickly scale to higher demand and potentially will need to build new coker units to fill the need. The International Energy Agency (IEA) stated that the lowering of the bunker fuel emissions cap is "easily the most dramatic change in fuel specifications in any oil product market on such a large scale." Since most vessels are presently using High Sulfur Fuel Oil (HSFO) for long haul trade, and only using Low Sulfur Gas Oil (LSGO) in ECA zones or for certain costal carriers, there isn't an abundance of supply for LSGO at this time.

Due to the current lack of demand, there are not enough refineries or suppliers to absorb the dramatic increase in necessity for LSGO that will result when this regulation goes into effect. Refiners are evaluating investments in capital projects to account for this demand increase so that they can produce more LSGO. Forecasts have shown costs for lower sulfur bunker fuels rising anywhere from 40 to 200%, with most trending on the higher end. More specifically, a Very Large Crude Carrier (VLCC) with an average fuel cost of $6.2 million in 2018 could see a fuel costs rising to between $8.5 and $12.5 million in 2020. An Aframax which would average $2 million in fuel costs for 2018 could see fuel costs over $4 million in 2020.

If scrubbers are the chosen solution, ship owners will need a clear view of their finances to see if they have access to credit, for the large up-front capital costs of a scrubber. In addition to the capital costs, ship owners will have to consider the loss of revenue during servicing time in dry dock to install the scrubber. Depending on how many ship owners choose the scrubber route to solve the emission requirements, yard space will likely be at a premium and require longer lead time to schedule.

Another alternative is to look at converting the vessel engine to run on less expensive LNG, but this option requires an even higher investment by the vessel owner that will need to be weighed against the commodity prices, fuel spreads and availability of LNG globally as a fuel.

While certainly not recommended, ship owners will need to take a view on the potential risks of ignoring the regulation, including the expected negative reaction from investors, clients, regulators and the general public if they are caught. While this may be an alternative in the short term, when low sulfur fuel is not readily available, it is a risky option over time.

The EU Complication

Further complicating the maritime control space is the new emission reporting requirements for CO2 in Europe. European Commission is adding maritime emissions into its 2009 climate and energy package. European Union's upcoming Monitoring, Reporting and Verification (EU MRV) regulation requires ship owners and operators of ships over 5,000 GT to monitor and report their CO2 emissions on all voyages to, from and between any EU or EFTA port. This regulation, 2015/757, came into force on July 1, 2015 and requires per voyage reporting beginning in January of 2018. By August 31, 2017 all ship owners are required to provide monitoring plans to an accredited verifier.

The EU MRV requires ship owners to report on specific parameters of fuel consumption. Presently, there are four acceptable fuel consumption monitoring methodologies:

- Bunker Fuel Delivery Note (BDN) and periodic stock-takes of fuel tanks
- Bunker fuel tank monitoring on board
- Flow meters for applicable combustion processes
- Direct emissions measurements.

Other relevant voyage details will also be required, including distance travelled, time spent at sea, port of departure and arrival with date and time of departure and arrival, cargo carried and transport work.

The shipping industry is critical for global trade, responsible for transporting about 90% of goods; fuel costs account for up to 80% of total voyage expenses, according to Platts. These regulations are coming at a time of prolonged financial stress for much of the maritime industry. Ship owners and operators need to choose wisely in their strategy for dealing with the sulfur cap and their emission reporting methodology. Those able to offer the lowest freight rates stand to increase their market share as shipping margins become even tighter.

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Howard Fireman

SVP & CTO, ABS

As industry increasingly evolves on the digital transformation path, inevitably the focus turns to the move toward cloud computing. Last month Maritime Reporter & Engineering News *spoke with Howard Fireman, SVP and Chief Technology Officer of the American Bureau of Shipping (ABS) for take on how industry innovators – large and small – in the shipbuilding and marine equipment sectors are leveraging inherent advantages of cloud computing to better position themselves for the competitive long-haul.*

BY GREG TRAUTHWEIN

Photo: ABS

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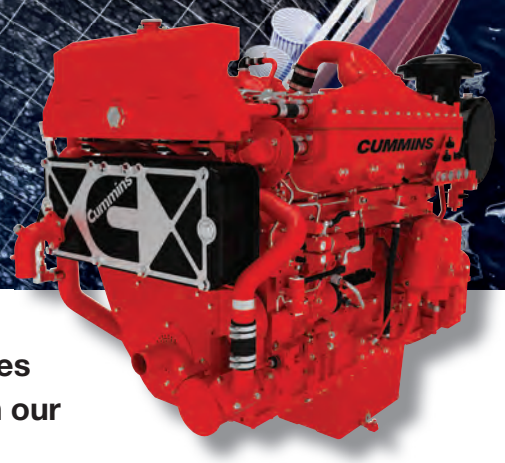

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Voices Howard Fireman, SVP & CTO, ABS

Please describe your organization's philosophy on the digitalization transformation as a core business philosophy.

Our industry as a whole is moving toward Digitalization. At ABS, we are leveraging digitalization to be more predictive about operational health and reliability. As a consequence of the drive for greater safety, we expect any improvements in operational reliability to also improve the health of our clients' businesses. Additionally, the transition to digitization will enable us to develop a comprehensive suite of compliance tools in an era of emerging regulation, which will help to make any inspections or audits conducted by class less-intrusive processes.

What about Cloud Computing as a part of this digitalization transformation.

It's about speed and velocity. Our industry is evolving at an accelerated pace so we need to be able to offer products and services that help our clients to manage their businesses in a fast-moving environment. That requires improvements in internal and external operating efficiencies. A cloud infrastructure responds to demands of speed and scale much faster than the traditional "on premise" approaches. The secure, shared environment offered in a cloud environment allows us to collaborate and work more efficiently with our entire business eco-system.

Please put in perspective where your company is on this move toward the cloud?

We have been moving many internal systems to the Cloud in the last several years – including HR systems, training systems, contract management systems, and now even email and office productivity software. Whenever we have a new project, we always ask ourselves "Does the cloud make sense for this solution?"

ABS Nautical Systems, our fleet management ERP offers products on the cloud now. New clients predominantly want cloud implementations, while existing clients are moving there as their natural investment cycle causes them to re-evaluate.

What are the main drivers toward 'a move to the Cloud?

Shifting the management of our IT infrastructure from a capital expenditure to an operating expense creates cost efficiencies that enable us to improve the efficiency of service delivery for our clients. Additionally, as a global organization, the reliability of 24/7 access offered with a cloud environment is crucial for supporting our global operations.

What do you see as the main risk of moving your business operations to the cloud, and how are you preparing?

Transitioning legacy products to the cloud that require architecture changes can be risky. Additionally, an increased reliance on third party providers with increasing costs and a loss of control is a risk that can be mitigated through due diligence and contract negotiations.

When you look at the speed of business today in the transport and logistics sectors, and specifically watch as non-maritime entities serve as 'disruptors', put in perspective your thoughts on the risk to a company that does not adopt a digital and/or cloud-based future.

Those who do not adopt cloud solutions are likely to miss the opportunity to develop point solutions which can be easily deployed in a cloud environment. These solutions can be very efficient at driving efficiency across the organization. In that scenario, organizations can find themselves investing in basic infrastructure hardware and management while their competitors invest in business intelligence and analytics.

When you look at your customers, give insight on "where we are at" on the adoption curve of digitalization and cloud computing.

I think it is common knowledge that shipping in general is a traditionally conservative industry that can be resistant to change. But, as there are many examples of other industries benefitting from digitalization, the tide is beginning to turn across the maritime sector. It is the role of class to support companies who wish to do so.

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Photo: PPM News Service Maritim

Going 'Green & Lean' in Germany with World-First Containership LNG Conversion

The world's first container feeder vessel which was refit to use natural gas was commissioned in late August in Bremerhaven, ushering in a new era in the use of alternative fuels across the global maritime sector.

BY PETER POSPIECH

The world's first container feeder vessel which was refit to use with natural gas was commissioned in late August in Bremerhaven

The container vessel Wes Amelie, owned by Wessels Reederei, Haren/Ems, was converted for the use of methane as a standard fuel at the German Dry Docks Shipyard in Bremerhaven, making it the world's first of its kind vessel which consumes environmentally friendly methane. This conversion is more than simply another environmentally advanced ship, rather as a 'world first' it provides the shipping company important pioneer work in further market launch of the natural gas technology in the container shipping segment. The project was also fueled by federal funds, as the German Economics Ministry has prepared about 30 million Euro for further natural gas projects.

The Vessel

"Our latest and newest project for more environmental protection in shipping was the retrofit of our container vessel Wes Amelie (1,036 TEU) for the use with natural gas – this is now the worldwide first retrofit of a container vessel from heavy fuel to natural gas. In cooperation with MAN D&T, and Marine Gas Engineering (TGE), we checked all aspects during the last two years of a possible retrofit of the drive line of our 1,000 TEU-container vessels from heavy fuel to natural gas. We also checked the installation possibilities of scrubber systems. At the end we decided not to use the scrubber but the natural gas use. Scrubber have a significant poorer environmental balance compared to natural gas – and they extend the use of heavy fuel. Furthermore, in regard to scrubber, is the use of open-loop and closed-loop systems in different national shipping areas not clear. Therefore, from our point of view, the future course shall be alternative fuels like natural gas," said Gerd Wessels, CEO of Wessels Reederei.

"We paid a lot of attention to achieve a high multiplier effect, in other words: possible follow-up projects can benefit from this first conversion. Because of this we chose our Wes Amelie which is

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Photo: Wessels Reederei

The initial LNG-filling took place in Bremerhaven by the Hamburg based company Nauticor.

a 1,000 TEU feeder vessels. This young vessel has been built in large series. They are mostly navigating in the European feeder traffic. Fifteen identical sister ships are available for (similar) a natural gas conversion. All these vessels feature the same main engine type from MAN which have been converted successfully in numerous landside gensets towards the use of natural gas. Thus, valuable practical experience and know-how could be gained in advance for our following conversion. I'm convinced that also vessels from other shipping companies can benefit from the experiences we will have. Future conversion will be profitable with the possible increase of quantity. In general, further gas conversion projects may substantially reduce the budget."

Christian Hoepfner, GM Wessels Reederei, added: "This particular feeder has been build in large series – there exist 23 sister ships of this SSW Super 1000-type (Schichau Seebeck-Werft) – and Wes Amelie operates currently on charter in the SECA area North- and Baltic Sea. As a mid-market company it is important for us to secure the future of this feeder and our competitiveness with this main engine conversion towards clean natural gas fuel use."

The New Drive System

Wes Amelie, which measures 152 x 23.4 m, was put into service in 2011. The ship has a container capacity of 1036 TEUs, and it was surveyed and classified during the construction phase by Bureau Veritas (BV). BV is also now the classification society which supervised and controlled the conversion according regulations and ships safety requirements.

Having previously been powered by one MAN 8L48/60 B at 9,000 kW @500 rpm running on heavy fuel oil, the conversion has changed this to MAN 8L51/60 DF dual fuel engine capable of operating on natural gas supplied from one 490-cubic-meter LNG storage tank on the fore deck. The power setting is now 7,800 kW @514 rpm.

While there are several references for this engine type, the Wessel-project is the very first retrofit for a container-vessel for the Augsburg based engine manufacturer, and the conversion of a ship towards natural gas operation is complex. There are differences between the two variants of engines. for instance enough space must be given for the installation of the LNG-tank and the regasification system, reducing load capacity.

The LNG-type "C" tank, supplied by TGE Marine Gas Engineering is positioned on the foredeck and will contain 490 cu. m. of liquefied methane. In total the tank installation cost the ship 29 TEU. Christian Hoepfner: "It was particularly important to us to offer our charterer an environmentally friendly drive system. With this decision we consciously accepted the reduction of load capacity".

The Engine Tech

"Before we started with the conversion we recorded the complete load profile of the vessel," said Rainer Runde, Project Manager, Wessels-Reederei. "They prove, that the use of the MAN 8L51/60DF as a main drive for the Wes

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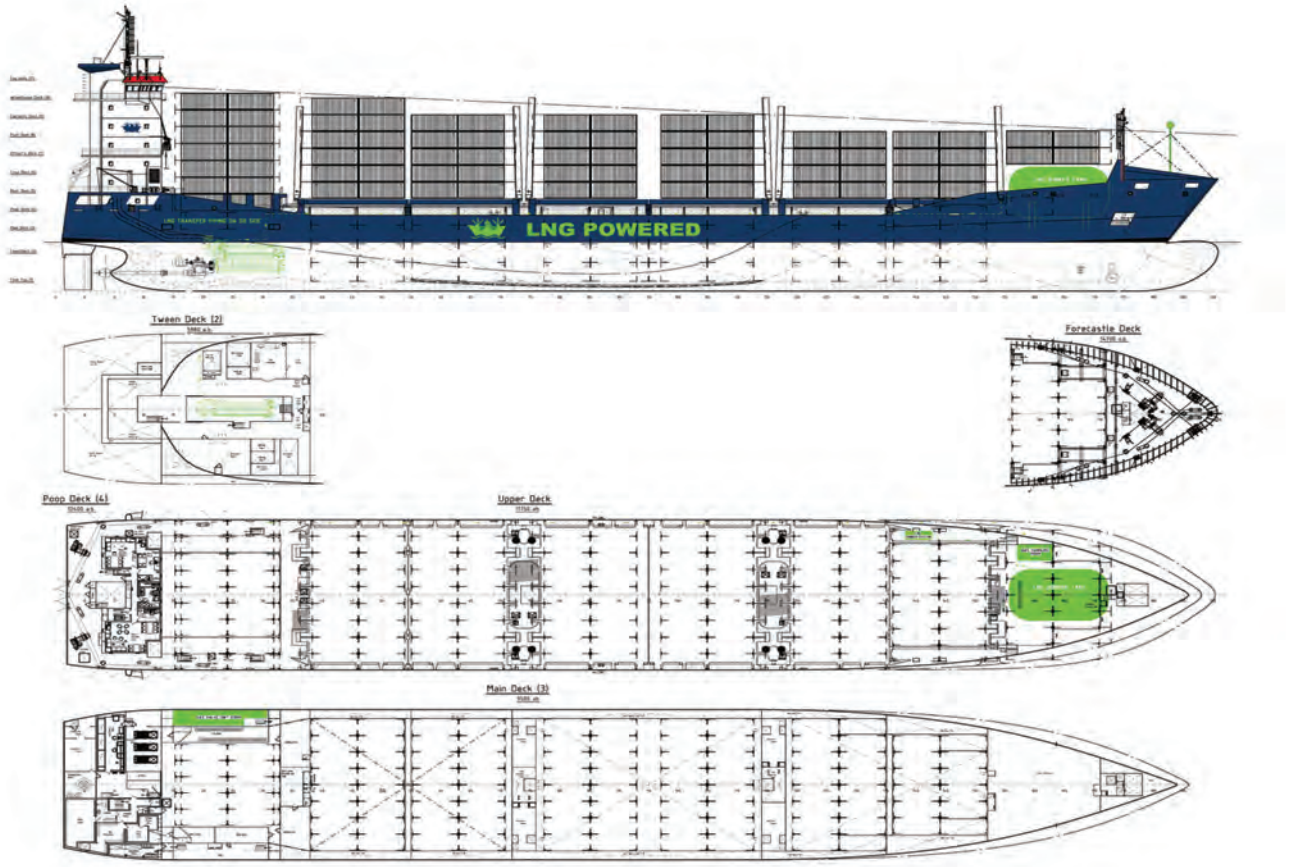


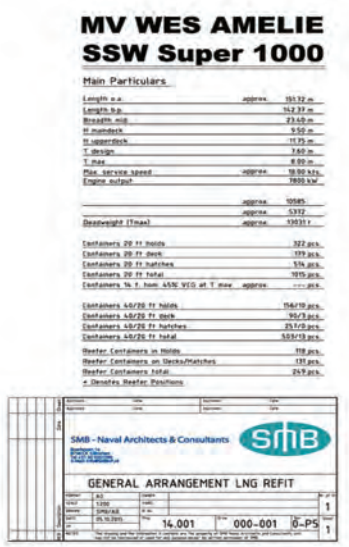


Photo: Wessels Reederei

Above: Masterplan of the Wes Amelie.

Below: Wes Amelie is now driven by a 7,800 kW MAN 8L51/60DF main engine.

Photo: PPM News Service Maritim

Amelie is absolutely sufficient. The collected data showed that the reconstructed 8L48/60B at 65 to 75% load at about 23% of the vessels operating time runs and at 25 to 50% at about 43% - values which fit perfect into the output profile of the 51/60DF. If we look at the maximum output of the 8L48/60Bs the operating time is about 75%. Our journey takes the vessel from Rotterdam, passing the Kiel Canal to different Baltic ports and back to Rotterdam. We bunker preferred LNG in Rotterdam – but the future will show if there are other possible LNG-terminals will exist to take LNG in the Baltic area. The LNG storage will last, at 100% load, for about seven days, according a distance of about 2.500 sm – but we never operate under full load."

MAN Diesel & Turbo supplied all required engine and selected system components as well as the engineering part to convert the former heavy-fuel-oil compatible engine to adapt it to run on liquid and gaseous fuels.

Most the engine components of the combustion chamber as well as the attachments have been exchanged: Cylinder liner with water-jacket area, piston, piston rings and the cylinder heads. This is necessary because of the cylinder diameter increase from 48 to 51 cm. Furthermore all injection components were exchanged respectively newly added. The pilot oil system, which is required for the gas use, was complete new installed. To realize new timings at the 51/60DF engine new cams as well as new turbocharger components were installed. The control of the dual-fuel engine 51/60DF is more complex compared to the heavy-fuel-oil engine. Hence, engine sensors must be converted respectively re-instrumentation was necessary.

MAN supplied all relevant components for the gas use and the pilot oil module on the installation side. TGE Marine Gas Engineering supplied tank and the required LNG-periphery between tank and main engine.

The First LNG-Fill

The initial LNG-filling took place in Bremerhaven by the Hamburg based company Nauticor. Four trucks supplied the LNG. "Thanks to the very good cooperation between ships-crew, the port team of Bremenports as well with our own experts, the first -fill was extremely successful," said Sonja Neßhöver, MD LNG Portfolio at Nauticor.

Wessels Reederei is forerunner with the use of methane in a container feeder vessel in north-western Europe.

After the first filling Christian Hoepfner said: "We are very happy that the first fill of LNG functioned so smoothly here in Bremerhaven. Here our thanks are once more expressed to the port security Bremerhaven, the Harbor Master's Office and the LNG supplier Nauticor."

Mahinde Abeynaike, CEO at Nauticor, concluded: "With the conversion of the Wes Amelie the Wessel Reederei creates important pioneer work for the successful establishment of natural gas as a fuel in the container shipping segment. We gladly support these endeavours and look forward to continuing our collaboration, particularly before the background that in 2018 we will receive our second bunker boat in order to ensure supplies to our customers."

Photo: Radio Holland

As Radio Holland Group (Rotterdam) finishes its '100th anniversary' celebration in the maritime shipping industry, we caught up with Paul Smulders, CEO, to discuss a century of accomplishment and the path ahead.

BY GREG TRAUTHWEIN

> *Today the market is challenged, but overall it is important for Radio Holland, as a company, to be there for them (ship owners) when they need us, providing efficient and effective service to keep them moving. Quality of Service and Support is central to all that we do, central to our future.*

Paul Smulders, CEO of Radio Holland since 2016, offers has a wealth of maritime experience and an in-depth perspective on Radio Holland, as this is actually his second run with the company, the first stretching from 1989 to 2012."If you look at my tenure with the company, the biggest change was, of course, the change in ownership in 2015, which when we started to really apply a strategy of customer support, maintenance and repair services," said Smulders. The focus on in-depth and true customer support has lead to additional opportunities. "It naturally led us into additional services such as remote monitoring, IT onboard and the use of data for support of the equipment on board."

A Long History

The company was founded in 1916 in Amsterdam as the "Nederlandsche Telegraaf Maatschappij Radio-Holland" by a group of Dutch ship owners, a group which saw the significance and necessity of radio communications to the safety and efficiency of shipping. At the outset, Radio Holland began installing radio stations on board of Dutch merchant vessels. In those years and up to the nineties Radio Holland also employed the radio-officer (also called 'sparks') on board, who operated the equipment and in the early days with the morse key. For this purpose, Radio Holland founded a special own training college for radio-officers after the WWI, in Amsterdam. When the radio-officer job ceased to exist on board in the beginning of the nineties, several radio-officers came ashore in the Radio Holland organization in various functions, from technician to purchaser, using their onboard and technical knowledge excellently.

"The '100-years-young' milestone we celebrate has given us a chance to not only celebrate the past, but prepare for the future and the decades to come," Smulders said.

Companies like Radio Holland are the future of the maritime and logistics market, as increasingly the movement of goods from manufacture to end-user depends on a seamless flow of and interactivity among data sources. While "Big Data" is a headline grabber in maritime circles, Smulders maintains that the concept is still in its infancy.

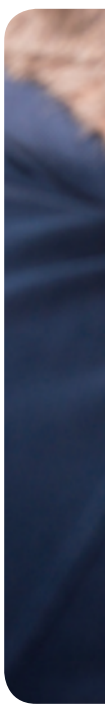
"Just this week (late September 2017) I hosted a round-table discussion with a number of ship owners, and I put on the table 'Remote Monitoring: Hype or Reality?,'" Smulders said. During the discussion it became clear to Smulders that while ship owners realize the potential benefits of remote monitoring, they don't have a crystal clear picture of how it will be organized and implemented across the fleet and the company.

As the industry searches for solutions, Smulders believes Radio Holland well positioned to provide answers – and practical tools – to provide ship owners the insight and overview they need to take investment in the technology to the next level.

The Move Forward

Smulders and his team are focused sharply on working with ship owners to deliver not simply a deluge of data, rather actionable information that has real, immediate value in helping them to run safer, more efficient operations.

"Today the market is challenged, but overall it is important for Radio Holland, as a company, to be there for them (ship



owners) when they need us, providing efficient and effective service to keep them moving. Quality of Service and Support is central to all that we do, central to our future," said Smulders.

In 'being there' he means both in person and remotely, consulting regarding specific problems and needs, meanwhile helping owners and managers employ best practices in the monitoring and maintenance of critical shipboard systems.

"Our sweet spot is making use of the data to support the onboard equipment, and reduced maintenance costs for the ship owner," said Smulders. "It is my view that we should not inundate ship owners with a lot of data. We take the angle of 'let's make use of data onboard ships to help maintain equipment onboard the ships; how can we apply the data we receive from the equipment to better determine when it needs to be maintained. So our stance is a limited amount of data, maximum support of actionable information to support equipment maintenance."

But in working with a conservative ownership in a down market, Smulders knows that his team must prove with tangible example the power of the digital solutions at hand. "What I've noticed in discussion with ship owners is they do not have a clear picture of what it can do for them," he said. "They are concerned about receiving too much data, getting lost in the data and not knowing what to do with it. They don't want to spend a lot of money on a solution if they are not clear on how it is going to help them."

To that end Radio Holland can create 'dashboards' to make the data compact and 'overviewable' in a quick and efficient way. The Dashboards can contain various key data, depending on what the ship owner would like to see.

While Smulders and his team are plenty busy in the present, this CEO enthusiastically eyes the future, and he knows that his top investment (and his top challenge) is attracting the right young people to the business. "To attract young people and to show them the possibilities. It is high technology, it is satellite communications, it is international." We need to show them the promise of maritime, the future of Radio Holland, said Smulders.

Photo: AME

Rich Merhige

AME is a Florida based engineering services company specializing in marine (Advanced Mechanical Enterprises) and industrial (Advanced Maintenance Engineering) predictive, preventative and corrective maintenance for rotating and reciprocating machinery. Founded by Rich Merhige in 1992, AME has pioneered the use of technologies and equipment to perform diagnostics, maintenance and repair, particularly for private and commercial vessels.

BY ERIC HAUN

As AME celebrates its 25th anniversary, discuss the decision to start the company.

I was exposed to reliability engineering and conditioning monitoring through my work for the Navy contractor (Booz Allen) and later through contract work I performed with Sea Land, Exxon and AT&T cable ships. These companies saw significant benefits gained from vibration analysis, ultrasonic, thermography, and we could significantly improve machinery reliability and save a tremendous amount of labor and spare parts expense – not to mention a better performing machinery is better for the environment.

I moved to South Florida and saw there wasn't anyone offering vibration analysis services based in Fort Lauderdale, so I started the business soon after buying a vibration analyzer in 1992. As the vibration analysis work grew, it became apparent a large percentage of vibration issues are alignment related. I expanded our services to laser alignment and field balancing so I could offer a complete solution beyond just pointing out problems. I was doing the pump work at the oil terminals and saw a lot of substandard work, with pumps failing prematurely and work which did not address the root causes of the failures. I started subcontracting pump rebuilds, et cetera to a local machine shop where I would oversee the work. I purchased that shop when it went up for sale in 2002, and it is still our main location, with our second location at Lauderdale Marine Center. Our service team travels worldwide to perform vibration, balancing and alignment services.

AME by the numbers: please provide a rundown on your company today.

We have two locations in Fort Lauderdale, one of which is in Lauderdale Marine Center, the largest yacht repair facility in the world. AME has 23 employees, with mobility worldwide. We perform vibration surveys, alignment or repair work on approximately 75 to 100 vessels per year.

How would you best decribe AME's services and capabilities?

AME provides mechanical engineering services and products for propulsion systems, rotating and reciprocating machinery. We're solutions-driven and focus on finding and correcting the root cause of mechanical issues to improve long term reliability and performance.

How has the business most significantly changed in the last 25 years?

When I first established the company 25 years ago, vibration analysis was not widely accepted for machinery condition monitoring and diagnosis. Early instruments were heavy, expensive and had limited capability. Early sensors and cabling were not always reliable, causing further hesitancy by operators. Now the analyzers are much more powerful with faster processors, units are lighter and the sensors and cabling more accurate and robust. Portable handheld analyzers are now able to collect multiple channels of data, enabling more accurate analysis of a wider range of problems. The software has also improved greatly, and offers the ability to process large amount of vibration data and apply expert diagnosis to speed up the process. The future looks even more exciting as processing speeds and memory size will allow even more complex signal processing, allowing better fault diagnosis and detection. AME is committed to using the latest technologies and methods.

I'm sure each job of analyzing and fixing vibration problems is unique, but are there commonalities that you have found over the years that might indicate a problem is imminent?

Most common issues for propulsion systems have to do with misalignment. Many times we find the resilient mounts are past their service life and have failed or deteriorated to the point of causing alignment problems between the engine and reduction gear. On main propulsion engines, we also pick up a lot of misfire vibration, due to a worn or bad injectors

and torsional vibration due to a torsional coupling which is beyond its service life, has failed or is about to.

Can you describe one problem that you found most challenging to solve, with insights on how the problem was detected, analyzed and fixed?

One of my first customers was a large, well-known cruise line. It was their flagship vessel, the first one they had built, and they had a complaint about a loud high pitch noise coming from the shaftline, following a dry docking, which they perceived as being a defective shaft bearing. I attended the vessel and was able to immediately diagnose it as a "singing" propeller. The propeller blade resonance was being excited by the vortices coming off the trailing edge of the blades. I recommended the divers grind an anti singing edge on the blades, which corrected the problem. However, while I was there, I noticed an exceptional and extreme vibration coming from the shaft generators which were driven by a pinion shaft which was integral with the propeller shafting. I came to find out that this had been an issue since the vessel was built, and resulted in catastrophic failures of the pinon shaft, rendering the shaftline inoperable and involving costly and time-consuming repairs. Vibration analysis showed a structural resonance problem of the propeller line shaft bearings. Further inspection revealed that additional structural reinforcement was needed in the double bottom to stiffen the tank top where the bearings were mounted. We were able to work together with a ship repair firm that welded in the appropriate structure while we monitored the position of the shaft bearings with precision lasers, so to maintain the shaft alignment and control the welding heat distortion. The result was a significant drop in vibration of the line shaft bearings and a happy and impressed customer.

What do you consider to be your biggest challenge in running an efficient, profitable business?

We are in a technology intensive business, using lasers alignment systems and vibration analysis equipment and software that requires an investment in both in equipment and training. We are constantly upgrading and purchasing new equipment to better our services. It is both challenging and exciting to be on the leading edge, but there is a huge learning curve when becoming proficient in the services we provide and equipment we use. It's not something that's taught in the classroom. It requires a combination of knowledge, training and hands-on, real world experience.

Looking back on the first quarter century in business, in what do you take the most satisfaction, and why?

It is rewarding as an engineer to diagnosis and solve complex vibration problems. It is also very rewarding to mentor our younger employees. Sometimes it takes perseverance, but with 25 years of business and experience behind us, we have been able to solve a lot of problems with the resources available to us and improve our customers operations and maintenance.

CROWLEY

Tom Crowley has become the face of the U.S. maritime industry, steadily building his transport and logistics company into a formidable goliath. From Jones Act waivers to emerging emissions technology to the devastation of Hurricane Maria on Puerto Rico, Crowley weighs in on the pressing matters of maritime with refreshing candor.

By Greg Trauthwein

Photo: © Brian Moran

"We've also been awarded a very large contract (the Department of Defense Freight Transportation Services (DFTS) contract) on our logistics side for moving cargo throughout North America, which will be a transformational project for our company in terms of expanding our capabilities, bringing new scale and capability on the domestic transportation side. ***While we see the energy sector being downsized, we see the potential for government business to increase.****"*

The last time we caught up with Tom Crowley two years ago at this headquarters in Jacksonville, Fla., we were handed a safety bulletin and Tom Crowley himself came down to the lobby to greet us. "Safety and People: The Crowley Way," was the natural headline and two years later, nothing much has changed, which sets perfectly well with Tom Crowley, the ubiquitous leader of this 125-year-old maritime company.

The State of the Market

"I think from an infrastructure point of view the U.S. Maritime Industry is as strong as it has ever been, with respect to new vessels that have been built on the tanker side, the new containerships under construction, the offshore boats, the tugs and the heavy lift barges … you name it and the shipbuilding market is coming off of a boom," said Crowley.

Then there is a pause, and the inevitable "but."

"But clearly the shift in the energy sector has reduced the amount of product being moved by sea, and reduced the level of exploration projects," said Crowley. "The offshore industry has a tremendous infrastructure that is built and ready to work, but the work simply is not there. This is putting a tremendous strain on labor pools, and a tremendous strain on balance sheets."

When the oil market was booming and crude was flowing from the inland oil and gas fracking fields to refineries on the coasts, Crowley was a major player in the construction of new tanker tonnage to help carry the load. But markets and regulators simultaneously turned south, as the oil bust – now entering its fourth year – was compounded by U.S. policy to allow the export of crude oil, a double whammy of sorts that left Crowley and others with U.S.-built and U.S.-crewed tonnage, while foreign tankers win the bids to carry U.S. oil overseas.

"Clearly there are things that will not turn around," said Crowley. "The lifting of the crude oil export ban has had a big impact on the tanker industry, effectively shifting exports to foreign ships and crew, taking that business away from American companies. While there is a great deal of equipment that has been built, the dynamics have changed."

A strong advocate of the U.S. maritime industry, Tom Crowley is not remiss to call it as he sees it, particularly when talk turns to lifting or issuing temporary waivers of the Jones Act.

"I think the basis behind the Jones Act is American jobs and the security of our country," said Crowley, noting that those two pillars of the Jones Act are in-line with everything he and his team have been hearing politically from the Congress and Administration.

"What we end up missing is conscience dialogue with the policy makers when they, for political reasons, suspend the Jones Act. I am not opposed to that (Jones Act waivers) if there is a dialogue and there is a reason behind doing it," said Crowley. In the case of the temporary Jones Act waiver in the wake of Hurricane Irma, Crowley contends that there was Jones Act tonnage available, but the company was told that it was no longer needed because a foreign flag ship was chartered. At the time Crowley had

Crowley & Puerto Rico

When Hurricane Maria devastated Puerto Rico, Crowley responded in force (above) to start the recovery. On the investment to build its new terminal, already well underway before the hurricane hit, Tom Crowley said: “The terminal rebuilding in Puerto Rico, in and of itself, could have been considered the most important project the company has ever taken on.”

an ATB laid up in Texas. “It is crazy to me that they (legislators) would go and arbitrarily lift the Jones Act because they wanted to get a headline in the paper, and then cause heartache to the people who don’t have jobs to rebuild their homes in Texas.”

Logistics

While the Crowley name is synonymous with maritime, the organization has grown to be a major player in the end-to-end logistics business, through the Caribbean and North America. In fact, Tom Crowley considers its project to rebuild its terminal in San Juan as the crowning achievement of 2017, if not all time.

“We’re not done (with the year) yet, but the amount of effort, time and funding that has gone into the re-fleeting of our Puerto Rican business is incredible,” said Crowley. “The terminal rebuilding in Puerto Rico, in and of itself, could have been considered the most important project the company has ever taken on.”

Crowley’s commitment to fostering the logistics chain doesn’t stop at the new terminal. Other project this year includes:

- Building a new LNG fueling system,
- Building a new LNG-fueled containerships
- Converting its entire operations from RoRo to LoLo

“This has been a monumental task,” said Crowley. “Each internal group has made this look easy, but when you step back and see how it has been integrated, it’s impressive. Each step was fraught with potential disaster, but calm cool heads have prevailed and we’re going to have an amazing system built by the middle of next year.”

Overall he counts a strong U.S. economy – and until Hurricane Maria ravaged Puerto Rico, a rebounding Puerto Rican market – as driving its logistics business. “The Puerto Rican economy was in pretty good shape, but now we have to shift gears and see how we can support the rebuilding process.”

“We’ve also been awarded a very large contract (the Department of Defense Freight Transportation Services (DFTS) contract) on our logistics side for moving cargo throughout North America, which will be a transformational project for our company in terms of expanding

Photo: © Brian Moran

Tom Crowley on:

Jones Act waivers

What we end up missing is conscience dialogue with the policy makers when they, for political reasons, suspend the Jones Act. I am not opposed to that (Jones Act waivers) if there is a dialogue and there is a reason behind doing it. It is crazy to me that they would go and arbitrarily lift the Jones Act because they wanted to get a headline in the paper.

The energy rebound

There is no consensus on when the recovery will come and what it will look like, but I think the common theme is that it will not go back to the way that it was. I think technology will play a much larger role, helping to make companies more efficient, and I don't think that the projects will be as large or as complicated as they were in the past.

Growing his business

I try not to let anything keep me up at night because I like a good night's sleep. (In business), I think it's not about being the hare, it's being the tortoise: building the foundation, the building blocks, the culture and the people. If you can get that right, all of the challenges that might keep you up at night, don't.

Regulation

I think most of the rules have a lot of thought and reason behind them, where things get messed up is in the implementation. By that I mean, setting deadlines, lifting deadlines, waivers and delays. I think you decide what you want to do, make it realistic so that industry can accomplish it, set a deadline and get it done.

Philanthropy

Traditionally we've always wanted to focus on maritime education. The next generation of our giving program is around our employees. We've created a "Crowley Cares" campaign, merging the things that are important to our employees with our giving program, giving our employees a voice on where the funding goes, and incentivizing them to make contributions (matching program).

Image: © 2017 Crowley Maritime Corporation

Crowley Invests

Crowley strategically invests in marine tranport assets, including tankers (above) to support domestic oil transport, and LNG-fueled ConRo ships to keep ahead of environmental regulation.

our capabilities, bringing new scale and capability on the domestic transportation side," said Crowley. "While we see the energy sector being downsized, we see the potential for government business to increase."

Disruptors

In recent years many sectors of the logistics business has been turned upside down with increasing competition from technology 'disruptors,' tech-driven solutions from the Amazon's, Google's and Uber's of the world which have effectively rewritten the 'business as usual' playbook in many sectors. When talk of technology disruption turns to Tom Crowley, he approaches it with his standard even-keeled pragmatism.

"I think it is incumbent upon us to provide the right transport solution for our customers, to understand our markets, to understand our customers," said Crowley. "If others want to come in, that's great, that's the way the world works. Our job is to do a better job. We've invested a lot in company culture, to get our employees to think differently on the way in which they should do things, to think differently about the way the company should do things."

So while the new tech might grab the headlines, Crowley insists that to be effective any step change starts internally with its own people. "When we bring in new technology, much effort is spent around change management, to have employees understand why we are making the change," he said. "You need to embrace new technologies, and understand if you don't head in this direction, there are consequences. Culture change and people are the start."

Ultimately, Crowley views people and tech as inextricably linked to realize full investment and efficiency value. "It's really easy to buy the new technology, it's much harder to get something out of it," Crowley said. "We are putting a lot more effort into the 'getting something out of it' part. At the end of the day Amazon is in the business of moving goods from the point of manufacture to the point of use; that's the business we're in, that's where we want to understand our customer's needs."

The Data Binge

Hand-in-hand with market disruption is the evolution of data management and autonomy on the water and, in fact, throughout the entire logistics chain. It is little secret that managers in every industry are deluged with information; the trick is turning that data into actionable information to whichever end the company seeks, from efficiency to safety to profitability.

"We see the data coming at us from a number of directions, whether it's from the companies building our engines or AIS information or container tracking, the list goes on forever," said Crowley. "What's missing is the integration of all of that information and presentation of it to customers in a way in which they get more value." With so many disperse systems tackling the integration portion is arguably the hardest, yet most important piece of the puzzle.

The challenge of technology integration is magnified within the walls of a 125-year-old organization as diverse a Crowley. "It is a much more difficult scenario to introduce new platforms and integrate them across all units to work properly together and ultimately deliver value to the customer," said Crowley.

The deluge of data does not stop shore side, and in fact the proliferation of helping crews onboard to better manage administrative duties has been, and remains, the biggest challenge for Crowley. With that the conversation naturally shifts to the burgeoning trials of autonomy on the waterfront, technologies that would severely reduce and in some cases replace the human element onboard vessels. As will other technology investigation, Crowley is intrigued but not yet convinced on autonomy.

"It is hard to visualize what this is going to be and how long it will take to get there," he said.

"There is no question that the technology is there, and it's only going to get better. When you're on the water things can and do go wrong that require human intervention. But I think that autonomy will only serve to improve safety, improve capability of vessels in terms of efficiency. There will be many cost efficiencies realized as autonomy continues to develop."

The big question on autonomy is not really about replacing crews, rather how it in all of its forms may help to make the job of mariners more safe and efficient. "Our biggest challenge onboard vessels with respect to our crews is we have had to give them so many more administrative duties onboard, and we haven't spent enough time making their life more simple. This (topic) is a top priority for me, but the question remains: will autonomy help or will it make it more of an administrative burden? At this point it's hard to tell."

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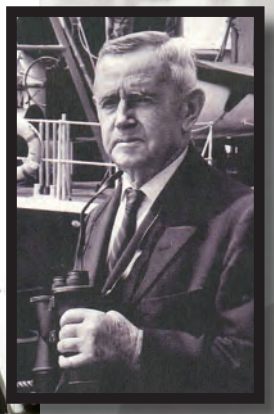


Thomas Crowley
1875-1970

Left: Tom &
Dave Crowley

1892
Founder Thomas Crowley for $80 purchased one 18-ft. Whitehall boat to provide transportation of personnel and stores to ships anchored on San Francisco Bay.

1900
Crowley continued to build new or buy used gasoline launches, expanding both the fleet and the type of work the company could perform.

1906
Crowley's fleet played a role in ferrying passengers and their belongings out of San Francisco following the great earthquake.

Operations incorporated under the name **Crowley Launch and Tugboat Company.** Stockholders were Thomas Crowley and his two half-brothers.

1908
Crowley purchased tugs of his own and entered competition with Shipowners and Merchants Tugboat Company, operators of the Red Stack tugs.

1912
To manage the growing fleet, Crowley built a marine railway, a dock and a woodworking mill and named it **Crowley Shipyard**.

1915
During the WWI, the company built and added to its fleet a large, heavy-lift derrick barge which could perform 100-ton lifts.

1934
Crowley undertook a conversion program to convert from steam to diesel.

1938
Crowley designed a 148-ft, 7,000 bbl. gasoline barge capable of moving refined bulk petroleum.

1939
Crowley's dry dock and repair company began building ships for the government in support of World War II.

1947
Construction of the company's first sea-going oil barge, Barge 11, was completed.

After the war, the Company replaced all of its surviving steam tugs with war surplus diesel equipment.

1953
Crowley pioneered transportation of railcars loaded with bails of dissolving pulp on a 125-mile water link between railroad tracks at Ward Cove in Ketchikan, Alaska, and Prince Rupert, British Columbia.

1955
Crowley initiated its long to arctic transportation with an agreement to resupply the U.S. Government's distant early warning radar and communication system on the Alaska coastline.

1960
In the 1960s, Crowley was called on by oil industry officials to help tame the waters of Cook Inlet, Alaska, by rafting tugs together to supply the necessary horsepower to set the oil exploration platforms and furnishing a supply boat and crew boat services.

1971
A weekly RoRo freight service between Miami, Fla., and San Juan, Puerto Rico, and from the U.S. Gulf to PR was developed.

1975
Crowley Maritime Corporation was formed.

1977
Aleyska selected Crowley to provide vessel assist and tanker escort services at Valdez for tankers loading crude oil.

Between 1974 and 1977, 25 Invader-class tugs and nine 450-series petroleum barges were built for the Company.

1978
The Company developed the world's largest RoRo barges for the mainland/Puerto Rico service. By the end of the 70s, Crowley had become the largest RoRo carrier in the Caribbean trade operating out of the U.S. Southeast and Gulf.

1986
New operating units in 1986 and early in 1987 further internationalized Crowley's marine operations by expanding cargo ship operations to Central America, the entire Caribbean, and both coasts of South America.

1989
On March 24, when the 987-foot tanker Exxon Valdez went aground, Crowley tugs were first on the scene to take up position alongside the stricken tanker. Crowley was the principle contractor of equipment and personnel to provide marine support for the spill cleanup.

1991
Crowley was the first in the industry to establish a data input program accepted by the Federal Maritime Commission.

1994
Thomas B. Crowley, Jr., was unanimously elected to the position of Chairman of the Board, President and CEO following the passing of his father.

2001
Crowley acquired all of the outstanding shares of Marine Transport Corporation, a U.S.-flag petroleum and chemical tanker company and folded its business activities into Crowley Petroleum Transportation. Marine Transport Corporation continues to provide ship management services for MARAD.

2002
In April, Crowley christens its first Articulated Tug Barge (ATB) - the 9,280 HP-tug Sea Reliance and 155,000-barrel barge 550-1. It was the first ATB in a newbuild program consisting of 17 tug-barge combinations spanning more than a decade.

2005
Crowley acquired marine salvage, wreck removal and emergency response company Titan Maritime, LLC. (Later renamed TITAN Salvage).

2006
Crowley deployed the Crowley Alliance, the company's first Russian flagged and crewed vessel serving the offshore oil industry near Sakhalin Island, Russia. The ship UT 708 design 12,000 BHP AHTS that is Lloyds Ice Class 1A Super has the hull strength and power to break first-year ice up to one-meter (approximately 39.37 inches) thick.

2007
After about two years as a public reporting company, Crowley once again became a private company on May 5 with the acquisition of all outstanding shares.

2008
Crowley acquires Seattle-based Jensen Maritime Consultants, a naval architecture and marine engineering firm with more than 45 years experience designing and engineering a variety of different commercial vessels.

2010
Crowley begins construction of three larger, Jones Act qualified ATB's known as the 750-Class. Each tank barge will have 330,000 bbls capacity and are scheduled for delivery by the end of 2012.

2011
Crowley acquired Houston-based Jarvis International Freight, Inc., a freight forwarding, export packing and logistics company primarily serving the energy, oilfield and mining industries.

2012
In April, the tender and removal of the Costa Concordia wreck was awarded to company subsidiary TITAN Salvage and partner Micoperi. The job is reported to be the largest maritime wreck removal project ever undertaken.

TITAN Salvage was awarded a contract to serve as the commercial marine salvage and engineering support contractor for the Navy.

Crowley expanded its logistics services to include Less-than-Containerload (LCL) ocean and air cargo lifts along with Customs brokerage services to Cartagena, Colombia.

In October, Crowley christened the first two ocean class tugboats, the Ocean Wave and the Ocean Wind in New Orleans.

2013
In January, Crowley christened its newest tanker, Florida. The 330,000-barrel vessel was immediately put to work in the U.S. Gulf of Mexico for a major energy customer.

In May, Crowley entered the liquefied natural gas (LNG) market by acquiring Carib Energy LLC.

Crowley announced in August that it would expand its fleet of petroleum vessels by building eight product tankers. (Delivery slated between 2015 and the end of 2017)

After a grueling year of preparation and engineering ingenuity, in September TITAN successfully parbuckled (raised upright) the Costa Concordia cruise ship.

Crowley's new ocean class tugboats completed the successful delivery of the offshore oil production and drilling platform Olympus – the largest tension-leg platform ever to be developed for the U.S. Gulf of Mexico – to its deepwater location in the Gulf. The project provided the first

Photo: Tim Rue

Photo: Lawrence Smith

Photo: Judy Patrick

opportunity for all four ocean class tugs to work together on a single job.

2014

Subsidiary Carib Energy LLC received a 20-year, small-scale U.S. Department of Energy (DOE) export license for the supply, trnsportation and distribution of U.S.-sourced liquefied natural gas (LNG) into Non-Free Trade Agreement (NTFA) countries in the Caribbean, Central and South America.

Construction began on the first of two liquefied natural gas (LNG)-powered, combination container - Roll-On/Roll-Off (ConRo) shipsfor use in the South Atlantic Puerto Rico trade

The third and fourth ocean class tugboats <96> Ocean Sun and Ocean Sky were christened and entered the fleet

2015

Crowley Maritime Corp. and Svitzer Salvage merge salvage divisions to create new company Ardent.

The international and government ship management groups take on new technical management duties for a number of container ships, tankers, MSC marine prepositioning ships the ROCON fleet and the U.S. Navy's T-AGOS/T-AGM fleet.

Crowley acquires SeaFreight Line, SeaFreight Agencies, and SeaPack to expand its liner and logistics services in the Caribbean Basin.

$48.5-million construction project for a new pier at its Isla Grande Terminal in San Juan, Puerto Rico begins.

The first two of four, new LNG-Ready Jones Act product tankers join the petroleum fleet after construction at Philly Shipyard, Inc.

After two years of careful planning, engineering and preparation, Crowley's marine solutions team, with nearly 300 on-site workers and 20 support vessels, completed the successful installation of customer Furie's Kitchen Lights natural gas production platform and underwater pipeline in Cook Inlet, Alaska.

2016

Crowley welcomes four more newly built, LNG-ready product tankers to its petroleum and chemical distribution fleet.

Ace Fuels in Alaska joins the Crowley family.

For more information, visit Crowley's 125-year interactive timeline at:
http://www.crowley.com/About-Us/History

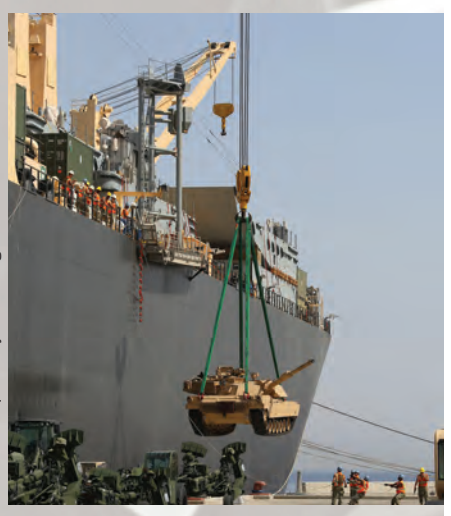


Photo:USMC photo by Master Sgt. Will Price

A NEW BREED OF TUG

When markets expand niches are created, goes the logic. For builders of tugs, that market is “floating gas” and the expanding use of liquefied natural gas, or LNG, as a fuel. In support of LNG, there’ll be more oceangoing tug duty — the new floating storage and regasification units, or FSRUs, mean busier LNG carriers, and LNG cargo owners have an interest in tug escorts that share their “carbon footprint”. Still, new emissions rules offer ways to keep using refinery products, and the work of master tug designers suggests the new breeds of tugs are about more than fuel.

By William Stoichevski

"The impact of LNG carrier and FSRU fleets worldwide is a significant and positive one for our tug business," Robert Allan president and CEO, Mike Fitzpatrick, tells Maritime Reporter & Engineering News. "The owners of LNG carriers and FSRU's demand much higher quality and higher performing tugs than other shippers for a variety of good reasons."

In fact, the push to LNG by Europe is real: The Continent is out of oil but well-supplied by natural gas and U.S. refinery products. Europe's port cities strive to be carbon-free harbors that nevertheless give free reign to LNG supply barges or LNG-fueled cruise ships. Marine fuel and emissions are being strictly monitored, with the monitoring technology offered up by classification societies. For over two years, now, MARPOL Tier III nitrogen oxide rules have been in effect for vessels with engines equal to or greater than 130 kW, and new Emissions Control Areas and the 2020 (or 2025) 0.5-percent sulfur cap are on the way. Since the preponderance of tugs already operate in current or future near-shore ECAs, they face widening compliance issues (as in the waters around Europe's many LNG import terminals and two LNG export terminals at Hammerfest LNG in Northern Norway and Yamal LNG in the Russian Arctic).

The Arctic — sensitive, likely future ECA of large and frequent LNG transshipments — has provided cold inspiration to at least one energy company insisting LNG-powered tugs handle the LNG carriers moving its "clean" cargoes: Statoil's ECA-LNG imperative offered market entry for three oceangoing LNG-powered tugs delivered recently by Spanish yard Astilleros Gondan to Ostensjo Rederi, a renown Norwegian tug operator and now the first owner in Europe of these LNG types. The vessels, designed by Robert Allan, won't need to respond to quite the same arctic conditions as tugs plying, say, Yamal or Northeastern Quebec, but they do need to respond to remoteness, freezing mists and fast shipping. To power that preparedness, they have Wärtsilä LNGPacs of two, six-cylinder, 34DF engines offering "seamless" LNG-diesel use and 3,000 kW each. Like every vessel in the Norwegian arctic, they have assigned roles in area oil-spill defense: onboard oil skimmers and booms; a RIB for arctic rescue and comfort for eight. The third of this trio of 40-meter tugs — Audax, Dux and Pax, with their (LNG) cargo-handling cranes and 107 tons of Ballard pull — was delivered in July 2017 and immediately heralded as "trend-setting" in Europe's gas powerhouse, Norway.

"The Ostensjo RAstarDF tugs are actually quite different from the TundRA design built for Group Ocean in Quebec," says Mr. Fitzpatrick. "The Ostensjo tugs use our standard escort tug hull form with some reinforcement to achieve a relatively light Ice Class, whereas the TundRA design is a specialized ice-breaking hull form with heavier reinforcement." The Swedish port of Lulea is understood to have already tendered to European shipyards for a powerful (diesel-electric) hybrid TundRA of 100 t BP based on the Group Ocean vessel.

Robert Allan isn't alone in proliferating new, "high-spec" tug designs. As we wrote these lines, Wärtsilä — its designs are the basis of 1,000 tugs worldwide — launched the HYTug concept and encapsulated gains made in mechanical and electric hybrid propulsion. The designer and builder of the 20 DF and 34 DF LNG is known for early LNG tug design deliveries to China and the

"A typical tug operating 1,500 to 2,000 hours per year at an average load factor of 30 percent simply does not burn enough fuel to offset the significantly increased capital costs to build an LNG-fueled tug.

Middle East. In 2012, Wärtsilä struck a deal to supply China's first LNG-powered tugs and were first out with a 29 m tug in partnership with Dry Dock World in Dubai on vessels that were delivered but never commissioned. In gas mode, Wärtsilä's LNG tugs are Tier III compliant for cutting emissions of sulfur oxide completely and trimming carbon-dioxide by 20 percent and nitrogen-oxide by 80 percent.

The non-LNG HYTug, however, allows for fewer emissions by enabling less installed power than a "conventional" design. "We believe that new tugs will in future rely more and more on battery and hybrid propulsion," says a Wärtsilä Marine Solutions statement. The HYTug launches at the Asian Tug Technology and Salvage conference in September 2017.

Photo: © Piriou

LNG ASPECTS

A Wärtsilä LNG bunkering system completes the company's LNG Pac offering of fuel storage and supply "designed with the smallest onboard footprint" for a tank, connection and process kit (in cold-box). Robert Allan documents confirms the surprisingly small space adjustments required to use Wärtsilä LNG storage tanks for some LNG tug models designed by the Vancouver-based outfit: "The aft deck space on many tugs is thus often just a large empty area. We considered it prime real estate (on the Robert Allen Rangler design) for lo-

Water-cooled:
Piriou's Ost 30 maneuvering

Photo: Wärtsilä

cating the accommodation facilities displaced by the LNG tanks." On a RAstar 4000 DF built for an escort speed of 15 knots to chase 300 fast-moving LNG carriers a year in arctic waters, there is still 313 cubic meters of diesel fuel oil storage; 33 m3 of LNG capacity; 46 m3 of fresh water storage; space for 254 m3 of oil slick; 20 m3 of fire-fighting foam and 20 m3 of dispersant.

"The new RAstar 4000-DF class tugs are indeed first of class in many respects and truly have no equal in the world of tugboats," Mr. Fitzpatrick asserts.

Along with the speed and storage are some peculiarities of LNG engines. Each tank-connection space contains LNG liquid and vapor passageways; a pressure build-up evaporator; a main gas evaporator and the gas valve unit for each engine. "The tank hold is designated a non-hazardous space accessed from the engine room by means of an A-60 rated watertight door, (and) all gas supply piping is double wall." On top of this novel complexity, there's the LNG bunker station on the main deck for bunkering from a tank truck or barge.

"We are working on a number of new projects at the moment utilizing the unique RANGLer design which we expect will proceed to construction in the not too distant future," Fitzpatrick said.

LNG-Power: Wärtsilä's LNGPac at Dubai Dry Dock.

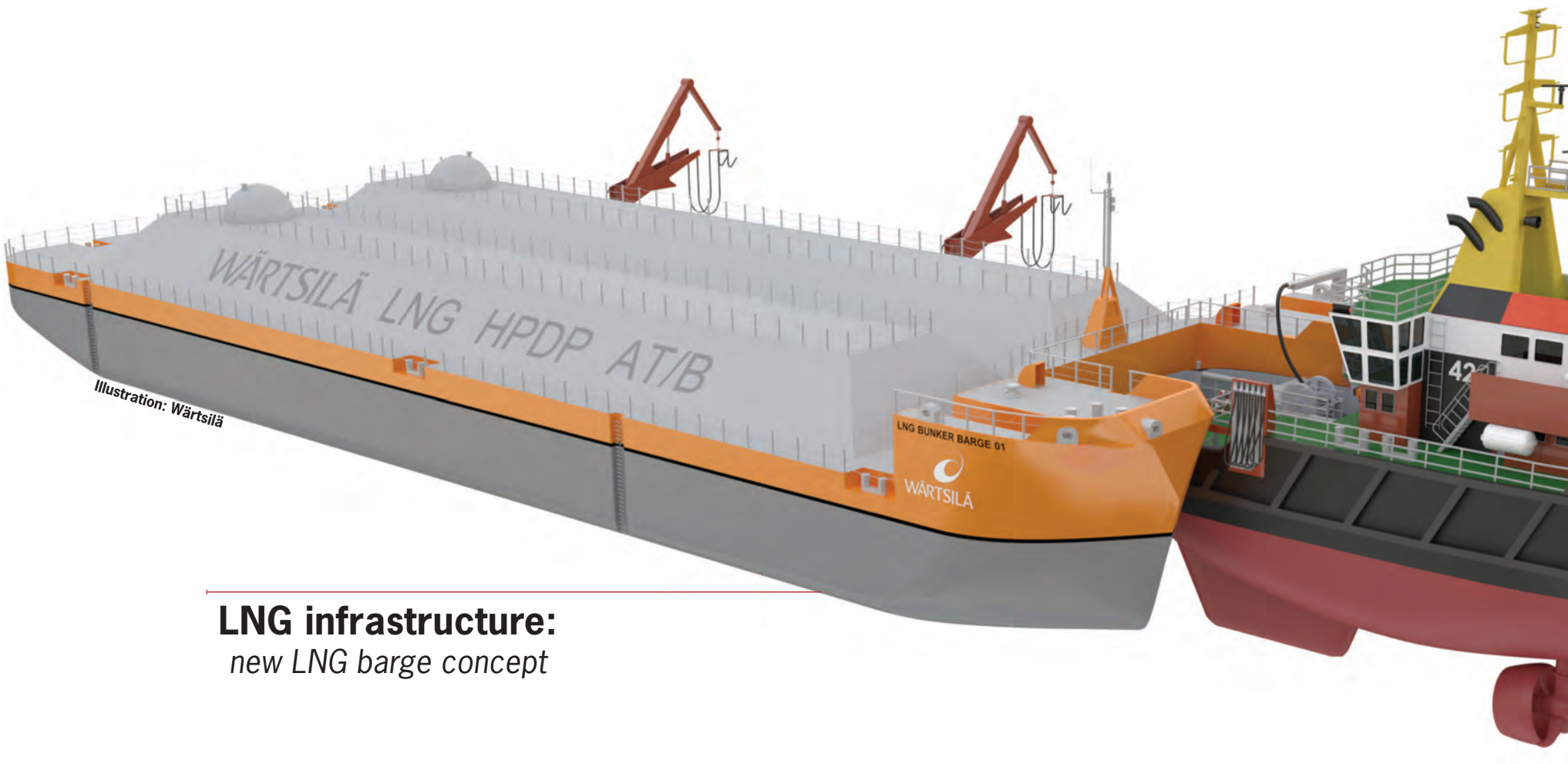


Illustration: Wärtsilä

LNG infrastructure:
new LNG barge concept

"The main factor driving these RANGLer projects is the need for greater endurance when running on LNG. In our more conventional RAstar and RAmparts designs we are realistically limited to a LNG capacity of about 30-40 m3 whereas we can accommodate tanks of up to about 100 m3." Until tanks are that large, tanker-supply, fuel-sharing and bunkering — including via a new Wärtsilä bunkering barge just released for use in Europe — will be the order of the day.

WARM-WATER TUGS

At Statoil's Melkoya LNG terminal off Hammerfest, there's the need to tackle high sea states for serving as emergency response backup. The Ostensjo hull forms are "optimized for excellent sea-keeping" in rough, cold sea states. Fore and aft winches are enclosed in insulated and heated winch rooms. Exposed working decks have heat tracing to reduce ice build-up. The wheelhouse is fitted with heated windows, and an efficient combination of electric- or oil-fired boiler provides hot water for "domestic use", the "pre-heating of engines" or to heat recovered oil tanks.

Tropical tug operations have the opposite requirement, and designer Piriou recently recorded an order for an OST 30 30 m vessel at Pointe-a-Pitre harbour in French Guadeloupe, an island in the Carribbean. Caraibes Remorquage will operate the 30.3 meter tug with 55 t BP and two 1,678 kW azimuth stern-drive propellers. The buyers wanted Piriou's indirect refrigeration system for all vessel equipment and box coolers adapted to tropical conditions without seawater circulation. The tug was shown at Tugnology in Rotterdam in May 2017 and will be built in Vietnam.

Robert Allan, too, has had something for warmer waters, including a dual-fuel RAstar 4200-DF for Ningbo Port Co. A pair of Niigata 8L28AHX-DF dual-fuel engines driving two Rolls-Royce US 255 CP Z-drives and delivering 80 t BP will carry up to 60 m³ of LNG fuel on this RAstar 4200. It'll be classed with China Classification Society. That's not the only warm-climate work the company's designs have found, and assisting Shell's giant Prelude FLNG vessel — the largest vessel in the world — are a team of dual-fuel Robert Allan ROTORTUGS "infield support vessels" for owner's KT Maritime Services Australia.

So, to a tug designer, is gas the new oil? Not yet.

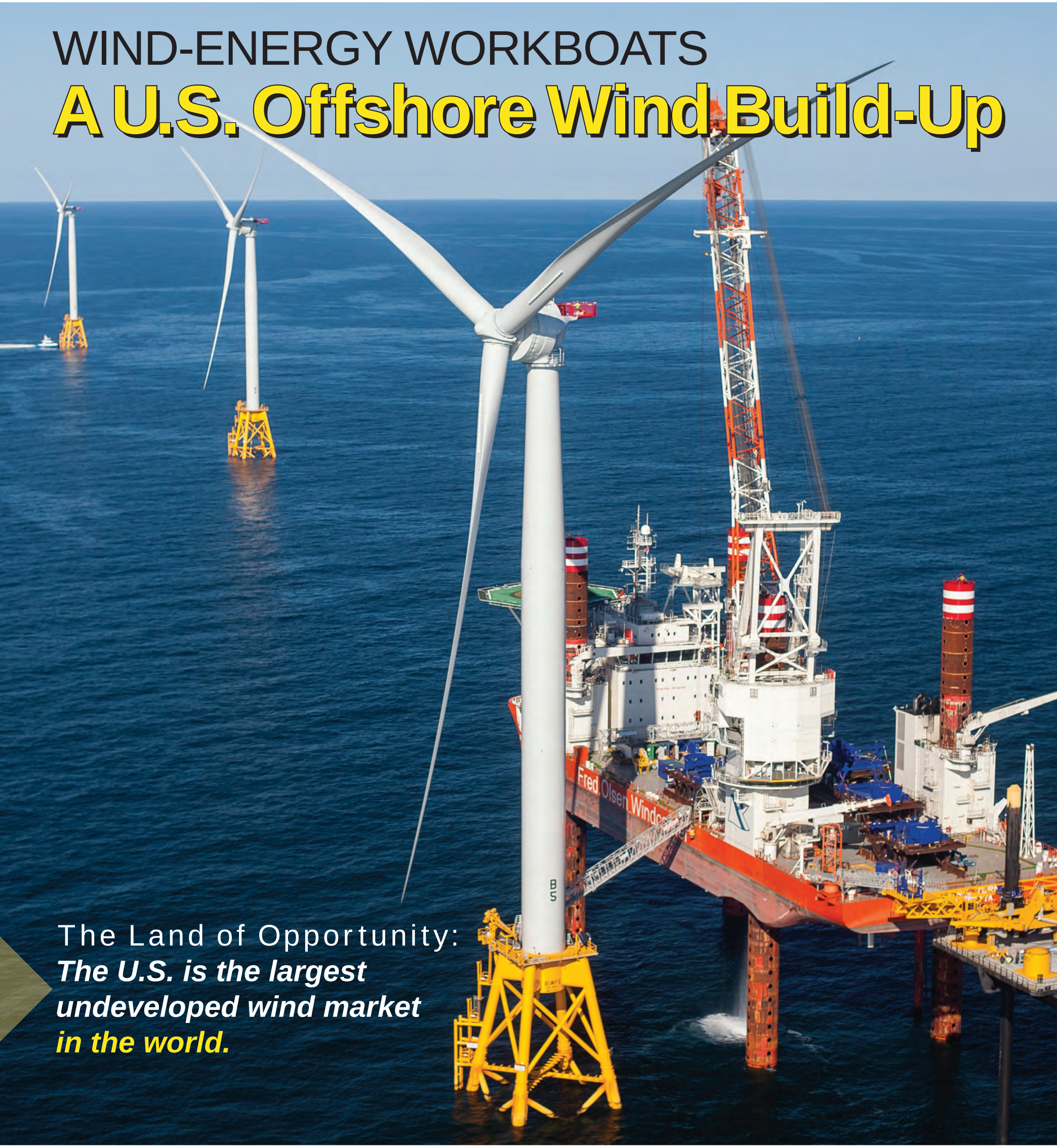
"That statement is perhaps a bit of a stretch if we are talking about LNG as a fuel for tugboats," Fitzpatrick said. "I do not realistically see a time when a large portion of the tugs we design are LNG-fueled unless fuel prices rise significantly."

A typical tug operating 1,500 to 2,000 hours per year at an average load factor of 30 percent "simply does not burn enough fuel to offset the significantly increased capital costs to build an LNG-fueled tug.

"That said, I am certain we will continue to build a number of LNG fueled tugs every year for operations where the (other factors) of burning gas outweigh the economic issues. Ultimately, the range and endurance of a tug with LNG is severely compromised in comparison to a diesel-powered tug of the same dimensions."

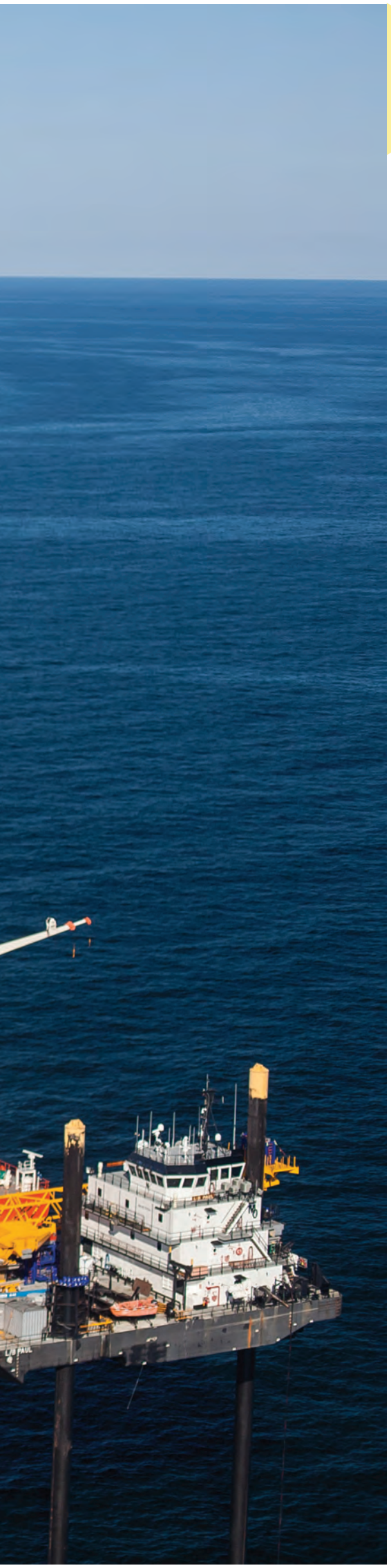
WIND-ENERGY WORKBOATS

A U.S. Offshore Wind Build-Up



The Land of Opportunity:

The U.S. is the largest undeveloped wind market in the world.



Pioneers:
Block Island, RI, America's first wind park.
Photo: AWEA/Deepwater Wind

Block Island — U.S.-based Deepwater Wind's five-turbine, 30-megawatt wind park — was the first. It showed what was possible, what might not have been optimal and how long it all takes. Since then, incentives for onshore-wind have been curbed, while a tax credit for offshore wind has been extended. Wind parks are in the works. States have power companies buying offshore wind energy, and experienced offshore operators are hiring the new wind-service vessels from elements of their oil-and-gas supply chain. The Jones Act, too, is being overcome by fleet owners and designers joining the U.S. offshore wind build-up.

By William Stoichevski

Image: GustoMSC

"The algorithms are built on top of the dynamic-positioning (controls) — accelerate, decelerate, wait, (throttle). Due to the repetition involved (in operating a wind-turbine service vessel's walk-to-work platform, or W2W), you need an auto-stop mechanism. It's too much for one person," a source close to Norwegian tug owner Ostensjo's two wind-service vessel new-builds tells us over coffee in downtown Norway.

A survey confirms the preponderance of Norway's offshore fleet owners are building new or converting vessels to capture wind-service market share. So, too, are the Dutch, the Danes and the Brits — and, yes, the Americans. Some Northern European ship owners say they're content to serve the world's hitherto largest offshore wind markets: Britain and Germany. "America," for these, is too "wait-and-see."

Some of their peers, however, have secured U.S. partners, builders or design offices to serve what market watchers know is the largest undeveloped wind market in the world: at least five U.S. coastal states have held successive, successful offshore lease sales for some of the over 2,000,000 acres in offshore wind concessions under auction. Populace New York and Massachusetts (the latter with mega-project bids due this December 2017) are notable for total acreage offerings of at least 750,000 acres, according to numbers from the Department of the Interior and the Bureau of Ocean Energy Management. New York in 2017 qualified 14 companies for its sixth lease sale, part of a commitment to 2.4 gigawatts of installed offshore wind energy hoped for by 2030. The first is Deepwater Wind's South Fork, although Statoil now also has rights to areas acreage. Ship owners would be wise to get to know the unfamiliar company names winning leases in New Jersey (offering over 345,000 acres), North Carolina (429,000 acres), Rhode Island (Deepwater Wind) or Maryland, where U.S. Wind Inc. plans a 248 MW project for 2020 and Skipjack Offshore Energy LLC's a 120 MW windfarm due 2022.

North Carolina in 2017 qualified nine companies to bid in its seventh offshore lease auction, and in March 2017 an auction for the Kitty Hawk Wind Energy Area, or WEA, for 122,405 acres went to Avangrid Renewables with a winning bid of $9.1 million. Projects now tend to dwarf the pioneering five-turbine, $350 million Block Island project of 2014-2016.

Fortunes align

BOEM checks the legal, financial and technical wherewithal of offshore operators now deep in planning that'll make them U.S. offshore grid owners. Statoil won the wind lease sale for 80,000 acres offshore New York and plans a wind park of up to 600 MW in the New York Wind Energy Area, or WEA, 30 to 60 miles offshore in water 65 to 130 feet deep. "The U.S. is a key emerging market for offshore wind — both bottom-fixed and floating — with significant potential along both the east and west coasts," the operator says, echoing a DOI report. Like the others, Statoil's an offshore stakeholder elsewhere: at Sherrington Shoal off the U.K. since 2012 and at a just-installed, first-ever floating wind park for its lauded Hywind turbines offshore Scotland.

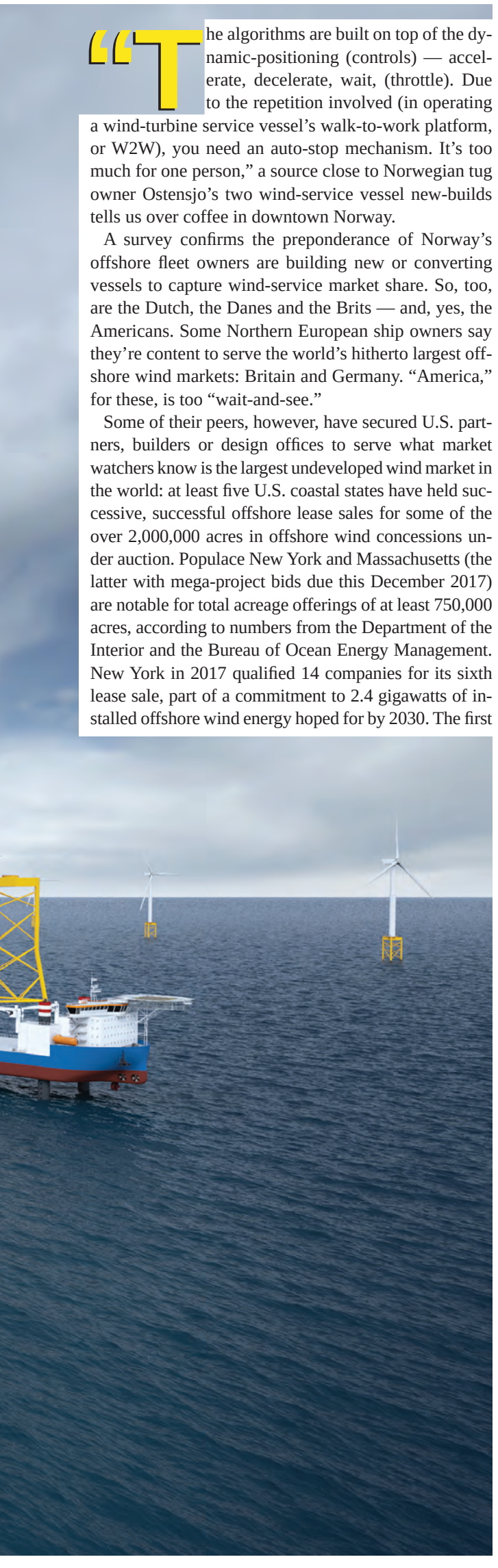
Foreign firsts

The largest U.S. wind farm is expected to be U.S. Wind's $2.5 billion installation 12 miles off the coast of Ocean City, Md. U.S. Wind brings international experience via its Italian leadership and will need it to install a planned 187 turbines by 2020. Despite such apparent needs for vessels, our calls to U.S. operators about their future shipping needs produced "reluctance", although there are good reasons for caution: Reason No. 1 is the not-yet assembled offshore wind supply chain.

There's another reason: The Block Island, RI, project revealed that while jack-up vessels could install windturbines with fair ease and security, smaller "support jack-ups" available locally appeared to some to struggle while handling large, unwieldy turbine components while being buffeted by waves. Cells, rotor blades, shafts, flanges and towers require scale or risks appear high. Word of Block Island's "demo" spread via veteran deck hands who had compared small local hires to the large installation vessel, Bold Tern, of Block Island's capable hire, Fred Olsen Windcarrier.

New designs

"A typical windfarm support vessel," says Vard Design's concepts VP, Kjell Morten Urke, of the Vard 4, a type offered American builders via the company's U.S. offices. "Typical" implied a norm has been established by Europe's veteran offshore wind industry (now over 20 years old), as exemplified by Fred Olsen Windcarrier. Vard, too, is confident of its U.S. clout. "We're ready. We're in Holland right not presenting the (just



announced wind-vessel) design. We may not take much market share in install vessels but in cable-layers, hook-up and service. We'll focus on that," Mr. Urke says.

GustoMSC — a wind pioneer with a hand in "80 percent" of the offshore wind-installation equipment out there, including Bold Tern and Brave Tern — has adapted a new jack-up installation concept to its view of the U.S. wind market as "emerging". GustoMSC offers shipyards and the growing numbers of U.S. wind operators self-propelled and unpropelled jack-ups, the latter for "the more risk-averse."

In October 2017, "the economical, safe and efficient" SEA-3250 LT installation jack-up was unveiled: "Currently there is no equipment available in the U.S. that is capable of installing present and future heavy foundations and turbines, due to insufficient carrying & lifting capability in terms of both capacity and height," the company says, echoing the view in European. The SEA 3250 LT joins the larger, wind-capable self-propelled NG-98000C-US and its NG-3750C feeder unit in solving "this (financial and installation-capacity) bottleneck." The SEA 3250 can carry two of the largest turbines "while underway" to the installation site. Heavy lifts to heights of over 130 meters — new normal for turbines sizes now reaching 12 MW— are possible "in an area where technicians are performing assembly tasks at the same time". Interestingly, this GustoMSC design can "serve as a Jones Act compliant feeder solution to a larger foreign vessel".

From New Orleans, lift-boat maker AK Suda has also joined the fray recently by developing its JG series of wind-turbine installation vessel, or WTIV. The first, JG6000P, "works within all U.S. staging ports" and can carry and install 8 MW turbines. AK Suda and GustoMSC might represent the bulk of U.S. wind-installation vessel offerings.

Europeans contrasts

Saving enormous sums, the Hamburg-based Fred Olsen Windcarrier's jack-up boat crossed the Atlantic with wind-turbine components aboard, a first for the vessel type and a hard-to-match feat. "Fred Olsen Windcarrier sees the U.S. as an important and potentially world-leading offshore wind market," business-development manager, Stuart Thornton, writes in an email. The company's twin lift-boats can install any of today's turbine sizes to fixed, seabed foundations.

A2Sea is typical of the seasoned, offshore wind European supply chain with links to Statoil, including its 67-turbine Dudgeon park, its just-installed Racebank wind park and a September 2017 contract for the Merkur project in Holland with a Sea Challenger fresh from the Racebank job of summer 2017!

While a DOE report confirms the "lack of a project pipeline" has held up the U.S. market, A2Sea confirms Europe's projects keep the company busy. Like A2Sea, European turbine maker Siemens Gamesa seems to busy for the U.S. market: "No offshore projects for now. It's a market where we see potential in the next few years. It's an important market of the future for us," they write in a letter. Like the U.S. grid operators "to-be", they can only be vague when it comes to vessel needs. "We work with nearly all operators of wind-turbine installation vessels. The challenge in the U.S. is that … If you need a jack-up for a turbine installation, it might be a challenge."

Specialty vessels

When this writer visited the East of England years ago, Britain was seeing its first wind turbines novel designs for crew-transfer vessels. For the uninitiated, there was something worrying about the bump-up against the grouted flanges turbine towers rested on. Grid operators then complained of suppliers' rickety finances.

Today's operator-supplier bonds are robust, as illustrated by Esvagt signing a 15-year contract with MHI Vestas Offshore Wind to deploy SOVs to both near-shore and remote European wind projects in need of accommodation, W2W and the company's deployable safe transfer boats, or STBs, for technicians, tools and turbine spares. In 2010, ESVAGT brought SOVs to the market that offered offshore-style leisure, office, storage and workshops of special interest should floating wind take projects succeed farther out into the U.S. 200-mile limit, as is envisioned.

So, is the U.S. an Esvagt target market? "The short answer is no," says business development manager, Ole Ditlev Nielsen. "ESVAGT aims to follow and assist the expansion of the renewable industry, where SOV's create value. We will therefore be ready to follow our customers out of Europe as well. This requires that the local regulations enable ESVAGT to perform its services there."

Meanwhile, British advocacy Subsea UK now advises its members to seek wind work to wherever it may be to offset lost oil-and-gas opportunity. In August 2017, the organization put world offshore-wind spending at over £350 billion through to 2026.

Crew comforts:
The Esvagt Faraday

Photo: Siemens Gamesa

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BOUCHARD
TRANSPORTATION CO., INC.

SET TO CELEBRATE A CENTURY

In 2018 one of the U.S. premier vessel owners – Bouchard Transportation Co., Inc. (BTC) – celebrates its 100th year in business. Maritime Reporter looks at BTC's evolution through the years.

The year 2018 is a celebration year for the Bouchard Transportation Co., Inc., which was founded in 1918 in New York Harbor by Capt. Frederick Bouchard, and will next year celebrate a century in business. The company's first cargo was a shipment of coal, and its first oil barge was acquired in 1931.

In 1955, the third generation of the Bouchard family joined the company, and in 1992 the fourth generation– Morton S. Bouchard, III – took the helm, and leads the company still today. For nearly a century, Bouchard has remained family-owned and operated, with now the fifth generation actively involved in the day-to-day operations.

BTC has a long list of achievements throughout the years in regards to safety, efficiency and charitable activity to seed the coming generation of mariners, and notably it is the largest privately-owned petroleum barge company in the United States.

Safety

The foundation of Bouchard's core business philosophy has always focused around safety, while consistently maintaining and advancing its equipment at the highest standards. "A safe and reliable operation is the only formula that leads to profitability," said Morton S. Bouchard III, President & CEO. "We have a dedicated commitment to our customers and the safety of our operation, and we will continue to lead the market by investing our profits into innovative advancements in order to continue operating in the safest and most efficient manner."

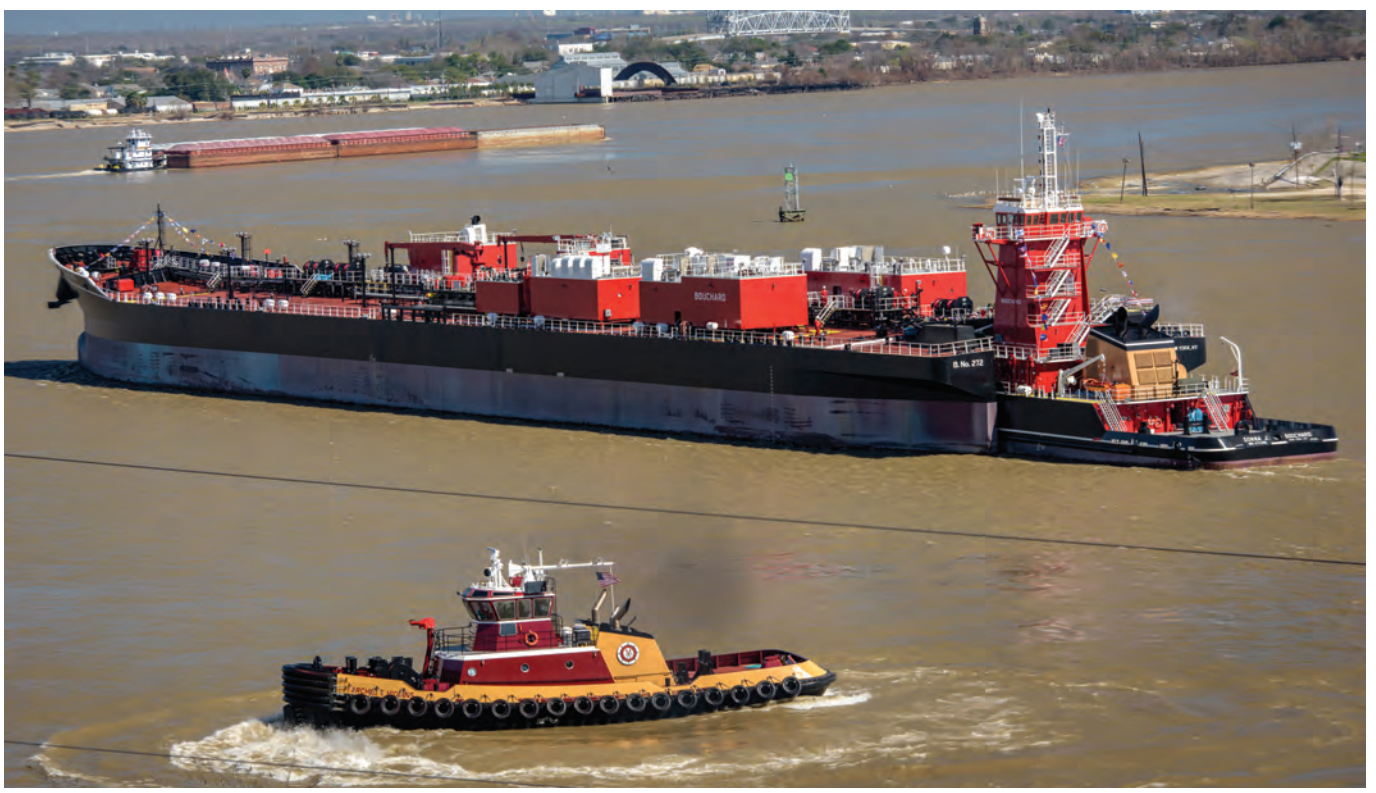
Bouchard's Safety Management System requires each vessel to be routinely vetted and evaluated annually and semi-annually. In addition, each vessel is continuously assigned routine maintenance and repair schedules to guarantee that the equipment is always operating at the most optimal level. "Our safety and vetting procedures, as well as the technological advancements consistently being made to our fleet allow for an efficient operation that limits risk by providing environmental protection, a safe work environment for the crew, and a reliable service for customers," said President & CEO Morton S. Bouchard III.

Investment in Technology

Over the past five years, Bouchard has made significant advancements to its fleet, including the investment in a major fleet expansion plan, which recently produced state-of-the-art ATB units M/V Kim M. Bouchard & B. No. 270 and M/V Donna J. Bouchard & B. No. 272.

These Jones Act vessels include the newest modifications to the Intercon and pin system, as well as the most technologically advanced equipment in various spaces, that are designed to reduce total emissions, thus ensuring a more eco-friendly vessel. The expansion also included four new ATB tugs; the M/V Evening Star (delivered in Sept. 2012), M/V Denise A. Bouchard (delivered in May, 2014), M/V Morton S. Bouchard Jr (delivered in February, 2016), and M/V Frederick E Bouchard (delivered in June, 2016).

Additionally, Bouchard's expansion continues with another state-of-the-art ATB unit currently under construction, the M/V Evening Breeze and B. No. 252. The M/V Evening Breeze is being built at VT Halter Marine, Inc., and is the sister vessel to the M/V Denise A. Bouchard and M/V Evening Star. The 4,000-hp Evening Breeze will measure 112 x 35 x 17 ft., equipped with an Intercon Coupler System. The B. No. 252 is being built by Bollinger Shipyards, is the sister vessel to the B. No. 250, and will measure 317.5 x 70 x 28 ft. The B. No. 252 will have a 55,000 barrel capacity, and be used to transport liquid petroleum products throughout the Jones Act Market.



Strategic Marine: Innovative Quality

By Alan Haig-Brown

As ferry operators search for efficiency to reduce pollutants and operating costs, the importance of design, quality construction, and efficient propulsion become ever more important. Such is clearly the case with the Netherlands-based ferry operator Rederij Doeksen, whose two BMT Nigel Gee designed ferries are currently under construction at Strategic Marine's Vietnam yard for operations between Harlingen on the mainland and the islands of Terschelling and Vlieland. in the Netherlands' Wadden Sea. As this is a UNESCO world heritage site, there was a strong incentive to minimize any environmental impact.

The all–aluminum 70-meter catamarans did not have speed as their primary objective however the rounded efficient underwater profile allowed an increase from 12 knots for the present ferry to 14 knots for the new vessel without increased wake in the shallow sea. Rederij Doeksen Managing Director Paul Melles explained the design selection process for the ferries at the recent Interferry Confernce. Apart from wake discomfort to the many small pleasure boats that sail this world heritage site, there is also a concern to avoid eroding the sand banks that line much of the shore.

The new ferries, each with a capacity for 592 passengers and 66 cars, are nearing completion at Strategic Marine's Vietnam shipyard. They will then be loaded onto a heavy lift ship together and delivered to the Netherlands. At that point their interiors and all components will be complete, the LNG tanks will be installed and, except for engines, they will be ready to go.

The pure LNG engines from MTU will be installed via soft patches on the vehicle deck over the engine compartments, after the boats arrive in Europe. "Instead of bringing the engines to the boats we are bringing the boats to meet the engines," explained Strategic Marine's General Manager Mike Bell. Each MTU 16-cylinder pre-production Series 4000 gas engine will deliver power to a pair of highly efficient counter rotating azimuthing fixed-pitch propellers.

Mike Bell takes justifiable pride in Strategic Marine's Vietnam shipyard being selected for this challenging state-of-the-art project. "We have had a yard in Singapore with about 100 employees and a very high reputation for quality, that builds boats up to 50 meters. Our yard in Vietnam, with 1000 employees, is much larger and has capacities for vessels the size of this ferry and larger. We have been in operating there for nearly ten years now and our quality, from engineering to welding, is absolutely world class."

The Strategic Marine's yards have recently delivered a wide range of craft from their Generation 3 crew boats, to a 36-meter Incat Crowther-designed luxury ferry for New Caledonia. Presently under construction includes a 42-meter catamaran for Taiwan and an 84-meter ro-pax catamaran, both scheduled for a 2018 delivery to Taiwanese and European customers respectively. Winning the 70-meter pure LNG ferry for Rederij Doeksen is the yard's crowning accomplishment to date. "We are already hearing from potential customers interested in LNG ferries," Mike Bell said at the recent Interferry Conference in Croatia, "And we expect more interest once it is in service."

INTERFERRY

Diverse Operations Common Successes

By Alan Haig-Brown

Photo: Alan Haig-Brown

Photo: John Nedwidek/Interferry

Photo: John Nedwidek/Interferry

In October the world's ferry operators gathered in Split Croatia for the Forty Second Annual Interferry Conference. The 470 or so delegates represented 210 operators and support companies from 27 countries. A trade show included firms from around the world including shipbuilders, naval architects, equipment suppliers, training and others of the diverse group that make up the ferry industry.

In a panel on Mediterranean Ferries, Philippe Holthof, of the Belgian-based Shipax explained the huge size and complexity of the fleet. While RoRo ferries are important in trans-med service, Italy has also taken the initiative in getting trucks off the highways in favor of RoRo services running up and down their coast. To support competition among ferry operators, subsidies go to the truckers rather than the ferries. He also pointed out that the old "rust bucket" fleet is now gone in favor of modern vessels, although LNG as a fuel has not been adopted largely due to the challenges of cooling the fuel with Mediterranean waters having temperatures in the 28 degree range.

In keeping with a time when world leaders rule by Twitter, there was appropriate coverage of the role of big data mining, utilizing social media for customer contact and the challenges of providing unlimited connectivity for passengers. In terms of bandwidth, Ole Sivertsen of USA-based Global Eagle explained that passengers are no longer just surf the net, but they are up loading vacation photos putting ever-greater demand on the marine systems. Meanwhile, Mark Collins of the British Columbia Ferries explained the challenges of passengers expecting free and seamless WiFi on routes that are often out of range of towers and must rely on expensive satellite services for connectivity.

In another example of the digitized ferry world, Dr. Roberta Weisbrod, Executive Director of the US-based Worldwide Ferry Safety Association, told of a New York ferry company whose navigators were using Google glasses. The glasses have navigational info that allows the vessel navigator to keep focused outside the bridge windows or even to walk around on the bridge wing while still tracking their vessel. She pointed out the obvious danger of system hacking and problems should the system go down while the continued loss of traditional navigation skill-sets remains a concern.

Ferry safety continued as a theme with John Wright of Wrightway, a UK-based consulting firm that has recently worked with BC Ferries in Canada. He stressed that safety had to be "top down and bottom up" with capturing the hearts and

Marija Zaputavic *of Jadrolinija Ferries of Croatia explained that while her company conducts periodic surveys of passengers wants and needs, the results must be balanced between the wishes of tourists with the needs of the year round residents.*

Jan Helge Pile*, of Norway's Colorline, told of his firm's designing of a new 160-meter, 2000-passenger, Ro-Pax ferry with about a 500-car capacity for a route between Norway and Sweden.*

The attendees were delighted with the good-humored sparring of two Australian heavy weights of the ferry world: Austal's ***Mike Wake*** *and Incat's* ***Bob Clifford****. Clifford, an icon of the industry and dressed in casual Aussie attire, made the case for the efficiency of "two long skinny hulls" while Wake, with an impressive video, argued for the sea kindliness of a third central hull.*

Photo: John Nedwidek/Interferry

"Jan Helge Pile, of Norway's Colorline, told of his firm's designing of a new 160-m, 2000-passenger, Ro-Pax ferry with about a 500-car capacity for a route between Norway and Sweden. ***In 2012, they had originally anticipated LNG for power. However when they ran a competition for the lowest emissions overall, it was an electric hybrid system that won."***

minds of middle management the key to including all in the ownership of a program. Markku Mylly of the Portugal-based European Maritime Safety Agency (EMSA) followed up on safety concerns for the modern ferry industry. He explained that the EMSA is the EU equivalent of the IMO. Along with other presenters he raised the concern of fires on RoRo ferries. These nearly always start on vehicles, both cars and cargo trucks, stowed on the cargo decks. His organization is currently conducting an extensive investigation into the problem and will submit their findings to the IMO.

The electric option for powering ferries was given a good airing in a panel with representatives from CalMak Ferries in the UK, ABB Finland, PBES Canada and Colorline, Norway. While there was agreement that electric had the potential for a zero emission ferry, there are generally some emissions from the onshore generation of electric power. The continuing efficiency of battery technology bodes well for the future with, one contributor maintaining that, fully 70% of new vessel proposals now include some option for electric storage.

Jan Helge Pile, of Norway's Colorline, told of his firm's designing of a new 160-meter, 2000-passenger, Ro-Pax ferry with about a 500-car capacity for a route between Norway and Sweden. In 2012, they had originally anticipated LNG for power. However when they ran a competition for the lowest emissions overall, it was an electric hybrid system that won. The winning proposal for a mono-hull ferry, currently under construction at the Ulstein yard for 2019 delivery, will use pure electric power in the port and fjord areas. This will make 20% of the 38 nautical mile route at zero emission. It will charge the batteries via plug-in at ports and generators at sea, making it the world's largest plug-in hybrid. At the same time, emissions will be dramatically reduced, especially in the sensitive fjord and port areas.

The attendees were delighted with the good-humored sparring of two Australian heavy weights of the ferry world: Austal's Mike Wake and Incat's Bob Clifford. Clifford, an icon of the industry and dressed in casual Aussie attire, made the case for the efficiency of "two long skinny hulls" while Wake, with an impressive video, argued for the sea kindliness of a third central hull. While there was no agreement on the best hull form, both speakers agreed that the future of fast ferries is secure as they continue to become more efficient with weight reduction and fine-tuning of designs.

Earlier in the conference, in a panel on the demographics of ferry passengers and crew, Marija Zaputavic of the host Jadrolinija Ferries of Croatia talked of her company. She explained that their many ferries serve the islands of the Adriatic. Periodically the company does surveys of their passengers' wants and needs. But they must balance the wishes of the large number of tourists with the needs of the year round island residents. This is a challenge that operators around the world would do well to acknowledge.

On the same panel, Capt. Morgan Mooney of New York's Fire Island Ferries spoke to the need to attract and retain young crew such as her. With 14 years in the family company, seven as captain, she spoke to the need to acknowledge, listen to and reward the millennials who will make up the next generation of mariners. "Look to the teenage deck hands. Don't belittle them but let them know that they have a future with the company. Help pay for them to upgrade their tickets," she said, before adding with a smile, "I am turning 30 and I plan to keep working for you, Dad."

As representatives of the host nation, the Croatian national carrier Jadrolinija Ferries, invited attendees to a technical visit onboard their Split to the Island of Brac ferry run. Jadrolinija has 50 ships serving 40 islands in the Adriatic Sea as well as operating on four international routes. Conference guests were welcomed aboard the ferry Hrvat and then taken in small groups to visit the bridge and the engine rooms. The later are located fore and aft with two propulsion engines in each engine room. These drive azimuthing z-drives located in each of the vessel's four corners to give the ferry both good speed and remarkable maneuverability.

It was a fitting wrap up for a conference that celebrated and shared ideas amongst diverse ferry operators who share concerns and successes in wide-ranging conditions and populations. In a now traditional ceremony, Alan Klanac of Inteferry Croatia, passed the Interferry flag on to, Germán Orozco of Ultramar, Mexico with the announcement that Interferry 43 will be held on October 6 to 10, 2018 in Cancun, Mexico.

NORSUL – Shipping & Maritime Market in Brazil

*To better understand the challenges faced by ship operators in Brazil, Maritime Reporter's correspondent in Brazil spoke to **Paulo Cesar P. Freitas**, Fleet Manager for Norsul Shipping company, one of the major shipping operators in Brazil.*

By Claudio Paschoa

All photo: Norsul

Norsul by the Numbers

Established in 1963 and operating continuously ever since, "Companhia de Navegação Norsul", as it is called in Portuguese, is one of the leading private maritime commerce companies in Brazil. Norsul specializes in dry-bulk, neo-bulk cargoes, general cargo, project cargoes, along with chemicals and liquid cargoes, operating in the Brazilian Cabotage and international shipping markets. Freitas has worked for Norsul for 28 years, starting as Ship Superintendent and today operating as Fleet Manager. Widely known and respected in the Brazilian and foreign shipping markets, Freitas has extensive knowledge of the details of managing ships and cargo deliveries locally and globally. Freitas said that "currently, Norsul operates about 290,000 Brazilian gross tonnage (TPB), in 23 vessels, of types such as bulk carriers, liquid chemical cargo, multipurpose ships, general cargo, oceanic barges and ocean pushes. As for the renewal of the fleet, Norsul is always on the lookout for opportunities, and has as its principle to evaluate cost versus benefit of investments, that is, to keep for a few more years less modern ships, investing in their maintenance or replacing them?"

Determining the best way to invest in its fleet is not always so obvious due to the nature of doing business in Brazil, where taxes are notoriously high and sudden and severe economic downturns are not uncommon.

"Our biggest challenge is to face the 'Brazil cost' of port expenses (harbor pilots, tugboats and port taxes), the cost of payroll charges, and existing taxes. Norsul has always operated by complying with, and adapting the regulatory changes by ANTAQ (Brazilian Maritime Regulatory Agency)," said Freitas. Norsul's workforce consists in 630 employees where 470 are seamen and officers, and 160 are administrative.

Regulations

In regards to 'the never ending story' of emerging ballast water technology and regulations, Freitas said that "They do not affect us yet, due to the deadlines reviewed in the last MEPC (The IMO Marine Environment Protection Committee) for the installation of the equipment. But they will definitely affect us, in the near future, mainly because of the investment needed to equip ships with such a system."

In step with new BWT rules Norsul is also dealing with preparing its fleet logistics to comply with international pollutant emission rules. "Our biggest concern is the availability of low sulfur fuels from 2020, as our fleet does not include the investment for the installation of diesel exhaust gas filtration systems," said Freitas.

Cabotage Ops in Brazil

Brazil's nearly 5,000 mile long coast line, and the fact that 80% of its population lives within 200 km of the coast, would stand to reason that the domestic shipping market is vibrant. But a true look at cabotage transport in and around the country shows that while it has doubled in size of transported volume, it still represents less than 10% of the Brazilian matrix of cargo transportation, with ample room to grow. (In the European Union it reaches 37% and in China 48%, in comparison).

The Cabotage market has seen many ups and down in Brazil, and some maritime insiders are seeing an upward trend. However as one of the main cabotage operators in Brazil, Norsul's view is more clinical. "We ba-

sically operate in Cabotage, in Brazilian ports. We do about 500 stopovers in national ports per year, operating in almost all ports in the country. Cabotage is closely linked to the national economy. The future of the Cabotage market will depend on the recovery of the domestic economy," says Freitas.

Taxation Burdens

Analyzing the main differences regarding the Brazilian maritime regulations in relation to the main countries that its ships visit, Paulo said that Brazil does have more onerous regulations than most maritime countries. "We basically operate in Cabotage and overseas carries. In Brazil, in addition to complying with the international regulations applied to any ship, we have regulations specific to various authorities, such as sanitary, environmental and labor, for example, burdening the cost of operating the Brazilian flag," said Freitas. The cost to fly the Brazil's flag makes it particularly unattractive to foreign operators, as situation that is unlikely to change anytime soon.

Shipbuilding and Ship Repair

The Brazilian shipbuilding market – like much of the world – is going through tough times. In Brazil the problem is perhaps more acute due to its reliance on oil major Petrobras for business, unfortunate at the moment because of the prolonged depressed pricing for oil that has seen the company pull-back on capital expenditures. The super-major's restructuring is a result of prolonged low oil prices, massive debt and a well-recorded series of corruption scandals.

As shipbuilding in Brazil settles into the 'new norm,' and as Petrobras orders continue to be minimal, many shipyards are looking at ship repair to cover costs. In some cases, the yards are even renting their berths to OSVs, for repair, loading and fitting out operations.

Many shipyards in Rio de Janeiro and elsewhere along the coast have a number of OSV alongside. Many new shipyards, along with older, established yards, such as the Jurong shipyard, have turned to ship repair in order to stay in business.

"For national shipbuilding to be resumed and to have sustainable growth (beyond orders from Petrobras), they should, among other points, seek to evolve in prices and construction deadlines that are closer to the world market," advised Freitas. "Guarantee of prices and deadlines; guarantee of delivery of the ship by the shipyards; The return of the AFRMM (Additional Freight for the Renovation of the Merchant Marine) by the RFB (Brazil's Federal Revenue Service) becoming regular and monthly, and thereby regain the security that the long-term investments (20-25 years) demand."

The Brazilian maritime industry had grown from 2,000 jobs to more than 82,000 between 2003 and 2014, according to Sinaval (National Shipbuilding Ship Repair Industry Union). Much of this increase in jobs happened in Pernambuco, which reached a high water mark of 17,000 workers in the sector, while today it has less than 5,000. The wave of unemployment intensified from 2014 onward, when the Petrobras crisis began to erode shipyard order books. Recent oil block tenders offer a glimmer of hope at the resurgence of local shipyards.

Pushers/Sea-barges

Norsul, has also been at the forefront of an efficient system of pushers/sea-barges. "It is a very interesting system, unprecedented in Brazil, at the time of the beginning of its operations in 2003. It is inserted in the supply chain of the customer's supply, and demands dedicated cribs for shipments and discharges, and that the time of embarkation and discharge is equivalent to the time of navigation between the ports. For example, look at the traffic of logs between the South of Bahia and Espírito Santo. Every 12 hours we have a barge being loaded in Bahia, a barge with logs being pushed south, a barge being discharged in Espírito Santo and an empty barge being pushed north. When arriving in Bahia, the pusher changes barge and drives south to Espirito Santo. Upon arriving in Espirito Santo, the other pusher changes barges and drives to Bahia," said Freitas.

It is interesting to note the main characteristics that make Norsul a successful navigation company in an unstable economy as sometimes is the case of Brazil. With over half a century of operations, Norsul has been through various stages of the fickle Brazilian economy and managed to survived survive and grow, which wasn't the case with some defunct local ship operators. "Norsul, since its foundation in 1963, has been characterized by being a company that always seeks to be special to the market and to its employees. Norsul is recognized for delivering the transportation that is contracted, regardless of the variations of the navigation market, as well as to analyze each request and seek the best of logistics to serve the client," said Freitas.

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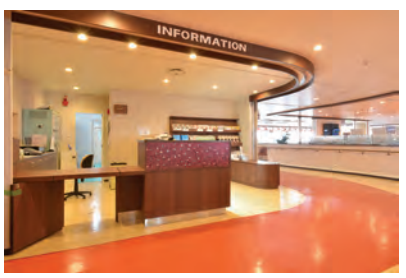

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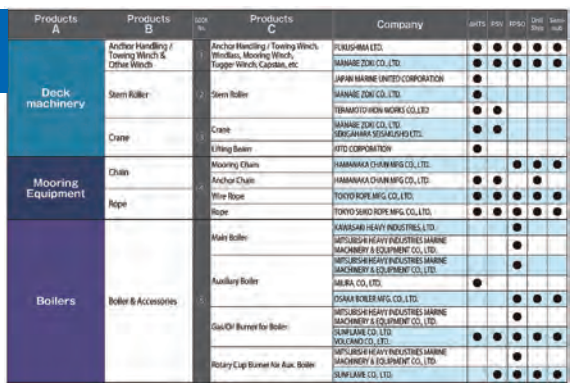

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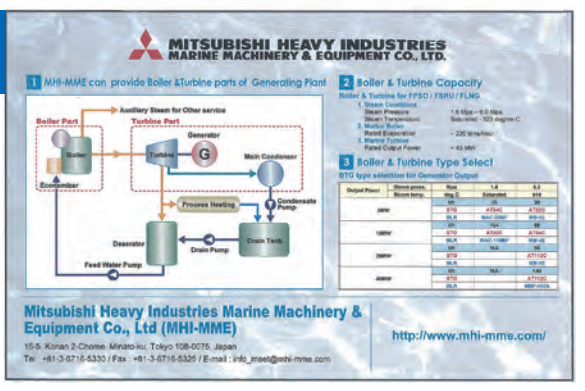

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Panamax Containerships

The explosive growth of international boxships is challenging not only the physical infrastructure of North American ports, but also the very nature of the existing supply chains that they impact.

By Barry Parker

Image: Marad

The recent dialogue on container shipping has been all about so-called "mega-ships;" those vessels that with larger capacity than those that are already in service at any point in time. In the container trades, as in tanker and drybulk arenas, ocean-going vessels are one link, albeit an important component, within broader supply chains. Unlike most other transport supply chains where the cargo side determines the overall architecture of the chain, the liner companies carrying containers appear to have dictated the critical linkages that make up supply programs. This fundamental dissimilarity has profound implications: the landside infrastructure for handling containerized cargo, rather than leading the charge, will always be playing catch-up. Mega-ships are (depending on your viewpoint) symptomatic of the problem, or – alternatively – part of the logistics solution.

Explosive Growth

The July 1998, port calls of the 6,000 TEU Regina Maersk along the U.S. East Coast, set in motion a chain of events that the supply chain is still sorting out – nearly 20 years later. Maersk told the ports that such ships would become the norm. In 2016 and 2017, 18,000 TEU vessels have similarly made the circuit on both coasts. In 2016, an 18,000 TEU vessel, Benjamin Franklin, visited ports along the U.S. West Coast and in late summer 2017, the 18,000 TEU CMA CGM T. Roosevelt visited the East

The CMA-CGM Ben Franklin, an 18,000 TEU containership, was, in 2015, the largest vessel to call on a U.S. port.

Coast. At the American Association of Port Authorities (AAPA) annual convention, held in early October, Mr. Mark Sisson, Senior Port Planner at engineering behemoth AECOM, told his audience: "The pace of the ship size increase has really caught a lot of folks by surprise, and ports are scrambling to catch up to this day."

The Panama Canal also got the message, embarking in 2006 on a $5.5 billion project that would allow vessels of up to 14,000 TEU to transit (contrasted with the previous size constraint of roughly 5,500 TEU). Though only 500 boxes were discharged by the Regina Maersk at New York, port planners there began looking in earnest at deep dredging (in a project that began in 2004), and at raising the air-draft of the 1930's vintage Bayonne Bridge to 215 feet, in a $2 billion project that commenced in 2013 and is now complete. Down the East Coast and into the U.S. Gulf, ports have already finished, or are now in the midst of channel deepening projects – typically to 50 feet depths that will allow transits of ships as big as 18,000 TEU.

Upon completion in 2016, the "neo-Panamax" vessels began transiting through Panama – bringing Asian cargo to the East Coast. CMA CGM, owners of the Franklin and Roosevelt, is now set to begin a regular routing of vessels up to 14,000 TEU from Asia to the East Coast.

"We're thrilled to have CMA CGM T. Roosevelt call at our port and serve as the celebratory vessel for the raising of the Bayonne Bridge," Molly Campbell, Port Director at the Port of New York and New Jersey, explained in a prepared statement. "We invested billions of dollars to raise the Bayonne Bridge, deepen harbor channels, install rail facilities at all of our terminals and improve our port road network, with the goal of attracting the world's biggest ships and cargo to our port and the jobs and economic activity they provide," she added.

But, harbor development is not restricted to the East Coast. In Southern California, the 10 year channel deepening at the Port of Los Angeles (completed in 2013) saw creation of a passage of 53 feet in depth. A $1.5 billion bridge replacement for the Desmond Bridge in Long Beach is also underway. When completed in 2018, the larger vessels will be able to enter terminals near downtown.

Beyond Deeper Draft

The larger vessels pose challenges for ports, and the landside infrastructures that link them to hinterlands. With economic growth, TEU throughput will continue to grow. At the AAPA confab, Mr. Mario Cordero, the former Chairman at the Federal Maritime Commission (FMC), who recently became Executive Director at the Port of Long Beach, provided some guideposts on anticipated growth. Referring to the San Pedro Bay port complex (Long Beach and Los Angeles), Mr. Cordero pegged 2015 throughput at 15.4 million boxes, and then offered forecasts of 28.3 million and 41 million boxes for 2030 and 2040 respectively. He continued, "Moving forward, we need to focus on efficiencies in the supply chain," explaining that Los Angeles and Long Beach are working cooperatively on a supply chain optimization project (after gaining FMC approval to do so, in 2015).

Existing infrastructure is stretched. Commenting on the impact of liner alliances, Mr. Cordero said: "Going forward, we may have fewer port calls, but each port call may involve more significantly more container movements within the port terminals." These comments jibe with results of a recent survey by Navis (part of Cargotec Corporation), a leading provider of Terminal Operating System (TOS) software, where 76% of respondents listed "optimizing operations to improve productivity" as their biggest challenge.

MLPro also spoke with FMC Commissioner William Doyle regarding the challenges of mega-ships, and the reverberations down the supply chain. He said, "Ocean carriers are building larger ships and those larger ships are now coming to East and Gulf coast ports as a result of the newly expanded Panama Canal. If you are a port and you want more business, the ocean carriers need the proper infrastructure to be in place. And that means the harbor and channels must be dredged, purchasing of new

The CMA CGM T.Roosevelt heads for Port Newark and to the Kill Van Kull before transiting under the newly raised Bayonne Bridge.

In the foreground (L to R): FMC Commissioner William Doyle, PANYNJ Port Director Molly Campbell, FMC Commissioner Dan Maffei and Panama Canal Administrator Jorge Quijano.

cranes and/or retrofit existing cranes by placing them on platforms to raise their height and reach, bridges must be raised … and also building distribution centers off-site, but close enough to the ports."

AECOM's Mark Sisson, in the same session following Mr. Cordero, elaborated on how vessel size impacts other links in the chains, telling the AAPA listeners, "… big ships like big terminals and vice versa. If you're going to try to move 10,000 containers off of a single ship, it helps to have a lot of real estate to manage those containers." The financial dimension is also impacted. Sisson insists, "It also helps the things like economies of scale of purchasing expensive equipment…and sophisticated operating systems and software. There's a lot of consolidation – not just on the liner side, but even on the terminal side."

Where land is scarce and that's certainly the case in urban U.S. ports on all three coasts, it's important to move boxes out of the port area as quickly as is possible. And, dwell time for boxes has become even a bigger issue when a mega-ship can discharge thousands in a single port call. Indeed, Mark Sisson says, "The hinterland connection is where a lot of the competition is going on." Separately, Mr. Cordero highlighted steps taken to prepare for the new dynamics, notably a $4 billion program to get ready for mega-ships. Inland connectivity, taking the form of increasing rail infrastructure, with the additional benefit of getting trucks out of the port district, was stressed. In Long Beach, he says that the Port Commissioners have established a goal of 50% of boxes moving out through on-dock rail (compared to the present 28%). Such a strategy is intertwined with another emerging strategy; that of inland port/ shuttle trains.

Beyond the Ports

The logistics business, if anything, is not static; with e-commerce retailers now seeking proximity to population centers. Cordero, for his part, emphasized the importance of having warehouses around a port area, closer to consumers, as quick deliveries become a selling point for new age retailers. When asked about this evolving aspect of supply chains, Doyle replied, "It's a distribution center construction bonanza throughout the I-78 and I-81 corridors extending from the Port of NY and NJ through the Lehigh Valley, into central Pennsylvania and south into Baltimore Maryland on I-83. These areas can be serviced relatively quickly by the Ports of Philadelphia and Baltimore as well as NY/NJ." But he pointed out that business practices would need to evolve to support this new model, telling ***MLPro***, "Remember, in order to run more shifts at the ports in the Mid-Atlantic and Northeast, the Distribution Centers would need to be open for additional shifts as well to receive the containers. And, this point is a serious discussion point."

Another part of efficiencies at all ports is quick container pickup, with Mr. Cordero, speaking at the AAPA event, emphasizing Long Beach's goal of having "uniform appointment systems" at terminals throughout the port. Efficient uses of chassis are a big part of that equation. In Long Beach, which has had a 'pool of pools' since 2015, port officials are now looking towards a 'gray pool,' one managed by a neutral entity, to keep cargo moving. Improved data capability (with increased transparency) is a key component of any supply chain optimization, and Mr. Cordero discussed ongoing efforts underway. He hinted at upcoming news regarding cooperation with Los Angeles, in a container data portal project spearheaded by GE Transportation Systems.

Though vessel technology was not subject at the AAPA meetings, Commissioner Doyle noted a group of issues concerning the mega-ships themselves, amidst an uncertain environment concerning pricing and availability of fuels going forward. He explains, "MARPOL ANNEX VI, is a topic of discussion because of the sulfur caps that must be adhered to globally come 2020 … more and more of the top-10 ocean carriers are announcing plans to build new ships with dual-fuel technology with low sulfur diesel/LNG engines. United Arab Shipping (Hapag-Lloyd), Mitsui and CMA CGM are companies that have committed to build or are considering the technology."

Mega-ships are still a work in progress. The revolution in efficient transportation that began in the late 1950's is powering onwards. But just because the yards can build vessels of 21,000 TEU capacity (and larger) such as the recently delivered OOCL Hong Kong, the ocean going vessel link must be fitted into a twisting supply chain of enormous complexity. This process is not without numerous fits and starts, as port planners in the States, and elsewhere, have experienced.

Efficiency Gains, CO_2 Reduction, Invasive Species Drives Development

Marine coatings increasingly are center stage, not simply to maintain the integrity of vessels, but as a means to make ship ops more efficient and environmentally benign. Maritime Reporter had questons, and two executives – **Andreas Glud** of Hempel A/S *and* **Michael Hindmarsh** of AkzoNobel and – *offered answers.*

Image: Akzo Nobel

What are the drivers for coatings development in the coming five years?

Glud The drive to optimize operational efficiency will continue to drive customer demand in the coming years. Ship owners and operators are becoming more and more cost and performance focused leading to suppliers needing to deliver innovative solutions that will impact the bottom line.

Advanced hull coatings offer such a solution as they deliver a fast return on investment with the potential for a large reduction in fuel consumption. In fact, the best of today's advanced hull coatings - such as Hempel's Hempaguard - are able to deliver up to six percent on average fuel savings over the entire docking interval. This is irrespective of trading patterns, speed and idle periods giving the ship owner and operator significant trading flexibility.

Hindmarsh One of the biggest issues we see in the next five years is the continuing challenge to reduce shipping's CO2 emissions. Recent discussions at the IMO are setting the stage for tackling de-carbonization and laying the foundations for a greenhouse gas (GHG) reduction strategy, aiming for adoption of an interim strategy at MEPC 72 in April next year. These discussions have been supported by many shipowner organizations, such as the European shipowners' body ECSA - and it is clear that the wider industry is increasingly putting its weight behind a shift towards a lower carbon future. Marine fouling control coatings have an integral role to play in reducing GHG emissions. Ship owners and operators using AkzoNobel's Intersleek range of biocide-free marine coatings, for example, have achieved fuel savings worth an estimated combined total of $3 billion since the technology was first introduced 21 years ago – saving 32 million tons of CO2. We know, however, that the push for de-carbonizsation must also compete with the economic realities of the shipping industry – and this means convincing a financially challenged market that de-carbonization not only makes environmental, but economic sense.

This is why we have pioneered programs such as carbon credits - an industry-first scheme that rewards owners who choose to use a biocide-free foul release coating such as Intersleek 1100SR by awarding them carbon credits for each tonne of carbon saved, which can then be traded or used to offset emissions in other areas. This effectively rewards owners twice for selecting sustainable coatings – once when they save fuel by using these coatings, and then when they are awarded the credits.

(Continued on page 87)

Image: Hempel

Coatings Tech Development

Tech advances from coatings and corrosion control manufacturers are pivotal in maintaining the health and integrity of vessels, but increasingly to improve efficiency and fuel economy, as well as maintain the health of the oceans. Some recent developments from leaders in the sector.

Hempel launched two premium antifouling coatings, Globic 9500M and Globic 9500S, which according to the manufacturer offer a up to a 2.5 percent reduction in speed loss, ultimately helping to save fuel and lower CO2 emissions.

Hempel's patented Nano acrylate technology is the strength behind the Globic range and is designed to provide a fine polishing control mechanism to bring the integral biocides to the surface at a stable rate ensuring a clean hull. With a strong binder and biocide package, Globic 9500M and Globic 9500S are designed to excel, particularly when slow steaming.

"Globic 9500M (M for maintenance) is designed to protect against slime as well as soft and hard fouling in all conditions," said Henrik Dyrholm, Global Product Manager, Hempel A/S. "Globic 9500S (S for static) is designed to protect against hard-fouling even during extended outfitting periods."

Since the Globic range was launched in 2005, more than 6.6 million gallons have been delivered encompassing more than 5,000 vessel applications.

In addition, the patented microfibers incorporated in the paint give Globic 9500M and Globic 9500S a mechanical strength to avoid cracking and peeling. Globic's unique technology allows it to start working as soon as the hull meets the water for full and immediate antifouling protection, making it highly efficient even for slow steaming and long idle periods.

I-Tech AB was recently recognized as a technology innovation leader in the European marine biocides market, a recognition courtesy of its 2017 Technology Innovation Award from Frost & Sullivan.

Based on its recent analysis of the European biocides market, Frost & Sullivan found that the long-term environmental and economic benefits of using I-Tech's bio-repellent antifouling ingredient, Selektope, make it aninnovative technology in the marine biocides market. According to Frost & Sullivan, the Selektope solution has the potential to induce transformative change in the marine industry. "I-Tech AB is one of the few companies in the European market to offer a sustainable marine biocide technology at cost-competitive prices on a commercial level," said Afia Allapitchai, Frost & Sullivan research analyst.

Selektope is an organic, non-metal compound with unique marine antifouling application. Its bio-repellent mode of action inhibits barnacle settlement on ships' hulls by stimulating the barnacle larvae's swimming behavior with reversible effect. It is characterized by high efficacy at extremely low concentrations in a marine coating (0.1% w/w), ultra-low leaching, and flexibility to boost copper-based paint formulations or replace copper completely.

Selektope repels barnacles even when ships are idle, allowing fuel saving claims made by coatings suppliers to cover the ship's entire operational cycle.

Antifouling: Hempel Globic 9500

The first branded marine coating products to feature Selektope were launched by **Chugoku Marine Paints, Ltd.** (CMP) in 2016, the SEAFLO NEO range of antifouling products. The latest product, launched in June 2017, was CMP's SEAGRANPRIX 880HS+, which is based on hydrolyzing technology and can be applied to deep sea-going vessels trading worldwide in-service periods for up to 90 months.

Subsea Industries has begun actively marketing its Ecospeed coating in the luxury yacht market following the introduction of stringent regulations aimed at reducing the impact of leisure craft operations on the marine environment.

The Antwerp-based coatings specialist will market its non-toxic hard coating initially in the U.S., where there is increasing scrutiny of copper-based antifouling systems on the hulls of all types of pleasure boats.

"There is a momentous drive to remove copper from the antifouling coatings typically used on the hulls of pleasure yachts" said Kelly Townsend, Subsea Industries' US-based Sales Manager.

"Since our Ecospeed product contains zero chemicals and is completely non-toxic to marine life, it has the potential to meet the yacht sector's requirement for a clean, reliable and cost-effective alternative to copper-based coatings. Ecospeed hulls can be cleaned by pressure washing but the best way is to clean in-water using mechanical brushes as this results in a hydrodynamically smoother surface which is harder to foul and reduces fuel consumption."

Washington became the first state to adopt a no-copper paint rule. And from 1 January 2018, no new recreational boat up to 65 feet can arrive with copper on its hull and no copper can be sold or applied to a boat after 1 January 2020.

I-Tech Awarded for Innovation

"I-Tech AB is one of the few companies in the European market to offer a sustainable marine biocide technology at cost-competitive prices on a commercial level," said Afia Allapitchai, Frost & Sullivan research analyst. To the left Dr. Oliver Weigenand – I-TECH COO, receiving the Frost & Sullivan Award.

From May 2018, New Zealand will require all vessels that arrive in its waters to have 'clean hulls', with varying levels of fouling acceptable depending on the vessel's itinerary. This region has also seen the ***world's first biofouling "casualty" as the bulk carrier DL Marigold was turned away*** having been deemed an invasive species risk.

Michael Hindmarsh, AkzoNobel's Marine Coatings Business, supplier of International Coatings

(Continued from page 85)

Much has been discussed for the past dozen years regarding the transport of invasive species in ballast water, but what is the situation in your corner of the market?

Hindmarsh Another major trend on our horizon is the focus on reducing the translocation of invasive aquatic species on the underwater sides of ships hulls. In August the IMO launched a new global project, the GloFouling Partnership, to encourage the uptake of the IMO Guidelines for the control and management of ships' biofouling (resolution MEPC.207(62)). These guidelines as they stand are not mandatory – but they do outline what best practice looks like for owners and operators wishing to stay ahead of the curve.

This looks like the smart choice, as many countries and regions are beginning to move ahead of the IMO and introduce their own biofouling regulations. For example, from May 2018, New Zealand will require all vessels that arrive in its waters to have 'clean hulls', with varying levels of fouling acceptable depending on the vessel's itinerary. This region has also seen the world's first biofouling "casualty" as the bulk carrier DL Marigold was turned away having been deemed an invasive species risk. The state of California also intends to tighten up its regulations on biofouling to include the mandatory biofouling management of the vessel's wetted surfaces.

What is your company's most recent product/system launch? Please provide insights on its performance promise, and if possible, real-world case study reference of application.

Glud We recently launched two new premium antifouling coatings – Globic 9500M and Globic 9500S – offering customers a maximum speed loss of 2.5 percent over five years. (See full details on previous page.) This reduction equates to significant fuel savings and lower CO2 emissions; improving the operational efficiency of a vessel and minimising the operator's environmental footprint.

Globic 9500M (M for maintenance) is designed to protect against slime as well as soft and hard fouling in all conditions. Globic 9500S (S for static) is designed to protect against hard-fouling even during extended outfitting periods. Together these two coatings deliver unparalleled anti-fouling protection. These two Globic coatings are built on our patented Nano acrylate technology, which delivers superior antifouling performance for new buildings and dry-dockings. This Nano acrylate technology provides a fine polishing control mechanism to bring the integral biocides to the surface at a stable rate ensuring a clean hull. The unique technology activates as soon as the hull meets the water for full and immediate antifouling protection. For this reason, this technology also provides a highly efficient solution for slow steaming and long idle periods.

Hindmarsh We recently launched Intertrac OBM (On Board Maintenance), the latest advancement to the Intertrac range, which will help customers reduce sea stores costs by up to 20%. This online tool records, visualizes and analyzes Seastores purchasing patterns by vessel and fleet. Intertrac OBM provides greater transparency and control over OBM paint consumption as well as purchasing and has a number of features. These include streamlining purchasing to avoid small quantity orders and additional administration costs. It also identifies alternative ports with greater savings potential, and optimizes product choice to provide cost savings. We also launched Intertrac Perform as a pilot initiative. This tool measures and monitors hull performance data and validates it against predictions made by Intertrac Vision, AkzoNobel's landmark big data tool for coating performance prediction. Developed in partnership with University College London, this software builds on the capabilities of Intertrac, a tool which analyses the fouling challenges of different trading routes, and Intertrac Vision, launched in 2015, a big data tool which combines this data with hydrodynamic analysis to predict hull performance. With Intertrac Perform, the Intertrac range forms a complete digital solution for predicting, measuring and analyzing coating performance, without the need for any expensive equipment to be installed.

United States in Focus

powered by VesselsValue

Top 5 Owner Nations

Country	Live		On Order		Total	
	# of Vessels	Total Value USD bn	# of Vessels	Total Value USD bn	# of Vessels	Total Value USD bn
Greece	4,290	$82.0	249	$14.8	4,539	$96.8
Japan	4,004	$69.0	322	$19.9	4,326	$88.9
China	4,577	$61.2	333	$15.0	4,910	$76.2
USA	**2,675**	**$42.5**	**78**	**$3.3**	**2,753**	**$45.7**
Singapore	2,547	$33.3	290	$11.0	2,837	$44.3

Top 5 USA Owner Companies

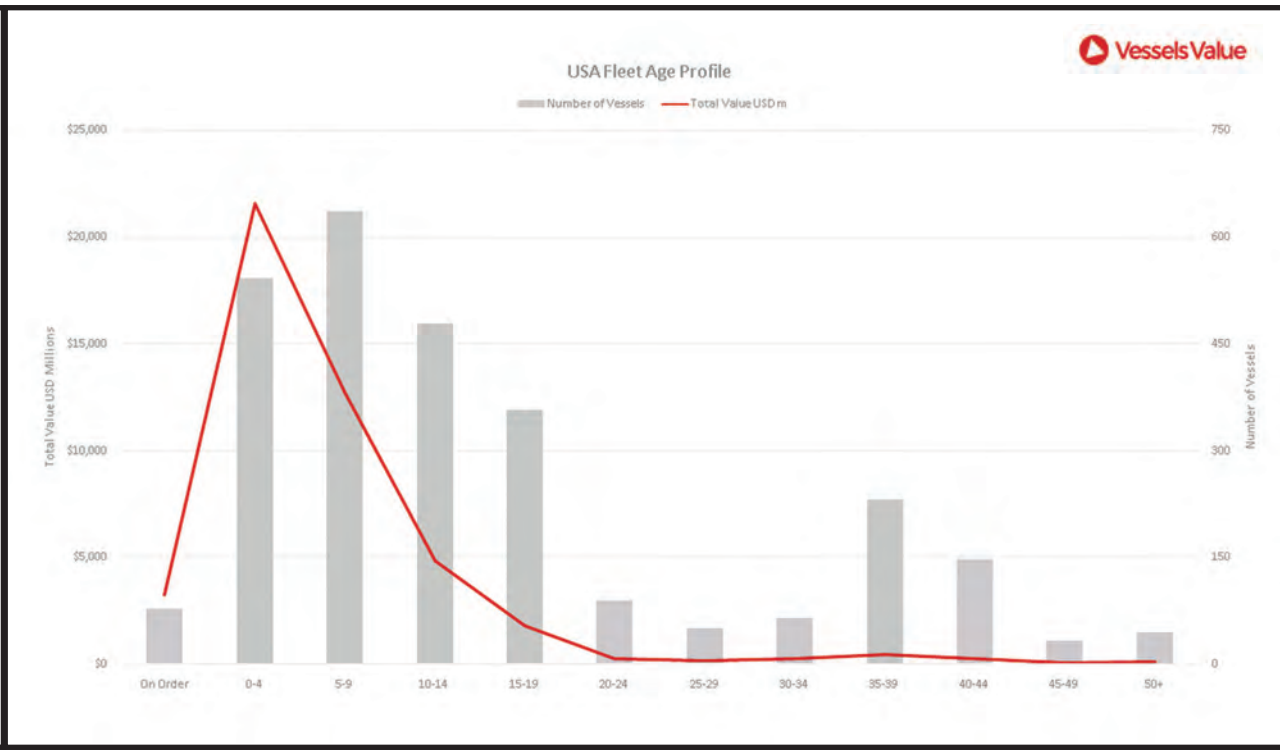
Company	Live		On Order		Total	
	# of Vessels	Total Value USD bn	# of Vessels	Total Value USD bn	# of Vessels	Total Value USD bn
Noble Drilling	28	$3.02			28	$3.02
Scorpio Tankers	85	$2.83	3	$0.10	88	$2.93
Rowan Companies Inc	29	$2.35			29	$2.35
Edison Chouest Offshore	202	$1.76	14	$0.33	216	$2.08
Gener8 Maritime	34	$1.81			34	$1.81

USA Fleet by Vessel Type

Vessel Type	Live		On Order		Total	
	Number of Vessels	Total Value USD m	Number of Vessels	Total Value USD m	Number of Vessels	Total Value USD m
Bulker	357	$5,595	10	$343	367	$5,938
Tanker	494	$15,739	19	$996	513	$16,735
Container	150	$3,247	12	$997	162	$4,244
Small Dry	82	$197	6	$76	88	$273
LPG	9	$196			9	$196
LNG	15	$1,964			15	$1,964
Multigas	2	$62			2	$62
OSV	1,391	$6,334	30	$624	1,421	$6,958
MODU	175	$9,120	1	$221	176	$9,341
Grand Total	2,675	$42,454	78	$3,257	2,753	$45,711

U.S. Fleet Age Profile

Age Group	# of Vessels	Value $ m
On Order	78	$3,257
0-4	542	$21,572
5-9	636	$12,733
10-14	479	$4,837
15-19	357	$1,785
20-24	89	$257
25-29	50	$156
30-34	65	$238
35-39	231	$442
40-44	148	$273
45-49	33	$64
50+	45	$97
Grand Total	2,753	$45,711



Earliest Known Marine Navigation Tool Found

Laser scanning technology has helped researchers to confirm that an artifact recovered from the wreck of a sunken 15th century ship in the Indian Ocean is the earliest known marine navigation tool.

When the Blue Water Recovery team found the object in 2014, they believed it was an astrolabe used by mariners to measure the altitude of the sun during voyages, but they were not certain as there were no visible navigational markings.

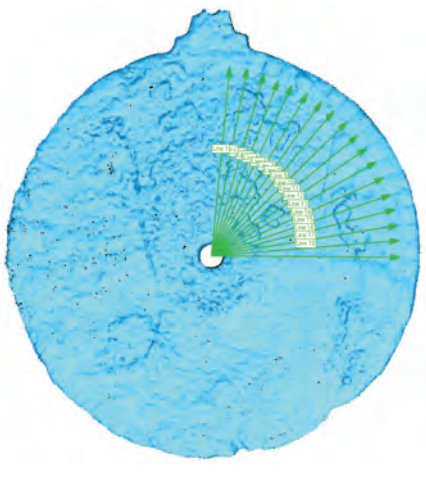
The team approached Professor Williams, who conducts high-tech scanning analyses in his laboratory at WMG University of Warwick in the U.K. to reveal the artifact's unseen details.

Williams was able to accurately scan the item to within 0.1mm and reproduce a high-resolution 3D model, revealing etches around the edge of the object, each separated by five degrees – proving that the relic is in fact an astrolabe. These markings would have allowed mariners to measure the height of the sun above the horizon at noon to determine their location so they could find their way on the high seas.

"It was fantastic to apply our 3D scanning technology to such an exciting project and help with the identification of such a rare and fascinating item," Williams said. "Usually we are working on engineering-related challenges, so to be able to take our expertise and transfer that to something totally different and so historically significant was a really interesting opportunity."

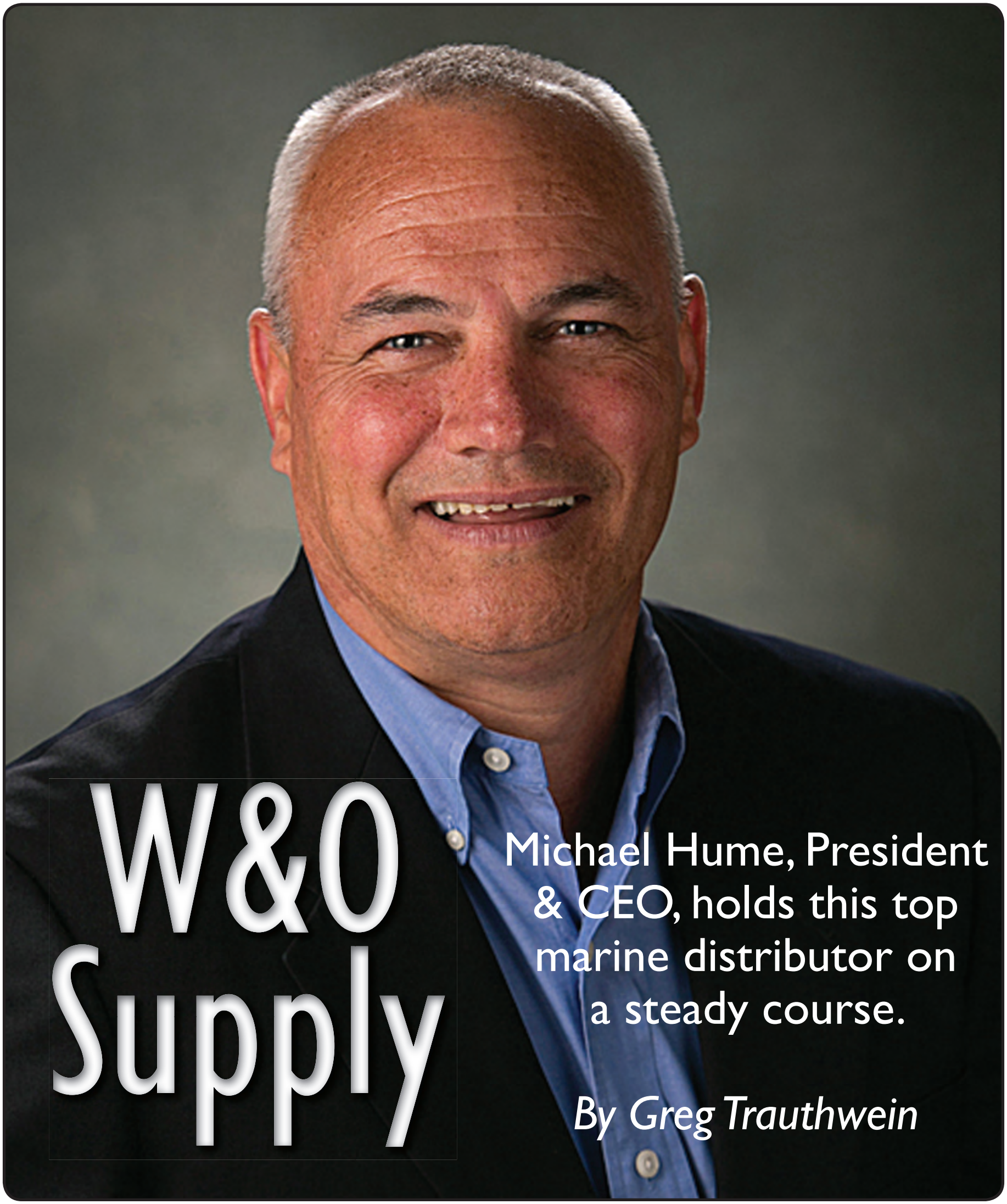
The astrolabe is a bronze disc measuring 17.5cm in diameter and engraved with the Portuguese coat of arms and the personal emblem of Don Manuel I, the King of Portugal from 1495-1521. It is believed to date from between 1495 and 1500, and was recovered from the wreck of a Portuguese explorer ship Esmeralda which was sunk by a storm in the Indian Ocean in 1503.

Credit: University of Warwick



Credit: University of Warwick

Scan of the astrolabe artifact; Below: Scan of the astrolabe artifact, revealing the etches



W&O Supply

Michael Hume, President & CEO, holds this top marine distributor on a steady course.

By Greg Trauthwein

Photo: W&O Supply

W&O has been a distribution leader in the commercial marine space for more than four decades for a number of reasons, but it all starts with stability at the top, in the form of the leadership of Michael Hume, President & Chief Executive Officer. Hume has been with the company since 1992, and on a recent visit to his office in Jacksonville, Fla., he discussed the challenges and opportunities that lie ahead for his company.

W&O supply is a ubiquitous name in the business of marine supply, supporting 18 locations globally staffed by more than 330 maritime professional and housing more than $50 million in standing inventory. But the story of W&O transcends the typical maritime product supply story, as the company stands out with its breadth of product and service offering, its sole focus on the marine business and its ability – as a wholly owned subsidiary since 1999 of PON Holdings B.V., a multi-billion dollar privately held company based in the Netherlands – to invest with the long term, big picture in mind.

"PON is a hands-on family company, they are involved in the business and they want to understand the opportunity that we see," said Hume. "This affords us the opportunity to plan a program to triple the size of the company; they listened, they understood and they supported us."

W&O is well on its way to hitting its growth target, no small feat in the face of a historically tight maritime market. When asked "how," Hume was succinct: acquisitions.

"We are looking at two or three acquisitions as we speak. To get to a $250 million company it will be about finding the right acquisitions, domestic or international." Through PON, W&O has the resources and the wherewithal to move quickly when opportunity arises to "invest ahead of the trend. PON has a 'buy and hold' strategy; they don't do anything temporarily just because it might look good," said Hume.

The Market: A Slugfest

"The marine market today is soft, some parts of it are as bad as we've ever seen," said Hume. "The offshore space is terrible; the inland workboat piece is off too."

But all is not bleak, as both the cruise ship segment and government/navy new construction business is helping the fill some gaps.

In step with a tight market, Hume said that competitive pressures in the marine space are greater than ever, coupled with a squeeze on margins and the requirements for quality, project support and documentation. "In a competitive world already, all of those things can create an awful burden, and then the question becomes 'how many people do you need to handle it and how do you make money doing it?'"

But Hume, having seen his fair share of marine cycles, neither gets too excited when times are good nor too down when business is bad. Looking ahead he predicts a "sluggish 2018 with the proverbial light at the end of the tunnel in 2019-2021."

"Marine is a cyclical business, and it's down. But I believe in the economics of maritime. As long as there is a fleet out there working – and we believe in the need for a strong inland shipping business, the need for a strong coastal shipping business, the need for a strong defense (Military Sealift Command, Coast Guard, Navy) – and we believe there will be a strong long-term demand for maritime."

Looking beyond 2018 Hume is decidedly bullish, as there are a number of government and commercial drivers in North America that promise to drive growth forward fast.

20 Leading Marine Distributors

We will always have local stock, local people, but we will continue to centralize capability on the more sophisticated marine solutions. If we can be an extension of the engineering department (of our customers), we have won. If we can be the go-to for a port engineer when they are struggling with something on their ship and we go visit the ship, we have won. If we can plan to have everything they need at dry dock when they need it, we have won. ***It's not about selling anything; it's all about planning and estimating and engineering and being an extension of our customer.***

"This is what I'm excited about looking ahead" to 2021-2022: "I think the Ballast Water business comes together in heavy quantity in 2020-2022; I think (the U.S. Coast Guard) OPC is fully loaded by then, I think the TAO program is fully loaded by then. In addition, they are going ahead with the SB6 at NASSCO, and I think the Canadian navy programs really starts to come together then. We are really bullish on the future."

The Strategy

W&O maintains its strategy to eye new business opportunities and invest, an investment strategy backed by PON. But W&O, like every other company in nearly every other industry, anxiously eyes the movements of the Amazon's and the Google's of the world to see how and when they might enter this maritime business space as a 'disruptor.'

"We are always looking at what could happen … how could someone else disrupt the business model that we have, how could someone try to commoditize what we do," said Hume.

To that end, Hume points to the key acquisition many years ago of VAC in San Diego, an investment that brought to W&O a critical technical knowledge and engineering capability. "That was a relatively small acquisition, but VAC's niche was engineering. VAC helped to show us how powerful our platform could be if we partnered with shipyards at the right level. We believe our technical knowledge and capabilities are a differentiator," said Hume.

In a way, Hume sees PON as a disruptor in the marine space, as W&O has evolved from a supplier of parts to a supplier of engineering systems and services, an engineering partner that helps it get in on the ground floor of a new projects.

"The more we get in on the front end of a project, the harder it is to change it," said Hume. But that's a trick, too, as W&O is a distribution model with commissioned sales people, and asking them to call on naval architects, spending a few hours with them advising when they could be in a shipyard selling product, is a challenge.

People Power

Though it may sound trite, the power of people cannot be undervalued, particularly in a small market like maritime where relationships are key.

When discussing the types of people he look for to drive the W&O business forward, Hume admits he is "old fashioned," looking for a person who first and foremost has a good work ethic, someone

Photos: W&O Supply

who is humble, someone with energy and someone with the willingness and capacity to learn.

"I always separate those two, as there are people with the capacity to learn, but not willing to put the time in; where there are others that are willing to learn, but simply don't grasp some of the technical evolution and the requirements that we have," said Hume.

"This is a relationship business. Marine people will reward hard working marine people if you stand behind what you do and you're honest when problems come up. I'm not so worried about education or pedigree."

And picking the right people to lead the W&O charge – particularly the people in the field that are facing the customers daily – is central to the company's long-term success.

"I think our field leadership is three fold from where it used to be," said Hume. "The OEM relationships are stronger than they have ever been, and we are only as good as the OEMs that we work with. We've always been strong with our customer support, but the OEM relationships have really helped us to grow."

So with all of the focus on technology, engineering, price and market, at the end of the day, for Michael Hume, it really comes down to people. "I truly believe that companies want to do business with other companies that provide value."

Vessel owner and operators are in a battle for profitability, eying fuel savings and emerging environmental regulations, amd finding and keeping the right people is increasingly difficult. "Our job is to help them find solutions," said Hume.

"At the end of the day, those that provide creative, on-demand solutions will win. That's how we've evolved the company. We will always have local stock, local people, but we will continue to centralize capability on the more sophisticated marine solutions. If we can be an extension of the engineering department (of our customers), we have won. If we can be the go-to for a port engineer when they are struggling with something on their ship and we go visit the ship, we have won. If we can plan to have everything they need at dry dock when they need it, we have won. It's not about selling anything; it's all about planning and estimating and engineering and being an extension of our customer."

W&O Expands in Singapore

W&O has been present in Singapore for years, previously via a hybrid joint venture with an industrial company. But maritime was not the local company's primary focus, and Hume said that he never really marketed the Singapore service to U.S. ship owners because he was never comfortable with the response time. Enter the "Grand Opening" of a new W&O presence in Singapore, effectively giving it a true Asia presence, a platform to work more effectively and expand work with global shipping companies.

"We've sold in there for a long time, so they are familiar with us," said Hume, noting that success in Singapore could serve as a launching point for W&O into other Asian countries. "We're going to start with 4 employees and plan to build it up to 12 within 18 months."

20 Leading Marine Distributors

Altec-Effer USA

Birmingham, AL
e: jonathan.white@altec.com
www.efferusa.com

Offering:
With a lifting capacity ranging from 2 ton meters to 300 ton meters, Effer Knuckleboom Cranes are a popular choice for construction, mining and marine industries and boast a power to weight ratio that is the best on the world market. Altec sells and supports the entire line of Effer Articulating Cranes. Contact us today for more details on additional models or to configure an articulating crane for your work requirements. Effer produces many different configurations to meet your specific needs.

AMS

Stevensville, MD
e: jgale@amsgroup.net
http://www.amsgroup.net

History:
Allied Marine Services (Allied) was formed in 1983 with the express purpose of acting as a sales representative for British naval technology OEM's who wanted to offer their products and services to the US Navy and US Coast Guard. Despite some early success it soon became apparent that the development of a long-term, viable presence in the market would depend on the OEM's ability to meet the unique demands of the US customer, . It was not enough to have a good product at a competitive price; the offered equipment also had to be accepted as a "standard" product, equivalent or superior to its domestic competitors in every way. Understandably, the Department of Defense expected the foreign entity to comply with the full set of applicable standards and specifications if the OEM wanted to secure meaningful business. For more than 30 years, Allied has established an excellent reputation in the sales and marketing of equipment and services to the US Navy and Coast Guard.

Offering:
Allied Marine Services is a sales representation company that sells and supports new products and technology to the naval and commercial maritime markets. Hull / Shipboard Equipment Protection Shipboard Sewage Handling / Fluid Transfer Equipment Propulsion / Stabilization / Steering Equipment Doors and Hatches: Watertight, Fire Rated Electronics / Navigation / Autopilots.

AME

Advanced Mechanical Enterprises
e: teresa@AMEsolutions.com
www.amesolutions.com

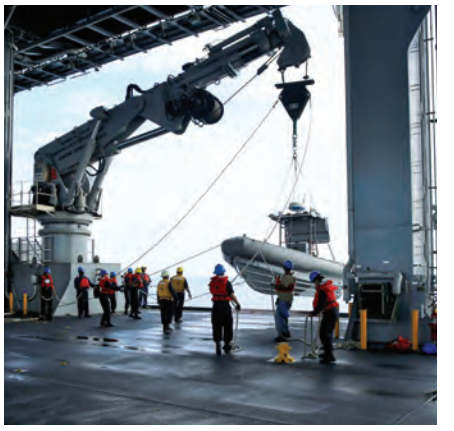
History:
Advanced Mechanical Enterprises/AME is a marine and industrial engineering services company specializing in predictive, preventative and corrective maintenance for propulsion systems, rotating, and reciprocating machinery. AME uses the most cutting-edge technologies and state-of-the-art equipment to provide industry-leading diagnostics, maintenance, and repair services. We've been in business for over 25 years, under the management of President/Owner, Rich Merhige, a highly respected specialist in vibration who's been commissioned the world over to consult of some of the most complex projects on everything from yachts, workboats, pumping stations, power plants, industrial/manufacturing facilities.

Offering:
See feature story on page 44.

DMW Marine Group

Chester Springs, PA
Ee: dw@dmwmarinegroup.com
www.dmwmarinegroup.com

History:
DMW Marine Group has been in the marine crane business since 1995. At first heavily concentrating on US Navy and Oceanographic research business DMW has evolved into all markets with heavy emphasis on Offshore oil, Military, Aqua Culture and Research vessel marine cranes.



Karl Senner, LLC

Kenner, LA
e: bbright@karlsenner.com
www.karlsenner.com

Karl Senner, LLC is a family business established by Karl H. Senner in 1972. The company is now owned and operated by his son, Ralph Senner, and grandsons, Karl and Christopher Senner.
In 1967, Karl sold the first Reintjes gearbox in North America to the inland operator LeBeouf Towing of Houma, LA. He quickly made a good name for himself by selling reliable products and providing dependable support to his customers. By 1972, he secured the exclusive Reintjes sales and service distributorship for all of North America. Over the years, the company was able to grow and gain a large portion of the U.S. commercial marine market through the companies' dedication to its customers and to the products it represents. To date, Karl Senner, LLC has sold approximately 4,000 Reintjes Gearboxes.

As markets adapted to advances in technology, Karl Senner, LLC saw a growing demand for azimuth thrusters across several marine market segments. In 1999, the company was approached by an azimuth manufacturer that shares a very similar design philosophy to that of Reintjes, and shortly thereafter, Karl Senner, LLC became the exclusive sales and service representative for Steerprop in United States, Mexico, and Bahamas.

Karl Senner, LLC has been selected to supply Steerprop thrusters onboard over 130 vessel to date; 120 of these vessels were diesel-electric PSVs where Karl Senner, LLC worked side-by-side to EPD (Electronic Power Design) Electrical Systems. This collaborative partnership poised Karl Senner, LLC to become the North American marine representative for EPD in 2015.

Today, Ralph and his two sons, Karl and Christopher, continue to operate under Mr. Karl H. Senner's philosophy, remaining dedicated to the product, customer support, parts availability, and in-house service/safety training. Karl Senner, LLC has since established a strong presence throughout Inland Waterways, Offshore Markets, ATBs, Ferries, Harbor/Ship Assist vessels, Fishing vessels, Dredges, Pleasure Craft, Government applications, among other markets.

Since 1967 the strong partnership between Reintjes and Karl Senner, LLC has earned the companies a strong reputation throughout the Maritime Industry, known for reliability, longevity and superior service.

Offering:
Karl Senner, LLC is the exclusive Sales and Service representative for Reintjes Gearboxes, Steerprop Azimuth Thrusters and EPD Electrical Systems throughout North America.

Offering:
DMW offers marine cranes of all configurations but is best known for its folding and telescoping knuckle boom marine cranes. Models start at 2 ton meter and the largest built to date is a 500 ton meter telescoping marine knuckle boom for the U.S. Navy.

Projects:
DMW was instrumental in developing knuckle boom marine cranes for target and torpedo recovery in the 80's and 90's where almost every oceanographic research vessel in North America was using DMW supplied cranes. When offshore oil grew in the late 90's DMW developed a newer safer way for handling personnel on offshore rigs and delivered over 80 units to that market, which unfortunately is quiet now. From Barge lid handling to handling rescue boats loaded with ammo and personnel to unloading 2000 pound baskets of oysters DMW has been involved with almost all of the marine industry.

Governor Control Syst.

Fort Lauderdale
www.govconsys.com

GCS specializes in control system integration and monitoring solutions. GCS is your partner for the life cycle of your control, monitoring and measuring systems. GCS is an authorized service partner of Woodward, Schaller, DCL, Dynalco, TDI, Spinner and Kral. GCS is specialized on the sales and service of: Governor Control Systems/Actuators; Emission Controls; Instrumentation; Air Starters; Oil Filtration Centrifuges; Volumeters / Fuel Consumption.

Green Marine & Industrial Equipment

Metairie, LA
e: katie@greenmarine.com
www.greenmarine.com/

History:
Since 1961, Green Marine has been recognized with the best standards for equipment and parts in the marine, offshore, and shipbuilding industries. Its equipment to quality extends beyond the sale with seasoned, well-trained service technicians, bringing more value to every product we sell.

Offering:
Incinerators, Oil content monitors, oily water separators, stainless steel push fit piping, ballast water treatment systems, ICCP systems, watermakers, marine sanitation devices, heaters and boilers, UV filtration, fire safety systems, and LED lighting. Manufacturing brands available upon request.

Gulf Coast Air & Hydraulic

Mobile, AL
http://wegetstuffdone.com/

Gulf Coast Air & Hydraulics is a full line distributor specializing in Air and Hydraulic Sales, Service, Fabrication and Installation for the Industrial and Marine Industry. Gulf Coast Air & Hydraulics was started in 1985 by Chuck Moorehead and Mike Ellis.

Since the beginning the company has evolved to keep up with the needs of the Marine and Industrial industry but mostly to continue to have what was needed by our customer base. Today with more than 35 years of experience it has emerged as a total solutions company serving the industrial market in our area but especially in the marine market. It has hydraulic component and systems sales, as well as electrical expertise specializing in varible frequency drives from 5 to 2000 HP.

20 Leading Marine Distributors

Imtra Corp.

New Bedford, MA
Holly Augustine, Marketing Manager
e: holly@imtra.com
www.imtra.com

History:
Imtra Corporation is the systems supplier for the marine and commercial industries. Product selection is only part of our story. Imtra's strength begins with its people, a dedicated team, with a knowledgeable in-house service staff, solid engineering capabilities and a nationwide support network of professionals.

Imtra offers a wide range of quality products built to stand up to the toughest on-the-job conditions of the commercial marine market. Whether it is a wiper system for an inland push boat or an ergonomic seat and bridge console solution for the demanding offshore market, Imtra has the equipment and expertise to create a complete system solution. Imtra's team works with all facets of the commercial marine industry, from naval architects and operators to shipyards and installers. At every step, Imtra make ssure that the product and support is there to deliver reliable results.

Livingston & Haven

Charlotte, NC
e: pmallory@livhaven.com
www.livhaven.com

Founded in 1947, Livingston and Haven has been a leader in industrial distribution in the Southeast. In a 1976 watershed moment for Livingston & Haven, the company executives traveled to Germany to tour Bosch (now Bosch Rexroth), a world leader in motion control, leading to Livingston & Haven's position as the premier Bosch Rexroth distributor in the Southeast. In the early 1980s, Livingston & Haven expanded into electronics and automation in a partnership with Mitsubishi Electric. The company later added lubrication capabilities with two strategic acquisitions and focused our strengths on motion control.

Offering:
L&H partners with industry leading suppliers that offer quality products at the highest standards for our customers. We are fully committed to our customer's success. Our mission is to provide innovative productivity solutions to our customers. Our team focuses on proactive approaches in solution development and we are dedicated to improving quality, productivity and efficiency. Our vendors include Bosch Rexroth, Aventics (WABCO), Hydac, Kluber, Graco, Parker and many more

Mack Boring & Parts

Somerset, NJ
e: info@mackboring.com

It was the early 1920's when founder Ed McGovern Sr., a WWI Navy Veteran, started servicing and repairing engines in the basement of his Newark, New Jersey home. His nickname was "Mack" and "boring" was one of his thriving machine shop's specialties; grinding and refitting holes in crank blocks for engine cylinders were among the others. In 1922, Mack opened a 500 sq. ft. machine shop in Newark, New Jersey and aptly named it Mack Boring & Parts Company. Its quality work and reliability led to rapid growth and the move to an even larger facility. Today, with the fourth McGovern generation working at the company, the private family-owned Mack Boring & Parts Company entered the new millennium with growth and customer focus. Scania diesel, Mitsubishi, and Aquadrive distributor ships were acquired. Mack Boring & Parts Company manages approximately 300 Authorized Dealers across 26 states.

Ships Machinery Intl.

Miami, Florida
e: info@shipsmachinery.com
www.shipsmachinery.com

SMI's history goes back to the early sixties of the last century. In 1963 a company was formed as a daughter company to a German manufacturer of propulsion systems. A property north west of the Miami airport was purchased in 1978 and a custom building was built to support the increased demand on U.S. built bow thrusters.

Products include Brunvoll, Van der Velden, Maritime Partner, Ibercisa, Jason, Heila, VDL Klima, Jets, MMC, Anda, Profiseal.

SMI's sales and service personnel support high quality marine equipment manufacturers offering a complete line of propulsion, maneuvering, fire-fighting, deck machinery, davits and other marine equipment.

The main offices is still located in Miami, FL, and it also maintains a fully staffed office in Mazatlan, Mexico, targeting the markets in Central and South America.

The diversity of our product lines together with the continued support and commitment from our suppliers is key to our mutual success in supplying the best modern marine equipment available.

DCL Rigging & Mooring

New Orleans, LA
e: kritschel@dcl-usa.com
www.dcl-usa.com

DCL Mooring & Rigging is a recognized leader in supplying a variety of lifting, mooring and inspection products and services to domestic and international customers in the marine, construction, industrial and oil and gas industries. Based in New Orleans, LA with locations in Houma, LA & Houston, TX, the company has been meeting the needs of customers for over 50 years. The operation grew from its beginning in 1945 as Dreyfus Supply, Inc. to the power-house it is today through acquisitions. In 2003 Dreyfus acquired the Cortney Company forming Dreyfus-Cortney, Inc. Dreyfus Supply and the Cortney Company were premier mooring supply operations providing anchors, anchor chain, buoys, fenders, related hardware and mooring design expertise to the market. Dreyfus-Cortney, Inc acquired Lowery Brothers Rigging Center in 2004 creating the only company internationally to offer a complete array of not only mooring products and expertise but ALSO full-service sling fabrication, rigging product supplies and testing services to customers. The company began doing business as DCL Mooring & Rigging in 2006 to recognize the history of its operating companies and unique combined capabilities Today's offshore and marine management, operations, engineering and field personnel are challenged to perform 21st Century tasks with 20th Century equipment. Recognizing the rapidly changing and more demanding needs of its customers and an increasing industry-driven demand for the right tool for the more complex job, DCL formed a sister company to DCL Mooring & Rigging specializing in new product development. Established in 2008, DCL Engineered Solutions (DCL-ES) provides patent assistance, design, engineering, testing, prototype development, CNC machining and fabrication of specialty and limited-production components for the marine and offshore oil industries. Stand-alone engineering services, comprehensive manufacturing capabilities and world-wide distribution programs are also available. DCL-ES works with you to design and deliver a component to meet your needs. If you already have an idea in mind, DCL-ES can engineer and develop your design into a finished product. DCL-ES combines innovative engineering with state of the art software, equipment and processes to develop "Tomorrow's Ideas Today!".

Offering:
a) Complete Heavy-Duty Mooring & Rigging solutions. b) Heavy Lift Work Plans, Consulting, Project Management. c) Custom Fabrication of lifting components & rigging hardware. d) Asset Management – software, equipment, consulting and services. e) Marine & Industrial Grade Port Construction Materials. f) Custom Product Development (We are very flexible on how we approach joint product development, DCL can engage in a model that ranges from DCL will design/develop for a fee to we invest in the product. We call this model, Collaborative Innovation). g) New & used anchors, chain, bollards, etc. equipment for sale & lease. h) Load testing & certification.

Viega

Broomfield, Colorado
www.viega.us

History:
Viega started in Germany in 1899, founded by Franz-Anselm Viegener, who created an innovative new design for a brass beer tap. By 1901, the Viega German company began to manufacture home plumbing products, growing and expanding internationally as the authority in press technology during the last century. In 1999, through the purchase of an interest in a U.S. company, Viega expanded its product offering to North America. Today, the innovative products of the Viega Group of companies are produced at six international locations and distributed worldwide. Viega LLC, a privately held subsidiary headquartered near Denver in Broomfield, Colorado, is the expert in the manufacture and distribution of plumbing, heating and pipe-joining systems for customers in residential, commercial, industrial and marine markets throughout North America.

Offering:
With more than 16,000 products and systems offered worldwide for plumbing, heating, cooling and pipe joining applications, all Viega systems are highly engineered, making them fast, easy and safe to install. Viega offers its flagship Viega ProPress line for marine systems in copper, stainless steel and copper nickel. The systems are designed to perform in the harsh environments of the open sea. Viega ProPress systems are best suited for fresh water systems while Viega SeaPress is specifically designed for corrosive seawater environments. Viega ProPress, Viega MegaPress and Viega SeaPress can be used in a variety of applications from potable water to fuel to fire main.

Laborde Products

Covington, LA
e: ccerullo@labordeproducts.com
www.labordeproducts.com

History:
A diesel engine distributor established in the 1980's, and purchased by the Laborde Family in 1998. Laborde Products began distributing Mitsubishi Heavy Duty engines in 2001 in the Gulf Coast, and has expanded its territory up the inland river system and Great Lakes. Laborde Products opened a full service branch servicing the Houston, TX Marine and Industrial markets in 2008.

Offering:
Laborde Products offers diesel engines and diesel powered custom equipment from 4 horsepower to 2000 horsepower using any of it's engine manufacturers. Our engine manufacturers are Mitsubishi, Yanmar, FPT, HATZ, Steyr, BUKH, OXE. In addition, we offer engines from PSI. Engines can be used in various marine, and land based applications. Custom packaging is available for any project.

Projects:
Laborde Products is currently providing propulsion packages for new construction push boats, diesel powered custom packages for municipal pumping stations, PSI gas engines for ground support vehicles for airport use and 10HP diesel powered pumps which meet the newest pushboat fire fighting requirements.

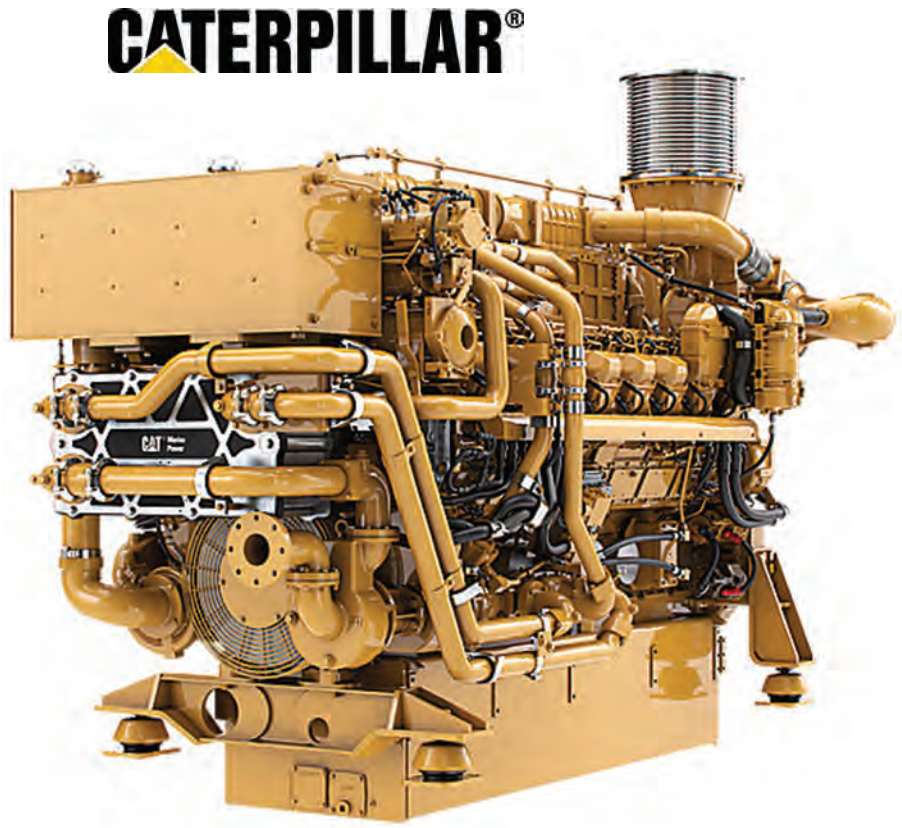
Caterpillar Inc.

e: smith_charlson_c@cat.com
w: www.marine.cat.com

History:
For over 90 years, Caterpillar Inc. has been making sustainable progress possible and driving positive change on every continent. Customers turn to Caterpillar to help them develop infrastructure, energy and natural resource assets. With 2016 sales and revenues of $38.5 billion, Caterpillar is the world's leading manufacturer of construction and mining equipment, diesel and natural gas engines, industrial gas turbines and diesel-electric locomotives. The company principally operates through its three product segments - Construction Industries, Resource Industries and Energy & Transportation - and also provides financing and related services through its Financial Products segment. For more information, visit caterpillar.com. To connect with us on social media, visit caterpillar.com/social-media.

Offering:
Caterpillar Inc. and the over 150 Cat dealers worldwide offer marine propulsion engines ranging from 280 to over 22,500 horsepower, as well as marine generator sets from 10 to 15,440 kW. Additionally, Caterpillar offers a complete line of controllable pitch propellers, azimuthing thrusters, tunnel thrusters, and controls through the Cat Propulsion division. The new 3500E series of EPA Tier 4 compliant diesel engines has already proven to be a user-friendly and reliable product, and the C32 Tier 4 will be launched in the near future as well. MaK medium speed engines continue to offer outstanding service fired by heavy fuel oil, and on the other end of the power continuum, the all-new C7.1 commercial propulsion engine will soon be launched in 280, 350, 400, and 425HP configurations. This new platform will be an ideal stablemate to the new C9.3 propulsion engine (375, 416, 476 bhp) that has already proven successful in towboat and fishing boat applications.

Projects:
A pair of Tier 4 Cat 3516Es have been installed in hulls 121 (Benson George Moran), 122, and 123 (the latter two for G&H towing) at Washburn & Doughty, making Moran Towing and G&H, along with McAllister Towing, among the first to adopt Tier 4 Caterpillar iron in tugs. Gladding-Hearn launched the fast ferry "Champion", hull 418, for the MBTA which features Cat C32 main engines. Cross Sound Ferries recently



repowered a vessel with 3516Cs, having removed older medium speed two-cycle main engines. Harley Marine recently launched the Tier 4 compliant "Earl W. Redd", accompanied by "Dr. Hank Kaplan" and "Rich Padden", the latter two featuring Cat Propulsion azimuthing thrusters. Built by Bay Delta, Foss recently launched 3516E-equipped "Caden Foss". Kirby has undertaken construction of six ATBs, featuring Tier 4 3516Es, and G&H Towing has committed to eight tugs to be built at Gulf Island Shipyard, also featuring 3516Es.

JA Moody: Composeal Valves Keep NCL Sailing

JA Moody is the national distributor for Emerson valves and control products. With millions of passengers traveling each year, cruising has become a major part of the tourism industry. For companies like Norwegian Cruise Line, it is critical that their passenger ships are available and at sea, serving their clientele, as much as possible. When Norwegian Cruise Line began to experience wear and tear of valve units servicing the pools and spas on their Norwegian Jewel cruise ship, they proactively wanted to get ahead of the situation. JA Moody was able to step in and offer a solution to this potential maintenance issue.

The Norwegian Jewel is the lead vessel of Norwegian Cruise Line's Jewel class cruise ships and it is critical that her maintenance requirements allow the vessel to be at sea as much as possible. Problems with the metal valves in the pools and spas would cause extended delays in dry dock for service and repairs. JA Moody was able to offer Emerson's Composeal valves with multiple available configurations to readily service Norwegian Cruise Line's application needs.

OPPORTUNITY:
Damaged and corroded valves requiring repeated replacement.

SOLUTION:
Composeal valves provided a light weight, cost effective alternative.

Emerson's Composeal valves have successfully passed extensive tests to prove compliance with marine application standards. They are suitable for a wide variety of purposes and can be used in both hot and cold water applications, heating and ventilation systems, swimming pools and waste water treatment, such as purification, ozone and demineralization. In addition to their enhanced performance, Composeal butterfly valves also provide excellent corrosion resistance, resulting in a longer product lifecycle.

The Composeal valves can replace stainless steel and other high priced exotic metals in corrosive service. The light weight construction enables more efficient transportation and simplified installation, reducing carbon emissions and cutting the overall manufacturing costs of the vessel. In addition, Composeal valves are made of advanced composite material and are 100% recyclable, making them the ideal fit for companies committed to sustainable production.

With a classification market share of 21 percent of all ships currently on order Det Norske Veritas (DNV) is one of the world's leading maritime certification societies. Emerson's Keystone Composeal butterfly valves successfully passed the DNV test, verifying

Universal Corrosion Specialist

Rosenberg, TX
e: RBusby@universalcorrosion.com
w: www.universalcorrosion.com

Since 2005, Universal Corrosion Specialist has been helping companies prevent and protect their valuable assets from corrosion.

Clients can be found in just about every industry, including oil & gas, manufacturing, industrial, LNG facilities, refineries & petrochemical, marine services, mining, metal parts & accessories – and more.

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Projects :

*** Hess Stampede Topsides;** (complete preservation of equipment using temporary coatings, VpCI shrink wrap and emitters), located at Kiewit Offshore Services Yard Ingleside, TX.
*** Drilling Rig Preservation** (Warm Stack / Cold Stack); 15 Rigs (Noble, ENSCO, Paragon, Vantage Drilling, Rowan, Transocean);
*** Freeport LNG** (provided facility corrosion inhibitors)

the entire Composeal range (DN40 – DN300) for all available seat materials including EPDM, NBR and FKM-B as DNV compliant.

Additionally Composeal valves are also ABS approved.

20 Leading Marine Distributors

Mackay Marine (Mackay Communications, Inc.)

Mackay
MARINE
www.mackaymarine.com

Raleigh, NC
e: info@mackaycomm.com
w: www.mackaymarine.com

History:
Founded by John Mackay in 1884; Commercial Cable Company constructed and operated a network of trans-Atlantic and Pacific telegraph cable systems. Mackay Radio and Telegraph expanded in the 1920's, opening coastal stations for international point-to-point communications and high seas ship-to-shore service. The operations were acquired by ITT until 1987. Mackay is now a privately held firm, headquartered in North Carolina. Mackay's reputation for quality service and products has propelled significant expansion worldwide. Today, Mackay has 36 locations worldwide, including North & South America, Europe, Asia, and India. Mackay distributes hundreds of quality marine electronics, while performing 17,000 ship-board attendances annually.

Offering:
Mackay Marine sells, installs, inspects, and services communication, navigation, security, and anti-pollution instruments for all classes of vessels, including high-seas shipping, coastal, fishing, passenger, military, and offshore drilling. Mackay represents the premier manufacturers in the marine electronics industry. It employs 290 professionals worldwide, serving roles in technical field service, management, service coordination, project management, sales advising and support. Mackay World Service seamlessly arranges 24/7, efficient service at any port-of-call, through our 36 global locations and 90+ collaborative agents. Offering turn-key solutions and a comprehensive line of marine electronics:

- **Communications:** GMDSS, Satellite Systems (L-Band, VSAT & Iridium Terminals) and Airtime, Interior Communications, Radios (Handheld & Ship-Board), Entertainment Equipment
- **Navigation:** AIS, Auto-Pilots, Chart Plotters, ECDIS, Depth Sounders, GPS, Gyro, Magnetic, and Satellite Compasses, Integrated Bridge (IBS), Radars, Speed Logs, Steering Systems.
- **Safety & Security Electronics:** Anti-Piracy Systems, AIS, BNWAS, EPIRBS, GMDSS, SART, SSAS, Tracking Systems, VDRs, Surveillance, CCTV
- **Anti-Pollution and Below-Deck Electronics:** Alarm Monitors, Fuel Consumption and Flow Measurement, Fuel Viscosity Control, Oil Discharge Monitors, Oily Water Monitors, Ballast Water Replacement Systems

Mackay's dedicated Project Management Group collaborates with new-build & retrofit marine architects and ship owners to integrate seamless electronics packages to match client plans and schedule.

Projects
A significant added-value to Mackay's role as a distributor, is its New-Build Project Management Department's ability to leverage its full-line of leading products and favorable pricing, while offering a complete array of services from conception to commissioning.

Services provided by its team of maritime professionals, include Estimating, Procurement, Drawings, Logistics, Installation, Commissioning, Invoicing, and Warranty Management of marine electronic solutions to a variety of customers.

Everything from small equipment-only purchase to 100% turn-key, customized bridge/pilothouse navigational consoles produced and integrated with electronics. Once vessels set-sail, Mackay continues to provide onboard service through our extensive global service network.

Most projects have involved U.S. customers and shipyards, but we're expanding our services globally; collaborating with Mackay offices in China, Singapore, Canada, and Europe.

DRONES: Cyberhawk Gets ABS Certification

As the maritime world increasingly turns to unmanned and autonomous systems to carry out difficult and dangerous work, one drone innovator has received certification from a classification society to this end. Cyberhawk Innovations reports that it has been certified as an External Specialist by the American Bureau of Shipping (ABS) in providing inspections for internal tanks using UAVs.

Achieving ABS recognition means that the data captured by Cyberhawk's UAVs can now be used by ABS surveyors to make decisions affecting classification surveys of cargo oil tanks (COT) and other bulk storage tanks on vessels.

As part of the External Specialist certification procedure, Cyberhawk completed two internal tank inspections on an Aframax class oil tanker in the U.S. in collaboration with an ABS Surveyor. The inspection took place in Portland, Ore., where the Surveyor examined all safety and inspection processes required to accept Cyberhawk's high quality inspection technique. The two inspections were part of a larger project, involving a survey of all 14 COTs using a drone on a sister vessel. The project was completed in just six days by the Cyberhawk team.

Aside from significant time and efficiency savings, the use of UAVs by experienced operators means minimized risks to personnel, offering a safer, more economical solution for detailed structural inspections. One current industry method for COT inspection on tankers is to use a technique called rafting. Rafting involves filling the tank being inspected with water, allowing the ship surveyor to use a raft or dinghy to view critical inspection areas of the tank, inaccessible from the tank floor. Rafting creates a large volume of oil-contaminated water which has to be decanted from the vessel at a port that can handle such waste. Using a UAV eliminated the generation of oil-contaminated water and the safety risks associated with rafting.

ABS auditors carried out a detailed review of Cyberhawk's UAV equipment, operator training, and maintenance and inspection processes both at Cyberhawk headquarters in Scotland and onsite in the U.S.

Arneson Surface Drives Enhanced

Twin Disc announced an expansion to its line of Arneson Surface Drives, as select models now interface with MasterTrim, an automated trim control system. By use of exacting sensors, the programmable MasterTrim control system automatically adjusts the position of Arneson Surface Drives and trim tabs or interceptors for maximum efficiency and performance. It has operator selectable modes to fine-tune trimming response based on sea conditions and vessel loading—freeing the helmsman to focus on safe navigation. MasterTrim will be available on Arneson ASD08, ASD10, ASD11, ASD12 and ASD14 models starting in 2018.

Arneson Surface Drives feature a surface-piercing design. The drive's skeg and propeller blades are the only components to contact the water. This is designed to reduce underwater drag by 50%.

www.twindisc.com

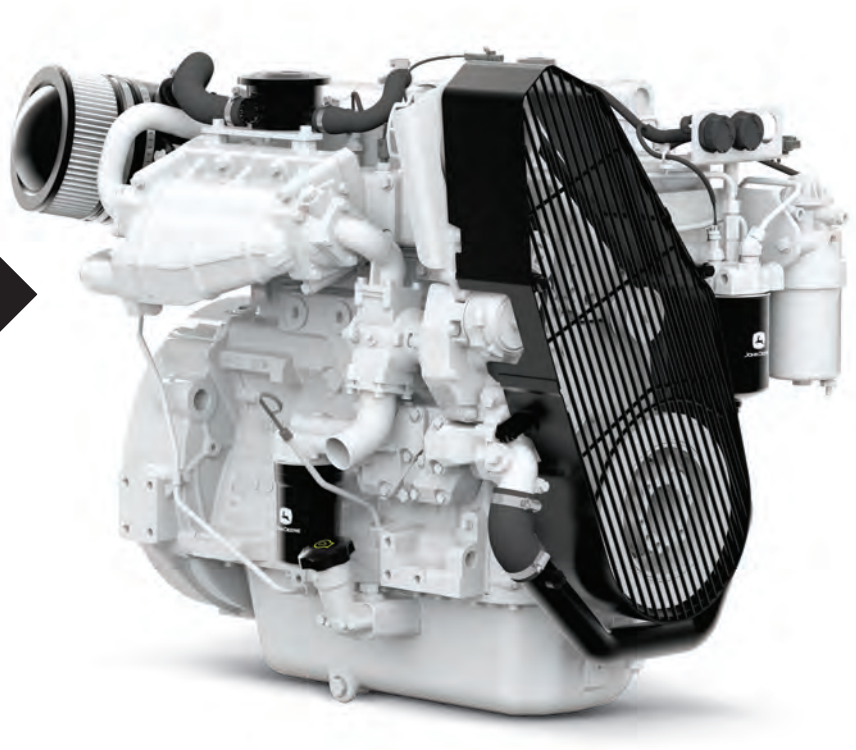
Ultra-Silent Propulsion for RV

Wärtsilä will supply an ultra-silent propulsion package for a new research vessel to be built for the Faroe Islands Marine Research Institute. The vessel is being built at the MEST shipyard in the Faroes.

The ability to create a propulsion solution that significantly limits underwater radiated noise (URN) and which meets the DNV Silent R notation, was a key factor in the award of this contract to Wärtsilä. By enabling the vessel to sail with very little URN, the Wärtsilä solution will facilitate the ability of the research personnel onboard to carry out their tasks with greater effectiveness. The 54m ship will be powered by a pair of eight-cylinder Wärtsilä 20 engines and will have a silent Wärtsilä fixed pitch propeller and complete shaft line. The solution is very compact, which results in reduced acoustic signals.

www.wartsila.com

John Deere Rolls Out New Marine Engine Trio



4045SFM85

John Deere Power Systems has expanded its lineup with three new marine engines available for order from early 2018.

The new 4.5L PowerTech 4045SFM85 offers high power to weight ratio for repowering and new vessel construction, ideal for planing and semi-displacement hulls, according to the manufacturer. It has two ratings for light-duty commercial vessels, high-speed governmental applications and high-speed pleasure craft, which includes an M4 rating with 205 kW (275 hp) at 2,600 rpm and M5 rating with 235 kW (315 hp) at 2,800 rpm.

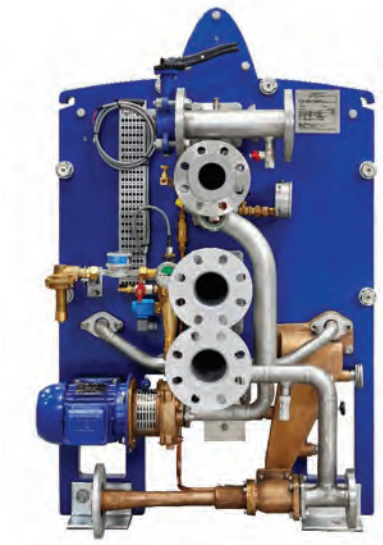
The 4045SFM85 propulsion engine ratings will meet U.S. Environmental Protection Agency (EPA) Marine Tier 3 and Recreational Craft Directive II emissions regulations, as well as International Maritime Organization (IMO) Tier II standards for commercial and recreational applications. The engine is pending approval by American Bureau of Shipping (ABS), DNV GL, Lloyd's Register and Bureau Veritas and will be the only ABS-certified, 315 hp, four-cylinder in-board diesel engine.

Also new from John Deere Power Systems, the new 6090HFM85 and 6135HFM85 marine engines are designed for radiator-cooled marine gen-set and auxiliary applications. The 6090HFM85 is rated for variable speed at 242 kW (325 hp) at 2,000 rpm and for generator drive and constant speed auxiliary at 262 kW (351 hp) at 1,800 rpm, while the 6135HFM85 is rated for variable speed at 373 kW (500 hp) at 2,000 rpm and for a generator drive and constant speed auxiliary at 458 kW (614 hp) at 1,800 rpm.

The new marine engines are well-suited for gen-set, constant speed and variable speed auxiliary applications, particularly when wet manifolds and marine society classification certificates are desired or required. The ratings of both engines meet U.S. EPA Marine Tier 3 emissions regulations and are compliant with IMO Tier II standards for commercial applications. The engines are type approved by ABS.

www.johndeere.com

Freshwater Generator Cuts Power Consumption



Alfa Laval AQUA Blue S-type.

With today's AQUA Blue S-type, the need for electrical power is further reduced – to just one-third that of conventional freshwater generators. The new AQUA Blue S-type uses the same three-in-one AQUA plate technology as the original C-type configuration. But it maximizes energy efficiency and capacity-to-footprint ratio by making use of the vessel's existing seawater cooling system pumps. According to the manufacturer, this cuts electrical power needs by 70 percent compared to conventional freshwater generators, and it shrinks the already small AQUA Blue footprint by up to 15 percent.

www.alfalaval.com

ABB Digitalizes Maritime Maintenance

ABB added 'Fleet Intelligence' to its ABB Ability Collaborative Operations software, providing a single overview of ship system maintenance needs. Fleet Intelligence is designed to deliver greater efficiency and more precise inspection scheduling, better spare parts availability, asset protection and prolonged equipment service life, helping to minimize the requirement for service engineer visits. It combines IT for marine equipment maintenance planning, including advanced analytics of data in the cloud, with ABB's domain knowledge and technical services support remote operational centers. Fleet Intelligence harnesses the integration at the heart of shipboard ABB Ability systems such as Integrated Automation and Remote Diagnostics. The system is also able to collect data from third party applications. The AHC approach overcomes one of the main roadblocks to digitalized vessel efficiency, the power and automation technology group says.

WinGD, Enamor Advance the Digitalization Trend

Winterthur Gas & Diesel (WinGD) has taken the next in accessing the benefits of digitalization for the operation and management of its low-speed diesel and dual-fuel engines. WinGD signed an agreement with Enamor Ltd. of Gdynia, Poland, formalizing an existing collaboration covering the development of data collection and monitoring (DCM) platform for engines and associated onboard systems. The first version is ready for commercial applications. Among its features, the platform is closely tailored to operating with WinGD's engine and ship-specific software, including advanced diagnostic software.

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Rapp Marine Selected for New OSU RV

Rapp Marine was selected by Gulf Island Shipyard, LLC, as the Overboard Handling System Single Source Vendor (OHS SSV) for Oregon State University's (OSU) 193 ft x 41 ft multi-mission Regional Class Research Vessel (RCRV), with the option of two additional vessels. Funding for the RCRV project is provided by the National Science Foundation (NSF), and the contract design of the RCRV was developed by Glosten. The first vessel is currently under construction at Gulf Island Shipyard in Houma, La.

Rapp Marine is responsible for integrating the systems required for science mission and cargo handling operations. The overboard handling systems will consist of the oceanographic winch and hydrographic winch systems, which will supply various tension members to the stern A-frame, main crane and overboard handling apparatus. The portable winch will also supply the tension member used with the portable side A-frame and portable crane.

The primary application of the oceanographic winch system will be for towing scientific devices, coring and deploying/recovering large surface buoys or heavy packages to the seafloor. The hydrographic winch system will be for instrument handling and towing as well as CTD/rosette casts. The portable winch system will be used for lighter tows or casts. The load handling systems will employ state of the art features for smooth operation, a few of them including Electric Variable Frequency drives (VFD) and Active Heave Compensation (AHC) for all the winch systems, wireless control chest packs with CCTV display feeds, and Rapp Marine's proprietary Pentagon PLC Control System that displays and logs all line data according to UNOLS standards during operations.

Warner Electric Clutch

When one powertrain manufacturer designed a remote PTO solution which would allow pumps to run from the main engine, eliminating the need for a secondary engine - there was immediate interest. At the heart of the new design was a clutch from Warner Electric. In the offshore, marine and oil and gas sectors most workboats and dredging vessels require large hydraulic pumps for their operations, as well as fire pumps for emergency situations. These pumps often require between 300 and 500 hp to operate, meaning that they are often run from secondary engines.

The assembly is designed to be driven from the front of the crankshaft, enabling it to run general purpose hydraulic pump drives, fire pump drives and other secondary drives from the primary motor. Part of the design required a remote operated clutch with proven reliability in the harsh marine environment. The manufacturers approached Warner Electric, part of Altra Industrial Motion, for a solution. The SFC-1525 stationary field clutch was selected due its size and design, remote electrical activation and reputation for reliability offshore.

The remote PTO has now been commissioned on many different vessels operating around the world. The clutch can be engaged in about a second, giving the crew almost instant access to the secondary systems driven by the PTO.

www.warnerelectric.com

BWTS Install "on the go"

When the time came to select ballast water treatment systems for retrofit on board its vessels, freight ferry operator Seatruck opted for the Optimarin Ballast System (OBS) for its ships, citing ease of installation, reliability, cost efficiency and complete regulatory compliance as deciding factors.

The RoRo cargo specialist went on to install five systems itself while its vessels were undertaking normal operations – no dry dock required.

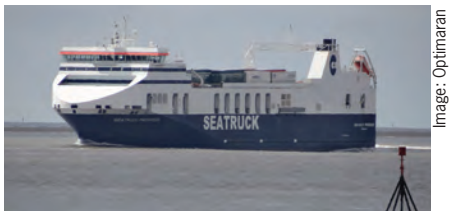


Image: Optimaran

Seatruck operates a fleet of 10 ferries ranging in capacity from 65-150 trailers, with more than 60 weekly departures servicing three routes linking Ireland and the North of England. This regular sailing schedule, between set ports, ensured the firm could call on local contractors to 'hop on and off' and carry out whatever engineering work the crew themselves couldn't manage.

Seatruck kicked off the installations with the 5,300 dwt Seatruck Progress in November last year, followed by the remaining four systems installed between January and the end of September this year. Optimarin said it has received orders for more than 520 systems to date, with more than 330 installed worldwide, of which 150 are retrofits.

The Quest to find USS Indianapolis

(U.S. Navy photo)

Sunk near the end of World War II, heavy cruiser USS Indianapolis disappeared to the darkest depths of the Philippine Sea, where it remained undiscovered for more than 70 years. Recently a team of civilian researchers led by Microsoft co-founder **Paul G. Allen** *set out equipped with an arsenal of high-tech search equipment on a mission to locate the historic vessel last seen on July 30, 1945.*

By Eric Haun

The Portland-class heavy cruiser USS Indianapolis (CA 35) in port at the Mare Island Navy Yard, in Northern California following its final overhaul. The ship was sunk on July 30, 1945 by a submarine in the Philippine Sea following delivery of parts for Little Boy, the first atomic bomb used in combat, to the United States air base at Tinian. Of 1,196 crewmen aboard, approximately 300 went down with the ship. The remaining 900 faced exposure, dehydration, saltwater poisoning, and shark attacks while floating with few lifeboats and almost no food or water. The Navy learned of the sinking when survivors were spotted four days later by the crew of a PV-1 Ventura on routine patrol. Only 317 survived.

The R/V Petrel, owned by Microsoft Cofounder and Philanthropist Paul G. Allen, at sea in search of the USS Indianapolis.

Photo courtesy of Paul G. Allen

Built by New York Shipbuilding Corporation in Camden, N.J., the 623-foot-long, 9,800-ton Portland Class heavy cruiser USS Indianapolis (CA-35) entered service during peacetime in November 1932, later going on to serve heroically through campaigns that earned the ship 10 battle stars over the course of World War II.

But after much success in battle, the fate of the Indianapolis eventually turned tragic as World War II neared its end. In the early hours of July 30, 1945, having just completed a secret mission to deliver materials from California for the first operational atomic bomb, "Little Boy" to a naval base on the Pacific island Tinian, Indianapolis was en route from Guam to Leyte when it was torpedoed by Japanese submarine I-58.

Indianapolis sank quickly – reportedly in just 12 minutes – leaving little time for the crew to deploy lifeboats or for an emergency signal to be sent. It is estimated that 800 of the nearly 1,200 Sailors and Marines on board survived the sinking, but a communication error prevented Navy command from having any knowledge of the sinking, and rescuers were not immediately dispatched. This left survivors to battle exposure, dehydration, drowning and shark attacks for a grueling four to five days at sea until help finally arrived. In the end, only 316 were rescued in what remains the largest loss of life at sea in U.S. naval history.

Due to the ship's rapid sinking and lack of a distress call, the ship's location had long remained a mystery – until recently.

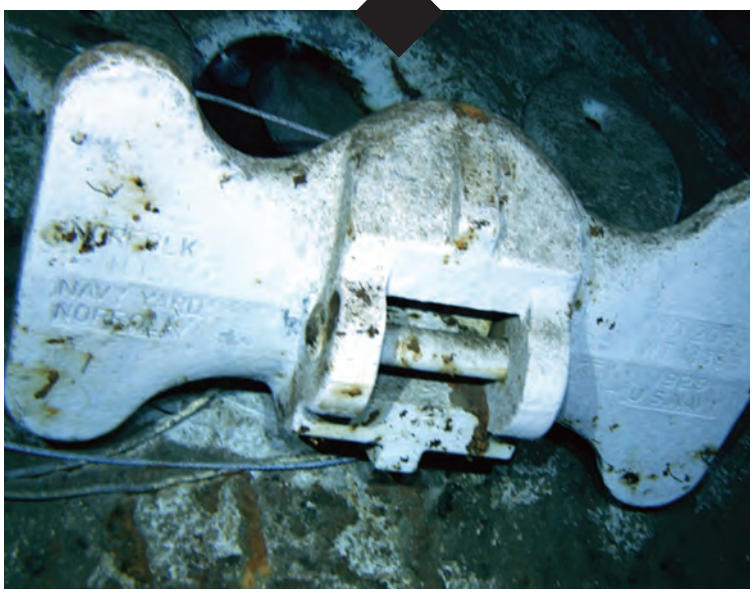
Microsoft co-founder, philanthropist and entrepreneur Paul G. Allen is fascinated with World War II history. Combining this passion with a spirit of technological innovation, Mr. Allen and his Seattle-based company Vulcan Inc. set out to hunt for the Indianapolis. The team embarked with several high-profile marine archaeology projects already under their belt, including the discovery of Japanese battleship Musashi in March 2015 and Italian WWII destroyer Artigliere in March 2017, as well as the recovery of the bell from the HMS Hood for presentation to the British Navy.

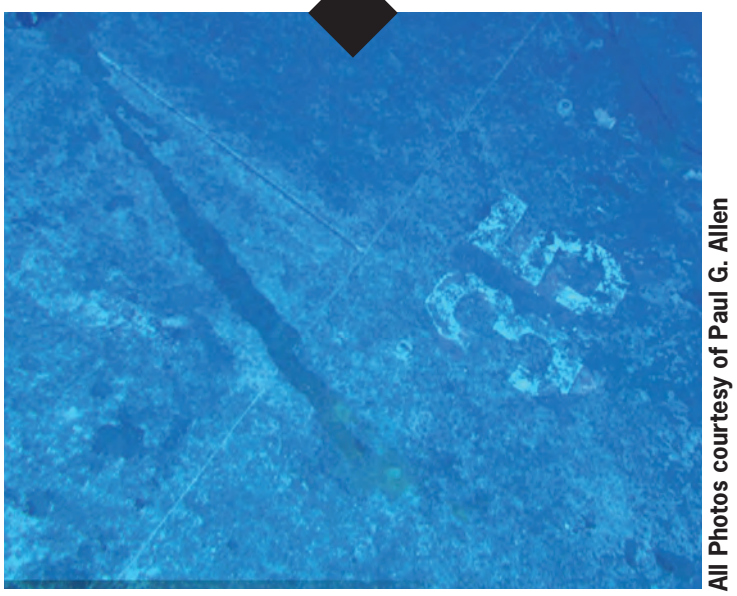
Other search missions to locate Indianapolis have been undertaken by various groups over the years, but all have come up short – partly due to a lack of sufficient technology. For the Indianapolis search, Mr. Allen deployed an exploration team outfitted with the latest state-of-the-art deep search and exploration equipment aboard the newly acquired 76-meter-long DP2 vessel RV Petrel. Vulcan Inc. purchased the offshore service vessel in 2016 from subsea engineering, construction and services company Subsea 7. The ship was converted into a bonafide deep submergence research vessel in 2017, and now sails as one of the select few ships worldwide equipped to explore 6,000 meters below the ocean's surface.

For the Indianapolis search, the Vulcan team conducted a significant amount of research, leveraging a combination of historical records, detailed undersea topographical data and advanced technology to explore a 400 square nautical mile search area between Guam and Palau in the Philippine Sea. A key data point came from a discovery by Dr. Richard Hulver, a historian with the Naval History and Heritage Command, who identified a naval landing craft that had recorded sighting the USS Indianapolis hours before it was torpedoed. All this research led to a new estimated position west of where previous searches have been conducted.

But even with the new insight, finding a ship that has been missing for over seven decades is no easy task, especially at depths greater than 5,000 meters. Aiding Vulcan's team is a 6,000-meter-rated autonomous underwater vehicle (AUV), the REMUS 6000, manufactured by Kongsberg Maritime subsidiary Hydroid Inc., which gathered sonar data to locate the USS Indianapolis.

Used regularly in commercial, research and defense applications, the REMUS 6000 AUV has been labeled a





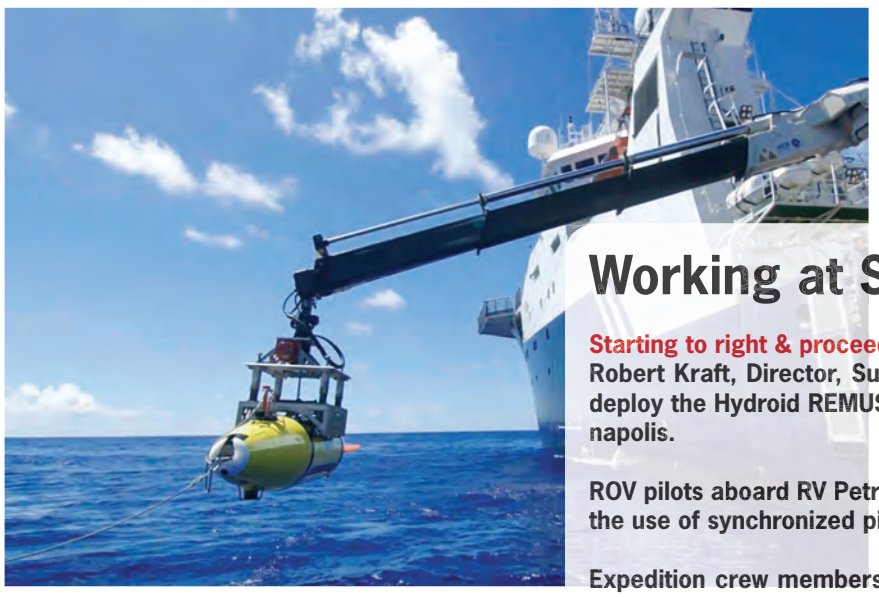
All Photos courtesy of Paul G. Allen

USS Indianapolis Artifacts

Above Left: An image shot from a remotely operated vehicle shows the bottom of an anchor clearly marked "U.S. Navy" and "Norfolk Navy Yard." The anchor is consistent with the one visible in this photo dated July 12, 1945 just weeks before the ship was lost.

Above Center: An image shot from a remotely operated underwater vehicle shows a spare parts box from USS Indianapolis on the floor of the Pacific Ocean in more than 16,000 feet of water.

Above Right: An image shot from a remotely operated vehicle shows what appears to be the painted hull number "35." Based on the curvature of the hull section, this seems to be the port side of the ship.



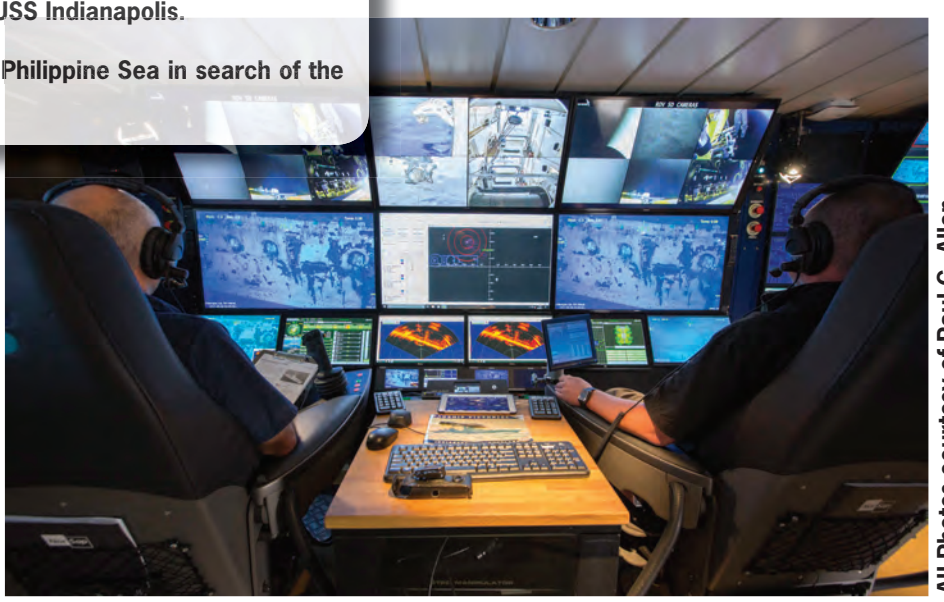
Working at Sea

Starting to right & proceeding clockwise:
Robert Kraft, Director, Subsea Ops at Vulcan, prepares to deploy the Hydroid REMUS AUV in search of the USS Indianapolis.

ROV pilots aboard RV Petrel. Greensea's OPENSEA enabled the use of synchronized pilot and co-pilot chairs.

Expedition crew members stand in the bridge, overseeing operations in search of the USS Indianapolis.

The AUV is lowered into the Philippine Sea in search of the USS Indianapolis.



All Photos courtesy of Paul G. Allen

(Continued on page 119)

"deep-water workhorse" by Hydroid. The vehicle can be configured to include a wide variety of payloads to meet diverse mission requirements and is capable of navigating for 20-22 hours of high speed search operations during a single dive, providing efficient coverage of wide areas. "Outfitted with a payload equipped with the tools to optimize the wreckage search, the REMUS 6000 vehicle was an ideal, versatile solution for this mission. This is one of the many reasons why the vehicle is in a league of its own; we are able to design it to meet individual operational requirements," a Hydroid representative said. "The REMUS 6000 has proven time and time again that it is a reliable, field-proven solution. Specifically, it was used in the discovery of Air France Flight 447, a passenger flight that crashed in June 2009, and to explore the site of the Titanic sinking in July 2010."

To find the long-lost Indianapolis, the REMUS 6000 AUV was equipped with long range, high resolution side scan sonar and bathymetry equipment for scanning the seafloor to detect and classify anomalies. The EdgeTech dual frequency 2205 75kHz / 230kHz side scan with interferometric bathymetry was mounted on the AUV to acoustically image a large 1 km range (in low frequency mode) from each side of the vehicle while flying preprogrammed deepwater searches in a mowing pattern.

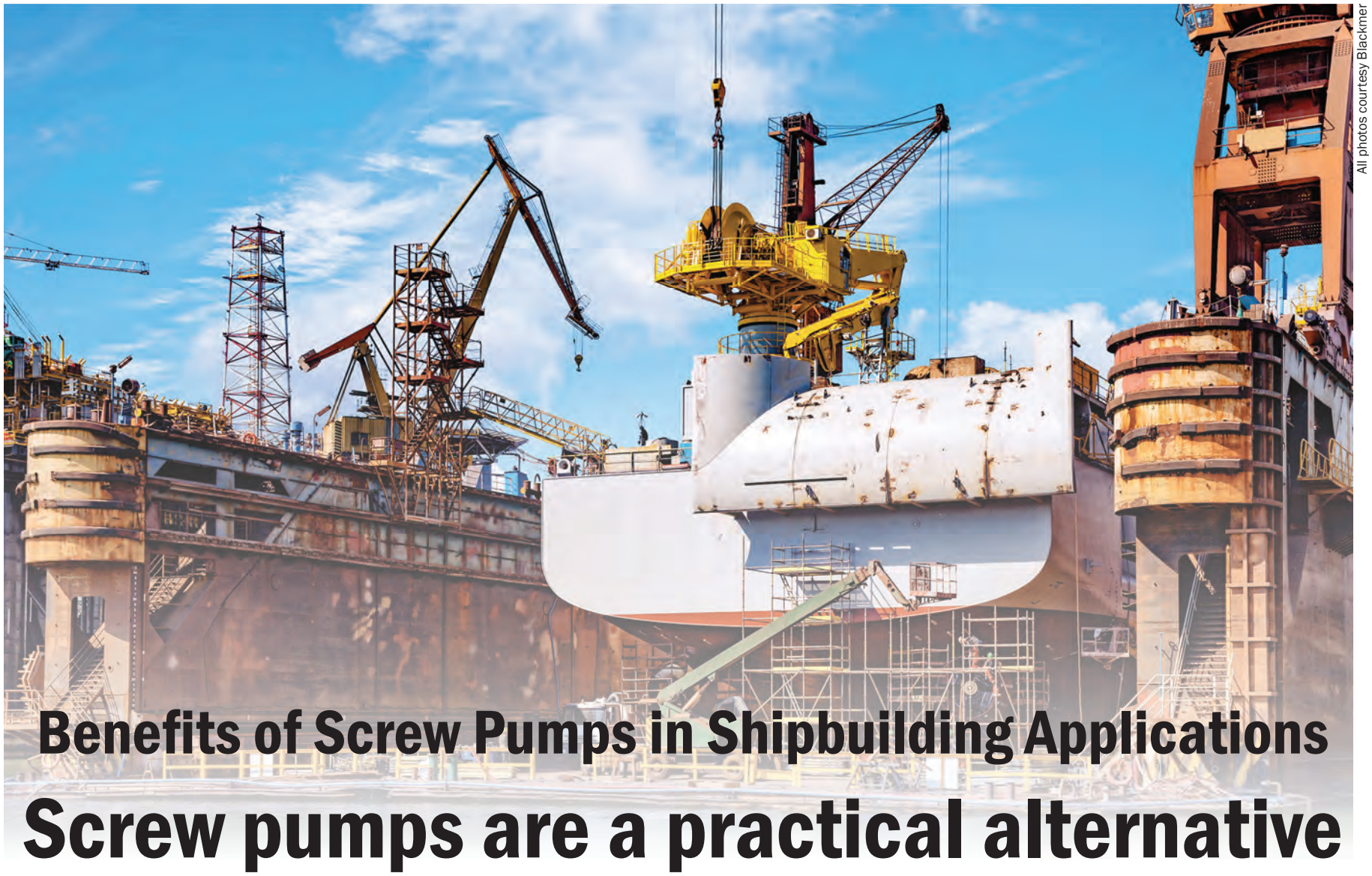
Once a search grid was completed, the AUV surfaced at a preset location for retrieval to the Petrel. On board the team downloaded stored survey data for review and swapped batteries for redeployment. Data analysis revealed seabed anomalies such as geology features or manmade objects/debris that could potentially point out the location of the missing warship. Once targets of interest were identified and mapped at closer range and higher resolution at 230 kHz, the Petrel team deployed a newly built, class-leading remotely operated vehicle (ROV) system for positive identification.

For design, build and commissioning of the specialty ROV, Mr. Allen's team contracted 3U Technologies LLC to manage overall system design and integration. Vulcan had initially contracted 3U in 2012 to investigate 6,000-meter rated ROV solutions to extend its exploration and archeology capabilities to a majority of the world's ocean depths. 3U worked under the direction of Robert Kraft, Vulcan's Director of Subsea Operations, to engineer what Kraft called "arguably one of the most technologically advanced and capable deep diving ROV systems in the world today."

"Vulcan's project team consists of experienced diving systems professionals and was expressly determined to push the boundaries and capabilities in the deep submergence realm," said Carl Barrett, 3U Project Manager. "The goal was to extend the present industry state-of-the-art to a full 6,000 meter depth capability."

3U and Vulcan sourced, specified and designed all key systems/subsystems and managed equipment manufacturing, testing and integration from a worldwide supplier base. The result, Barrett said, is a powerful 100 kW ROV system (90 kW at ROV) which is well outfitted for deep ocean exploration. Key features include:

- An integrated surface control and data management suite with intuitive interfaces;
- Dual interchangeable pilot and navigation control stations with ergonomic Cyber chairs;
- INS and DVL Based Automation: Waypoint navigation and station keeping; sonar target tracking and station keeping;
- Powerful all-electric propulsion with 550 kg horizontal and 780 kg vertical thrust capacity;
- 4500 VAC, 17mm diameter umbilical;
- 5 kW LED lighting system;
- Broadcast quality HDTV video cameras;
- Scanning and multi-beam sonar systems;
- Fiber optic MUX featuring multiple high



All photos courtesy Blackmer

Benefits of Screw Pumps in Shipbuilding Applications

Screw pumps are a practical alternative

In the industrialized world, there may be no more deceptively named mode of transportation than the "very large crude carrier," or VLCC. Calling an oil tanker that can be nearly half a kilometer in length "very large" is akin to saying that King Kong is a "pretty big" gorilla or that the Great Wall of China is "kinda long."

In reality, the VLCC – along with its "supertanker" cousin, the "ultra large crude carrier" (ULCC) – plays a large role in the transportation of crude oil and refined petroleum products around the globe. The capacity of a VLCC can range from 160,000 to 320,000 dead weight tons (DWT), with ULCCs able to accommodate upwards of 550,000 DWT. While hundreds of VLCCs and ULCCs move millions of barrels of crude oil at a time, a fleet of product tankers, with capacities of up to 60,000 DWT, stand ready to transport the petroleum, petrochemicals and other refined products to other pivotal points along the production and supply chain.

Traditionally, centrifugal pumps have been a go-to technology that shipbuilders have used for various fluid-transfer applications. However, positive displacement twin- and triple-screw pumps

can offer a versatile, reliable and efficient alternative to centrifugal pumps in the critical loading/unloading and transfer operations on the vessels that carry crude oil and finished petroleum-based products for the long-haul shipping industry.

The Challenge

The most obvious challenge – and perhaps the toughest to eliminate – is positioning the screw pumps an accepted solution for shipbuilders, a group that have long relied on centrifugal pumps. Generally speaking, the bulk of the fluids that are handled on ships, tankers and barges are transferred at very high flow rates and volumes, which hits the operational sweet spot of centrifugal pumps.

When meeting the operational needs of the centrifugal pump, though, care must be taken to ensure that the pump is operating at or close to a level of efficiency that is known as its "Best Efficiency Point," or BEP. A centrifugal pump that is able to function between 80% and 110% of its BEP is operating within a tolerable efficiency range.

However, when the pump moves too far off its BEP uneven pressure will be applied to the impeller, which can result in increased radial thrust that causes the pump's shaft to "deflect." When this occurs, higher loads will be placed on the bearings and mechanical seal, which can lead to damage to the pump's casing, back plate and impeller. Therefore, ensuring that the pump is working within an acceptable BEP range can be a time-intensive task since the pump must be monitored constantly and adjusted as needed, which costs time and money.

There are other considerations that shipbuilder must contemplate before deciding on the best pump technology, including:

- Small footprint on or below decks for installing pumping equipment
- Intermittent service that requires quick, multiple starts with minimal line priming
- Varied shipping media with differing fluid-handling characteristics
- Effective stripping of cargo holds to maximize deliverable working volume without any pump shutdown due to vapor locking
- Strict cycle times regarding incoming and outgoing shipments, with delays or shutdowns affecting the shipper's profitability
- Risk of explosion due to static charge buildup during filling cycles.

The Screw Pump Solution

The design of screw pumps makes them capable of handling liquids with varying levels of viscosity, while today's screw pump models can offer flow ranges from 220 gpm (833 L/min) to 11,000 gpm (41,635 L/min). The screw pump's operation sees opposed screws engaged to form a sealed cavity with the pump casing. As the drive screws turn, the fluid is conveyed to the discharge port of the pump, which creates a volumetrically consistent flow rate regardless of the pumping pressure.

Screw-pump technology advantages in shipping applications include:

- Compact design that can be mounted in a vertical or horizontal orientation with minimal deck support while providing a good power-to-density ratio
- Can strip residual fluids from the cargo hull
- Can handle a wide range of flows, pressures, liquids and viscosities without manipulating a BEP position
- No pre-heating of high-viscosity fluids, which can be handled without sacrificing performance
- Constant flow, even in the presence of varying backpressures due to viscosity changes
- Can accommodate turndown ratios when controlled by an adjustable-speed drive, allowing for wider flow ranges without recycling
- Good suction-lift capabilities that maximize line-stripping while being able to tolerate the intake of entrained air and other gases without vapor locking
- High volumetric and overall operating efficiencies, resulting in reduced costs
- High and constant flow rates even when experiencing upstream and downstream pressure fluctuations, ensuring consistent loading and unloading times
- Low mechanical vibration that lengthens service life
- Intrinsically smooth and quiet operation
- Extremely low pulsation reduces stress and prolongs life of associated fluid-transfer components

Two specific types of screw pumps can excel in shipping applications – twin screw with timing gear (WTG) and triple screw. Twin Screw (WTG) pumps have external bearings and a timing-gear transmission, which produces double-suction, self-priming operation with no metal-to-metal contact between the pump's internal components. Triple screw pumps are designed with a male drive spindle, two female secondary spindles and a case that contains the screws, which allows the fluid to move smoothly and continuously in an axial direction from suction to discharge.

The main operational advantages that screw pumps have –handling a wider window of fluid viscosities at higher rates and pressures, lower energy consumption and no BEP to identify –make them an efficient and versatile alternative to centrifugal pumps for shipbuilders.

About the Authors:

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Chembulk Tankers

Noonan


Mike Crane Photograhy

Bob Stewart with Rob Allan (left) and the 2017 President's Awards Recipients.


PONANT

Rodriguez


HII

Bolcar

Robert Allan Honored

Rob Allan was presented with the Meritorious Achievement Award as one of the President's Awards conferred by Engineers & Geoscientists British Columbia (EGBC) on October 20, 2017 at its Annual Award Gala held in Whistler, BC. This award is given annually to a member of the Association who has achieved distinction and outstanding goals associated with his/her profession.

Allan has more than 45 years of experience in the design of commercial workboats of all types, but especially high-performance tugboats for tanker escort and offshore terminal operations. From 1981 until 2008 when company ownership was transferred to a cadre of senior employees, he led Robert Allan Ltd. to a position of international prominence in this field. Notable achievements under his leadership include; major ice-breaking vessels for the Beaufort Sea and more recently the Caspian Sea and offshore Sakhalin; the Red Dot Award-winning Z-Tech ship-handling tug concept; and the development of the RAstar concept of escort tug which has revolutionized the conduct of tanker escort operations.

In the course of his career, Allan has authored dozens of papers for international industry technical conferences, and contributed chapters on tug and workboat design to the major textbooks of SNAME.

He is the recipient of the Small Craft Group Medal from the Royal Institution of Naval Architects (UK) for significant lifetime achievements in naval architecture; the Beaver Medal for significant contributions to the maritime industry of British Columbia; and he is the only Canadian to have been awarded the David W. Taylor Medal from SNAME for notable achievement in naval architecture.

The receipt of this major award from EGBC caps a significant and fulfilling career, as Allan announced his retirement from full employment in June of this year. He remains as Executive Chairman of the Board and as "Ambassador at Large" for Robert Allan Ltd., the company founded by his Grandfather in 1930.

Chembulk Tankers Appoints Ellis CEO

Chembulk Tankers announced the appointment of **David Ellis** as Chief Executive Officer (CEO), succeeding **Jack Noonan** who will retire after 10 years of leading the team at Chembulk Tankers. Effective November 1, 2017, Jack will take on the role of CEO Emeritus through the balance of the year and will continue to advise and counsel Chembulk as part of the leadership transition. Ellis has more than 30 years in chemical and petroleum transportation experience, including over 20 years with Odfjell SE in various leadership roles culminating in the global leadership position in Odfjell's joint venture with Lindsay Goldberg. He most recently served as CEO of Waypoint Solutions LLC, a Houston-based company he founded in 2016 to develop, buy, and operate midstream assets.

Mæland Steps in as DeepOcean CEO

DeepOcean's board of directors announced that company COO **Ottar Mæland** will take over the responsibilities as acting CEO of DeepOcean, succeeding current CEO **Bart Heijermans**, who has decided to step down.

Rodriguez Takes Lead Role at PONANT

Edie Rodriguez will serve as Americas Brand Chairman and Corporate Special Advisor at French-owned cruise line PONANT. With more than 30 years of experience in the cruise industry, the former Crystal CEO and President will be responsible for increasing PONANT's brand awareness and sales in the Americas, and will act as a Corporate Advisor for the company.

Newport News Promotes Two

Huntington Ingalls Industries (HII) announced two promotions to the company's leadership team at its Newport News Shipbuilding division: **Dave Bolcar** has been promoted to vice president of submarine construction, and **Bill Smith** has been promoted to vice president, fleet support programs.

Bolcar is now vice president of submarine construction, which currently encompasses both the Virginia- and Columbia-class submarine programs. He joined the shipyard in 1988 as an engineer in the Los Angeles-class submarine engineering division. Since then, he has held several positions of increasing responsibility, including manager in Ford-class component engineering and Columbia-class propulsion engineering, and director of submarine engineering. Bolcar earned a bachelor's degree in mechanical engineering from Pennsylvania State University. He will continue to report to Ken Mahler, Newport News' vice president of Navy programs.

Smith is vice president of fleet support programs, with responsibility for both submarine


HII
Smith


HII
Needy


HII
Anderson


HII
DiMarco


Photo: Taylor Adamczyk, Webb Institute
Gray-Hoehn

and aircraft carrier fleet support, including Gerald R. Ford-class fleet support work. Smith most recently served as program director for aircraft carrier fleet support. He began his shipbuilding career in 1984 as a sheet metal apprentice.

In addition, **Matt Needy**, who most recently served as vice president of the Virginia-class submarine program and fleet services, is transferring to vice president of operations, effective immediately. Needy will be responsible for all trade, manufacturing, material logistics and facilities operations. He will report to Newport News Shipbuilding President Jennifer Boykin.

HII's Technical Solutions Appoints Two

Huntington Ingalls Industries (HII) appointed two at its Technical Solutions division: **Melanie Anderson** has joined the division as vice president of human resources, and **Kristine DiMarco** has been named director of communications.

FairfieldNodal Welcomes New COO, CTO

FairfieldNodal has made two new additions to its executive leadership team: **Tom Scoulios**, Senior Vice President and Chief Technology Officer of Geosciences, and **Shawn Rice**, Senior Vice President and Chief Operating Officer.

Webb Senior Wins Crowley Scholarship

Crowley Maritime Corp. has awarded a Thomas B. Crowley Sr. Memorial Scholarship to **Tyler Gray-Hoehn**, class of 2018 at the Webb Institute. Gray-Hoehn, from Brookfield, Wisc., was recognized for his dedication, academic excellence and leadership as a student Webb.

He is senior class president and vice president of the Webb Institute's Student Organization (SO), and has also been Webb's Motor Boat Chair, Van Chair and a member of the Honor Council. In addition, he plays on the soccer and volleyball teams. His involvement with campus activities and leadership at Webb have taught him invaluable lessons that will benefit him in his professional and personal life forever, said Gray-Hoehn, who plans to be a merchant mariner after graduation.

Crowley initiated the Thomas B. Crowley, Sr. Memorial Scholarship at Webb in 2007 and has since given tens of thousands of dollars in support of the school's students. Crowley's involvement with Webb took on added significance in 2008 when the company acquired Jensen Maritime Consultants, a leading naval architecture and marine engineering firm headquartered in Seattle. Many Webb graduates are currently employed by Crowley and Jensen in a number of disciplines from naval architecture and marine engineering, to vessel construction management and vessel operations.

SMC Wins Cruise Ship Newbuild Contract

Schulte Marine Concept (S.M.C) won its first cruise ship contract with Portugal-based Mystic Cruises. Schulte Marine Concept the project management arm of maritime services company Bernhard Schulte Shipmanagement (BSM), working together with Bernhard Schulte Cruise Services (BS Cruise), will provide technical consultancy and newbuild supervision services to support construction of the oceangoing luxury expedition cruise ship, MS World Explorer.

MS World Explorer will be built as a 126-meter long expedition cruise ship with a passenger capacity of 200 and a crew complement of 111. The vessel will meet the latest Polar Code operating requirements and will be equipped with state-of-the-art hybrid power and propulsion technology, which will enable the ship to cruise in environmentally-sensitive areas.

Construction of MS World Explorer has commenced at the West Sea shipyard in Viana do Castello, in northern Portugal and she will start cruising during the winter season of 2018.

The Mystic Group, led by Portuguese businessman **Mario Ferreira**, has already established a river cruise operation; DouroAzul, which is the largest luxury operator on the Douro River utilizing 16 vessels. Ferreira anticipates at least another three vessels besides World Explorer to be delivered for the Mystic Group over the next four years.

Shell Opens Lubricant Plant in Singapore

Shell opened an integrated lubricants and grease production facility in Tuas, Singapore. At 10 hectares, it is Shell's third largest lubricants plant in the world and second largest in Asia-Pacific, capable of producing up to 430 million litres (equivalent to 390 kilotonnes) of lubricants and greases every year. **Huibert Vigeveno**, Shell Global Commercial, Executive Vice President (including Shell Lubricants) said "This facility will also further strengthen our marine lubricant business's presence here in Singapore, the world's second busiest port."

ABB Acquires Tekomar

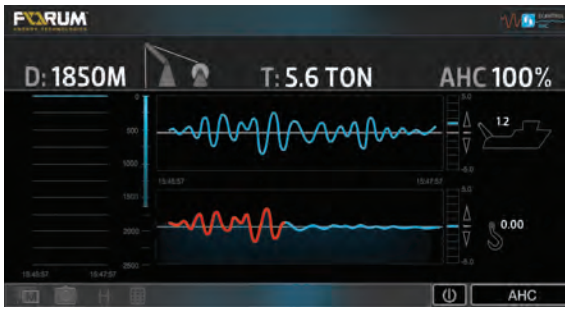
With the acquisition of Tekomar ABB expands its ABB Ability portfolio of digital products and services with the addition of a new propulsion performance monitoring solution. ABB Turbo Systems Ltd. has signed an agreement to acquire Swiss headquartered Tekomar Group Ltd. ABB said it will further develop Tekomar's digital so-

Schulte Marine Concept

Schulte Marine Concept: First Cruise Newbuild.

Shell

Shell opens lubricants plant in Singapore.



Scantrol

Scantrol AHC for Dynacon LARS.

lution for engine analytics and advisory systems enabling better performance for marine customers. The transaction is expected to be closed during Q4 2017.

The acquisition will enable ABB to extend its digital portfolio with a propulsion performance monitoring solution targeted at two-stroke main engines and auxiliary engine applications, the company said. The solution will be integrated into ABB's established vessel optimization system. The deal also offers a platform for cooperation with the engine licensors and builders.

The operators of more than 1,000 ships are already benefiting from Tekomar's performance monitoring and advisory solution that provides operators with recommendations for achieving optimized and original levels of engine performance.

Deutz Buying Binge Continues

In the wake of its acquisition of the electric drive specialist Torqeedo GmbH, Deutz announced today that it will acquire IML Motori, an Italian sales and service partner based in Lomagna near Milan, a move which simultaneously strengthens its presence in Italy and gives the company market penetration in the service segment.

The subsidiary IML Service and the Romanian sales and service company IML Motoare also form part of the acquisition. Deutz is looking to drive growth in its profitable service business and increase its proximity to customers in the Mediterranean. IML Motori generated around $53 million in revenue in the most recent financial year. The company will trade in Italy under the name DEUTZ Italy.

This is a continuation of the Deutz 'growth through acquisition' strategy, as recently the manufacturer of innovative drive systems announced its acquisition of the electric drive specialist Torqeedo GmbH.

Norautron Group becomes EMBRON

Norautron Group, parent company to technology firms GuardREC, Elektronix and Norautron, in addition to the leading maritime display and computer manufacturer Hatteland Display, has changed its name to EMBRON Group AS.

Dynacon, Scantrol Partner

A launch and recovery systems (LARS) manufacturer has teamed up with a supplier of active heave compensation (AHC) control systems to offer AHC functionality. Dynacon, a Texas-based business line of Forum Energy Technologies, Inc., is a manufacturer of handling systems for remote operational vehicles (ROV) and has supplied more than 250 ROV LARS Systems and almost 500 ROV winch systems. Scantrol is an independent supplier of control systems and has specialized in AHC. More than 1,000 vessels worldwide are deployed with a Scantrol system onboard.

Erma First BWTS USCG Approved

Ballast water treatment system (BWTS) manufacturer Erma First said it has received U.S. Coast Guard (USCG) Type Approval certificate for its full flow electrolysis Erma First BWTS FIT on October 18, 2017

Erma First BWTS FIT is a modular system developed to exceed all special installation requirements either for New Building vessels or any retrofit projects. Covering a capacity range of 50-3740 m3/hr, Erma First BWTS FIT is a solution suitable for all vessel types and sizes. The major components of the system are a backwash filter and an electrolytic cell. The self-cleaning automatic screen filter has a nominal filtration rate of 40 microns. For the de-ballasting of the vessel there is no need to use the system; It is completely by-passed and the water can be discharged directly overboard, after neutralization where applicable, with considerable gains in energy saving for the operators/managers of the vessel. Using an active substance that is produced by the method of electrolysis, any danger for regrowth of microorganisms is eliminated.

Furuno DS60 DSL for 200+ USCG Vessels

Furuno USA, Inc. won a five-year U.S. Coast Guard (USCG) IDIQ contract, valued at approximately $10 million, to supply Doppler Speed Logs (DSL) as part of the USCG's Doppler Speed Refreshment Project. Furuno's DS60 DSL will be installed on more than 200 vessels, ranging from 87-ft. Marine Protector-class patrol boats to the 418-ft. National Security Cutters, the largest class of vessel in the USCG fleet.

Vice President Products and Services at Forum Energy Technologies.

Chevron Lubricant &WinGD

Chevron Marine Lubricants received a No Objection Letter (NOL) from Winterthur Gas & Diesel (WinGD) for the use of its Taro Special HT 100 cylinder lubrication oil in a number of the manufacturer's engines when operating on a wide variety of fuels from 0.0% to 3.5% sulphur, including fuels compliant with emissions control area (ECA) regulations with a maximum content of 0.10% sulphur, eliminating the need to change cylinder lubricants when operating in and out of ECAs.

MAN D&T

Wayne Jones, OBE, Chief Sales Officer MAN Diesel & Turbo pledging 2 Million in discounts in LNG retrofits at 'Our Ocean 2017'.

MAN D&T: 20M Euro Pledge for LNG Refits

At the Our Ocean 2017 Conference recently concluded in Malta, MAN Diesel and Turbo made a unique pledge that to furthering the use of LNG as fuel onboard commercial ships.

"We clearly recognize that our interests are best served by ensuring that the world's oceans remain in robust, good health," said Wayne Jones, OBE, Chief Sales Officer of MAN Diesel & Turbo. "MAN Diesel & Turbo believes that it is time for what we call a 'Maritime Energy Transition' to find clean solutions for seaborne trade and transportation. My company set a new benchmark with the world's first conversion of a container ship from conventional fuel to gas operation. In order to encourage more ship owners to follow this example, MAN Diesel & Turbo is pledging a 2 million Euro discount for 10 such LNG-retrofits to convert existing HFO engines into modern, clean, efficient gas-engines."

The invitation only conference was held October 5-6, 2017, and brought together statesmen, government ministers and industry leaders to look to the future and deliver high-level commitments to preserve the world's oceans.

Hosted by the European Union's Karmenu Vella – EU Commissioner for the Environment, Maritime Affairs and Fisheries – areas of action during the conference included the topics of Climate Change, Marine Pollution, Sustainable Fisheries, Sustainable Blue Economies, Marine Protection Areas and Maritime Security.

Read about the world's first LNG retrofit on a commercial containership in the November 2017 edition of *Maritime Reporter & Engineering News*, page 36.

Watch Wayne Jones, OBE, Chief Sales Officer, MAN Diesel & Turbo on Maritime Reporter TV

www.marinelink.com/videos/video/maritime-reporter-tv-interviews-wayne-jones-chief-sales-officer-100019

Southampton Marine Delivers Svitzer Merlin

Southampton Marine Services delivered a newly constructed 20.45-m multipurpose harbor workboat to Svitzer. Svitzer Merlin is the forerunner in Southampton Marine Services' new Bulldog workboats range. "Once in service, Svitzer Merlin will have an important role to play in Svitzer's operation up and down Milford Haven supporting some of the very largest oil and gas ships that visit our waters paying attention to safety and timeliness," said Keith Furlong, Svitzer's Port Manager at Milford Haven. Designed by Argyll Maritime Design Services, Svitzer Merlin is a twin screw, pontoon style, shallow draft work vessel and with a small superstructure and wheelhouse on the portside aft, her large clear deck space across the bow will accommodate 12 waste 'skips' and several pallets. The vessel is propelled by twin Doosan KEMD 196TI 320BHP manually operated diesels engines, each driving conventional contra-rotating propellers via KGDMT 170H gearboxes at 3.42:1 reduction. John Deere generators with a capacity 60Kva supply power at 415 volts 3 phase at 50 Hz.

Builder:	Southampton Marine Services
Design:	Argyll Maritime Design Services
Type:	Bulldog 20
Length:	20.45 m
Breadth:	7.5 m
Propulsion:	2 x Doosan MD196TI diesel
Power:	(each) 320 bhp at 235kW at 2,000 rpm
Generators:	John Deere
Speed:	9.5 knots

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PS Form **3526-R**, September 2007 (Page 2 of 3)

The Quest to Find the USS Indianapolis (Continued from page 111)

bandwidth data channels: Gigabit Ethernet; Serial Data;

- Dual Titan 4 manipulators: Isolated hydraulic supply; and
- 18 kW tooling hydraulic system: Operator adjustable flow and pressure

Barrett explained that the Petrel ROV serves primarily as a camera and survey sensor platform that must maintain a no-touch policy out of respect for the hallowed wreck sites it typically explores. "The vehicle system must provide a stable platform with excellent station keeping capabilities for close proximity video work, have a powerful propulsion system to combat currents impacting both the ROV and the entire 6,000 meter umbilical length, provide the operators with outstanding situational awareness and operate reliably and efficiently for extended durations," he said.

Also instrumental to the mission was the OPENSEA operating platform from Greensea, which "provided a stable, automated operating platform for acquisition of stunning video sequences, created operational efficiencies which minimized operator task loading and dramatically simplified integration of a large suite of camera and sensor packages into a coherent and intuitive operator interface," Barrett said.

"Greensea's data management and archival system provides ease of access to a wealth of data (past and present) such that operators can maintain situational awareness and monitor vehicle health with minimum effort to maintain focus on mission goals."

Synchronized pilot and co-pilot chairs allowed vehicle control and navigation to be switched between pilots, complete with touchscreen displays to support simultaneous operation of lights, cameras, positioning and hydraulics. The system even included an automated ascent and descent for the umbilical winch that enabled pilots to automatically synchronize ROV depths.

"Greensea's OPENSEA control system is crucial to our success for extreme deep diving operations. Never before have I experienced an ROV control environment as unified, configurable or integrated as this one," Kraft said.

With help from some of the most capable and advanced equipment available, the Vulcan team located the wreckage of the USS Indianapolis on August 19, resting 5,500 meters below the surface in the Philippine Sea where it will remain undisturbed as a naval war grave. The wreck's exact location was provided to the U.S. Navy exclusively, as the wreck is property of the U.S. Navy.

"To be able to honor the brave men of the USS Indianapolis and their families through the discovery of a ship that played such a significant role during World War II is truly humbling," Mr. Allen said in a press release announcing the discovery. "As Americans, we all owe a debt of gratitude to the crew for their courage, persistence and sacrifice in the face of horrendous circumstances. While our search for the rest of the wreckage will continue, I hope everyone connected to this historic ship will feel some measure of closure at this discovery so long in coming."

Acknowledgements

Special thanks to Carl Barrett and the team at 3U Technologies, LLC.

MARITIME REPORTER AND ENGINEERING NEWS

EDITORIAL CALENDAR

JANUARY

Ad Close: Dec 21

Ship Repair & Conversion

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

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

FEBRUARY

Ad Close: Jan 22

Cruise Ship Annual

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

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

MARCH

Ad Close: Feb 21

Annual World Yearbook

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

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

APRIL

Ad Close: Mar 21

Offshore Energy Annual

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

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

MAY

Ad Close: Apr 20

Marine Propulsion Edition

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

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

JUNE

Ad Close: May 21

Green Marine Technology

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

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

All information may be subject to change

MARITIME REPORTER AND ENGINEERING NEWS

EDITORIAL CALENDAR

JULY

Ad Close: Jun 21

Marine Communications Edition

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

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

AUGUST

Ad Close: Jul 20

The Shipyard Edition

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

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

SEPTEMBER

Ad Close: Aug 21

Maritime Port & Ship Security

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

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

OCTOBER

Ad Close: Sep 21

Marine Design Annual

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

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

NOVEMBER

Ad Close: Oct 22

Workboat Edition

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

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

DECEMBER

Ad Close: Nov 21

Great Ships of 2018

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

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

All information may be subject to change

BUYER'S DIRECTORY

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

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Anchor Marine & Supply, INC., 6545 Lindbergh Houston, Texas 77087 , tel:(713) 644-1183, fax:(713) 644-1185, david@anchormarinehouston.com

AUTOMATIC IDENTIFICATION SYSTEM

Saab AB (publ) TransponderTech, SE-589 41 Linkoping , tel:46 13 180000, fax:46 13 182377, Info.transpondertech@saabgroup.com

BARGE FABRICATION

McDonough Marine Service, 3500 Causeway Blvd., Suite 900, Metairie, LA , USA , tel:(504) 780-8100, fax:(504) 780-8200, pstant@marmac.net

COMMUNICATIONS

David Clark Company (Wireless Headset Communication Systems), 360 Franklin Street, Worcester, MA 77060, USA , tel:(800) 298-6235 , www.davidclarkcompany.com/marine

COMMUNICATIONS SERVICE

Delta Wave Communications, Inc., 8001 Hwy 182 E. Morgan City, LA 70380 , tel:(985) 384-4100, fax:(504) 617-6393, tom.clark@deltawavecomm.com contact: Tom Clark

CORDAGE

Helkama Bica Oy, Lakimiehenkatu 4, KAARINA FI-20780, Finland , tel:+358-2-410 8700, sales@helkamabica.fi , www.helkamabica.com

CRANE - HOIST - DERRICK - WHIRLEYS

DMW MARINE GROUP, LLC, 1123 St. Matthews Rd Chester Springs, PA 19425 USA , USA , tel:(610) 827-2032, dw@dmwmarinegroup.com contact: Doug Weidner, dmwmarinegroup.com/

CYBER SECURITY

Gnostech Inc., 650 Louis Drive, Suite 190, Warminster, PA , tel:(215) 443-8660, sales@gnostech.com , www.gnostech.com

DECK MACHINERY- CARGO HANDLING EQUIPMENT

Allied Systems Company, 21433 SW Oregon Street, Sherwood, OR 23462, USA , tel:(503) 625-2560, cranes@alliedsystems.com, www.alliedsystems.com

JonRie InterTech, LLC, 982 Whispering Oak Circle, Manahawkin, NJ , USA , tel:(609) 978-3523, bjdme@marinewinch.com contact: Brandon Durar, www.marinewinch.com

DRILLS

Hougen Inc., 3001 Hogan Drive Swartz Creek, MI 48473

DRY DOCK TRAINING

DM Consulting, 12316 Dormouse Road, San Diego, CA 92129, USA , tel:+1 858-705-0760, joe@drydocktraining.com

EDUCATION

San Jacinto College, 8060 Spencer Highway Pasadena, TX 77505

FILTRATION

Harmsco, 7169 49th Terrace Place Riviera Beach, Florida 33407

FIRE FIGHTING

In-Mar Systems, 3011 S Ruby Avenue Gonzales, LA 70737 USA , tel:(225) 644-7063 ext 11, glynn@inmarsystems.com contact: Glynn Grantham, www.inmarsystems.com

FUEL TESTING/BUNKER SURVEYS

Seahawk Services, 1501 Grandview Ave, West Deptford, NJ , USA

FUEL TREATMENT

Advanced Power Systems / Fitch Fuel Catalyst, 18 Hemlock Drive New Hartford, CT.06057 , USA , tel:860-921-0009, info@fitchfuelcatalyst.com , www.fitchfuelcatalyst.com

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Garibaldi Glass, 8183 Wiggins Street, Burnaby, BC. V3N 0C4 , tel:604.420.4527, fax:604.421.7678, duaner@garibaldiglass.com contact: Duane Rose, garibaldiglass.com

GROUNDING & EARTHING BRUSHES

Sohre Turbomachinery, Inc., 128 Main Street, Monson, MA , USA , tel:413-267-0590, fax:413-267-0592, tsohre@sohreturbo.com contact: Tom Sohre, www.sohreturbo.com

HYDRAULIC BRAKE CALIPERS

Twiflex by Altra Industrial Motion, 2800 Fisher Road, Wichita Falls, TX , USA , tel:(844) 723-3483, twiflex.info@twiflex.com , www.altramotion.com/market/marine/home

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Bay Ship & Yacht Co, 2900 MAIN ST. #2100 ALAMEDA, CA 94501 USA , tel:(510) 337-9122, rmaguire@bay-ship.com or ndelgavio@bay-ship.com contact: Richard Maguire or Nick Del Gavio, www.bay-ship.com

INSTRUMENT AIR SYSTEM

Generon, 16250 TOMBALL PARKWAY highway 249 , tel:713-937-5256, gthompson@generon.com contact: Gene thompson

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Kleeco, 10110 S. M43 HIGHWAY Delton, MI 49046

Lifting Gear Hire, 9925 Industrial Drive Bridgeview, IL 60455 , tel:708 598-4727 ext 111, christina.Czeszewski@lgh-usa.com

Tandemloc, 824 Highway 101(FONTANA BLVD) HAVELOCK, NC 28532

MARINE TRANSPORTATION

Central Boat Rentals, Inc., P.O. Box 2545, Morgan City, LA , USA , tel:985-384-8200, fax:985-384-8455, earl@centralboat.com or gary@centralboat.com

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Chesapeake Marine Training Institute, 3566 George Washington Mem. Hwy, Hayes, VA , USA , tel:(804) 642-0123, fax:(804) 642-1743, information@chesapeakemarineinst.com , www.ChesapeakeMarineInst.com

El Camino College, 13430 Hawthorne Blvd., Hawthorne, CA , USA , tel:(310) 973-3147, psutton@elcamino.edu

MECHANICALLY ATTACHED FITTINGS (MAFS)

Viega, Mountain View Corporate Center Building 1, Suite 395 12303 Airport Way, Broomfield, CO , USA , tel:904-315-3899, fax:888-782-6188, paul.switzer@viega.us contact: Paul Switzer, www.viega.us

MILITARY PATROL CRAFT MANUFACTURERS

Brunswick Commercial & Government Products, 420 Megan Z Avenue, Edgwater, FL 80204, USA , tel:(386) 423-2900, kelsey.nemeth@whaler.com , www.brunswickcgp.com

Tampa Defense USA, 4350 62nd Avenue North, Pinellas Park, FL , USA , tel:(813) 792-2114 / (813) 843-8737, robert.stevens@tampa-yacht.com

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SPM Instrument, Inc., 780 Bailey Hill Rd. Suite #3 Eugene, OR. 97402 , USA , tel:541-687-6869, info@spminstrument.com , www.spminstrument.com

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3GA Marine, 208-1497 ADMIRALS RD VIEW ROYAL, Victoria BC Canada V9A 2P8

Bristol Harbor Group / The Shearer Group, 99 Poppasquash Road, Unit H, Bristol, RI , USA , tel:(401) 253-4318, fax:(401) 253-2329, gbeers@bristolharborgroup.com contact: Greg Beers, www.bristolharborgroup.com / www.shearer-group.com

Brunswick Commercial & Government Products, 420 Megan Z Avenue, Edgwater, FL 80204, USA , tel:(386) 423-2900, kelsey.nemeth@whaler.com

Gilbert Associates, 100 Grossman Dr. Suite 205 Braintree, MA 02184 USA , tel:(781) 740-8193, jgilbert@jwgainc.com contact: John Gilbert, www.jwgainc.com

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Generon, 16250 TOMBALL PARKWAY highway 249 , tel:713-937-5256, gthompson@generon.com contact: Gene thompson

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Tube-Mac Piping Technologies Ltd., 853 Arvin Avenue Stoney Creek, Ontario , tel:(905) 643-8823, fax:(905) 643-0643, sean.kennedy@tube-mac.com

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PROPULSION EQUIPMENT AND SERVICES

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In-Mar Solutions, LLC, 3011 S Ruby Avenue Gonzales, LA 70737 USA , tel:(225) 644-7063 ext 15, toby@inmarsolutions.com contact: Toby Whitfield, www.inmarsolutions.com

The Springfield Marine Company, 1093 N. Cynthia Drive, Suite #1 Nixa, MO 65714

SHIP REPAIR

Malin International, 320 77th street, Pier 40/41 Galveston, TX 77554

Metal Trades Inc., 4194 Highway 165 (PO Box 129) Yonges Island, SC 29449 USA , tel:(843) 889-5143, mdean@metaltrades.com contact: Megan Dean, www.metaltrades.com

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St. John's Ship Building, 560 STOKES LANDING ROAD Palatka, Fl. 32177 , USA , tel:386-328-6054, sganoe@stjohns-ship.com contact: Steve Ganoe, www.stjohnsshipbuilding.com

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Grand Bahama Shipyard Limited, P.O. Box F-42623, Freeport, Grand Bahama , Bahamas , tel:+1 242-350-4000, enquiries@gbshipyard.com

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Condition Analyzing Corp, 23 White Street Eatontown, New Jersey 07724 , USA , tel:800 586-8435, cac@cacvibe.com,www.cacvibe.com

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Environmental Marine, Inc., 711 Colyer Rd., Bronson, KY , USA , tel:(606) 561-4697, bobkenison@aol.com contact: Bob Kenison, www.envmar.com

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1600 Ton Master / DPO Unlimited

Complete Logistical Services
Salary: $ To Be Discussed , Contract , Mid Career
Category: Vessel Operations
Skills:
CLS is accepting applications for 1600 Ton Master / DPO-Unlimited with the following certifications. Please email a current Resume and your offshore certifications to our hr@clogistical.com address, so the CLS Operations team can review and advise qualified candidates.
Description:
State/Area: Louisiana
Regional Area: New Orleans Metro Area
Primary Background: Crew
Secondary Background: Crew
CLS is accepting applications for 1600 Ton Master / DPO-Unlimited with the following certifications. Please email a current Resume and your offshore certifications to our hr@clogistical.com address, so the CLS Operations team can review and advise qualified candidates.

AB-Unlimited

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Salary: $ To Be Discussed , Contract , Mid Career
Category: Vessel Operations
Skills: The certificates needed are as stated below and should all be valid: 1. Merchant Mariner Credential with current dates 2. AB-Unlimited rating with RFPNW endorsement along with your Basic Safety Training and VPDSD 3. Current USCG Medical Certificate with valid National and STCW dates 4. Water Survival must be T-HUET/HUET (OPITO Approved) or have a valid BOSIET 5. Rigging cert (API-RP-2D standard) 6. USCG Physical & Drug screen current or will be taken upon validation 7. TWIC 8. SafeGulf
Description:
State/Area: Louisiana
Regional Area: Louisiana All
Primary Background: Able Body Seaman (ABS)
Secondary Background: Able Body Seaman (ABS)
Accepting applications for AB-Unlimited with the following certifications.

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Complete Logistical Services
Salary: $ To Be Discussed , Contract , Mid Career
Category: Vessel Operations
Skills: The certificates and training needed are as stated and should all be valid: 1. Current ADC (Association of Diving Contractors) Card 2. Current DCBC (Diver Certification Board of Canada) Card 3. Fit For Duty Dive Physical 4. Water Survival – HUET 5. Rigging cert (API-RP-2D standard) 6. Drug screen current or will be taken upon qualification 7. TWIC 8. SafeGulf or RigPass 9. Current First Aid Provider with o2 Admin 10. Current Dive Hat Inspection (if you own a Dive Hat)
Description:
State/Area: Louisiana
Regional Area: New Orleans Metro Area
Primary Background: Diving
Secondary Background: Diving
CLS is accepting applications for Commercial Dive Tender(s) with the following certifications.

Procurement Specialist

Full Time , Mid Career
Category: Purchasing / Specification Manager
Job Location: 201 Notre Dame W Montreal, QC, H2Y 1T4 Canada
Contact
VP, Engineering
Email: hakbari@marineexhaustsolutions.com
201 Notre Dame W Montreal, QC, H2Y 1T4 Canada
Job Description:
Marine Exhaust Solutions (MES) is a privately funded start-up marine environmental company that has developed and is commercializing its market leading exhaust gas cleaning system for use on-board marine commercial vessels (tankers, container ships, ferries, bulk carriers).

Naval Architect/Marine Engineer Services

Lorain Port Authority
Contract
Category: Engineer / Naval Architect
Description:
Lorain (Ohio) Port Authority is soliciting Request for Qualifications (RFQs) and intends to contract for naval architect/marine engineer service
Lorain (Ohio) Port Authority
The Lorain (Ohio) Port Authority is soliciting Request for Qualifications (RFQs) and intends to contract for naval architect/marine engineer services in coordination with the Kelley's Island Ferry Boat Line (KIFBL) for the purpose of constructing a ferry boat vessel. RFQ specifications and guidelines can be received by contacting the Lorain Port Authority. Firms interested in being considered should reply with a statement of qualification no later than 11:00 AM November 2nd, 2017. Statements received after this deadline will not be considered.
As required by Ohio Revised Code Sections 153.65 – 153.71, responding firms will be evaluated and ranked in order of their qualifications. Following this evaluation, the Lorain Port Authority will enter into contract negotiations with the most highly qualified firms.
Please submit qualification information to:
Lorain Port Authority 319 Black River Lane Lorain, Ohio 44052
Phone: (440) 204 - 2269
Website: www.lorainportauthority.com

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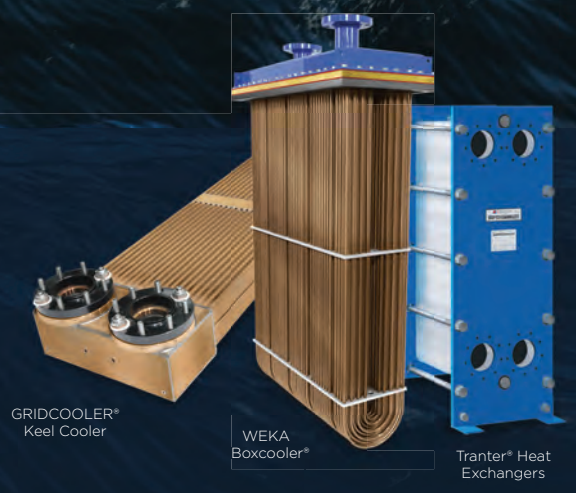

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