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MARITIME REPORTER AND ENGINEERING NEWS

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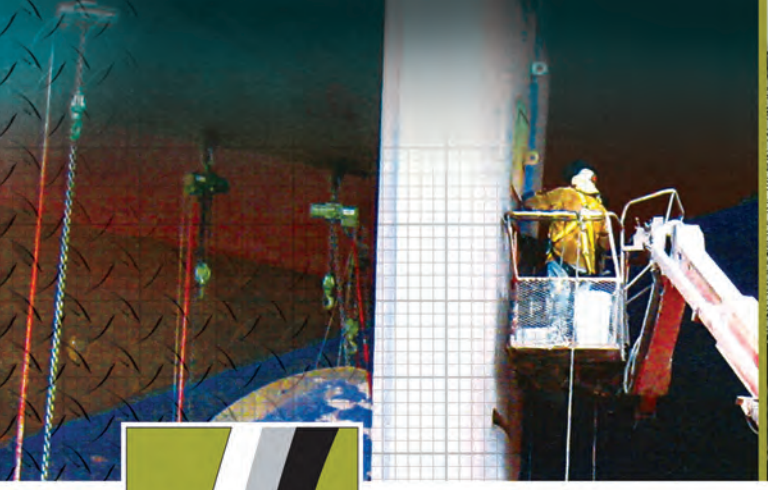
June 2017

2017 World Yearbook



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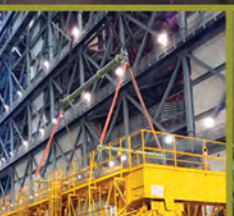

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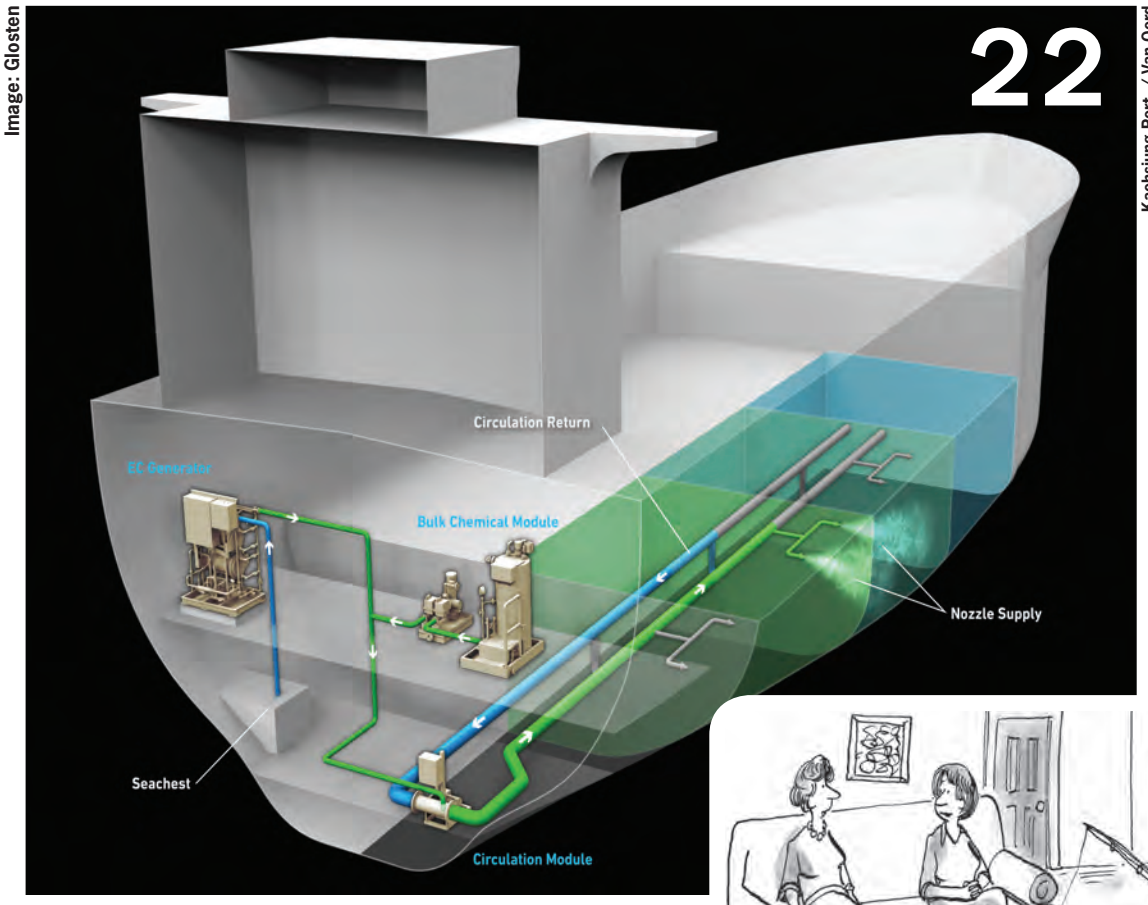

Image: Glosten

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Kaohsiung Port / Van Oord

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"Climate change has allowed him to do his fishing inside the house."

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The Yearbook

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THE COVER

Dredging Tuas Terminal Phase 1, Singapore
The works for the Tuas Terminal Phase 1 megaproject in Singapore are rapidly moving forward and innovative techniques and equipment are being utilized. In a joint venture with Daelim Industrial of South Korea, Dredging International Asia Pacific (DIAP) [part of the DEME Group] is creating 21 deepwater berths. Once completed, these berths will have a combined container capacity of 20 million TEU per year. An important project milestone took place in April 2016 with the launch of the first of a total of 222 caissons. When fully placed, these caissons will form the frame of the 8.6 km long quay wall.

Photo: Daelim Industrial & DIAP, courtesy of IADC

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Tech Profiles

Drone delivery for ships? Fully integrated **Hybrid** solutions? A **3D printed, class-**approved propeller? A concrete **drydock** named **'Big Fred'** with a planned 200-year lifespan? Maritime moves rapidly towards the modern world with these innovations.

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Training & Education

Where Training is Personal

MPT's Captain Ted Morley put heart & soul into the new S.M.A.R.T. Center.

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Simulation training at MSRC in Canada.

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Mikael Mäkinen has Rolls-Royce hurtling toward the future of commercial maritime.

By Tom Mulligan

MARITIME REPORTER AND ENGINEERING NEWS

MARINELINK.COM

ISSN-0025-3448
USPS-016-750
No. 6 Vol. 79

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

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

SUBSCRIPTION INFORMATION

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

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

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GREG TRAUTHWEIN, EDITOR & ASSOCIATE PUBLISHER

Closing the Yearbook edition was a particular challenge this year, as it was directly on the heels of my return from NorShipping in Oslo. NorShipping is traditionally one of the world's stronger maritime events, and show management again delivered a high-quality show, comprehensive and topical. I have attended the event since 1993 without fail, and while the show was delivered with traditional Scandinavian flair, it was noticeably down from years past. That said, for anyone serious about the global commercial maritime industry, it is a worthwhile investment of time and money to make the trek to Norway every two years, as invariably it attracts some of the biggest names in shipping. We had an outstanding exhibition, as I was able to conduct nearly two dozen video interviews with a variety of corporate leaders in our **Maritime Reporter TV** 'studio' in the main hallway. Even better for me personally was the opportunity to bring my oldest son Shane to Oslo for the week, just two days after his college graduation and before he enters his career later this summer, using his degree in Applied Mathematics and Statistics to effectively remove himself from my payroll!

Winnowing the topics for this edition was – as always – the biggest challenge of the year. You certainly don't need an advanced degree in mathematics to tell you that these have been a fairly tough few years. But as always, there are bright spots to be found. Looking ahead, here are some market drivers to watch:

- **U.S. Navy:** Edward Lundquist delivered a comprehensive analysis of the challenge ahead to grow and fund the U.S. Navy fleet of the future. His report starts on page 34, and it includes links to an extended report online at www.MarineLink.com
- **Dredging:** The dredging community has not been immune to market fluctuations, but the unique work of this critically important sector is highlighted in an eight-page report starting on page 26.
- **Hybrid Drives & Marine Fuel:** While precise numbers are hard to pin down, there is a palpable ground swell of interest and support in innovative drive solutions. All of the engine majors are actively engaged in acquisition and development, and starting on page 69 **William P. Doyle** delivers a compelling overview of natural gas as marine fuel as we prepare for the new global fuel regulations coming in 2020.
- **"Big Data" & "Disruption":** Use the buzzword du jour of your liking, but this industry is embarked firmly on the path of data as a differentiator. How far we are from the much-discussed 'airline industry' model, I can honestly say that I have no clue. What I do know: if you are not actively seeking the means to use information to optimize your operations, you can be sure that your competitors – both the ones you know as well as the ones you don't – are.

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Stoichevski
William began working for the AP in Oslo. In 2003, he left the AP to oversee and write for a number of print and electronic energy industry publications in Oslo, where he lives and works. He started writing for Maritime Reporter & Engineering News in 2014.

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Photo: Hyundai Heavy Industries

HHI: Surge in Orders

South Korea's Hyundai Heavy Industries (HHI) Group won 62 new ship orders worth $3.8 billion for January-May period this year, a 500% increase for the comparable period last year when it received 12 ship orders worth $1 billion. In May alone, HHI Group netted 20 ships worth $1.3 billion, and the total number and value of ships HHI Group won in May can be increased to 29 ships and $1.9 billion if all the options are exercised.
According to Clarkson's Report, HHI Group secured as much as 67% (28 ships) of 100,000 DWT or bigger tankers, and 50% (14 ships) of VLCCs that are ordered globally this year to date.
https://www.marinelink.com/news/shipbuilding-reports425919

Robotic Hull Inspector

Deep Trekker launched a new inspection vehicle: the Deep Trekker DT640 Utility Crawler, the first three-wheeled vehicle of its kind. Equipped with an HD camera, magnetic wheels and a multitude of application specific add-ons, the Utility Crawler can perform an array of tasks, making it versatile and easy to deploy.
The Utility Crawler, designed and built by Deep Trekker, is submersible to 50m, and houses its own onboard batteries. Deployment is designed to be quick for tasks such as contraband inspections and testing hull integrity or thickness.
https://www.marinelink.com/news/submersible-inspections426010

Photo: Deep Trekker

USS Gerald R. Ford

The future USS Gerald R. Ford (CVN 78) was delivered from Huntington Ingalls Industries' Newport News Shipbuilding division to the Navy on May 31. The new warship is the lead ship of its class and the first new-design aircraft carrier delivered to the Navy since USS Nimitz (CVN 68) in 1975. The Ford class features a new nuclear power plant, a redesigned island, and electromagnetic catapults.
https://www.marinelink.com/news/delivered-gerald-future425925

(Photo by Matt Hildreth/Huntington Ingalls Industries)

MAN D&T Takes 40% Stake in Aspin Kemp

The move toward hybrid drives is proceeding in earnest, the latest news coming from MAN Diesel & Turbo, which has agreed to acquire a 40% participation in Aspin Kemp & Associates (AKA), a Canadian company specializing in power supply, energy management and drive systems for marine applications. Jointly, the companies will offer turnkey integrated power, propulsion and automation solutions. MAN Diesel & Turbo said the investment is part of its strategic development program, "Basecamp 3000+", launched in 2016. As part of this program, the company announced strategic acquisitions and partnerships to expand its product range with respect to the global trends of decarburization and digitalization.

https://www.marinelink.com/news/diesel-turbo-stake426132

NASSCO Delivers Final Jones Act Tanker for APT

Photo: General Dynamics NASSCO

With the delivery of Palmetto State to American Petroleum Tankers (APT), San Diego shipbuilder General Dynamics NASSCO has now handed over the final ECO Class tanker constructed as part of an eight-tanker, dual-customer program. Each vessel is 610 ft. long, weighs 50,000 deadweight tons and features 330,000 barrel cargo capacity. NASSCO constructed and delivered all eight ECO tankers in a period just under three years, during which the company achieved several first-time milestones, including a record throughput of 60,000 tons of steel per year and the delivery of six ships in 2016.

https://www.marinelink.com/news/delivers-nassco-tanker426146

China Vigilant as U.S. Drills in S.China Sea

China was monitoring U.S. military activities in the South China Sea, after two U.S. bombers conducted training flights over the disputed waters. The U.S. Pacific Command said on its website that two U.S. Air Force B-1B Lancer bombers flew a 10-hour training mission from Guam over the South China Sea recently in conjunction with the Navy's USS Sterett guided-missile destroyer.

https://www.marinelink.com/news/vigilant-drills-schina426219

Newport News Names VP, Strategic Sourcing

John Temple was appointed vice president of strategic sourcing at Huntington Ingalls Industries' (HII) Newport News Shipbuilding division. Temple, an Apprentice School graduate, began his shipbuilding career in Newport News' pipe department. He has worked in quality inspection, cost engineering and contracts and pricing.

https://www.marinelink.com/news/strategic-sourcing426220

Canary in the Coal Mine

The rapid loss of Arctic sea ice is a sentinel. Most of us will never venture into the Arctic, but it can and does provide us with a forewarning of impacts coming to our parts of the Earth – and some of the most significant impacts will directly affect the maritime industry.

In earlier times, coal miners were sometimes overcome by the build-up of odorless carbon monoxide gas. Some died as a consequence. Eventually it was realized that canaries were more susceptible to the gas than were humans. They would collapse in the presence of lower concentrations of carbon monoxide than the level necessary to have an impact on the miners. Caged canaries soon were being brought into the mines to serve as a sentinel species, providing an early warning to the miners that they had encountered a hidden danger. Many miners' lives were saved.

Various species of living organisms can and do serve similar purposes. They are more sensitive to environmental changes than are humans, thus serving as early warning systems. The environment itself can also serve as a sentinel, with small or remote changes warning that changes of greater magnitude are developing.

Currently, the extent and condition of Arctic sea ice is in the midst of rapid change. Ice coverage in the Arctic Ocean seems to set new lower maximums every winter lately. In addition, the sea ice is getting thinner. Estimates are that, over the past 30 years, the Arctic area has lost 50% of its prior coverage and 75% of its volume. Previously, scientists calculate that the Arctic Ocean might be virtually ice-free during summer months by 2070. Because of a recent acceleration in warming air and sea temperatures in the Arctic, that date has been moved up to as early as 2040.

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Some view these changes in eager anticipation. Merchant vessels could transit between the North Atlantic and the North Pacific via the Arctic, saving time and money.

The natural resources estimated to be located in the Arctic could be much more susceptible to exploitation.

Let's stop for a moment though and consider what the rapid melting of Arctic sea ice is telling us.

I suggest a simple experiment. Take a clear glass filled about two-thirds with water. Place a few ice cubes therein, but not so many as to touch the bottom, and mark the side of the glass at the level of the water (not the ice). Allow the ice to melt. You will find that the level of the water is unchanged. This is because the free-floating ice, being lighter than liquid water, rode above the surface by displacing some of the water.

Now, do the experiment a second time, only add so much ice that it touches the bottom of the glass and rises well above the water. Again, mark the water level on the side of the glass and allow the ice to melt. This time, the new water level will be higher than the original water level. Ice that is not free-floating will increase the volume of surrounding liquid water when it melts.

You might say, so what if there is less Arctic sea ice – it will not impact the level of the sea. That is true.

But not all the ice in the Arctic is free-floating. In fact, the majority of Arctic ice is found in the Greenland ice cap, with lesser volumes of ice located on Arctic islands, such as Ellesmere and Svalbard. The same environmental changes that are accelerating the melting of Arctic sea ice are accelerating the melting of Arctic non-floating ice, although not yet to the same extent. As that non-floating ice melts, sea levels around the world will rise.

If the Greenland ice cap were to melt, the US Geological Survey estimates that sea level would rise by about six meters (20 feet).

Another, sometimes overlooked, factor in sea level rise is the increasing temperature of the sea. Like many other

Estimates are that, over the past 30 years, the Arctic area has lost 50% of its prior coverage and 75% of its volume. Previously, scientists calculate that the Arctic Ocean might be virtually ice-free during summer months by 2070. **Because of a recent acceleration in warming air & sea temperatures in the Arctic, that date has been moved up to 2040.**

substances, water expands as it warms. Thermal expansion of sea water is estimated to have caused almost half of the sea level rise experienced during the past century, putting it on a par with glacial melt.

There is no indication that the rate of the rise in air and ocean water temperatures is likely to decrease in the foreseeable future without significant changes. What those changes should be is outside my limited range of knowledge, thus I will leave that to the experts..

I can say, though, that the rapid loss of Arctic sea ice is a sentinel. Most of us will never venture into the Arctic, but it can and does provide us with a forewarning of impacts coming to our parts of the Earth – and some of the most significant impacts will directly affect the maritime industry.

The number of ice bergs reaching the North Atlantic during the first week of April this year was about 450, up from 37 the week before, making this the fourth consecutive extreme ice season. This is forcing ships in the area to slow or to divert south to warmer waters. The vast majority of the larger bergs are calved off Greenland glaciers, which are flowing into the sea at a slow but ever-increasing rate.

Sea ports, by definition, are located along the coasts. They are generally sited just a few feet above sea level. Thus, sea ports are highly sensitive to sea level rise. In the United States, the ports of Norfolk and Miami are currently most at risk.

The U.S. Navy is developing contingency and mitigation plans for addressing the threat of sea level rise to Naval Station Norfolk, the world's largest naval base.

Miami has been ranked first of all the world's major port cities in terms of value of assets exposed to inundation today. The Port Miami Tunnel linking cargo terminals with the land-based transportation system was closed for the first time in 2016 in advance of Hurricane Matthew due to the threat of inundation of the port.

The Thames Barrier has been in operation since 1984 to protect Greater London from being flooded by exceptionally high tides and storm surges. At the time of construction, it was anticipated that the barrier would be closed 2-3 times per year. It is now closed 6-7 times per year. The design was prepared with full consideration of then-anticipated sea level changes, but sea level has risen faster than those predictions foresaw.

Sea ports are not alone is the risk. Much of the Louisiana coast is in danger in inundation. One island community there was recently abandoned as untenable. Others will surely follow. Islands in the Pacific have disappeared below the waves and others are smaller than they were previously. Bangladesh has a massive river delta that is slowly being flooded, potentially displacing millions.

Change is coming. Watch your tide gauge.

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Piloting Choppy Waters

Uncharted hazards roil the waters for established pilot organizations across the fruited plain. These days, there is never a dull moment for this uniquely American system of piloting deep draft tonnage to and from the ports dotting our 95,000+ miles of coastline.

The U.S. system of marine pilot oversight typically calls for individual states to govern commerce on their own waterways as they see fit. When it comes to deciding who will be trusted to guide large, deep draft tonnage into their blue water ports, the standard business model calls for one association – typically described as 'state pilots' – to perform all of this work (at least the registered, foreign flag variety), without outside competition, governed by a local pilot board of one sort or another.

Occasionally, there comes a challenge to the status quo. Lately, there have been more than usual; a trend which is building, and one which reflects users (some operating in depressed business sectors) who increasingly chafe against escalating fees for service providers already making hundreds of thousands of dollars annually. In response; advocates for the system of 'state pilots' typically argue that "you can't put a price on safety." Actually, that remains to be seen.

In at least five ports or sectors nationwide, the issue(s) of rates, who gets to perform what task and where, and under what conditions they can do it, are very much in dispute. Piloting a deep draft vessel on the water has never been boring. It turns out that navigating the business aspect of that profession is also becoming far more interesting. Spanning all four U.S. coasts – pilot-related news is not in short supply.

Great Lakes

Stakeholders who depend on Great Lakes pilots to guide tonnage in three separate districts may be facing 'sticker shock' in the near term as the method of determining rates has changed. Previously, the U.S. Coast Guard used the "touchstone baseline" of a local deck officer's union agreement as the basis for their calculations. Reportedly, however, that data has been made "proprietary" and is no longer available.

As the Coast Guard navigates what could be a sizable increase in local rates, it also added an additional 30 days to the comment period on the supplemental notice of proposed rulemaking for "Great Lakes Pilotage Rates—2017 Annual Review" published in the Federal Register on April 5, 2017. The comment period, which allows the public a venue to comment on the proposed rulemaking, is now open through June 5, 2017.

In a nutshell, the Coast Guard is proposing to modify its calculations for hourly pilotage rates on the Great Lakes by accounting for the "weighting factor," which is a multiplier that can increase pilotage costs for larger vessels traversing areas in the Great Lakes by a factor of up to 1.45. But, the real fear is that the new rates will follow the national 'state pilot' trend of benchmarking against "what everyone else is making." And, since these rates are reviewed annually, the potential for regular and hefty increases worries shippers. Like other places, the dispute has (not surprisingly) resulted in a lawsuit – in this case from the shipping companies who operate in this area versus the U.S. Coast Guard.

Galveston, TX

An attorney representing federal pilots looking to earn state pilot licenses to guide registered, foreign flag tonnage in and out of Galveston Bay has appealed to Texas Governor Greg Abbott. According to Justin Renshaw, he hasn't yet heard back from the governor, but his petition to force the local Board of Pilot Commissioners to "implement rules" has to be responded to within 90 days (from 10 May). Failing all of that, he says, the matter is headed to court.

The federal pilots don't necessarily want to join the existing association; they want to form their own group. Renshaw contends that the local state pilot rules in force in Galveston violate the Texas Constitution, which he says forbids so-called monopolies. These federal pilot hopefuls base their argument for a State Issued license, in part, on the premise that "Perpetuities and monopolies are contrary to the genius of a free government, and shall never be allowed, nor shall the law of primogeniture or entailments ever be in force in this State."

Although a purely local matter for the time being, the spat could take on statewide and national implications because the typical model of "state pilot" monopolies on foreign flag business could ultimately be tested; first here, and then at other ports. Pilot organizations and stakeholders are therefore watching closely from the sidelines. It looks like this one will come to a boil, appropriately enough, mid-summer.

Port Canaveral, FL

According to Steve Parrish, a federally licensed pilot based in Port Canaveral, Florida, Southern Federal Pilot has filed suit the Canaveral Pilots Association for Violation of the Florida Antitrust Act and for interference with Southern Federal Pilots' contract with the Navy.

According to Parrish, Southern Federal Pilot provides harbor pilot service to the U.S. Military and U.S. Flag Vessels travelling between U.S. ports. It was awarded a contract to provide pilot service to the U.S. Navy at Port Canaveral, a contract that Parrish says has now been terminated. Also according to Parrish, under the contract that was terminated, Southern Federal Pilot was charging a lower rate for its services. As a result of the termination, he says, the Navy will have to pay the higher rate charged by Canaveral Pilots Association which is set by state law.

The dispute is an unusual one whereby the local federal pilot isn't trying to provide services to registered, foreign flag tonnage. Instead, he just wants to compete in the traditional sectors that federal pilots everywhere make their bread and butter – namely, U.S. Navy work and on board domestic enrolled vessels. Work, by the way, that he has considerable experience in – particularly in the specialized guidance of Navy submarine traffic.

Also according to Parrish, the case will face its first test in August, when a judge will determine whether it can go forward.

Seattle, WA

In Seattle, Washington, another bit of drama is playing out. Without a doubt, the Seattle case is an unusual one for no other reason than the decision gave the local pilot system a black eye. For his part, John McLaurin, president of the Pacific Merchant Shipping Association, asked simply, "Who should pay for a $6 million gender discrimination lawsuit involving a woman who was denied a pilot license in Puget Sound?" As it happens, the answer is … everyone.

According to McLaurin, the training program for pilot candidates is managed by pilots; assessing and evaluating the trainees. Pilots ultimately provide the key input and recommendations to the Washington State Board of Pilotage Commissioners as to whether to license a pilot candidate or not. In this particular case, the pilots recommended that the Board not issue a pilot's license, and the Board concurred. In the end, the State lost the gender discrimination lawsuit and paid a $6.1 million settlement. But, stakeholders – shippers and cargo interests – who regularly ante up for what they perceive as a premium rate for pilot services, pushed back on who was to pay the bill. Pilot services are one thing – gender discrimination lawsuits are another.

In the end, Transportation Budget legislation signed by the Governor effectively froze pilot rates until June 30, 2019, although pilots can make more or less depending on workload, number of pilots, expenses and assignment mix (size, type of assignments like shifts, two pilot jobs etc.). Nevertheless, and according to local sources, last year's indi-

vidual earnings grew more than $36,000 each despite having only a small tariff increase for the first 6 months (2% equivalent) equaling 1% for the year. Hence, revenue per assignment continues to grow without tariff increases, with larger container vessels and cruise ships a key factor in that metric.

Local stakeholders argued that industry should not pay (for the discrimination judgment) and that they were not responsible. Ultimately, the legislature decided on an assessment of $16 per assignment plus the rate freeze plus a study of rate setting, workload, governance and other issues. But, that decision only lasts for the biennium (whereas a Senate Bill pushed for the pilots paying the entire amount for six years with a six year tariff rate freeze and a study – the final was compromise between the House and Senate).

With respect to the passage of Engrossed Senate Bill 5096 Section 108, the Board of Pilotage Commissioners is appropriated $1,100,000 from the Multimodal Transportation Account solely for self-insurance liability premium expenditures. This appropriation is contingent upon three stipulated conditions:

(1) The Puget Sound Pilots shall pay to the Board, from its tariffs, $150,000 annually on July 1, 2017 and July 1, 2018. These amounts shall be deposited by the Board into the pilotage account and used solely for the expenditure of self-insurance premiums;

(2) The Board shall maintain the Puget Sound Pilotage District pilotage tariff at the rate which became effective on January 1, 2017; and

(3) A self-insurance premium surcharge of $16.00 shall be added to each Puget Sound pilotage assignment on all vessels requiring pilotage in the Puget Sound Pilotage District. The Puget Sound Pilots shall remit the total amount of such surcharges generated to the Board by the 10 of each month. The surcharge shall be in effect from July 1, 2017 through June 30, 2019. These amounts shall be in addition to those fees to be paid to the Board pursuant to subsection (1) above and shall be deposited by the Board into the pilotage account solely for the expenditure of self-insurance premiums.

These three directives are in effect beginning May 18, 2017 through June 30, 2019.

Looking Ahead: in the Radar

The only thing that is certain in terms of pilot law here in the United States is that challenges are becoming more frequent. The disputes also touch upon many more issues than just rates and fees. How will any or all of these spats play out? That's anyone's guess. That said; there may be no other aspect of the domestic waterfront which regularly provides more entertainment. For the players involved, though, the stakes are high and current events are anything but fun and games.

Millions and millions of dollars hang in the balance. A good friend once told me that finding out the truth simply involves "following the money." If so, then the collective legal wrangling now underway makes perfect sense.

About the Author

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Improved Safety and Training: Step-by-Step

Everyone responsible for safety or training in their organization is aware that everything is changing in the maritime world. The worker demographic has shifted; regulatory demand is rising; and compliance is more complex. Accidents are more public and the consequences more severe. Ignoring this changing operational context means we are creating risk for tomorrow – a risk that increases every day until finally something gives. It has become increasingly difficult and risky to operate in today's environment using yesterday's tools and processes.

Fortunately, it is also the case that maritime safety and training has entered a renaissance period. Everything is changing here too. New tools are available that improve training outcomes on shore and on-board. Tracking and measurement technology now exists to reliably assess the state of training and compliance with a level of insight not previously possible. And leading indicators of training and safety help identify and reduce or eliminate future performance problems, near-misses or accidents.

At the heart of these tools is the practice of blended learning and a Learning Management System (LMS) – software to deliver training, assessments, tracking and insights. Blended learning and LMSs, although relatively new to the maritime industry, have been in use for two decades in other industries. Recently, case studies have shown them to significantly improve safety and performance in the maritime industry.

This short series of articles provides an overview of these new tools that address today's safety and training challenges, and provides step-by-step guidance on how to approach and implement them. The advice applies equally to the smallest and largest vessel operators and fortunately, it is remarkably easy. Let's get started.

Define Success

The outcomes we are looking to achieve in our safety and training program are as follows: improved training results (better understanding and retention ideally with a reduction in cost), the ability to accurately track and report on the state of training and compliance, the ability to continuously measure the success of our training program both for individuals and for the company as a whole, and the ability to continuously improve all of the above. These may seem like daunting, time consuming and expensive goals, but read on – they are not. In fact, large up-front expenditures of time and resources tend to create unnecessary risk and reduce the likelihood of success.

Start Small, Start Simple, But Start!

Embarking on a plan to implement a modern safety and training program is simple. Unlike some projects – such as vessel construction where every last detail must be planned before implementation can begin, this type of project benefits from small steps and flexibility. This means that a bare minimum of time and resources are required to get going, a big benefit because it reduces risk and downside while at the same time allowing us to produce meaningful results early on. If the initial, small implementation works out well, then that success and the lessons learned will naturally drive the next phases of the project. If the first phase does not work out well (which is unlikely) then we can go back to the drawing board or even abandon the project having wasted almost no time or resources. There are three parts to implementing a program of training and safety transformation using proven, modern tools. They are as follows:

1. **Create your minimum viable plan (MVP):** this is a two or three page living document which acts as a roadmap for the management of blended learning.

2. **Prepare and run a pilot:** here we produce a very small pilot implementation that addresses a small number of trainees and a small number of courses / competencies. The goal is to require minimal time and resources, but produce useful initial results.

3. **Grow and improve iteratively:** once the pilot is complete, we move into a stage where we repeatedly implement successive phases of blended learning, each one encompassing more trainees and more courses / competencies, and each one learning from the lessons of all previous phases.

For the remainder of this article, we will outline the MVP (Minimum Viable Plan). The second and third articles will address parts two and three (the pilot and subsequent iterating) respectively.

Marine Learning Systems

The MVP (Minimum Viable Plan)

At the outset it is important to understand that this will be a new endeavour and to some extent a learning process for the organization. Although there has now been a good deal of experience in the maritime industry implementing blended learning plans, each implementation is somewhat different. Thus it is important to avoid making decisions that are based on assumptions rather than experience. Therefore, best practice here is to create a simple "skeleton" plan which provides initial guidance, but is a living document – continually revised as experience is gained. This means that your initial plan will be quick to create and is likely to be only a few pages long. What should the plan look like? There are three main components.

First, as a living document, the plan should define how the plan itself is managed. This ensures that the plan has a present and a future. The plan should

include basic guidelines for how often it is to be reviewed, who is in charge of the plan, who participates in formulating and executing the plan, how the plan is communicated, how success will be measured, and how the plan will be improved. Although this may sound like a lot of effort, in truth none of these components of the plan need to be spelled out in any great detail at the outset. Some parts are little more than position statements requiring that these issues need to be addressed, and requiring that they be addressed in a reasonable amount of time as experience is gained.

Second, the plan should define the tools for long-term success. This means choosing a maritime-focused learning management system (LMS) to deliver the new training initiatives, reduce training costs, provide training metrics and analytics, and grow with the organization as needs grow. Arguably the best approach here is to connect with other vessel operators who have been down this road before and ask how their LMS choice is working out. It is not impossible to change an LMS in the future if need be, but it requires effort that can be avoided with a little due diligence at the beginning of the project.

Finally, the plan should define one short-term meaningful project that improves training outcomes and/or reduced costs. Specifically this means identifying some aspect of training that will take advantage of blended learning and benefit from the insights and metrics the LMS can provide. For many operators this means choosing a group of trainees such as new hires or deckhands, and adapting some training resources to be delivered on line in a blended learning program (more details on this will be discussed in the second article in the series). This initial project should be achievable in a short timeframe - say six months or less. It does not have to be (and should not be) be grand or expensive, but it should be useful and visible. This initial pilot will put the plan and LMS to the test. It will also visibly demonstrate the company's commitment to transforming training and safety and allow your organization to start gathering metrics on training. In all, the project should enable your organization to get comfortable with your new LMS and experience the new approach using familiar material.

What's Next?

With a minimum viable plan in place, we now turn to the implementation of the blended learning pilot. This is the most exciting phase of the project because it is here that engagement begins and real result materialize. It is also the phase that will be fully described in next month's edition of *Maritime Reporter & Engineering News.*

So check this space in a month and until then, sail safe!

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.

Photo: Almaco

Vilhelm Roberts

BORN GLOBAL

[CEO & President, ALMACO Group]

Where many see challenges, Vilhelm Roberts, CEO and President of ALMACO Group sees opportunity, as his company has carved a niche in providing turnkey accommodation spaces and food handling areas serving the global maritime and offshore markets. He discusses the company's strategy and future with Maritime Reporter.

By Greg Trauthwein

"We were born global," said Roberts. The mother company is in Finland, and he leads the company from the company's office in Florida along with his CFO who is in the office in France. More to the point, the company manufactures accommodation and food handling spaces, but Roberts admits "we have no 'own' manufacturing, as our business plan is to stay flexible. We have excellent, reliable partners in different world regions. If you want to stay competitive you must remain flexible, you must be international."

One of the company's core philosophies is centered on its Mobile Modular Cabin Production Line, where Roberts claims the company can take a warehouse with a flat floor, good lighting and good ventilation – anywhere in the world – and turn it into an efficient cabin-making machine. He explains: "We provide cabins for projects where there isn't an established cabin factory building 4000 or 5000 cabins per year. We can easily and quickly assemble the factory anywhere in the world and start delivering modular cabins right away for both newbuilding and modernization projects. To date we have set up factories in 12 different locations around the world"

The value for a shipbuilder is a flexible and accomplished partner who can fulfill a technically demanding, logistically challenging part of the shipbuilding operation. If you are a shipyard building cargo ships, and then all of the sudden you win a ferry contract, then ALMACO can jump in and set up a factory to start producing modular cabins as you continue the construction of the rest of the vessel. "As I said, we have done this many times and it all revolves around logistics, bringing in kits to be built up and rolled onboard the ships," said Roberts. "It is engineering, it is logistics, it is globally sourced and it is very competitive."

Two Heads are Better than One

In 2016 ALMACO shed its business of supplying product and systems for shore side facilities, focusing instead on two core units, Maritime and Offshore. The Finnish operations are centered on accommodations, whereas France and Italy are focused on food handling – galley's, refrigeration and food storage. ALMACO also has a presence in China, Brazil and Singapore, and in fact the company got its start in offshore about 10 years ago in Singapore when Keppel FELS

asked to provide accommodations for the first Floatel International unit, Floatel Superior. "We were already in Singapore for the cruise business, and they invited us to work with them to lift the quality standard of accommodations on the Floatel project, which included 440 NORSOK-compliant cabins. Since then the business has taken off."

ALMACO is also well situated in the global cruise industry, a business that has been booming for a number of years with more, ever-larger ships. While Roberts was remiss to point out one project in the cruise sector that stood above all others, he did admit a great satisfaction and pride in being onboard the Genting Dream of Dream Cruises, which is the first custom made cruise ship for the Chinese cruise shipping market. "It is purpose built for the Chinese market and we built all of the food handling areas," said Roberts. He sees great opportunity in China, as some market prognosticators predict that within a decade China's cruise industry could be larger than Florida's cruise industry, which is today the world's largest by a large margin. But the marine sector is certainly not limited to cruise, and in this regard Roberts sees green fields of opportunity to roll the ALMACO concept into shipyards globally.

Just last month, in a partnership with Davie Shipbuilding in Quebec, Canada, ALMACO delivered an outfitted accommodation unit for installation on a converted containership which will become Canada's Resolve-Class AOR; a naval auxiliary vessel which will be the largest ship operating in the Royal Canadian Navy fleet. ALMACO literally delivered the living quarters completely outfitted with all accommodation facilities, ready to 'plug and play.' Making this contract perhaps a bit more special is the unit was built in Finland and delivered in Quebec via ocean barge. "That's 2,200 tons of living quarters transported on an ocean barge from Rauma, Finland to Quebec, Canada … that's pretty cool," Roberts said in understatement. Thanks to ALMACO's skills and technological expertise in accommodation construction, the company was able to meet the deadline to deliver the superstructure to Davie while sharing the technical knowledge with the Canadian team as part of the partnership.

ALMACO's scope of work included the full EPC (Engineering, Procurement and Construction) contract for the accommodation unit including cabins, public areas, galley, provision stores, wheelhouse and technical spaces, combining cruise-ship standard accommodation with military requirements.

Strong Roots, Bright Future

Roberts joined ALMACO as CEO in 2005 after running the passenger ship division at MacGregor, which was acquired by ALMACO. "I think the spirit of the company is incredible, the same as when I joined. We are a bunch of highly motivated people, very international and at our best when working on difficult products and demanding projects."

Today ALMACO is about 200 people strong, and while it started in the refurbishment business, nearly 60% of its revenue today comes from the newbuild sector. With the offshore business down for several years, ALMACO too is challenged. "There is a benefit to us having these two businesses – Marine and Offshore – because one is booming and one is not," said Roberts. "We also are reshuffling our resources. The level of outfit is much higher on a cruise ship than an offshore accommodation, but it's the same fundamental concept, it's the same method of installation. That is another benefit to our movable, mobile manufacturing process."

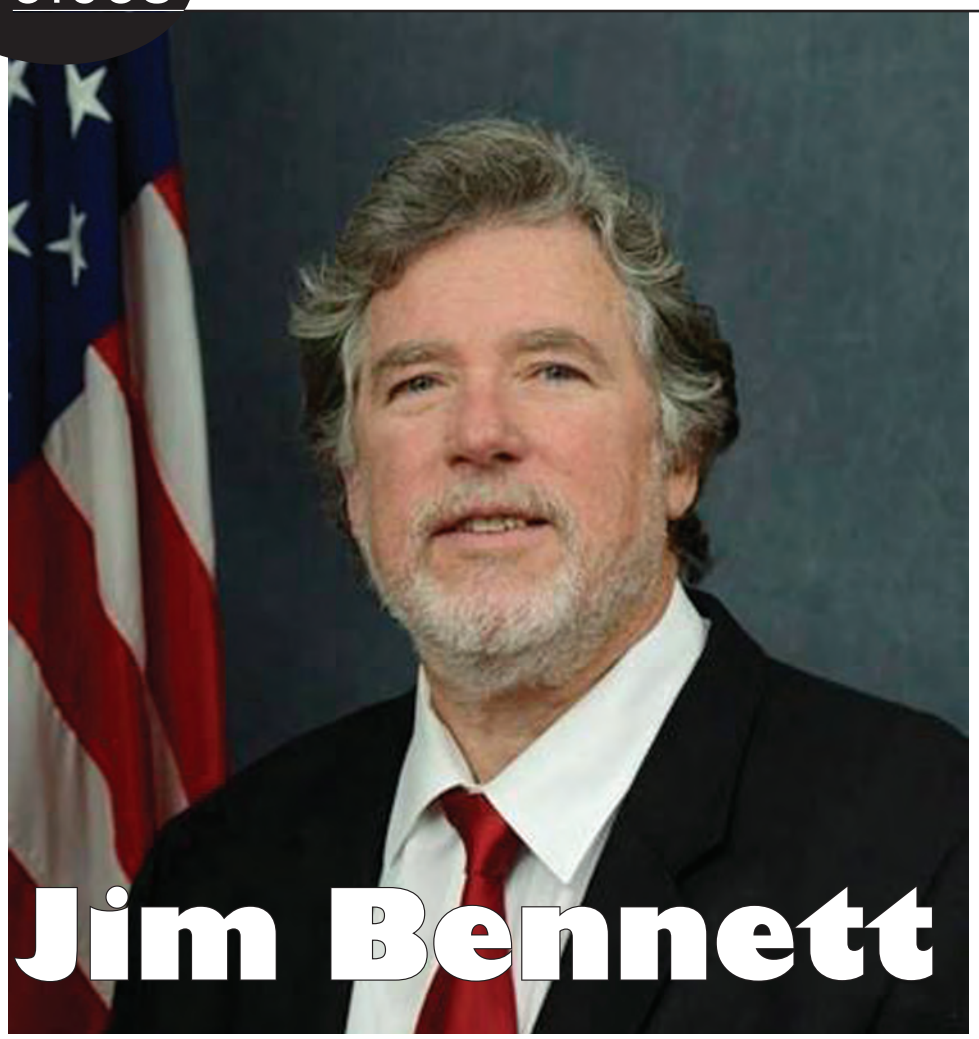
ALMACO's flexibility has served it well, enabling it to nimbly turn and efficiently serve an ever changing global maritime market. "This business is changing all of the time. In the early years, there were fewer ships and smaller organizations and there has been a big consolidation. Today the companies are more professional in their approach especially when it comes to our accommodation and food handling equipment; they know what they want. We have to be much more aggressive and constantly find new ways to become more competitive. It is a much bigger industry."

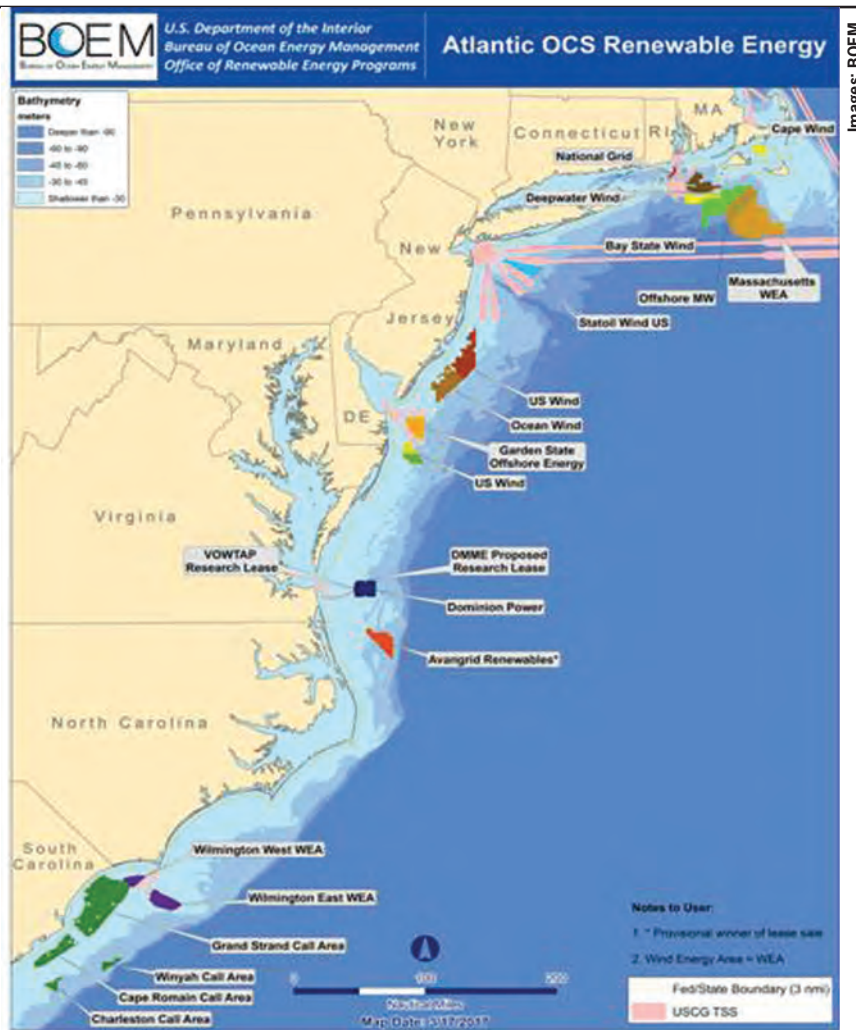
"… that's pretty cool." ALMACO built this fully outfitted accommodation unit in Rauma, Finland and delivered it to Quebec, Canada

Photo: Almaco

Voices

BOEM's Jim Bennett





Images: BOEM

Chief for the Office of Renewable Energy Programs (OREP), BOEM

Two years ago James F. (Jim) Bennett was named Chief for the Office of Renewable Energy Programs (OREP) at the Bureau of Ocean Energy Management (BOEM) the program responsible for overseeing offshore renewable energy development on the Outer Continental Shelf. Here he discusses Offshore Renewable Energy in the United States.

By Greg Trauthwein

Compare and contrast the work offshore in the traditional oil and gas and renewable world.

There is a compare and contrast; there are a lot of similarities, but there are many differences too. First, it's not really the 'other side' because our bureau is all about 'ocean energy' and that includes both oil and gas and renewable energy. A main difference is the renewable program is relatively new, established in 2005 with the regulatory regime in 2009, whereas the oil and gas program goes back decades. There is much more 'on the ground' experience with the program in the oil and gas side, where as there is a lot of new things being dealt with on the renewable side.

For those not in the know, what specifically is BOEM's role in helping to bring forward the advent of Renewable Energy projects in the offshore environment?

The agency's role is to essentially provide access. The law is set up so that the private sector is given opportunity on a competitive basis to move into the offshore environment and commercially develop the resource for the benefit of the public. Our role is to make sure that the development is expeditious and orderly, with appropriate environmental safeguards and fairness throughout the process.

When you look at development by region and investment actions that have been taken, and progress that has been made in making offshore renewable energy closer to reality.

Sure. I'm going to focus on the Atlantic because that's where most of our work resides. The Atlantic Northeast is the most promising areas (for offshore renewable energy development); the factors simply come together … the market is there, the demand is there, the technology for shallow water (offshore wind) is possible and there is a wind resource. We've been focusing on that area and since 2009 we've had seven competitive leases and a couple of non-competitive. In that process we have worked very closely with the states, and we're now in a position where we have 13 leases (the most recent in North Carolina is still awaiting full execution). In essence we have 13 leases, with at least one lease in every state from Cape Hattaras up to Cape Cod. That is

a good foundation to build the program into the future.

Our last two sales – one off of New York and one off of North Carolina – were very promising. The bids were substantial to say the least, based on our expectations, and it indicates that there is very strong industry interest in moving forward in a commercial basis offshore. (In mid-March it was announced that a Wind Energy Area of 122,405 acres offshore Kitty Hawk, NC, received the high bid of $9,066,650 from Avangrid Renewables, LLC, the provisional winner. Also participating in the lease sale were Wind Future LLC, Statoil Wind US LLC, and wpd offshore Alpha LLC.)

There are other world regions that are further along the curve in generating energy from renewable sources. Are there any "lessons learned" that BOEM has sought to incorporate into its program.

Yes. One is communication and stakeholder involvement, which is not necessarily a lesson learned from Europe, but certainly they have let us know it's an important thing and it is something we have found out as well. In terms of specific items, one of the things that we are pursuing that comes from European experience is the design envelope; an effort to provide enough flexibility to developers from a regulatory and review process standpoint to keep projects moving along with required environmental analysis and support without having a process that is so restrictive that we run into long delays every time there is a change. I'm oversimplifying a little bit, but this is something they (Europeans) have done that we are trying to incorporate here in the U.S.

U.S. offshore wind has gained momentum in recent years, with the first commercial project coming on line late last year. How has the new Administration impacted that momentum?

We've gotten some very positive indicators from the Administration. The Administration has clearly identified national interest in regards to energy generation, and they very specifically include renewable sources. That's a positive. We also had, after our last sale last month in North Carolina which was higher than anticipated, Secretary (of Interior Ryan) Zinke noted that this was a 'big win' and that it fits very well with the overall strategy, noting that 'it was a big win for collaborative efforts with state, local and private sector partners.'

The current energy markets, specifically oil and gas, is interesting to say the least. In a low-price energy environment, how does that interact and balance with renewable energy offshore?

Despite the fact that we are in a low-price arena for fossil fuels, the offshore wind industry seems to be going very well. The last two sales in New York and North Carolina provide very strong indicators of viability. We are now going out and seeking input on additional areas that might be appropriate for leasing opportunities. I think we have turned a corner in the offshore wind industry and we may be looking at a very high level of activity in offshore wind in the future.

What are the long term plans, projects or projections which estimates the role of offshore renewables in the future of U.S. energy – 5, 10, 20 years down the line?

We think it is very strong. Long term, on the East Coast, we anticipate a number of projects over the next few years in the shallow water sector. We expect to have additional leasing. But the big player for the long term is floating technology. There are areas in deeper water, and floating technology is coming along so that the long term prognosis is it will play a very big role, possibly here on the Atlantic side but more so out in the Pacific Ocean where there is no shallow continental shelf to build on. So the mid-term looks good, and long-term, with the technology changes, looks very good.

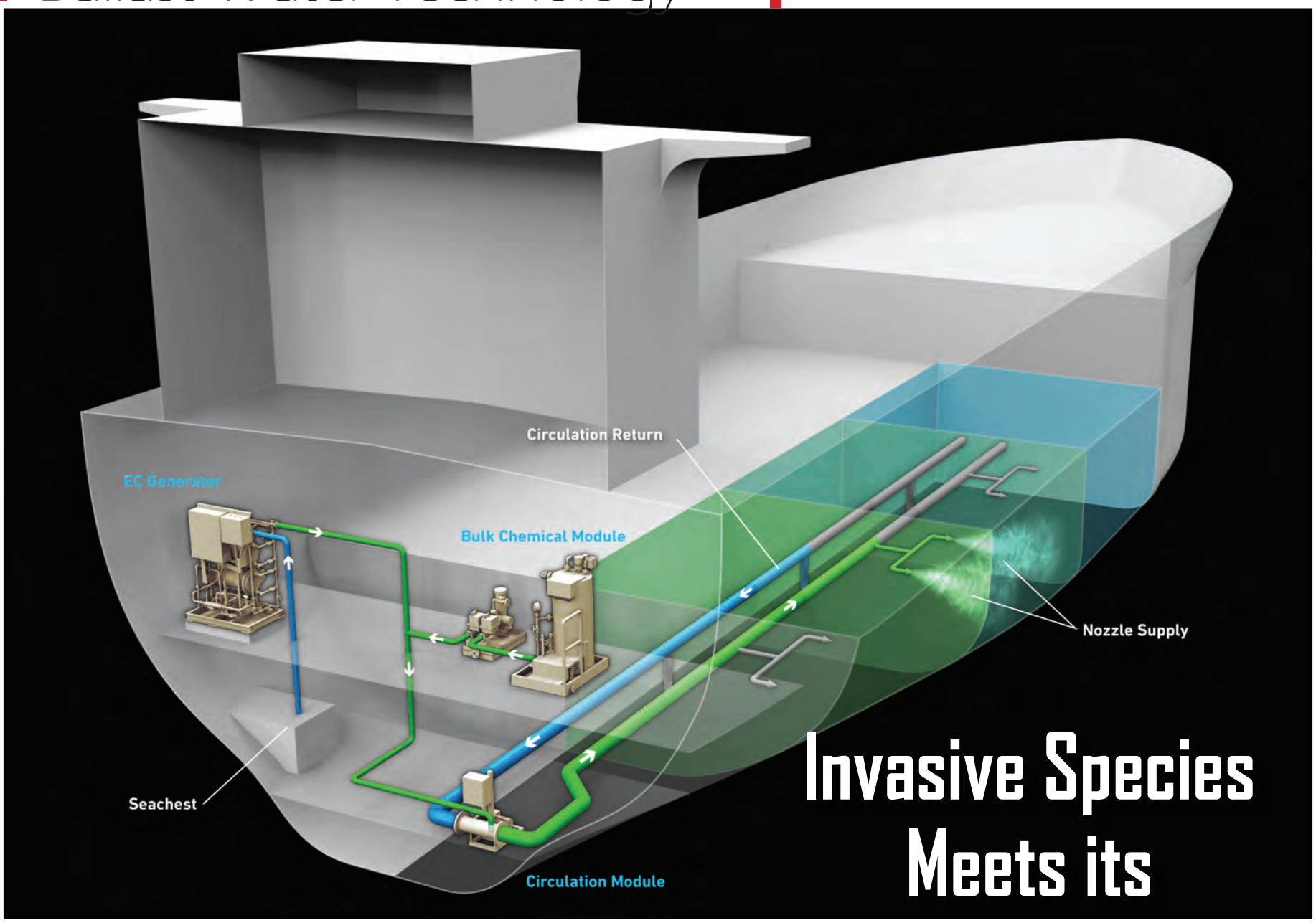


Image: Glosten

Invasive Species Meets its 'Silver Bullet'

BY JOSEPH KEEFE

A new entry to the ballast water treatment promises compliance along with savings in both CapEx and OpEx. Who says there's no 'silver bullet' in the BWTS game?

In the port of Houston, Texas, three medium-sized tankers are berthed adjacent to one another at this sprawling petrochemical complex. The first, a 70,000 ton shuttle tanker, is discharging a parcel of Brent Crude Oil. The second, a coastwise product carrier, is taking on a parcel of gasoline destined for the East Coast. And the third, another crude carrier, is also discharging bulk crude oil. All considered quality vessels, operated by reputable and fully vetted owners, only one is experiencing what could be described as a satisfactory port call. For the two poor performers, that's got nothing to do with cargo equipment, and everything to do with their newly minted ballast water treatment systems.

As the product tanker loads cargo, it struggles to keep up with the delivery volumes from shore. On at least one occasion, cargo is interrupted for two hours and for the balance of the lifting, a ship-imposed restricted loading rate – owing to restricted draft at the berth – kept the vessel at the berth well past its allowed window. The demurrage quickly eats into what had been thought to be profitable charter party. Slow deballasting rates, owing to the necessity to 'retreat' in-line, is determined to be the culprit.

Across the channel, crude tanker number one has a different problem. As discharge continues, the intake of murky, muddy ballast water also impacts its ability to get enough ballast on in order to make a speedy departure from the berth once finished stripping its tanks. It experiences ballast filters that impede the flow of water into its segregated ballast system. Many hours after finishing discharge – and not before receiving a raft of Letters of Protest for poor performance – it finally departs

the berth. In contrast, tanker number three discharges an entire 70,000 ton parcel of Bonny Light crude oil in just 22 hours, including crude oil washing of 25 percent of its cargo tanks. Ballast was loaded at maximum rated pumping capacity. Unimpeded by an in-line ballast water treatment system, the vessel was ready to depart immediately upon hose disconnection, and then presented promptly for her next fixture.

On the way, the tanks are treated, and then neutralized in transit – while employing real time monitoring to optimize dosing – using one of the newest entries into the ballast water treatment game. The vessel's Envirocleanse inTank™ BWTS utilizes salt water and Electrochemical Activation (ECA) to generate Hypochlorite as the active substance to achieve ballast water discharge standards. The dosing module mixes one tank at a time where ballast water quality is assessed and the generated disinfectant is applied until the target Total Residual Oxidant (TRO) level is reached.

The circulated ballast water is returned through the patented in-tank nozzle mixing system that ensures even chemical distribution. After an initial hold time, the dosing module rechecks the TRO in each tank, applying more disinfectant if required. For our tanker, this was repeated for all ballast tanks that require treatment. Prior to arrival in port, the dosing module checks the remaining TRO in the ballast tanks and applies Sodium Thiosulfate to neutralize any remaining active substance and the ballast water is ready for discharge.

The inTank™ BWTS does not filter the ballast water on uptake, which is different than most in-line systems. To ensure consistent and effective kill of target organisms and pathogens, the Concentration-Time (CT) treatment approach is utilized. The recirculation capacity enables monitoring and re-dosing to meet the target combination of oxidant dose and hold time. The ability to dose in-tank and re-dose ensures effective treatment regardless of organic and inorganic loads in the ballast water. And, while those advantages translate into real operational gains – and profits – the Envirocleanse BWTS delivers in many more ways, as well.

Fashionably Late

The Envirocleanse BWTS product is not yet the best known of the 50+ systems that have dipped their toes into the global ballast water treatment game, nor is it the first to hit the market. On the other hand, when the dust shakes out from the testing, certification and production phase of this burgeoning market, it will likely be one of the few to survive.

Anything but new, Envirocleanse LLC is a division of Charter Brokerage LLC, a Berkshire Hathaway company. Charter Brokerage knows its way around the waterfront. A market leader in duty drawback recoveries; import brokerage and freight forwarding services; marine barging both inland US and ocean voyages; and import/export commodities trading, the firm has been interacting with shipping for many years. Beyond that, Berkshire Hathaway, through their ownership of Marmon Water Technologies, also knows water treatment.

All of that said; the Envirocleanse entry into the market was anything but late. Matt Hughes, Envirocleanse Senior VP of Sales and Marketing told MLPro in April, "We have admittedly been fortunate with much of our timing for market entry, some by design and some by luck. Several requirements have changed, even over just

"We have admittedly been fortunate with much of our timing for market entry, some by design and some by luck. Several requirements have changed, even over just the last year. **Being currently in the middle of our Type Approval testing however, we are able to incorporate the new G8 testing requirements,** as well as all current guidance from The US Coast Guard and the EPA."

Matt Hughes P.E., EVP of Marketing & Sales, Envirocleanse

Image: Envirocleanse

the last year. Being currently in the middle of our Type Approval testing however, we are able to incorporate the new G8 testing requirements, as well as all current guidance from The US Coast Guard and the EPA."

With a proven disinfectant treatment solution already in hand, the firm was also hesitant to commit too early to a market that had no ratified or defined standards. And, adds Hughes, "There was no interest at a corporate level to simply 'be another player' just because it appeared to be a large market potential. When we were able to team with Glosten to bring the inTank™ BWTS to market, we felt very strongly at that point that we had something unique to offer." The choice to partner with Glosten proved to be a smart one.

Marinizing-to-Market

Envirocleanse management knew that just because a technology worked ashore didn't necessarily translate into a successful marine offering. And after interviewing several other groups, Envirocleanse determined that Glosten was the right fit for marinizing their system. Matt Hughes adds, "Their inTank™ treatment technology was the perfect complement to our EC system, enabling Envirocleanse to bring a uniquely ship operator-focused solution to market."

Kevin Reynolds, Principal at Glosten, leverages prior experience in the marinization and integration of as many as a dozen of the leading ballast water treatment technology providers. He explains, "We help them understand how controls work on ships, the testing regimen, and how to navigate marine-style hazard assessments. We understand how ships work, and we understand how to integrate and get marine equipment working on vessels. You can bring the best shoreside technology to a vessel, but that doesn't guarantee you success on the water at all. In fact, I don't think there's anyone out there who has done more marinizing of equipment than Glosten."

After seeing what Envirocleanse had to offer, Reynolds and his team were convinced that in-tank treatment was the way to go. Eliminating the need to install massive amounts of equipment into existing pumprooms and/or engine spaces was at the top of the list.

In fact, says Reynolds, "It is rare and unusual to be able to install a large 3,000-to-5,000 cubic meter per hour system along with heavy filters without having to do significant relocations of equipment in those spaces. In addition, there's quite an additional effort to put together a rigging plan just to get that equipment into the belly of the ship," he said, adding, "We've actually had to cut holes in the bottoms of ships to put those filters in because to do otherwise would've involved too much equipment removal. And that involves recommissioning equipment that had to be relocated. So you end up commissioning not just a BWT system, but other equipment as well."

The inTank™ approach, with no filtration, has a very small amount of work required in crowded pumprooms or machinery spaces. What this means is that the installation team can install the piping and equipment in different areas of the ship at the same time, removing any bottle necks. This significantly reduces the total time for installation as compared to inline treatment systems, making refit within a 10 day period practical.

Beyond the complexity of the typical in-line BWTS system installation, the reality of the matter is that the vast majority of these retrofit systems will be installed overseas, to a large extent in Asian yards. Hence, says Reynolds, on a tanker or a bulker that requires an extraordinarily large in-line system, shipyards that are used to cropping and replacing and other simpler items and coating repair, will now be asked to employ skills that they are not used to – those very complicated relocations and installations. He explains, "If you go with the in-tank system, you've put your shipyard – particularly those that typically do repair work – back into their comfort zone. Their traditional work is cutting and replacing steel and running pipe. With the in-tank treatment – the main effort is running pipe – and that's their comfort zone."

Taking into consideration engineering, labor and material line items, the CapEx involved with an in-tank treatment system is significantly lower than the cost of the in-line systems. Real CapEx and OpEx savings are easy to calculate. But, the purpose of ballast water treatment is to meet compliance. According to Reynolds, using the in-tank process is the only way to actually respond to the water quality that the ballast treatment sees. "Any other method puts in a fixed amount of UV radiation or a fixed amount of chemical," says Reynolds, adding, "The in-tank process adjusts how much chemical is added based on the oxidant demand in the ballast water. It is the only method that we're aware of that can really assure compliance."

For those operators still unsure about the long term impact of chemicals on ballast tank coatings, IMO research in collaboration with coatings manufacturers has determined that as long as the oxidant level stays below 10 mg/liter in the ballast tank, it doesn't compromise the tank coatings.

Envirocleanse @ a Glance

- The ability to separate ballast treatment from cargo operations.
- A simpler system – easier / cheaper to install (easier for retrofit yards), easier to run (automation).
- The system is able to fulfill all the IMO and USCG ballast water disinfection requirements.
- Flexible and modular Installation, lower upfront CapEx.
- Operation is simple and fully-automated, with very low maintenance requirements.
- Low OpEx: power consumption is very low, circulation pumps smaller than typical ballast pump.

Envirocleanse Testing & Approval

- Date on board the Golden Bear: January 2017
- Date started testing: March 2017
- Date expected completion testing: October 2017
- Date of expected submittal of documents to USCG: Dec.2017
- Expected USCG approvals: 1Q 2018
- Expected IMO approvals: MEPC 72 in March 2018

Testing & Type Approval

Envirocleanse LLC has previously received both EPA registration and FDA approvals for usage in various industries including oil & gas applications, food preparation and medical disinfection. Also armed with in-house knowledge of water disinfection utilizing electrically-activated treatments systems, Envirocleanse expects U.S. Coast Guard regulatory approvals to occur in the first quarter of 2018. Already commissioned on the Golden Bear testing facility in California and having been through pilot testing, the system has already passed the first couple of tests.

How it Works

Under the vast majority of cases the system will use sea water to generate hypochlorite on-site. In cases where fresh or brackish water is the feed, bulk dosing using liquid hypochlorite or NaDCC are options. Because the system constantly and automatically monitors the residual oxidant in the tank, the vessel can allow the oxidant to degrade over the life of the voyage, keeping a minimal amount to ensure there is no regrowth. By allowing degradation to a level of .1 ppm - .5 ppm towards the end of the voyage, there is minimal neutralization using sodium Thiosulfate. Typical neutralization will require roughly .5 kg per 1,000 m3 of ballast water, and the cost of STS is about 50 cents per kg. Thus, chemical costs for neutralization is quite minimal. And, sea water is free.

Finally, and for vessels operating in fresh and/or brackish water, there are several options available to shipowners. Unlike some other systems, Envirocleanse was designed to allow fresh water ballast to be treated by an electrolytic system. This is accomplished by using clean sea water feed during the ocean voyage to feed the generator. Hughes adds, "For vessels that trade exclusively in fresh water, we've developed bulk chemical options. These bulk chemicals are part of our type approval kit, and treat in the same manner as the electrolytic version in the ballast water tank."

Power requirements are indeed an advantage when using power in transit at non peak times, as opposed to in port. The reactor cells creating the disinfectant are very efficient, and have low power requirements. The unit can be properly sized to take into account the typical voyage time. So a system could be smaller than might otherwise be anticipated by the ship owner which again, would use less power.

A key concern of vessel operators and regulators alike has been the fear that BWTS OEMs wouldn't be able to ramp up quickly enough to produce enough equipment in a timely fashion to meet demand. According to Matt Hughes, that's unlike to be an issue for Envirocleanse. "Manufacturing will be 100% in the USA, using almost exclusively U.S. made parts. We are prepared to manufacture up to 10 complete systems per week, he said, continuing, "I would rather anticipate that industry wide, the engineering, project management, and ship yard availability will be more problematic. However, these are all issues we are already in the midst of solving for the Buyer."

Underscoring the compact, flexible and easy to install nature of the equipment, Matt Hughes told ML-

Pro, “There are two distinct modules to our system; the treatment module and the dosing module. The dosing module must have access to the ballast water system and will likely go in or near the pump room. It can be constructed with EX rated components and be installed in classified areas when needed. The treatment module can be located almost anywhere. We simply need to be able to run piping from the treatment module to the dosing equipment. In short, the entire system as a whole is very flexible and modular. Also, each component is smaller, as compared to other systems.”

No Silver Bullet?

In the BWT business, ‘there is no silver bullet.’ Nevertheless, Matt Hughes tells MLPro, “While we do believe we are a viable option for the vast majority of vessels, certainly the high-ballast longer-voyage ships will see the most benefit from our system.” He adds, “We do not have a maximum ballast volume capacity, in fact, we believe our system has benefits at the higher ballast rate levels. By treating in-transit, our primary evaluation is total ballast capacity, and voyage time. When taking those two factors into consideration, we can then present the option for a customer vessel, both for pricing and anticipated commercial uses. The rate of ballasting during uptake is of absolutely no consideration for our system.”

Beyond the easier and less expensive installation process, a key fundamental of the Envirocleanse solution is that it does not operate during cargo operations. Everything in the vessel’s current ballast system remains exactly the same. Kevin Reynolds explains, “The ability to completely separate ballast water treatment from in port cargo operations is a huge benefit. Imagine you clog the filter on an in-line system during cargo operations and now you must either notify the Coast Guard or other flag state that you no longer are able to meet your treatment requirements or you need to shut down cargo until you remedy some sort of fix. With an in-tank system, you avoid it and you defer that treatment to the sea passage.”

As the Envirocleanse BWTS entry marches quickly towards market entry and regulatory approvals, vessel owners suddenly have a new option – one which costs less to install, less to operate and one which doesn’t impact cargo or ballast operations. Backed by one of the most recognizable and successful names in business today, Envirocleanse also has the staying power to provide service for the long run. If that sounds like the full package you’ve been waiting for, then perhaps there is a ‘silver bullet’ for BWTS compliance.

DREDGING

Image: IADC

IADC'S RENÉ KOLMAN "PRIMUS INTER PARES"

SECOND ARTIFICIAL ISLAND OF THE AMERICAS, PANAMA

Following the successful construction of the first artificial island of the Americas off the coast of Punta Pacifica in Panama City in the period 2011-2013, Royal Boskalis is currently building a second island, which is expected to be handed over to the client in 2017. Nine hectares of land is being created in the Pacific Ocean by using around 600,000 cubic metres of rock to form a perimeter and filling it with 1.3 million cubic metres of sand. A bridge will connect the second island to the first island. Construction of the second island commenced in April 2015 when the Dutch Prime Minister, Mark Rutte placed the first stones.

Royal Boskalis

The world of dredging is an ever changing and endlessly fascinating niche of the global marine industry, an indispensable activity essential to keeping world commerce flowing. For insight on recent trends we visited last month with René Kolman, Secretary General, International Association of Dredging Companies (IADC), for his take on a world of dredging challenges and opportunities.

By Greg Trauthwein

In true Dutch fashion René Kolman is refreshingly forthright. Kolman assumed the mantle of leadership at IADC more than seven years ago, coming to the post from the landscape and garden trade association business. But his roots are in maritime, having spent 18 months after high school in nautical school, and he saw the opportunity to lead the IADC as a homecoming of sorts.

"When I came in, I didn't have any short or long term objectives, as I just started working in the dredging industry, so it was a big learning curve," Kolman said. He relished the challenge to work in this unique maritime niche, which is a relatively small and tight-knit, yet fiercely competitive community dominated by some very large corporate entities. "Working with contractors in general it is a very special dynamic: they cut each other's throat in competition, but never completely; because tomorrow they have to work together and will likely be friendly. You should be able to walk on eggs, being diplomatic yet competitive."

Since starting in 2008 and becoming Secretary General in 2010, Kolman is most proud of broadening the activities of the IADC over the last few years to better serve his constituents, crediting a new and diverse website but more importantly his colleagues and coworkers, who are independent and hard-working. There is a Latin phrase for it, I am a "Primus inter pares" meaning first among equals.

The Importance of IADC today:

I think most importantly, we are seen as a trusted source of independent, neutral information for the world. We are working for the dredging industry, but we are independent and neutral. Another thing: with all of the information on our website, and all of the information we publish, it helps to communicate the importance of the dredging industry to the world. The term 'dredging up' something can have a negative connotation; in a lot of languages terminology around dredging can have a negative connotation, and I think it is important to inform the public about the industry and the good that we do.

Dredging "By the Numbers":

We publish a publication, Dredging in Figures, but we had to stop publishing figures on the closed markets because we are not able to verify the figures. The closed markets are chiefly the United States and China. IADC is aiming for

PORTSMOUTH HARBOR DREDGING

In 2017, the Portsmouth Harbor will become the home to two new aircraft carriers that the BritishRoyal Navy is building. Royal Boskalis was appointed by the Defence Infrastructure Organisation, a part of the British Ministry of Defence, to prepare the port for the arrival of these ships by widening and deepening the port and the entrance channel. The main challenge involved detecting and removing large quantities of obstructions and unexploded ordnance (UXO). Boskalis developed advanced equipment for this work in collaboration with UXO detection and clearance specialist, Boskalis Hirdes. A large proportion of the dredging work was executed by the trailing suction hopper dredger, Shoalway, and the backhoe dredger, Manu Pekka.

Royal Boskalis

"Without dredging, there is no marine world trade; **harbors must be maintained.**"

NOUVELLE ROUTE DU LITTORAL, FRANCE

In La Réunion, France, works are taking place for a major project – the construction of a new coastal road, the "Nouvelle Route du Littoral". The works were awarded to Société de Dragage International (SDI), which is part of the DEME Group, in Joint Venture. Currently, dredging and backfilling works are taking place for the gravity-based foundations of the viaduct for the new coastal road. For this project, the dredging and civil divisions of Jan De Nul Group have been working closely together in order to optimise planning and execution methods.

Société de Dragage International / Jan De Nul Group

level playing field, and we are working to receive verified information and open these markets.

In total IADC has 10 members, and worldwide there are only about 30 companies qualified to become a member. It is worthy to note, however, that its membership represents about 80% of dredging capacity in the world's open markets. There are many more dredging companies than that, but to become a member of IADC you need to be privately owned, you should work outside of your own country and have at least $25 million in seagoing equipment.

The largest hopper dredger is 48,000 cu. m. and that is really huge. Amongst IACD members you will find the largest pieces of dredging equipment in the world. Today you are also starting to see a whole new generation of equipment, including cutter suction dredgers with a capacity of 40,000 kW. In the dredging sector newer, larger generations of equipment historically create their own work, and this is no exception with the new generation of cutter suction dredgers. The big companies are not averse to investing in new technology, and now is a particularly good time as the shipyards are not as busy and are under some price pressure and urgently need some work.

The Global Economic Impact of dredging is an elusive number to identify, but suffice it to say: Without dredging, there is no marine world trade; harbors must be maintained. If you look at the value of world trade overall, an industry like dredging, with a turnover range between 10 and 12 billion Euros, is a very important piece of the puzzle.

Today what are the challenges of IADC?

If you take an hour glass, on one side you have the public at large and the need for information. On the other side, you have all of the information to fulfill the public's need. The biggest challenge for IADC is the middle of the hourglass; getting that information out to all. If people don't know anything about dredging, they often disagree and oppose dredging activities. It's difficult to have a discussion with them without them seeing the entire picture.

How is IADC working to bridge this communications gap?

We are completely updating our website to facilitate the efficient search and recovery of information. Looking at the site now, everything is available as .pdf files but that is not efficient. In a few months time this will be transformed into a 'knowledge center.' Making information available readily and easily electronically is essential, particularly to attract and maintain the younger generation.

What do other challenges do you see, from a legislative lens?

Considering where you are calling from I would say The Jones Act, and given the new president, I don't think that the opening of the market will be any closer, as I think there will be more protectionist behaviors. We think this is bad for the dredging industry. Another challenge centers around environmental impact assessment and environmental permits. The permits requirements sometimes are an irrelevant request because of a lack of knowledge of the impact of the new infrastructure and the dredging

SABETTA PORT, RUSSIA

The Arctic port of Sabetta is situated on the Yamal Peninsula, on the western shore of the Ob Bay. The federal objects of this brand new port were developed and constructed between 2012 and 2017 for the Federal State Unitary Enterprise Rosmorport and are part of the Yamal LNG project. This project includes the construction of an LNG plant, gas transportation pipelines and a sea port. Sabetta Port will be used for transporting the LNG gas towards Europe and Asia.

It is impressive work for a project situated in an area with challenging weather conditions for all parties involved amongst which Jan De Nul Group is one. JDN was assigned the contract to perform the capital dredging works in the new port in 2012, 2013, 2016 and 2017. In the summer of 2012, JDN's first TSHD arrived in the isolated region that is ice-bound for seven to nine months during the year. The Alexander von Humboldt executed the first capital dredging works in the Sabetta access channel. One year later, JDB returned with a total of 13 dredging vessels to continue the dredging works in the access channel and to start the dredging works in Sabetta port basin. In only 10 ice-free weeks, 10 million m³ of permafrost was dredged. In 2016 Jan De Nul Group mobilised no less than 18 dredging vessels to widen the 50km-long sea channel stretching into the peninsula. The basin was deepened up to 15.2m. The access channel was widened to 315m and deepened up to 15.1m. The sea channel was widened from 210 to 295m and deepened to 15.1 metres.

Federal State Unitary Enterprise Rosmorport / Jan De Nul Group

LAND RECLAMATION, TAIWAN

A port expansion project is under way to improve the quality of life for local residents and increase the capacity of Kaohsiung Port itself. It is one of the biggest land reclamation projects in the history of Taiwan. Van Oord's client, the Port of Kaohsiung, Taiwan International Ports Corporation (TIPC), imposed a strict deadline: the project team must reclaim 250 hectares of land by January 2018. The 37 million cubic metres of sand this will require was reason enough to deploy two of Van Oord's largest TSHDs on the project: the Vox Máxima and the Rotterdam. Summer is typhoon season in Taiwan, so the team drew up an emergency typhoon plan in addition to the usual safety precautions, which proved useful when Typhoon Nepartak hit during the works. The project team, the crews and the equipment survived the storm unscathed. The reclaimed land will offer space to a string of shipyards and terminals, some capable of accommodating 22,000 TEU container ships. The expansion project will boost Taiwan's economic growth and ensure that Kaohsiung retains its status as the country's biggest port.

Port of Kaohsiung, Taiwan International Ports Corporation (TIPC) / Van Oord

process on the environment.

Another challenge is not really legislative, but it is important, and that is tapping the knowledge of dredging companies. If you look at a typical dredging company you see a highly educated workforce with much practical experience – there is so much knowledge available. It really is a waste that this resource is not involved move often early on in regards to very large, complex projects.

Looking at the business of dredging, what challenges do you see?

At the moment, overall, we have a very challenging market situation; simply put there is less work available and companies are looking to diversify. One area where you see these companies expanding is in the offshore wind energy and renewable markets. Another challenge is simply dealing with sustainability. The companies acknowledge that they must do business in a sustainable way, and you're starting to see innovations such as the use of LNG as fuel onboard the dredgers.

Looking at major projects completed last year, can you point to one or two with major economic impact?

It is really hard to gauge the real economic return on recently completed projects, but I think the Suez Canal dredging project has had a tremendous impact, chiefly because sailing distances were shortened. At the moment world trade is decreasing, so there is less benefit from the Suez Canal project. Another project, perhaps less well known is the Sand Engine project off of the Dutch coast. In the Netherlands and Belgium, two low lying countries, if we don't protect ourselves from the sea than a large part will be flooded. If you take into account a rising sea level, the urgency is even greater. Here we have to replenish our beaches every 3-4 years, harming some sea life. The Sand Engine seeks to use the force of nature, specifically putting 20 million cubic meters of sand in front of the Dutch coast, in a specific shape, so that wind and wave disseminates the sand naturally along the coast for several years. Due to this large reclamation there is no need any more to replenish every 3-4 year which is less harmful for the environment. (Read about the Dutch "Sand Engine" here: www.ecoshape.org/en/).

You see more and more in the dredging industry the use of nature, working with nature to find long-term sustainable solutions. You can see a lot of these projects shaping up globally, and the Army Corps of Engineers in the U.S. is at the forefront as well. I may be against the Jones Act, but the Army Corps of Engineers in the U.S. is doing many things that are contributing to the dredging community. Projects like this have less of a direct economic impact, but I think long-term they contribute strongly to the overall world economy.

In conclusion, where do you see opportunities for your members?

Dredging activities travel around the world. Today there are opportunities in the Far East and South America. There is much need for dredging around Africa, but this will be difficult because projects are often financed by the Chinese government and the work will be done by Chinese contractors. On the other hand, the offshore wind industry is generating a lot of work.

U.S.A. DREDGING

DIGGING DEEP FOR A "WIIN"

BY BARRY PARKER

In the waning days of 2016, the outlook brightened dramatically for the big U.S. dredging contractors. Just before Congress dispersed for the Holidays, then-President Obama signed a pivotal piece of legislation – the Water Infrastructure Improvements for the Nation (WIIN) Act, S612. Key aspects of the bill:

- Authorized needed investment in America's ports, channels, locks, dams, and other infrastructure that supports the maritime and waterways transportation system and provides flood protection.
- Authorized U.S. Army Corps of Engineers (USACE) Chief's Reports received since previous legislation (WRRDA 2014); Chief's Reports are the final recommendations to Congress by the Corps' Chief of Engineers for water resources infrastructure investment. (These infrastructure improvements have been proposed at the local level, in cooperation and consultation with the Corps, and have national economic and environmental benefits).
- Accelerated and broadens reforms for infrastructure project permit processing, and
- Cut red tape by requiring timely approvals for non-federal modifications to Corps of Engineers projects.

The harbor deepening authorized by WIIN includes marquee projects at Port Everglades (with a Federal contribution of $229.8 million) and Charleston, SC (with $231.2 million Federal cost). Hence, for the domestic dredging industry, and the blue water ports they serve, the bill was good news indeed. William Hanson, Washington, DC-based Vice President at Great Lakes Dredge and Dock, the largest dredging contractor in the States,) explained to MLPro, "WIIN allows projects to become eligible for funding. We look to WRDA bills to set the stage for future projects, but to the appropriations budget for immediate work." Sounding an optimistic note, Hanson added: "Fortunately, Congress has done a terrific job of improving funding for Corps of Engineers in recent years and so we hope to see a continuation of that trend in 2017."

Hanson said "We would prefer to see Congress pass a budget though rather than short term CR's, since working on short term extensions hampers the Corps' ability to manage its dredging program."

Separately, John Witte, Jr., an executive at U.S. dredger Donjon, said, "With the need to continually maintain access to our Port's and water accessible facilities as well as deepening to keep up with the larger and more cost effective shipping, we are optimistic that with the support of the Federal Government in the form of funding, 2017 will provide for the opportunities the Dredging Industry needs to stay engaged with an opportunity for success." About WIIN, Witte added, "Obviously this will only provide industry players with an opportunity, the rest would be up to the individual Dredging Contracts to earn the Success thru Bidding and performance."

Domestic Dredging Heats Up

The regulatory filings of GLDD provide insight into the ebbs and flows of the domestic business. In 2016, its "Capital Dredging" segment benefited from work done at Savannah, where it participated in the first portion of deepening a 40 mile channel that reaches inland to the Garden City container terminal. Its work on the Delaware River – a multi-phase project where the waterway will be deepened from 40 feet to 45 feet – was also cited as a positive for GLDD's business. For that work, GLDD used its cutter suction dredges Illinois and Florida for deepening, and its Apache for late-stage blasting work. GLDD stayed busy, also working at Cheniere's Corpus Christi LNG export project and in Louisiana, conducting restoration work at Southwest Pass.

WIIN promises even more business, as ports will now see their plans for harbor deepening realized. In an early December conference call, just prior to final approval of WIIN in Congress, American Association of Port Authorities (AAPA) President and CEO Kurt Nagle, explained that the allowable harbor dredging depth would be increased to 50 feet (from the present 45 feet) on harbor deepening projects, which become eligible for a 75% federal contribution. GLDD's Hanson added, "WIIN authorizes projects within certain parameters, final engineering and environmental approvals are still necessary before they get funded. We generally pay most attention to projects obviously involving dredging, including port expansion and coastal projects. WIIN like most WRDA's also includes policy changes that will have a positive impact on our business. Increased emphasis on beneficial use of dredged material and regional sediment management will help make projects more sustainable." In Charleston, for example, where GLDD has a long history of work, the WIIN authorization sets the stage for dredging to 52 feet.

WIIN also provides more certainty of funding maintenance of existing channels. Washington, D.C.-based K&L Gates explained to clients that the new law ensures that the amount of harbor tax revenues dedicated to the Harbor Maintenance Trust Fund (HMTF) will be at least 3 percent higher than the previous year's allotment, and 100 percent of the tax is dedicated to the HMTF in 2025." Echoing that optimism, Hanson from GLDD noted hopefully, "HMTF language will assure that funding for maintenance dredging will continue to increase toward full utilization and an agreement that the Federal government will pay for maintaining authorized channels to 50' helps more ports rationalize expanding their channels."

Beyond Washington

Mother Nature also creates demand for beach renourishment, where a beach that's seen erosion or damage from a hurricane is replenished with sand pumped from an area near the coastline. Weeks Marine, another major U.S. contractor, recently completed a five month replenishment project along seven miles of beachfront at Hilton Head Island, SC, not far from the landfall of Hurricane Matthew in October 2016. The shoreline was filled in with roughly 2.2 million cubic yards of sand, piped in from a shoal four miles offshore by the Weeks-owned CR McCaskill (a 17,400 Thp cutter suc-

"Like all prudent operators, we will look into the advantages and disadvantages of whatever changes the new administration will bring (or not) and make an informed decision based upon a number of different factors; all of which will hopefully result in the continued success of Donjon Marine."

John Witte, Jr., Donjon

tion dredge built 2012). This unit was also deployed on a 2013 project at Rockaway Beach following Hurricane Sandy. And in late 2016, two GLDD hopper dredges, Dodge Island and Padre Island, were filling in a depleted beachfront at Dewey Beach and Rehobeth, Delaware.

Farther afield, the international market sees demand for the biggest units supported by mega-projects. In its 2016 report, Dredging in Figures, the International Association of Dredging Companies (IADC) notes: "Despite the slow growth and fluctuations in the world's economy, the dredging industry's turnover in 2015 (excluding the "closed markets" of China and U.S.) increased to €7.115 billion compared to €6.415 billion in 2014 – mainly as a result of the sizable Suez Canal expansion project (€1.1 billion)."

The Suez Canal expansion, a major demand driver with 180 million cubic meters of material dredged has now completed, but other projects still provide work for the major international players. The large port projects have benefited from funding sourced from the large international development banks.

The biggest projects can be seen by tracking the fleet of Jan De Nul, a large Belgian contractor with noteworthy units, including Cristóbal Colón and Leiv Eriksson, trailing suction hopper units with a capacity of 46,000 cubic meters (equivalent to the cargo intake of a Handysize bulk carrier), working on a reclamation project where a Free Trade Zone is being expanded at Lagos, Nigeria (funded by Chinese development banks). The Vasco da Gama, with a capacity of 33,000 cubic meters, has been deployed at in the construction of a new port at Nador, Morocco funded by the European Bank for Reconstruction and Development (EBRD) and the Arab Fund for Economic and Social Development (AFESD).

In Kuwait, the Dutch firm of Van Oord has been a contractor to Kuwait National Petroleum Company in a 65 million cubic meter reclamation project for construction of a "greenfield" port at Al-Zour that will serve a new refinery producing low sulfur fuels and petrochemicals. Two suction hopper dredges have been used on the project. In a joint venture with Boskalis, Van Oord's trailing suction hopper dredger Vox Maxima is in the midst of a three year project where 20 million cubic meters of sand will be used to create an artificial island for residential use kin the bay near highly crowded Jakarta, Indonesia. Van Oord will be part of a consortium working on the West Nile Delta project, which will tie offshore gas drilling to an onshore facility at Burrulus, near Alexandria, in Egypt. Van Oord will also deploy a trailing hopper suction dredge as part of the landfall portion of the project in 2017. In a two year project in Kingston, Jamaica – where loc al authorities hope to capitalize on larger containerships entering the Caribbean from Asia – Jan de Nul's cutter suction units Marco Polo and Pedro AlvaresCabrál will be deepening the channel and the port basin.

Dike reinforcement, vital in the Netherlands where flood protection and water management are paramount concerns, is an important segment for Van Oord. Its 2016 built cutter suction dredge Biesbosch was employed in the Zeetoe-gangIJmond project, the construction of the new sea lock at Ijmuiden. Along with GMB, another Dutch provider, Van Oord has been a lead contractor on the Dutch "Room for the River" program, a national flood protection effort in low-lying river areas. To that end, Van Oord also has equipment working at Maasvlakte, near Rotterdam.

Van Oord has also played a role in international beach replenishment projects. In Spain, the contractor has recently completed projects at Barcelona and La Pineda. Work at Playa de Castillo (in the Canary Islands) is also ongoing using the small trailing suction hopper dredger "Costa Verde" acquired in early 2016. This new addition to the Van Oord fleet was recently named, after the coast of Asturia in northern Spain. In describing this asset, Van Oord said: "With its small dimensions and shallow draft, the ship is very well-suited to the shallow water and smaller harbours that dominate the Mediterranean market."

Closer to Home, Looking Ahead

In the United States, policy changes on the horizon may bode well for investment in maritime equipment, if the proposed investment tax credits (ITCs) take shape in an actionable way, but it's too early to draw a firm conclusion. Donjon's Witte noted, "Like all prudent operators, we will look into the advantages and disadvantages of whatever changes the new administration will bring (or not) and make an informed decision based upon a number of different factors; all of which will hopefully result in the continued success of Donjon Marine."

When asked about the role of ITC's at GLDD, going forward, Mr. Hanson said: "I don't think there have been enough specifics to really comment on this." Nevertheless, he was quick to mention the newbuild soon to be completed at Eastern Shipbuilding, and told MLPro, "We recently launched our new hopper dredge, the Ellis Island and plan to continue to invest in new equipment, so yes, ITC's would theoretically help us make investment decisions. Obviously we are monitoring these developments and appreciate the new administration's interest in infrastructure and U.S. manufacturing and U.S. job creation that is critical to us." Ultimately, however, government incentives don't relieve businesses of their roles to manage balance sheets, a point emphasized by Mr. Witte, who said simply, "Donjon was built based upon the simple principle that you do the work you are capable of with, for the most part, equipment that you own. We look to add equipment based upon need and our ability to purchase what we need. Debt, while a simple fact of life, is something that we try very hard to aggressively manage." Assuming the developments inside the Beltway continue produce positive news and that IADC's annual projections and recap of the previous year are correct – and typically, they do a very good job – there is a lot to look forward to; here and abroad.

Bigger and deeper ships are coming, and further inland, the barges need to move those products to the deepwater gateways. There's a dredge for that.

US NAVY

Navy photo by Mass Communication Specialist 2nd Class Z.A. Landers (Released)

BIGGER IS BETTER

BUT AT WHAT COST?

BY EDWARD LUNDQUIST

SEA OF JAPAN - The Carl Vinson Carrier Strike Group, including the aircraft carrier USS Carl Vinson (CVN 70) operate with the Ronald Reagan Carrier Strike Group and the Japan Maritime Self-Defense Force ships (JS) Hyuga (DDH 181) and JS Ashigara (DDG 178) in the western Pacific region. The Japan Maritime Self-Defense Force and U.S. Navy forces routinely train together to improve interoperability and readiness to provide stability and security for the Indo-Asia Pacific region. U.S.

Maritime Reporters March 2017 cover story on the U.S. Navy was all about the numbers. There exists several plans to grow the fleet beyond the current number of 308 ships, the Mitre recommendation of 414 ships, the Center for Strategic and Budgetary Assessment 340-ship proposal, and the Navy's decision to grow the fleet to 355 ships, and the Trump administration's 350.

With so many numbers being bandied about, there are even more suggestions on how to get there. The decision to expand the number of ships is based on sound analysis, and most of the suggested numbers are the result of a thoughtful examination of the requirement and the reasonable pathways to achieving growth.

According to a report to Congress by the Congressional Research Service, the figure of 355 ships appears close to an objective of building toward a fleet of 350 ships that was announced by the Trump campaign organization during the 2016 presidential election campaign. "The 355-ship goal, however, reflects the national security strategy and national military strategy that were in place in 2016 (i.e., the Obama Administration's national security strategy and national military strategy)."

But no matter how you slice it and dice it, there's a huge cost.

And those who want to point to instantaneous gratification, and see an immediate growth in fleet size, will not find it in this most recent budget submission to the Congress.

The current Presidential Budget delivered to Capitol Hill does call for an increase in defense spending. This year's budget submission is about readiness, not new construction.

The non-partisan Congressional Research Service (CRS) estimates that "procuring the 57 to 67 ships that would need to be added to the Navy's FY2017 30-year shipbuilding plan to achieve the Navy's 355-ship fleet and maintain it through FY2046 would notionally cost an average of roughly $4.6 billion to $5.1 billion per year in additional shipbuilding funds over the 30-year period, using today's shipbuilding costs."

There are also time and industrial capacity constraints to achieving the 355-ship objective. "Even with increased shipbuilding rates, achieving certain parts of the 355-ship force-level goal could take many years," CRS reports. "For example, the 355-ship force-level goal includes a goal of 12 aircraft carriers. Increasing aircraft carrier procurement from the current rate of one ship every five years to one ship every three years would achieve a 12-carrier force on a sustained basis by about 2030. As another example, the 355-ship force level includes a goal of 66 attack submarines. Increasing attack submarine procurement to a rate of three attack submarines (or two attack submarines and one ballistic missile submarine) per year could achieve a 65-boat SSN force by the late 2030s. CBO estimates that the earliest the Navy could achieve the 355-ship fleet would be 2035."

That means manning and tooling up the nation's shipbuilders and suppliers.

"Ramping up to higher rates of shipbuilding would require additional tooling and equipment at some ship-

(Continued on page 38)

British Indian Ocean Territory (Dec. 13, 2013) Sailors aboard the guided-missile submarine USS Georgia (SSGN 729) prepare to dock at U.S. Navy Support Facility Diego Garcia.

U.S. Navy photo by Mass Communication Specialist 3rd Class Alex Smedegard/Released

AIRCRAFT CARRIERS

The U.S. Navy operate as a balanced mix of aircraft carriers, expeditionary warfare platforms, combatants and auxiliaries. Here are some of the key Navy ship programs:

• Nimitz-class aircraft carriers

The Nimitz-class supercarriers are a class of ten nuclear-powered aircraft carriers in service with the United States Navy. These ships are 1,092 feet long with a displacement of over 100,000 tons. The two A4W pressurized water reactors drive four propeller shafts for a maximum speed of over 30 knots. The reactors can operate for more than 20 years without refueling. All ten carriers were constructed by Newport News Shipbuilding Company in Virginia. USS Nimitz was commissioned on 3 May 1975, and the final ship in the class, USS George H.W. Bush, joined the fleet in 2009. The ship has a crew of about 5,500 including the airwing of about 90 aircraft.

• Gerald R. Ford-class Aircraft Carriers

USS Gerald R. Ford (CVN-78), first of a new class of aircraft carriers, will be commissioned this year. Two more are on the way. The fourth ship in the class, CVN-81, is scheduled for procurement in FY2023, with advance procurement (AP) funding scheduled to begin in FY2021.
USS Gerald R. Ford (CVN 78), Norfolk, Virginia (commissioning summer 2017)

SUBMARINES

• Ohio-class ballistic missile submarine (SSBN)

The Ohio-class SSBN is an 18,600-ton, 560-foot nuclear submarine carrying 24 missile tubes for Trident C4 ballistic missiles, capable of conducting 100-day long submerged strategic deterrent patrols.

• Ohio-class guided missile submarine (SSGN)

Four of the Ohio-class SSBNs were converted to SSGNs to provide the Navy with unprecedented strike and special operation mission capabilities from a stealthy, clandestine platform. Armed with tactical missiles and equipped with superior communications capabilities, SSGNs are capable of directly supporting Combatant Commander's strike and Special Operation Forces (SOF) requirements. Each SSGN is capable of carrying up to 154 Tomahawk land-attack cruise missiles, which are loaded in seven-shot Multiple-All-Up-Round Canisters (MACs) in up to 22 missile tubes. The tubes are also able to accommodate future payloads such as new types of missiles, unmanned aerial vehicles, and unmanned undersea vehicles.

• Virginia-class attack submarines

Ten 10 Virginia-class attack submarines are being procured under a 2014-2018 multiyear procurement (MYP) contract. The next group of submarines will be built with an additional ship section called the Virginia Payload Module (VPM) that will substantially increase the boats' weapon capacity.

Washington (SSN 787) - Keel laid Nov. 11, 2014
Colorado (SSN 788) - Keel laid March 7, 2015
Indiana (SSN 789) - Keel laid May 16, 2015
South Dakota (SSN 790) - Keel laid April 4, 2016
Delaware (SSN 791) - Keel laid April 30, 2016
Vermont (SSN 792) - Construction began May 2014
Oregon (SSN 793) - Construction began September 2014
Montana (SSN 794) - Construction began April 2015
Hyman G. Rickover (SSN 795) - Construction began September 2015
New Jersey (SSN 796) - Construction began March 2016
Iowa (SSN 797) - Construction began September 2016
Massachusetts (SSN 798) - Construction began March 2017
Idaho (SSN 799) - Under contract
Arkansas (SSN 800) - Under contract
Utah (SSN 801) - Under contract

• Seawolf Class attack submarines

The Seawolf (SSN 21) class of stealthy nuclear-powered fast attack submarines was designed to succeed the Los Angeles class for Cold War missions. Although extremely capable, the end of the Cold War prompted the Navy to seek a less costly submarine, resulting in the Virginia-class.

• Los Angeles Class attack submarines

USS Los Angeles (SSN 688) is the lead ship of a class of 60 nuclear-powered fast attack submarines (SSN), first of which entered service in service with the United States Navy 1976. 36 of the class are still in commission. The 362-foot long 688s displace nearly 7,000 tons submerged.

SURFACE SHIPS

• Arleigh Burke-class guided missile destroyers (DDG)

These 8,900-ton guided missile destroyers currently feature the Aegis Weapon Systems and the SPY-1D(V) multifunction phased-array radar. More than 60 are in service. Ten Arleigh Burke-class (DDG-51) are currently being procured under a FY2013-FY2017 multiyear procurement (MYP) contract. The CGs have helicopters, guns, torpedoes, Close-In Weapon Systems, and can fire Standard, Tomahawk, Evolved SeaSparrow Missiles, and Anti-submarine Rockets. They are capable of ballistic missile defense. Beginning with DDG 123, the ships will built to the new Flight III version with the Raytheon SPY-6(V) Air and Missile Defense Radar (AMDR).

PCU John Finn (DDG 113), Under construction
PCU Ralph Johnson (DDG 114), Under construction
PCU Rafael Peralta (DDG 115), Under construction
PCU Thomas Hudner (DDG 116), Under construction
PCU Paul Ignatius (DDG 117) - under construction
PCU Daniel Inouye (DDG 118), Under construction
PCU Delbert Black (DDG 119), Under construction

Ticonderoga-class guided-missile cruisers (CGs)

Ticonderoga (CG 47)-class guided-missile cruisers (CGs) are highly capable multimission warships with significant offensive and defensive warfighting capabilities for strike group or independent missions. These cruisers feature the Aegis Weapons System, centered on the SPY-1B/(B)V multi-function, phased-array radar. The first five CG 47s have been retired, with the remaining 22 ships receiving extensive upgrades. The 9,800-ton CGs have helicopters, guns, torpedoes, Close-In Weapon Systems, and can fire Standard, Tomahawk, Evolved SeaSparrow Missiles, and Anti-submarine Rockets. They are capable of ballistic missile defense.

Zumwalt (DDG 1000) —class guided missile destroyer

DDG 1000 is a stealthy multi-mission combatant optimized for operations in the littoral. Zumwalt-class guided-missile destroyer. It has a long-range precision fires capability to support forces and to strike targets ashore. It features an integrated propulsion system that generates 78 MW of power, and has sophisticated survivability features. Despite being much larger that DDG 51, it has a much smaller crew.

PCU Michael Monsoor (DDG 1001), Under Construction
PCU Lyndon B. Johnson (DDG 1002), Under Construction

Littoral Combat Ships and Frigates

• Littoral Combat Ship (LCS)

The Littoral Combat Ship is a fast focused-mission combatant designed to address the asymmetric threats in littoral waters on mines, quiet diesel submarines and swarms of fast armed boats. LCS is being built in two variants. The Freedom-class variant is a monohull, built in Marinette, Wisconsin. The Independence-class is a trimaran, built in Mobile, Ala. Both have core systems to fight and defend the ship, and are modular and can be configured with mission packages to address those three asymmetric threats. The crews rotate between their homeport and the forward deployed ships. The Navy has a requirement for 52 LCS.

• Freedom-class variant

PCU Sioux City (LCS 11) - under construction
PCU Wichita (LCS 13) - under construction
PCU Billings (LCS 15) - under construction
PCU Indianapolis (LCS 17) - under construction
PCU St. Louis (LCS 19) - under construction
PCU Minneapolis-St. Paul (LCS 21) - under construction
PCU Cooperstown (LCS 23) - in pre-production phase
USS Marinette (LCS 25) - in pre-production phase
PCU Little Rock (LCS 9) - under construction

• Independence Variant

PCU Gabrielle Giffords (LCS 10) - delivered, Mobile, AL
PCU Omaha (LCS 12) - under construction
PCU Manchester (LCS 14) - under construction
PCU Tulsa (LCS 16) - under construction
PCU Charleston (LCS 18) - under construction
PCU Cincinnati (LCS 20) - under construction
PCU Kansas City (LCS 22) - under construction
PCU Oakland (LCS 24) - in pre-production phase
PCU Mobile (LCS 26) - in pre-production phase

• Frigate (FF)

The next-generation frigate (FF) is currently envisioned to be a modified multi-mission littoral combat ship (LCS) with enhanced lethality and survivability in support of surface warfare (SUW) and anti-submarine warfare (ASW) missions. The FF will operate independently, as part of a strike group, and serve as an escort. Both the Freedom and Independence variant may be selected for the frigate, but the COMBATSS-21 (an Aegis Weapon System derivative) has been selected as the combat management system. The existing LCS training and maintenance infrastructure will be able to support the frigate program.

• LHD 1 Wasp-class amphibious assault ship and LHA 6 America-Class amphibious assault ship

LHD and LHA amphibious assault ships are the centerpiece of U.S. expeditionary strike groups, carrying elements of a Marine landing force, and able to embark, deploy, and land combat-equipped Marines and aircraft, to include MV-22 Osprey, F-35B Lightning II Joint Strike Fighter and rotary-winged aircraft for sustained periods.

PCU Tripoli (LHA 7), No homeport, under construction

• LPD 17 San Antonio-Class amphibious transport Dock (LPD)

The San Antonio LPD is an amphibious transport supporting Marine Air/Ground Task Force (MAGTF) lift requirements. The 684-foot, 25,000-ton ship has a crew of 25,000 long tons, and a crew of about and can carry up to 700 Marines with their equipment. LPD 17 20,000 square feet of space for vehicles and 34,000 cubic feet for cargo. The well deck can launch and recover traditional assault craft and landing craft air cushion vehicles (LCACs). Aviation facilities include a hangar and flight deck for current and future fixed- and rotary-wing aircraft.

PCU Portland (LPD 27), Under construction - San Diego, California
PCU Fort Lauderdale (LPD 28) - Detail Design and Construction contract awarded Dec 19, 2016

• LSD 41 / 49 Whidbey Island / Harpers Ferry-Class amphibious dock landing ships

Whidbey Island/Harpers Ferry dock landing ships support Marine expeditionary units and transport and launch amphibious assault vehicles and landing craft with their crews and embarked personnel. They can launch and recover LCACs and have aviation facilities for a variety of Navy and Marine Corps helicopters as well as the MV-22 Osprey. There 12 LSDs in the fleet (eight LSD 41-class and four LSD 49-class) are being provided a mid-life upgrade.

• LX(R) Dock Landing Ship Replacement

LX(R) is intended to replace the LSD 41 Whidbey Island and LSD 49 Harpers Ferry classes of dock landing ships when they reach their end of service life in 2025. The plan is for a cheaper, less capable ship built on the basic LPD 17 seaframe as the LSD replacement.

• PC 1 Cyclone-Class Patrol Coastal (PC)

The Cyclone-class Patrol Coastal ships conduct theater security cooperation tasks (TSC), high-value unit escort, maritime security and infrastructure protection operations, and intelligence, surveillance, and reconnaissance (ISR) missions. Ten PCs are forward deployed to the U.S. Fifth Fleet in the Arabian Gulf, based in Bahrain, and three are supporting the U.S. Fourth Fleet, homeported at Mayport, Florida. The Fifth Fleet ships have received new remotely-fired guns, Griffin missiles and Puma unmanned aircraft.

• Amphibious Command Ships (LCC)

Amphibious command ships (LCC) serve as flagships, and are the afloat headquarters for combatant commanders. They provide command, control, communications, information systems, and intelligence to the commander and staff.
USS Mount Whitney (LCC 20), Gaeta, Italy
USS Blue Ridge (LCC19), Yokosuka, Japan

• T-EPF 1 Spearhead-Class Expeditionary Fast Transport (formerly Joint High-Speed Vessel)

The Expeditionary Fast Transport is a high-speed (35 knots), shallow-draft surface vessel with roll on/roll off capability and significant volume for vehicles, cargo and passengers to provide intra-theater logistics support. EPF is operated by Military Sealift Command civilian mariners, and can be reconfigured with adaptive force packages to perform various missions, such as theater security cooperation, intelligence and surveillance.

USNS City of Bismarck (T-EPF-9)	Under construction
USNS Burlington (T-EPF-10)	Under construction
USNS Puerto Rico (T-EPF-11)	Under construction
Unnamed (T-EPF-12)	On order
Unnamed (T-EPF-13)	On order

• Expeditionary Sea Base (ESB) and Expeditionary Transfer Dock (ESD)

The Expeditionary Transfer Dock (ESD) (formerly known as the Mobile Landing Platform (MLP)) is an The 80,000-ton, 785-foot long ship that utilizes float on/float off technology to support seabasing and expeditionary forces with a surface interface between large, medium speed roll-on/roll-off (LMSR) prepositioning ships and surface connectors including landing craft air cushion vehicle (LCAC), amphibious assault vehicle (AAV), and the future ship-to-shore connector (SSC).
The Expeditionary Sea Base (ESB) is an ESD variant that supports airborne mine countermeasures (AMCM) and support to Special Operations Forces (SOF) as an afloat forward staging base. ESD and ESB are operated by the Military Sealift Command.

T-ESB-5 Under construction, NASSCO San Diego

• T-AKE 1 Lewis and Clark-Class dry cargo and ammunition Ship

The 12 Lewis and Clark T-AKEs are operated by Military Sealift Command in the combat logistics force (CLF) role. They provide logistics support—food, parts, consumables, ammunition and fuel--to ships underway though connected and vertical replenishment.

• T-AO 187 Kaiser-Class and T-AO(X) Replenishment Oiler

The Navy has 15 Henry J. Kaiser-class fleet replenishment oilers, operated by Military Sealift Command in support of the combat logistics force. They provide fuel and supplies to Navy strike groups.

• T-AO(X) Replenishment Oiler

The T-AO 205 John Lewis class will replace the T-AO 187s. Seventeen T-AO 205s are planned, with delivery of the first ship in FY 2020.

• T-AOE 6 Supply-Class Fast Combat Support Ship

Two T-AOE 6 fast combat support the combat logistics force. Operated by Military Sealift Command, the 49,000-ton, 754-foot long T-AOEs can operate at high speed to support carrier strike groups with carry the full spectrum of fuel, ammunition and cargo.

EDITOR'S NOTE:

This is a profile of U.S. ship navy classes and vessels under construction. For the full listing of ALL U.S. Navy ships and their homeport:

https://www.marinelink.com/news/bigger-navy-what426224

The amphibious transport dock ship USS San Diego (LPD 22) leads the America Amphibious Ready Group, comprised of San Diego, the amphibious assault ship USS America (LHA 6) and the amphibious dock landing ship USS Pearl Harbor (LSD 52) during a simulated straits transit off the coast of Southern California.

(U.S. Navy photo by Mass Communication Specialist Seaman Apprentice Chad Swysgood/Released)

yards and some supplier firms. Additional production and supervisory workers would need to be hired and trained at shipyards and supplier firms. Depending on their specialties, newly hired workers could be initially less productive per unit of time worked than more experienced workers.

Given the time needed to increase tooling and hire and train new workers, some amount of time would be needed to ramp up to higher shipbuilding rates—production could not jump to higher rates overnight," the CRS report said. "Some parts of the shipbuilding industrial base could face more challenges than others in ramping up to the higher production rates required to build the various parts of the 355-ship fleet."

CRS cited a non-partisan Congressional Budget Office Costs of Building a 355-Ship Navy report, which it submitted to Congress in April 2017.

"All seven shipyards would need to increase their workforces and several would need to make improvements to their infrastructure in order to build ships at a faster rate. However, certain sectors face greater obstacles in constructing ships at faster rates than others: Building more submarines to meet the goals of the 2016 force structure assessment would pose the greatest challenge to the shipbuilding industry. Increasing the number of aircraft carriers and surface combatants would pose a small to moderate challenge to builders of those vessels. Finally, building more amphibious ships and combat logistics and support ships would be the least problematic for the shipyards. The workforces across those yards would need to increase by about 40 percent over the next 5 to 10 years. Managing the growth and training of those new workforces while maintaining the current standard of quality and efficiency would represent the most significant industrywide challenge. In addition, industry and Navy sources indicate that as much as $4 billion would need to be invested in the physical infrastructure of the shipyards to achieve the higher production rates required under the [notional] 15-year and 20-year [buildup scenarios examined by CBO]. Less investment would be needed for the [notional] 25-year or 30-year [buildup scenarios examined by CBO]."

But the obstacles are not insurmountable, and frankly the kind of problem that the Navy and industry wants to solve.

The Navy currently has "hot production lines. "Our facilities are in pretty good shape," said then Assistant Secretary of the Navy (now the acting secretary) Sean Stackley at the Surface Navy Association's annual symposium. "Industry's going to have to go out and procure special tooling associated with going from current production rates to a higher rate, but I would say that's easily done," he said.

"My sense is that the industrial base will size to the demand signal," said Rear Adm. William Gallinis, the program executive officer for ships at the SNA symposium. "We just need to be mindful of how we transition to that increased demand signal," he said.

Also speaking at the SNA event, Adm. William Moran, the Vice Chief of Naval Operations said the priority is readiness. Before inauguration, Moran said the Trump transition team inquired about what the Navy could do with more money right away.

"The answer was not, 'Buy more ships.' The answer was, 'Make sure that the 274 that we had were maintained and modernized to provide 274 ships' worth of combat time.' Then, we'll start buying more ships," he said.

Chief of Naval Operations Adm. John Richardson said the nation needs a more powerful Navy, on the order of 350 ships, that includes a combination of manned and unmanned systems. "More platforms are necessary but not sufficient. The Navy must also incorporate new technologies and new operational concepts."

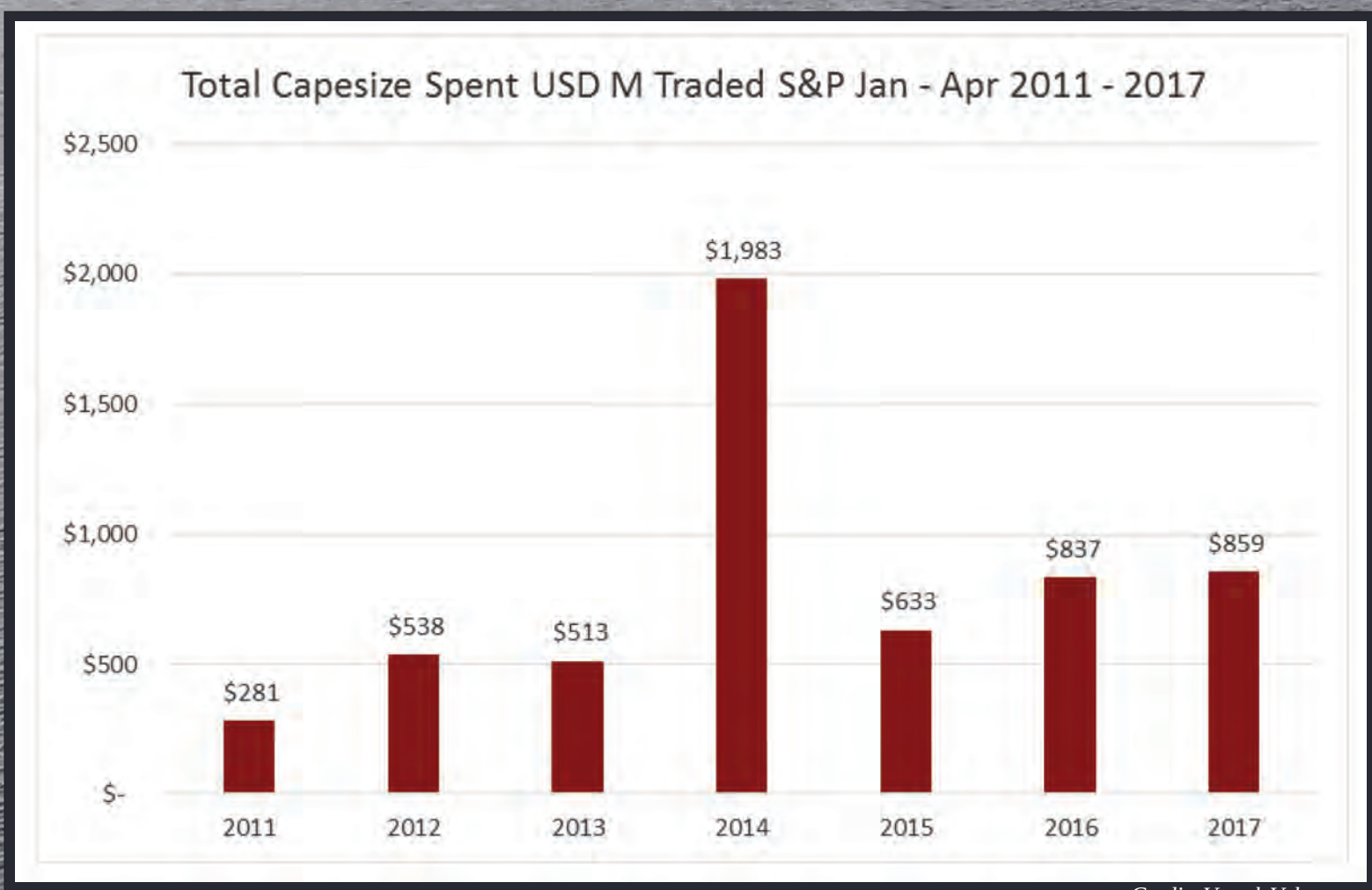
"As we increase our naval power, our focus cannot be on some distant goal decades in the future. The Navy must get to work now to both build more ships, and to think forward – innovate – as we go," Richardson said. "To remain competitive, we must start today and we must improve faster."

"I believe that strong naval forces – maritime forces - are uniquely suited to help manage the increasing pace and complexity of change, by virtue of the uniquely productive relationships that are possible, and by virtue of strong history and advocacy for behavior in accordance with a well understood and agreed-to set of rules," said Richardson. "And navies can do this in a way that preserves the opportunity for growth, and yes, the opportunity for competition, but also in a way that avoids conflict and violence."

A Sailor observes the sunset aboard the guided-missile cruiser USS Bunker Hill (CG 52). Bunker Hill is underway participating in a group sail training unit exercise with the Theodore Roosevelt Carrier Strike Group.

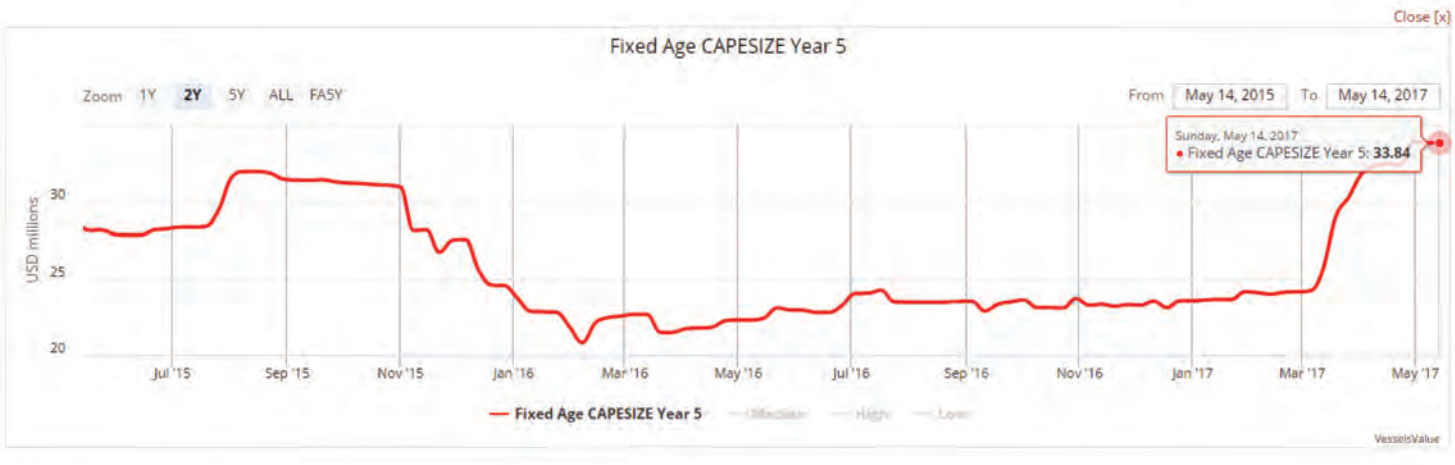
U.S. Navy photo by Ensign Peter G. Suess/Released

BULKERS



Credit: VesselsValue.com

FIGURE 1.
VESSELSVALUE'S 5 YEAR OLD CAPESIZE FIXED AGE MARKET VALUE FOR THE LAST 2 YEARS



Credit: VesselsValue.com

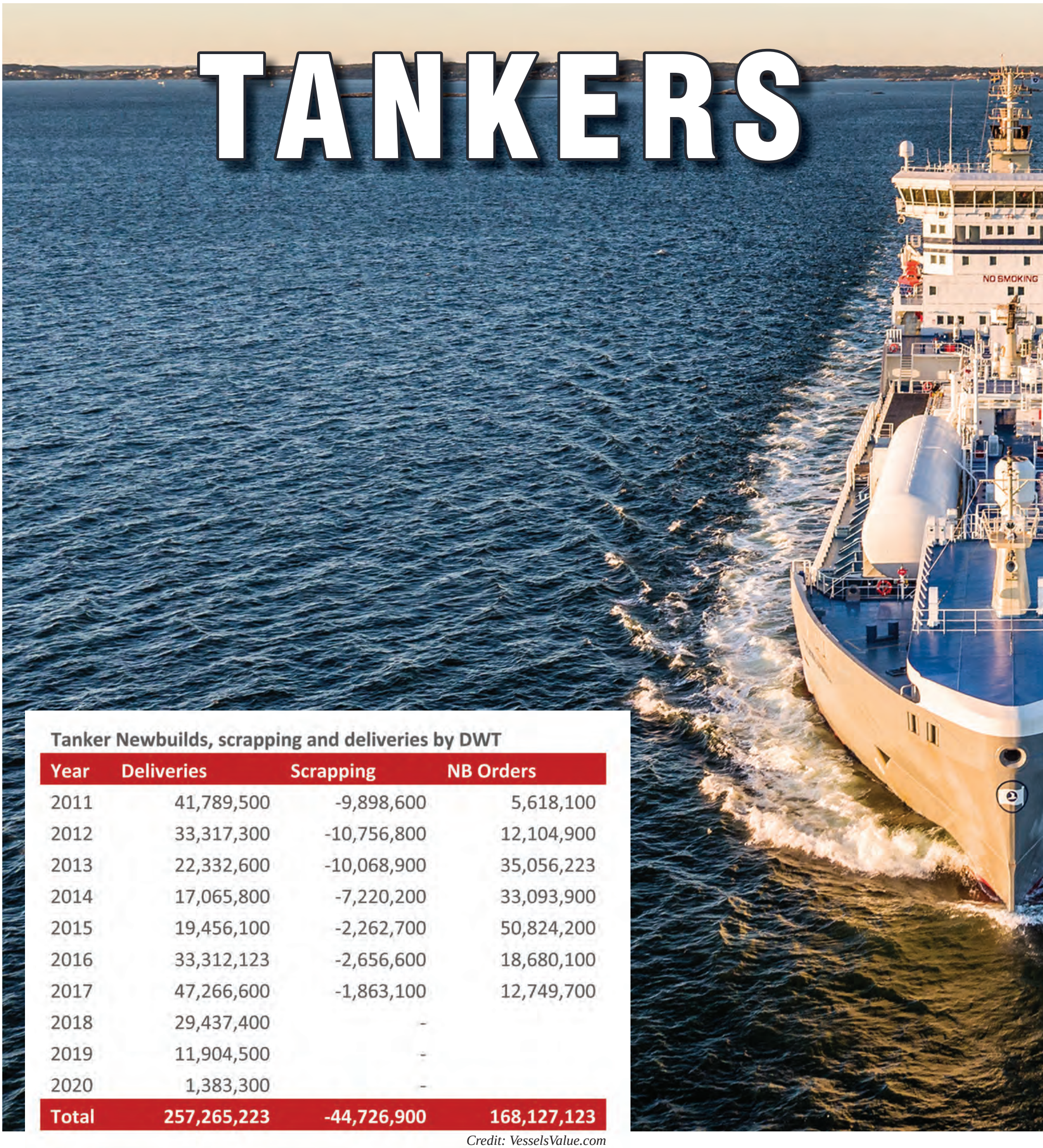
VesselsValue has seen a recovery in the Market Value for bulker values. Over the last 12 months values have been stable, at close to 25 year low: in February 2016 a 5 year old capesize could be bought for $20.6 million (example K Foundation 2012 blt capsize). But in the last 2 months, Bulker values have increased by 50% and 5 year old capesize are now being sold at in excess of $32 million (example 2012 blt Dong A Artemis).

However, over the last month we have witnessed a softening in BCI rates from a peak of usd 20kpd in end March down to usd 10kpd today. The total spent between Jan and April in 2017 is in line with last year (see fig 2.), however it is a far cry from the 2 billion USD spent on capesize vessels in 2014.

Our commercial arm, Seasure Shipbroking are witnessing the beginnings of a softening market and for many in the dry bulk space are wondering if this is a dead cat bounce.

There is also a similar story for the smaller bulker vessels, such as the panamax sector. Over the last few months these vessels have seen similar gains in market value, however the industry is dealing with the fundamental issue of over supply. To counter this there has been a lot of slow steaming over the last few months, which has affected the available capacity, but it is a short term solution. This tactic will have to be consistently employed without the addition of any more tonnage and continued scrapping.

TANKERS

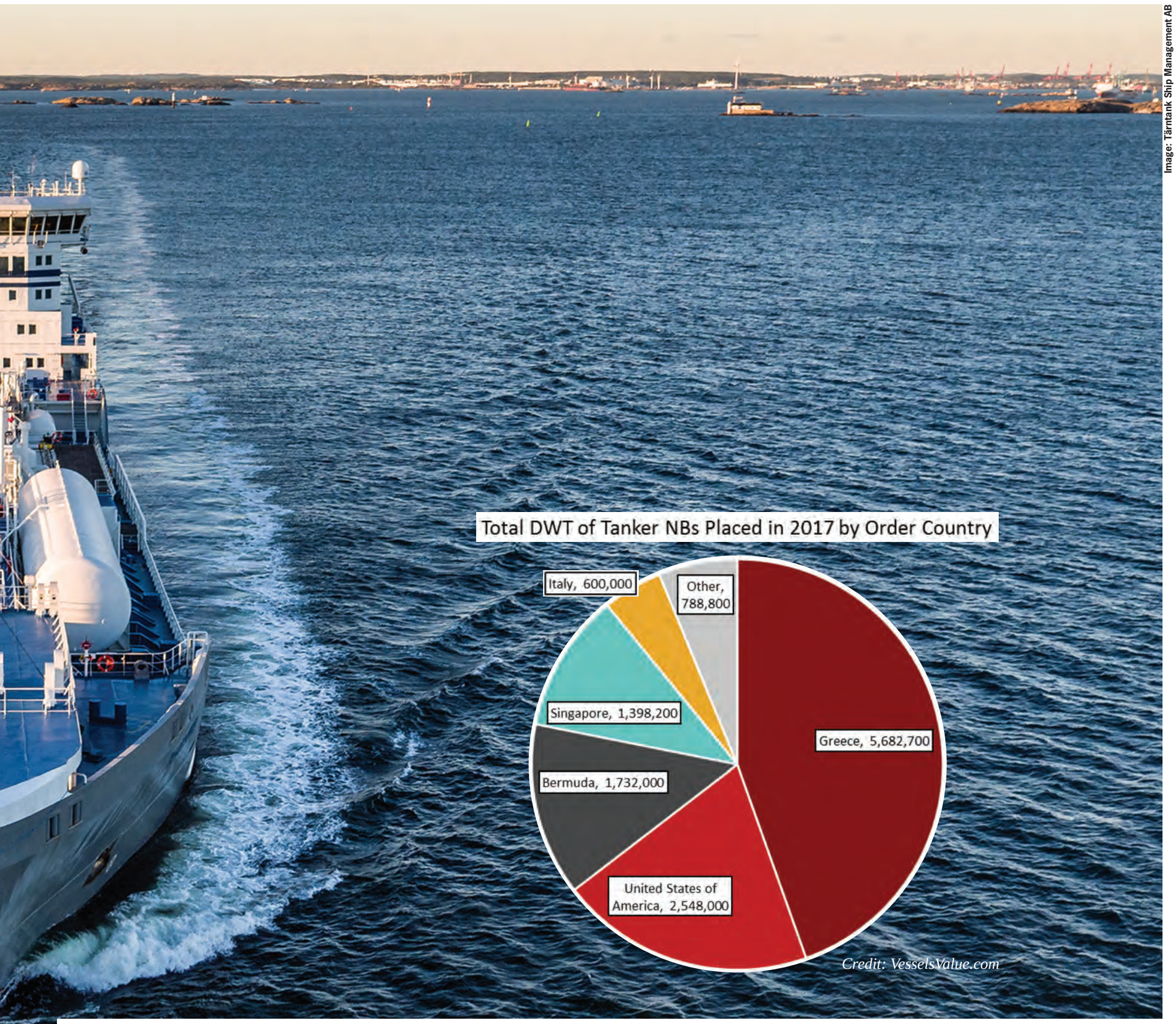


Tanker Newbuilds, scrapping and deliveries by DWT

Year	Deliveries	Scrapping	NB Orders
2011	41,789,500	-9,898,600	5,618,100
2012	33,317,300	-10,756,800	12,104,900
2013	22,332,600	-10,068,900	35,056,223
2014	17,065,800	-7,220,200	33,093,900
2015	19,456,100	-2,262,700	50,824,200
2016	33,312,123	-2,656,600	18,680,100
2017	47,266,600	-1,863,100	12,749,700
2018	29,437,400	-	
2019	11,904,500	-	
2020	1,383,300	-	
Total	**257,265,223**	**-44,726,900**	**168,127,123**

Credit: VesselsValue.com

Image: Tärntank Ship Management AB



There has been a huge amount of newbuild orders so far this year, especially in the already oversupplied VLCC sector. 2017 a huge year for deliveries a total of 47 million dwt of tankers scheduled to be delivered, which is the highest level of deliveries since 2009.

So far this year just under 13 million dwt of orders have been placed for delivery over the next few years, compared to only 18 million dwt tanker newbuildings placed in 2016. However this is a far cry from the high ordering level achieved in 2015 when 50.8 million dwt of tanker newbuildings were ordered. Over the last 5 years, a major source of finance & investment in the newbuilding market came from the private equity sector who invested heavily to capitalise in the post-crash market downturn.

Today the preference from the private equity sector is to invest in tonnage already delivered and on the water so that an immediate return on their investment can be realised. This led to a lack of newbuilding finance available and resulted in a gap in deliveries at the major shipyards and therefore increased appetite from them to take orders.

In early 2017 the cash rich Greek community took advantage of this, securing a number of orders at competitive prices. As we progress through 2017, yard capacity has reduced but continued buying demand from the private sector remains. This is one of the major factors that has led to the increase in newbuilding prices over the past 5 months.

On the other hand scraping rates are picking up (so far in 2017 1.8 million dwt have been sold for scrap) after being at relatively low levels in 2015 and 2016. During these two years tanker owners enjoyed high charter rates which encouraged owners to keep their vessels on the water, which meant total dwt scrapped was around 2.5 million dwt each year. This was down on the previous years, when total dwt scrapped each year was 7 million dwt in 2014 and 10 million dwt in 2013.

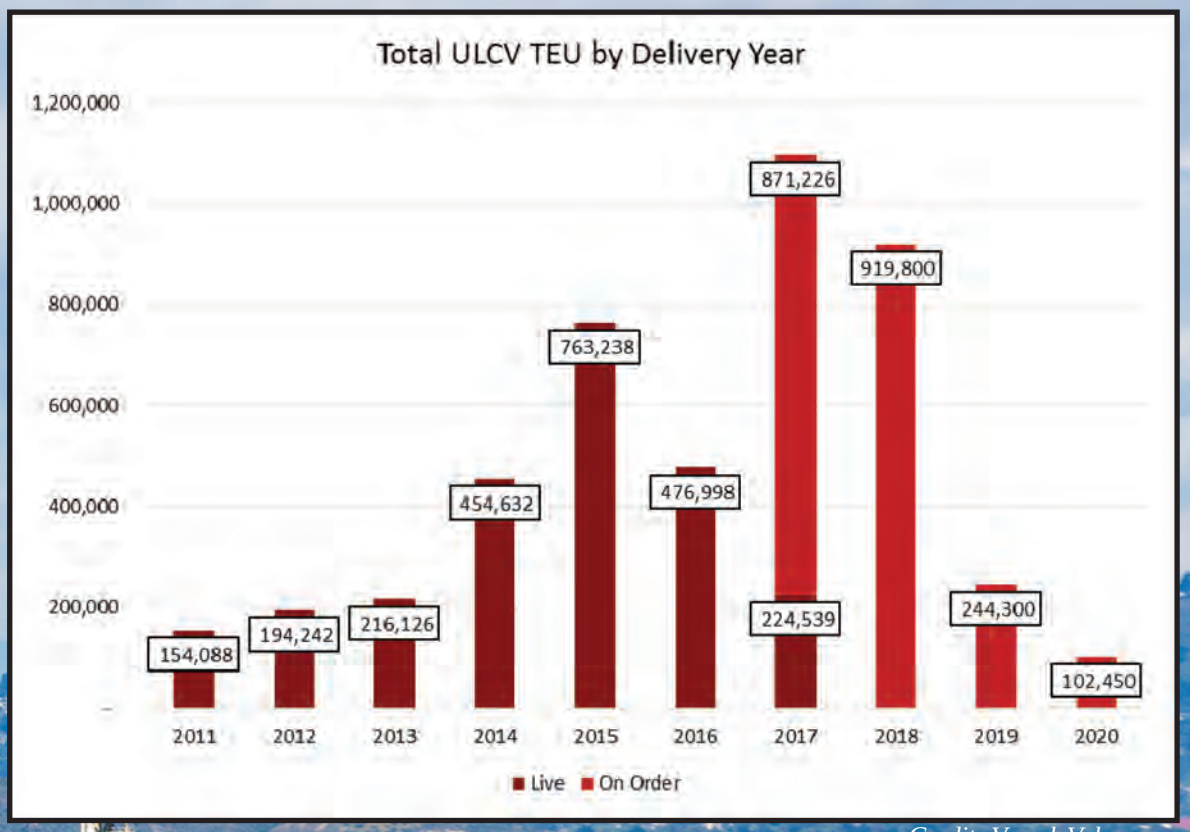
CONTAINERSHI

Consolidation is a big talking point for this industry with 2016 being the year for mergers and alliance creation between the largest container fleets, both in terms of their total capacity as well as the size of vessels they run. Earlier this year there was a feeder consolidation deal (?), which suggests this trend is spreading to other container sizes. However consolidation does not affect supply and demand due as no vessels are removed from active service. Instead great efficiencies between the largest liners are improved in order to maintain a profit in current market conditions. Ultimately the smaller fleet owners and mid size lines are the ones who will bear the brunt of the market downturn.

To further exacerbate the imbalance between supply and demand, there is currently over 2.1 million TEU of ULCVs currently on order vs a live ULCV fleet of 2.9 million TEU. The majority of these ultra large container vessels are scheduled to hit the water over the next 18 months: 1.8 million teu have delivery dates before 2019. Aside from scrapping, this means that owners need to see a lot more consolidation in order to survive.

This appetite for larger and large vessels has encouraged a cascading effect with new panamax and neo panamaxes taking the work of the panamax vessels, while the latter have been stealing sub-panamax cargoes. Looking towards the future of the industry, a natural divide is occurring between the bigger routes and bigger ships, with owners pushing for the largest economies of scale possible which may even include routes being run by 25-26k teu vessels, and the common feeder operators.

PPING



Credit: VesselsValue.com

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GAS

HIGHEST VALUED LPG FLEET

Navigator Gas	Petredec Ltd	BW LPG
worth $1.4 billion	worth $1.5 billion	worth $2.2 billion

The LNG sector differs slightly from traditional shipping in that the market is project based. However the market is oversupplied with 2017 looking to be a bumper delivery year: 53 vessels, which can carry nearly 8 million CBM, are scheduled for delivery. In order to predict the future of the LNG market, you need to turn to the projects and the infrastructure which will be coming online over the next few years.

Many owners and yards are touting LNG as the fuel of the future. However in order to switch from traditional bunkers to LNG fuelled vessels the fuel of the past needs to become more expensive than LNG. There is a lot of LNG out there but not the consumer demand. In the future this will pick up.

VLGC market values dipped below their 25 year average in February 2017. This year the biggest story over 2016 was BW LPG increasing their ownership of Aurora. BW already had the biggest fleet and now is by a long way: today BW LPG's fleet tops the ranking of highest valued LPG fleet worth 2.2 billion USD. Second place is served by Petredec Ltd, worth 1.5 billion USD, and third place is Navigator Gas with 1.4 billion USD worth of LPG vessels.

OFFSHORE

Since 2014 we've seen a significant decline in the oil price from 115 USD/bbl to 28 USD/bbl, with a recovery to around 50 USD/bbl (today's price 51 USD/bbl). There has been a significant reduction in demand for vessels throughout the offshore drilling chain due to the collapse in the oil price and the high costs associated with offshore oil extraction. This has led to a crash in vessel utilisation and asset values.

This market downturn has created mixed results. Efficiencies have vastly improved and some drillers are able to maintain a profit at the current oil price, however this has led to even less demand for vessels. The second hand market is unpredictable, with some deals indicating a bottoming out and others contradicting this. It is clear that many believe the market may soon turn and have seen this as an opportunity to invest in distressed offshore drilling assets.

John Fredriksen's former right hand man, Tor Olav Troim is taking advantage of the presumed bottom of the market and has managed to raise heavy investment from capital markets and Oil giant Schulumberger in December 2016. With this money, they have managed to remove their North Sea competitor Transocean. In March 2017, they bought all transocean's rigs for $1.35 billion, which has kick started a lot of activity within the jack up rig sector. Previously most of the activity concerned a small volumes of resales or at auction sales with older assets, for example the 70s and 80s built jack up rigs belonging to the now bankrupt Hurcules.

On the other hand, the current market has been hurting John Fredriksen's Seadrill, who is going to great lengths to keep their head above water after announcing earlier this year their intention to restructure. Today Seadrill has a share price sitting at 0.58 dollars as opposed to a high of 46.93 in October 2013.

At the end of April 2017 Seadrill sold three Jack Up rigs (West Triton, West Resolute, West Mischief for a total of $225 million) to Shelf Drilling as part of a push to raise capital. However these rigs were valued at $415m therefore Seadrill recorded a loss of $190 mil. Since the Borr drilling acquisitions, these Seadrill sales are a good price, even though the vessels are significantly older.

Fire Protection
Staff aboard a floating producer pass several coatings types.

Photo: Øyvind Hagen, Statoil

Earth, Wind ... & Fire Protection

BY WILLIAM STOICHEVSKI

Three years ago coatings giant Jotun was buying up real estate for U.S. market access and location savings. The effort to get closer to its shipping and offshore customer base is still underway with research aimed at protecting client assets in frontier areas like the arctic. An R&D expansion at Flixborough in the U.K. and in the Arctic archipelago of Spitsbergen aims to make active the fire response of passive surface treatments. There's a need to address fires in enclosed steel workplaces plus high-temperature hydrocarbon fires.

There are a number of International Standards Organization strictures for the surface treatment of ferrous metals, aluminum alloys, stainless steel and even titanium (mostly in the aerospace and auto industries). Yet, while the ISO might be replete with standards for testing coatings ignitability, the offshore and marine environments are areas of special concern owing to the risk to steel structures — national assets — and lives posed by hydrocarbon fires and the elements' effects on surfacing. Jotun's move to push R&D in order to speed up the number of offerings able to respond to offshore safety officials' newest concerns is timely. In Norway, for instance, a new report by the Petroleum Safety Authority says the number of accidents offshore, including those involving vessels, is up dramatically again after a period of "relative safety".

There were just two fires offshore Norway in 2016, the PSA notes, but both were considered accidents that could have had catastrophic outcomes. The low number of fires, however, is just a fraction of the number of dangerous incidents — around 35 — that the agency says could well have wrought explosions and fire. Well-control incidents, for instance, were up, and that's what the Macondo accident in the Gulf of Mexico was all about. Offshore Norway, the number of offshore service vessels, or OSVs, deemed to be "on a collision course" of some kind was down in 2016 (down to better training, station-keeping and coms, no doubt), yet these maritime incidents that imply potential fire were over twice as frequent as fires.

The PSA's report (online but still only in Norwegian) also shows a slightly higher incidence of unignited hydrocarbon leaks, with the non-ignition attributed to sensors and alarms, part of an offshore asset's active (if somewhat passive) fire-suppression.

“Many have tried, none have succeeded,” said Dr. Skilbred, the chemist, of those seeking fast drying (coatings) in the cold. For good measure, he adds that epoxy based coatings break down faster due to natural ultraviolet rays, or yet another consideration in an Arctic where the depleted ozone layer and 24-hour summer sun allows for more UV-based degradation.

Dr. Anders Skilbred

Jotun’s overseer of worldwide test facilities

Photo: William Stoichevski

Protected Steel
Near-shore shipping in Norway's near-Arctic

Photo: William Stoichevski

Passively Active

It's against this backdrop and the continued move north to areas like the Barents Sea or the West of Shetlands — the so-called harsh environments — that Jotun is firing-up its fire-protection R&D with a 17,000 square-foot U.K. facility costing $5.8 million. It already has a Dubai unit doing fire-protection coatings research, but headquarters in Sandefjord, Norway, is hoping to add more actively to its Steelmaster and Jotachar coatings offerings. While the U.K. has "a strong network of third-party test facilities," Jotun says it will at Flixborough (site of an infamous chemical plant fire) have two furnace areas (to test intumescent paints), laboratories and mill rooms. An "unrivalled temperature tolerance range (of products)" is what they're after.

While, it's understood that steel and concrete protected from heat will buy escaping crews from 30 minutes to two hours of precious time, the indirect risks of fire related to a corroded floor, flange, jacket leg, hull or deck are limited only by the number and type of activities offshore. Worldwide Jotun test station manager, Anders Skilbred, Ph.D., tells us his arctic facility is partly about that indirect threat. He cites a Redding University study which holds that the opportunities to sail the arctic for non-ice-class vessels hoping to cut travel times to the Far East may double if global warming continues to melt permanent ice. "More and more vessels are sailing this route already," Dr. Skilbred says, adding, "In addition, there's more fishing in the arctic." His Spitsbergen test facility examines arctic corrosion rates that are "unknown" for 40 coatings "with and without zinc" that he's testing. Interestingly, he says the coatings the company is after "cure fast at low temperatures and are ice-resistant," a nod both to the potential of crews several days sail from home doing their own coatings maintenance and to the proliferation of Arctic shipyards. "Many have tried, none have succeeded," said Dr. Skilbred, the chemist, of those seeking fast drying in the cold. For good measure, he adds that epoxy based coatings break down faster due to natural ultraviolet rays, or yet another consideration in an Arctic where the depleted ozone layer and 24-hour summer sun allows for more UV-based degradation.

Steel the Key

The European grades of structural steel Dr. Skilbred is performing standardized coatings tests on include S235 (equivalent to the U.S. standard A283C), the stuff of ship's hulls, superstructures and pressure vessels (and bridges). One of the major makers of S235 structural steel is U.K.-based Masteel, a company with a major and growing share of Brazil's offshore sector, including, it is understood, a custom specification of steel plate for Brazilian oil company, Petrobras, operator and buyer of massive floating oil installations requiring structural plates of shipbuilding steel. Oil companies — still responsible as operators for the integrity not only of oil installations but of their retinue of OSVs — will be hoping for all protection possible, or against fire and degradation. In the PSA report, corrosion causing structural damage and dangerous situations offshore far outnumbered fires. Defined as "chemical reactions between materials and their environment" — not rust — corrosion incidents included the discovery that bolts on a crane's gears had corroded and cracked. Elsewhere, a plate that looked "suspicious (and had rusted)" fell into the sea when a mechanic banged on it with a hammer. In the arctic, the loss of a crane or hull plate due to coatings failure would exacerbate maintenance delays. Areas enclosed for artic operations — derricks, battery rooms and decks — make obvious the need for fire-proof coatings that protect in the arctic cold against the heat of a hydrocarbon fire.

Arctic Challenge

Dr. Skilbred says one of the reasons he watches paint dry in the arctic is to study the performance of the company's products after exposure to Arctic saltwater mists, ice, UV and cold. He'll chart corrosion rates, coatings cracking, ice impact and the impact on coatings of bolts (and visa-versa). "As (maritime) operations move further north, we expect that more surface treatment will be performed under Arctic conditions," he says, a nod to our assertion of "DIY Arctic" for sailors. Preliminary results on applying paint as protection in the arctic suggest a "challenging application" with "corrosion creep … more severe than expected".

Still, Dr. Skilbred seems hopeful that "ice-repellant" coatings tested at a more exposed location than the recently warmed Spitsbergen might one day help yield a product that prevents the deadly clinging of ice to ships' hulls. The phenomenon notoriously affects a vessel's stability and threatens structural steel collapse and fire — always fire — with the compounded danger of blocked or difficult escape due to ice. To our surprise, the mild-mannered Norwegian seems to suggest, as well, that Jotun might just sponsor another Ph.D. if they agree to study "the influence of arctic climate towards corrosion and passive fire protection". If Jotun succeeds and we get a range of paint that prevents icing while hindering then perhaps its time for new jargon: passively active fire and ice protection.

Can I have copyright on that? How about an ISO standard?

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Photo: handout

At MPT, Training is Personal

BY GREG TRAUTHWEIN

Step into MPT's new state-of-the-art S.M.A.R.T. simulation center in Fort Lauderdale and Captain Ted Morley lights up. While the center is packed with the very latest in maritime simulation software and hardware, his eagerness to usher us through the new building transcends any new technology, because at MPT mariner training is personal; it always has been, and if Captain Morley has his way it always will be.

It is clear to see that MPT's new simulation center in Fort Lauderdale is a source of pride for Captain Ted Morley. Five years in the planning, two years in the construction, the 25,000 sq. ft. building is LEED compliant, able to withstand a Cat 5 hurricane and a 15-ft. storm surge, the latter of which has never happened in Fort Lauderdale. It houses what Captain Morley calls the most powerful private server in Broward County, horsepower to drive the current multitude of simulation capability with ample room to grow. It houses three Class A full mission bridge simulators, and a long list of additional simulation capability and learning tools that are all tied together in an operational matrix that is designed with one mission in mind: create an ideal learning environment for its students, and arm them with knowledge that can immediately be applied in the real world.

"One of the biggest complements we can get is when (a customer) says … 'as soon as they got back to the ship, they were putting that knowledge to work.' That's learning," said Captain Morley. "That's not just passing a test and moving on, it's putting that knowledge into your everyday life."

Build it & They Will Come

"I'm pretty proud of this building …. I love this building. It is one of the coolest things we've ever done," said Captain Morley. The new S.M.A.R.T. center was designed by Ted and his father, the latter an industrial engineer "who was one of the smartest men I've ever met," said Captain

"From a mariner's perspective, it is simply amazing to see how far and fast technology is leaping. Cruise ships and yachts always had the new technology while the tankers and the cargo ships lagged behind. Not anymore. All of the new ships have an amazing amount of modern equipment, and just another reason why simulation centers have to step up."

Captain Ted Morley

Maritime Professional Training (MPT)

Morley. "My father was great at creating things, machines, and I look at this building as one big machine."

But the heart of any learning institution is the people, and that's where Capt. Morley fits in. "Inserting the people in this machine and making it work. That's my specialty."

Through all of the high tech bells and whistles featured in the S.M.A.R.T. Center, the conversation always seems to come back to the human assets, the students. "It's all in the details, it's about making that person open and willing to receive that information," said Captain Morley. "Take the chairs for example. It might seem silly to spend $500 per chair when you're buying 300 chairs. That's a lot of money and you could buy a house for what we spent on student chairs. But if they're not comfortable, they're not learning. It's all about creating a comfortable environment: we get how education works, and we care about our students. We're a school that is run by a mariner."

Around every corner is another subtle touch designed to keep students focused, whether the grand rock wall seen when entering the building, the overall color scheme down to the granite in the bathrooms.

"It's not about just trying to look nice; it's the human element, the textured elements, the color palette, the 3D glass mosaic wall, the furnishings: are all geared toward helping the student relax," said Captain Morley. "Simulation training is not physically taxing, but it is mentally taxing. The brain needs to 'switch off' when it's out of a stressful situation, and the interior elements of the new center help the brain to do that." In MPT's new facility more than 60% is dedicated to simulation, with additional classrooms and student areas making up the remaining space. An additional 9,000 of existing space was remodeled with new classrooms, meeting areas, and a conference center and all four Broward County campuses received significant technology upgrades allowing for live streaming and cloud-based data sharing between them. In total the MPT campus is now 61,000 sq. ft., and MPT's investment in this upgrade was self-funded and exceeded $6 million.

Tech Transfer

While the focus is on the student experience, the technology delivers the 'wow' factor. The main bridge in the new center is the largest, the flagship bridge. "This bridge is really an amazing piece of kit. That chart table back here, for example, is the only one that exists in simulation. It is one-of-one right now, and the reason it is one-of-one is because it is my creation," said Captain Morley. "What you have here is a full navigational planning station that can be transmitted from here, electronically, onto the active ECDIS unit. So for route planning you can have someone working on the route, while the bridge team is navigating the current route. When it is sent, it is uploaded, and then the bridge team can accept it and start navigating the new route. It is a really neat training evolution."

In early March 2017 MPT was finalizing the installation of its new Full Mission Liquid Cargo Simulator, a new capability for the center. "As STCW requires more simulation training, we looked at our offerings and decided that Liquid Cargo simulation training was needed," said Captain Morley.

The Evolution of Simulation Training

Simulation has changed dramatically in the past five years and operators are able to utilize simulators for much more than simple regulatory training. Being able to conduct realistic vessel familiarization, port building projects, dredging impact studies, and realistic tug/ship interactions are vital as our ports get more congested and the ships get larger. Simulation is a major component of port safety, from the ship and tug operators up to the VTS controllers.

"A big contributor is processing power, which is driving the visuals. It takes someone about 15 to 20 minutes from entering the simulator to really feel that they are on a ship. If they're in heavy weather they start walking funny. But if the visuals don't work, nothing else does either," said Captain Morley.

The visuals in the upgraded simulator are comprehensive, complete with planes taking off and landing from the local airport, real local landmarks, and even a 'reflectivity' upgrade meaning operators can see real life reflections on the water. "It simulates not only the bathymetrics of the tides, but the visuals that correspond," said Captain Morley. "Another big change is the bathymetry and meteorological information, the ability to simulate the environment outside of the vessel. Simulating radar or ECDIS has been there for a long time, but now we are simulating how the outside world impacts the ship (much more accurately)."

"From a mariner's perspective, it is simply amazing to see how far and fast technology is leaping. Cruise ships and yachts always had the new technology while the tankers and the cargo ships lagged behind," said Captain Morley. "Not anymore. All of the new ships have an amazing amount of modern equipment, and just another reason why simulation centers have to step up."

Simulation Training @ MSRC

In the world of maritime training, MSRC has carved a unique niche in the training of pilots. Founded in 2005, MSRC is a division of the Corporation of Lower St. Lawrence Pilots (CLSLP). The MSRC is a purpose-built simulator with a fully instrumented DNV Class "A" configured bridge with 330° visuals that exceed the requirements of the 1995 STCW Convention. MSRC's Full Mission Simulator (FMS) is one of the most advanced simulators of its type and is continually being upgraded.

The Center is also equipped with three fully instrumented ship bridges, with a horizontal view of 240°. These bridges can be configured as standard or azimuth propulsion tugs that are specifically designed to support high fidelity tugging operations involving physical space constraints, ship design, overhang, limited push and pull attach points and turning radiuses. This capability is achieved by combining two critical operational components: purpose-built tug wheelhouses, which replicate the controls, layout, and tools used by a tug master and high fidelity mathematical models of the tugboat.

All four bridges are networked to a common simulation control system with two primary instructor control positions as well as a suite of self-contained, portable laptop simulator. The simulators are manufactured by Kongsberg Maritime. Having the possibility of using four interactive bridges allow for the bridge team, the pilots and tug operators to simulate the most realistic experience possible.

The Center also functions as a total turnkey port procedural development center. It has in-house capability for building geographic databases anywhere in the world and is one of the few facilities in the world offering a full range of simulation options spanning from single ship simulations to fully interactive, multiple unit tug and large vessel simulations.

MSRC is developing its own "Pilot grade" ship models and has an extensive library of more than 100 ship models (bulk carriers, oil tankers, container ships, LNG carriers, tugs, passenger ships, etc.). Each ship model is unique with maneuvering characteristics very faithful to those of the ship on which the model was based.

MSRC is the only school in Canada providing a Bridge Resource Management for Marine Pilots (BRM-P) course, and is also approved by the American Pilots' Association to give this training. In addition, MSRC is the official training institution for the Portable Pilot Unit (PPU) software developed by SEAiq.

"In 2016, MSRC offered 138 sessions of 43 different training programs to 30 different groups of pilots and maritime companies for a total of 7,847 hours of training. It also developed several new ship models and geographic area databases for training and operational feasibility studies," said Paul Racicot, Director, MSRC.

According to Racicot, continual investment in physical equipment and personnel is a must to keep up in today's maritime training world. "MSRC invests in Human Resources as it continues to grow," he said. "We have recently opened a new position for a full-time instructor. MSRC also constantly upgrades its software and hardware to keep its state-of-the-art equipment running at peak performance. Since its inception, MSRC has had a Long-Term System Support Program agreement with Kongsberg Maritime (KM). Through Premium Customized Care, KM assists MSRC to keep pace with advances in simulator technologies and applications. In addition to as-needed support and maintenance, KM completes annual upgrades to all MSRC's simulation equipment (Every year, the Center shuts down for 14 days where all systems and software are updated, computers, graphic cards, etc., are replaced with newer and more

"Each pilot group has its own strategies and goals for training but more are sending their pilots to us, in particular, because MSRC also builds customized pilotage databases and ship models that allow pilots to train in their own real-world conditions."

Paul Racicot, Director

Maritime Simulation and Resource Centre (MSRC)

robust versions). In the past two years, MSRC has upgraded many of the 60 in-house computers that run the systems."

Pilot Training

At this time, there's no regulation, whether Canadian, American, or international, that makes training compulsory for the pilots. But Racicot said that most pilot groups feel they need to maintain and upgrade their skills.

On their own the Corporation of Lower St. Lawrence Pilots (CLSLP) founded MSRC and purchased its own simulator 11 years ago to train its own pilots and began developing curricula specific to pilots. MSRC subsequently grew out of CLSLP as a dedicated central training hub.

MSRC trains pilot groups across North America and beyond.

"Each pilot group has its own strategies and goals for training but more and more are sending their pilots to us, in particular, because MSRC also builds customized pilotage databases and ship models that allow pilots to train in their own real-world conditions," said Racicot. "For example, in our local pilotage areas along the St. Lawrence River, we've identified 15 different maneuvers that every pilot must be trained on within a five year period. We keep track of each pilot's training record and personally follow up to ensure they get trained when they need to be – an initiative that other pilots groups are looking to adopt."

Pilot training is a specialized niche and, with the advent of mega ships, it is becoming even more important for pilots to be trained in advanced ship-handling and navigational techniques. "Portable Pilot Units are also a welcome technology for pilots as the PPUs have become a hub of navigational data in addition to vessel systems," said Racicot. "Combining PPU technology with pilot simulation training gives pilots more situational awareness than in the past. MSRC can provide PPU-related simulation training, again, by simulating specific pilotage areas customized to different pilot groups."

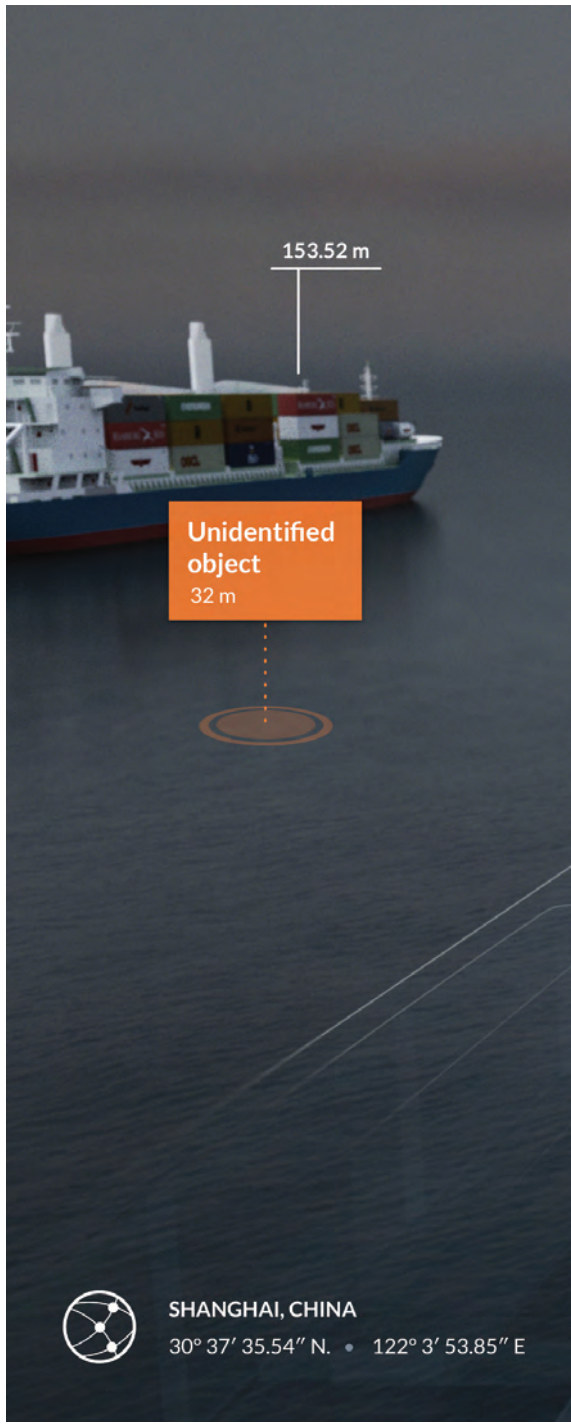
A Promising Future

"An additional area of growth MSRC sees is in our other area of focus; operational feasibility studies," said Racicot. "As mentioned, with larger vessels comes more requirements for ports to adapt as well as those who are onboard ship.

Stakeholders across the maritime industry such as port personnel and engineers are recognizing and adopting simulation as a necessary tool for validation of such engineering projects."

Simulation allows for not only an entire exact representation of the geographic area but also of ship models as well to help collaborations with tug operators and the areas of navigation ships will need to transit. Simulation technology also enables the measuring and recording of data for review, and facilitates communication as it allows everyone involved to discuss the validity of potential operations and undertake any risk analysis needed in order to make informed decisions on whether or not to move forward.

"As an added value, when a port project is considered feasible to move forward, MSRC can provide the simulation training to pilots and help facilitate the coordination and communication of all parties," said Racicot. "We see adoption of simulation technology in this area becoming more main stream every day, evidenced by the mounting requests MSRC receives from Engineering firms and Port Authorities to supply operational feasibility studies for new port infrastructures."



Rolls-Royce & The Future Tech "Reality"

BY TOM MULLIGAN

Rolls-Royce. *The words have been used by many to signify excellence – though not with the company's permission, of course. Rolls-Royce Marine is taking a leading position in developing and introducing the systems and technologies needed for the running of a successful business in the maritime industry of the 21st century. At a company presentation held in London earlier this year,* ***Mikael Mäkinen****, President of Rolls-Royce Marine, outlined the company's vision for the future and its strategies to put these new systems based on new technologies into place.*

Growth Drivers

Rolls-Royce Marine has 4,000 customers worldwide and equipment installed on 25,000 vessels, its main strengths being in the naval, merchant and offshore markets. Rolls-Royce says the main driver for growth is the need for cleaner power technologies to satisfy new environmental legislation and the company now has the world's largest portfolio of power, propulsion, complex positioning systems and deck equipment operating to the new standards. These systems are based upon products that provide competitive vessel systems integration capability in multiple layers across ship design and operation and ship intelligence, and include electrical, automation & control (EA&C) systems.

The driver for technology development at Rolls-Royce is the need for the shipping industry to comply with increasing environmental legislation and system efficiency requirements. According to Mäkinen, such technology development is based on the company's rich heritage and its many technological achieve-

Photo: Rolls-Royce

'Situational awareness' technology will ensure safe operation of autonomous vessels, acting as a 'collision avoidance' system.

ments: the roots of the Rolls-Royce Marine business are in the naval and offshore sectors and the company has a broad portfolio of products, mainly with an offshore focus, and a world-leading position in offshore vessel design. It developed the first marine gas turbine 60 years ago and its MT30 turbine is the most powerful in global marine service. The company is also the world 'number one' in underwater mountable thrusters. It has 100,000 pieces of equipment at sea, with equipment in place on one in every four vessels currently in operation.

Increasing regional trade and transportation of goods is creating demand for more shortsea shipping while population growth is leading to an increasing energy and resources demand for cargo and passenger transportation in the longer term. In addition, the maritime sector is seeing a strong shift from traditional markets towards Asia, both in shipbuilding and operation. Other factors affecting the global industry include the geopolitical situation: an increasingly multipolar world has resulted in more uncertainty in defense expenditures, while low oil prices and weak investment signals are creating significant challenges in offshore markets; and there is a need for new technologies to enable ships to perform in harsher environments such as the polar oceans.

Structural Issues

Such challenges were easily manageable in the better economic conditions of the past, but the previous market-driven growth experienced by the industry concealed a number of underlying structural issues, most notably a high cost base that lacked flexibility. Rolls-Royce is also now experiencing considerable competition targeting its strengths in offshore and complex systems and the offshore cyclical downturn in 2015 combined with the drop in oil price quickly became a weakness for the company: its revenues halved and it experienced what Mäkinen terms "the toughest conditions for a generation" with vessel lay-ups and order cancellations. The serious impact on the offshore sector continues today: the company's customers in traditional markets are suffering from the adverse economic conditions and operators are less inclined to contract newbuild projects to European shipyards. The company needed to change direction quickly; its marine business was unsustainable and it needed to tackle immediate challenges and prepare for future opportunities – hence its Marine 4.0 strategy.

Differentiation

Rolls-Royce's Marine 4.0 strategy is designed to protect the company's unique offering by differentiating it through innovative mission-critical products, deep systems integration and the best possible aftermarket support. Thus the company is following a course of developing innovative solutions by strengthening its core offerings and concentrating only on solutions aligned with its Marine 4.0 vision, enabling it to become 'shipshape' and transform itself in order to survive the downturn and 'grow into' the new technologies. It plans to win customer engagement by improving responsiveness, reducing disruption and utilizing data to help optimize the value of the customer's asset.

Photo: Rolls-Royce

Rolls-Royce and Finland's Tampere University of Technology are working on the support systems necessary for autonomous navigation. The systems will be developed and tested using a purpose-built autonomous ship simulator located at the University.

The company says Marine 4.0 will enable it to respond to market challenges while continuing to lower its fixed-cost base and focus on new investments: about $385 million has been earmarked to cover R&D expenditure, while a 25 percent reduction in the workforce (implemented in 2012) and innovation growth require changes in engineering capability, and therefore the need to redefine the company's culture.

Manufacturing Footprint

Since 2012, Rolls-Royce has reduced its manufacturing footprint by 40 percent; manufacturing has been consolidated onto fewer sites; and several non-core product lines and businesses have been divested, including hydrodynamic bearings (Michell Bearings), shiplift systems (Syncrolift) and tank stabilization equipment (Intering).

However, it isn't all cutbacks: the company is investing in the future of one of its most important products by implementing its expansion plans for its azimuth thruster facility in Rauma, Finland in a $56.5 million project scheduled for completion in 2020. This includes a major rebuild of the existing facilities and the consolida-

Collaborative R&D:

Partnerships Cross the World

Rolls-Royce and MacGregor:

Partnering to develop autonomous navigation and cargo handling technology for container ships.

Rolls-Royce signed a memorandum of understanding (MOU) with global Cargotec business MacGregor to collaborate on research and development to explore the impact of developments in autonomy for cargo ship navigation and cargo handling systems on board container ships. The company believes that a remote-controlled ship will be in commercial use by the end of the decade and a common sight on the high seas by 2030, and stated that this new R&D agreement will help it explore how the many activities that are currently done manually can be changed over to autonomous operation.

The company has also signed a MoU with the Technology Centre for Offshore and Marine, Singapore (TCOMS), a joint venture between Singapore's Agency for Science, Technology and Research and the National University of Singapore, to form a strategic partnership to develop fundamental smart ship technologies including smart sensing, digital twinning and integrated modeling, all of which are essential to the development of future marine data-based solutions. These developments will be applied to technology demonstrators to show how they can be used by specific ship types.

In addition, Rolls-Royce and Tampere University of Technology have established a strategic partnership to develop and test technology to support the systems necessary for autonomous navigation, thereby enabling the construction of the first generation of autonomous ships by developing and validating technologies using the University's purpose-built autonomous ship simulator.

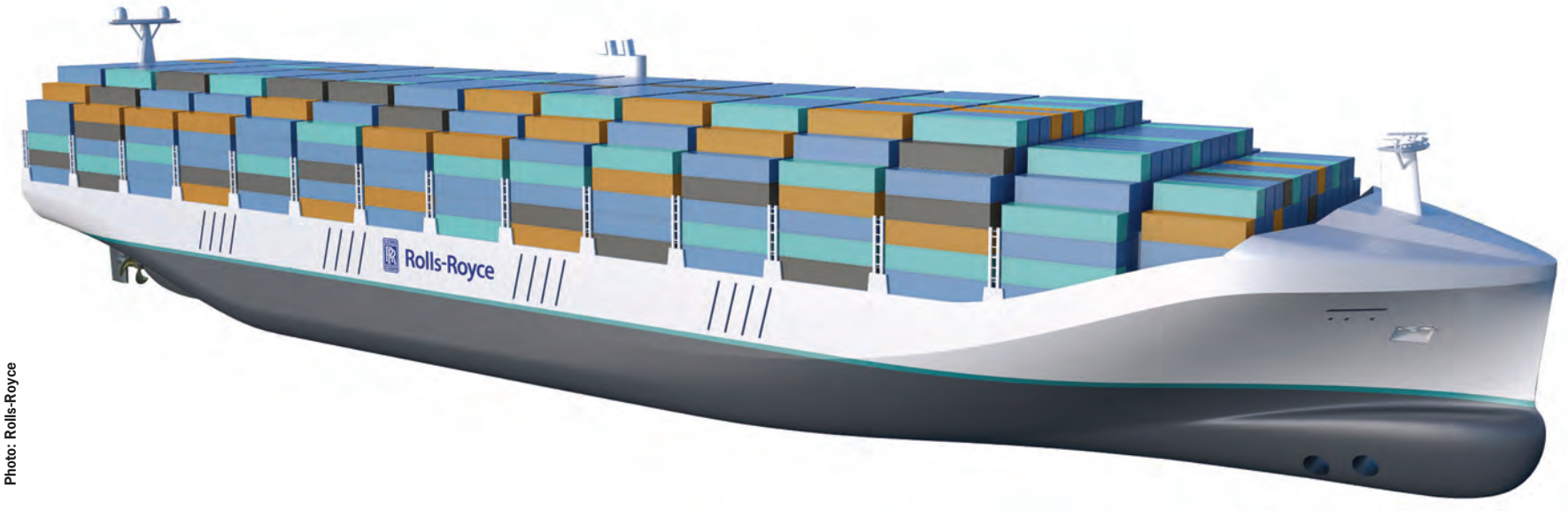


Photo: Rolls-Royce

tion of thruster assembly and testing onto one site from the existing two locations; plus there will be significant investment in new equipment for the production of the current product range and the development of new and larger mechanical thrusters.

The aim of Rolls-Royce is that by 2025 features such as high-efficiency energy storage, PM propulsion and new electrical systems will be standard; ships will be configured on standard modules; situational awareness technology will be commonplace, as will remote control of vessels with Rolls-Royce as a prime contractor; the next generation of the current propeller range will have been introduced; and multi-purpose deck machinery solutions and automated handling systems will enable more efficient and safer cargo handling.

Technologies Create Opportunities

According to Mäkinen, Marine 4.0 will create opportunities in global trade, freight rates and trade patterns, while lower oil prices will lead to fuel diversity and evironmental regulations will drive technology trends. Entrepreneurs view 'uncertainty' as opportunity and Rolls-Royce is no exception: Marine 4.0 is designed to enable the company to design more vessel types, with more product focus and greater systems and product integration and to open up 'Ocean Space' opportunities in the oil & gas, offshore wind, fish farming, fishing, biomarine and ocean mining industries.

Partnerships

Rolls-Royce has set out its $250 million R&D 'medium-term' roadmap but says it cannot achieve its goal on its own. The company needs to collaborate with its customers in technology trials and to increasingly engage with academia to advance its engineering technology. With its significant investments in R&D and its new partnerships, the company is set to realize this bold new vision. As Sir Henry Royce stated: "Take the best that exists and make it better...if it doesn't exist, create it."

Hybrid-power ferries with automated crossing systems

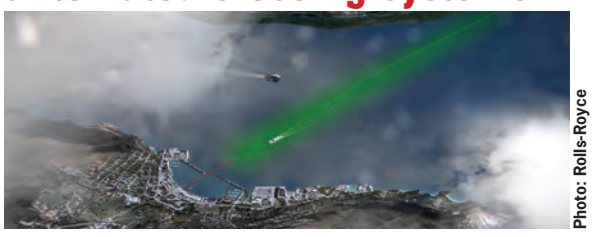


Photo: Rolls-Royce

Rolls-Royce agreed to supply its automatic crossing system for two new double-ended plug-in battery hybrid ferries being built by Norway's Kleven for FosenNamsos Sjø. The system will control the ferries as they cross the fjord between Flakk and Rørvik connecting the peninsula of Fosen with Trondheim. Automatic systems ensure consistent behavior during the journey, and hence predictable energy consumption. The captain will supervise the automatic system and intervene using traditional maneuvering systems if needed. In the first deliveries, the captain will maneuver the ferry manually over the last few meters to the dock. If the captain is not able to take manual control for some reason, the system stops the vessel at a safe distance from the quayside and keeps it safely positioned automatically. Rolls-Royce expects shortly to be able to integrate the system into a variant of its Unified Bridge. The company is also looking to test an extension of the product that will allow automatic berthing in the near future. Construction of the vessels, designed by Multi Maritime, is taking place at the Kleven-owned Myklebust Verft Shipyard in Norway with a delivery date in late 2018 and operation commencing at the beginning of 2019.

Concrete Drydock ‘Big Fred’ Launched

Images: Marisco/GL E&C

Southeast Asia’s largest concrete floating dry dock has been launched by Singapore’s GL Engineering & Construction Pte Ltd (GL E&C). Built in Batam, Indonesia with a local sub-contractor, the dry dock named ‘Peleke Nui’ – (‘Big Fred’ in Hawaiian Language, named after Mr Alfred Anwati, Marisco’s Founder) – has been commissioned by Marisco Limited. Built for $12 million, the dry dock will be used for the construction, maintenance as well as repair of ships and naval crafts, serving international clients from the owner’s base in Hawaii.

Alfred Anawati, President and Founder of Marisco said that “the new concrete floating dry dock will be the biggest yet for the state of Hawaii and will serve Marisco’s expanding international businesses with possible future projects for commercial clients in Asia and worldwide.

Given the high demand for ship repair work, we have already received orders for the dry dock use even while it was still under construction.” This concrete dry dock will also be the largest amongst the current fleet of different steel and second-hand dry docks that Marisco owns.

Designed to last 200 years, the dry dock is built of high strength Grade 85 concrete, the completed structure is a hybrid concrete pontoon and steel wing wall.

At a height of 15m, the dry dock measures 138m long and 46m wide with clear working space of 36m between wing walls. Weighing 15,000 tonnes, the dry dock is designed to lift ships up to 9,500 tonnes and can repair 2 to 3 ships concurrently depending on size.

Peleke Nui at a Glance

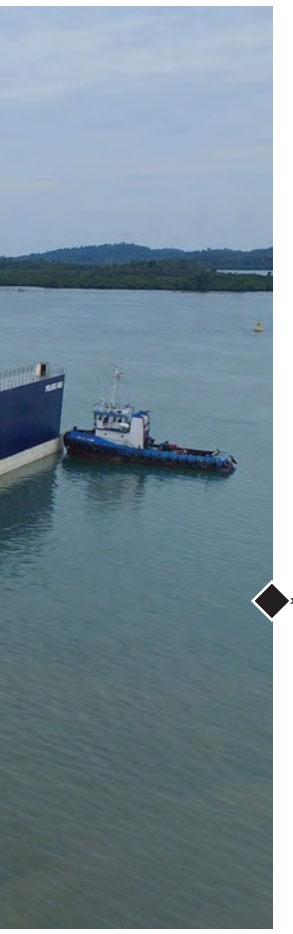
Project	Build of Concrete Floating Dry Dock
Name	Peleke Nui (‘Big Fred’ in Hawaiian, named after Alfred Anwati, Marisco’s Founder)
Owner	Marisco Limited (Hawaii, USA)
Contractor	GL Engineering & Construction
Construction Site	Sagulung Batam, Indonesia
Construction Period	13 months
Specifications	138m x 46m x 15 m high
Weight	15,000 metric tonnes
Design life	200 years
Cost	$12 million

WSS will soon deliver essentials via drone

Drone Delivery

The global maritime industry is on the precipice of shedding its ‘conservative’ image, driven by market demands and companies such as Wilhelmsen Ships Service (WSS) which are pushing to makes its services more efficient using drone technology. “Whether it is deliveries of critical documents or vital medical supplies, tank inspections, or monitoring cargo and stockpile levels, we believe semi-autonomous drone flights can support and further enhance what our ships agency team can offer our customers,” said Marius Johansen, VP Business Solutions & Marketing, WSS Ships Agency. Drone technology can help to dispense the neeed for launch boats to deliver essentials to vessels at anchorage, along with cutting delivery times, Johansen estimates drone flights will also slash costs. With launch vessels typically costing on average $1500, he suggests a drone delivery would eventually come down to costing just $150.

Images: WSS

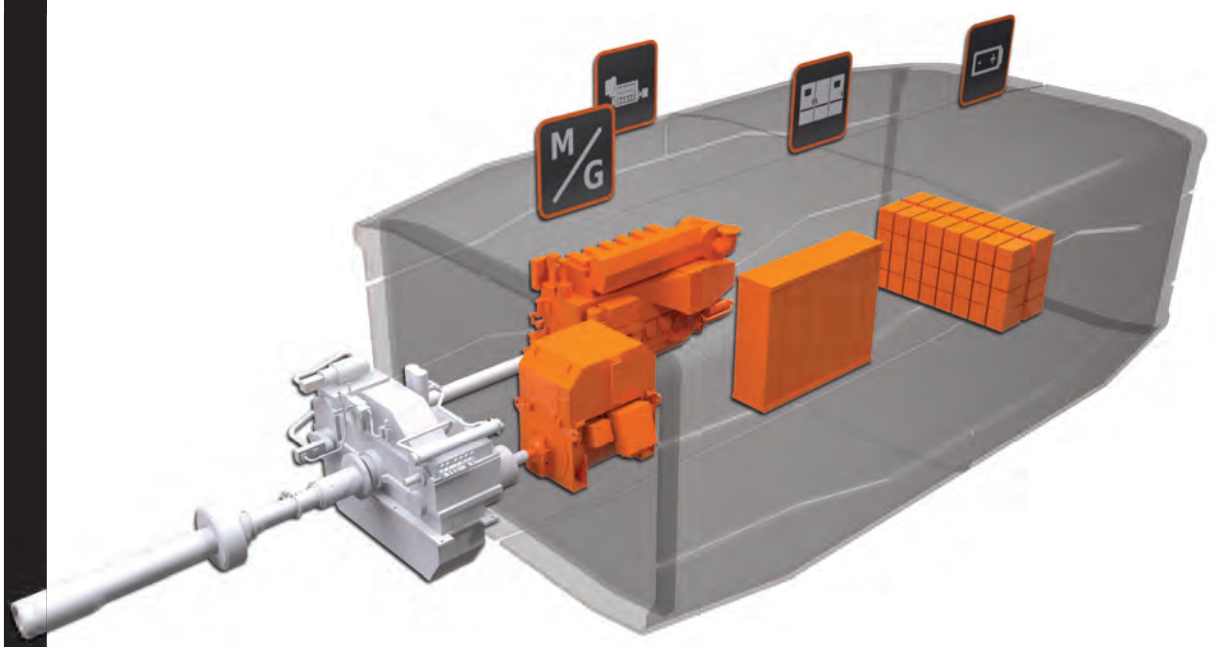


Wärtsilä HY debuts in Oslo at Nor-Shipping; first order received from Rimorchiatori Riuniti

Wärtsilä's HY Hybrid Power Module

In Oslo at Norshipping 2017 Wärtsilä launched Wärtsilä HY Hybrid Power Module, a fully integrated hybrid power module combining engines, energy storage system and power electronics optimized to work together through a newly developed energy management system (EMS). While the company debuted the system in Norway, it also announced its inaugural order fo installation on Rimorchiatori Riuniti's new tug boat

According to the manufacturer, the new system will provide a wide range of customer benefits through increased operational efficiency and flexibility, resulting in lower fuel consumption, reduced emissions and improved vessel performance. When operating in 'Green Mode' zero emissions can be achieved. Smokeless operation is also achievable at all load points and in all operating modes, thanks to a new patent pending automation procedure. In addition, the reduction in engine operating hours lowers maintenance requirements and extends the intervals between overhauls. Lloyds Register (LR) has issued an Approval in Principle (AIP) certificate for the Wärtsilä HY, and the Wärtsilä HY will have dedicated versions for each category of vessels. While the first versions being made available will be designed for tugs and medium sized ferries, the company also sees big potential in other types of vessels as well. The first order for the new Wärtsilä HY has been placed by Italy based Rimorchiatori Riuniti, the biggest owner and operator of tugs in the Mediterranean Sea region with a fleet of approximately 100 vessels. The Wärtsilä HY will be dedicated to a project for a new 80 TBP (tons bollard pull) harbor tug.

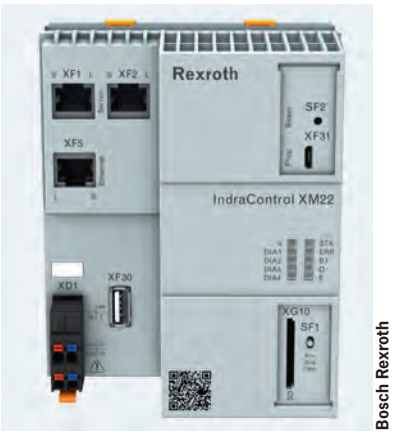


Left:
The Wärtsilä HY is a fully integrated hybrid power module in a diesel-mechanical configuration.

Below:
Rimorchiatori Riuniti's new tug boat will be powered by the Wärtsilä HY hybrid power module. Shown here is the tug boat Svezia, owned by the same company, and which is also equipped with a Wärtsilä solution.

Images: Wärtsilä

IndraControl XM2201



Bosch Rexroth

Six European and American certification boards have approved the IndraControl XM22 control hardware for use on ships and offshore installations even under extreme ambient conditions. The certifications include the control hardware, extension modules for the expansion of the communication interfaces as well as application-specific modules of the fast IndraControl S20 I/O portfolio. The control modules are approved for an application temperature range from -25 to +60 ° C, and the shock-resistant electromechanical system is designed to withstand vibrational loads of up to 5 g and impacts of up to 30 g.

www.boschrexroth.com

e-Navigation

SESAME Straits

The SESAME Straits project (Secure, Efficient, and Safe maritime traffic Management in the Straits of Malacca and Singapore) is a three-year joint Singapore and Norway project, funded by the Norwegian Research Council and led by Kongsberg Norcontrol in collaboration with the Norwegian Coastal Administration, Navtor, University of South East Norway, SINTEF Ocean, Kongsberg Seatex, Kongsberg Maritime and Singaporean partners. The technology legs of the project are ship systems, shore systems and AIS (Automatic Identification System) and VDES communications (VHF Data Exchange System), and the involved parties will develop and validate shared situational awareness and cooperative decision making between the bridge team and shore side operators. The project's objective is to improve the safety of vessel traffic and enable "Just-in-time" arrival technology, improving the efficiency of existing port infrastructure, and reducing the environmental footprint by making it possible to predict possible vessel traffic hot-spots in congested waterways, as well as providing new strategies to avoid such congestions.

WAAMpeller Class-Approved, 3D Printed Propeller

A consortium of organizations – including Damen Shipyards Group, RAMLAB, Promarin, Autodesk and Bureau Veritas – are working toward creating the world's first class-approved 3D-printed ship's propeller to develop the world's first class approved 3D printed ship's propeller, dubbed WAAMpeller. "Three students from Delft Technical University were investigating the potential of 3D printing for us. They brought us into contact with the other members of the consortium," said Kees Custers, Project Engineer in Damen's R&D. The propeller will be based on a Promarin design that is typically found on a Damen Stan Tug 1606, a 1,300mm diameter propeller weighs approximately 180kg. Once the propeller has been printed – expected in the summer of 2017 – Damen will commence full-scale trials.

RAMLAB (Rotterdam Additive Manufacturing Lab) makes the vision of manufacturing certified large metal parts on demand through Additive Manufacturing a reality.

Images: RAMLAB

Photo: Courtesy of Singapore Press Holding

App Simplifies SubM

Images: ABS

NS Workboat, a new mobile application from ABS Nautical Systems (NS) purpose-built for the workboat/inland sector, aims to streamline onboard tasks for Subchapter M compliance.

The tablet-based application is delivered preconfigured to an operator's selected Subchapter M safety management system. For companies selecting the U.S. Coast Guard inspection option, documents required to demonstrate compliance are also included. Designed to facilitate "walk-around" tasks with a familiar and easy-to-use interface, the mobile app makes managing all of the critical Subchapter M compliance requirements nearly effortless. No onboard software is needed, and very little training is required. NS Workboat is a cloud-based subscription solution offered on both iOS and Android. Tablets are delivered preconfigured by NS as a part of the solution.

www.eagle.org

Marine Battery System

Leclanché SA introduces the Leclanché Marine Rack System (MRS), a modular, Lithium-ion battery system. Leclanché MRS is the first marine battery system of its type approved by DNV-GL under revised rules issued in October 2015. Leclanché will use the MRS on the E-ferry in Denmark, the world's largest, 100% electric ferry by battery capacity, equipped with a 4.3 MWh Leclanché Lithium-ion battery. The market for battery power in the marine sector is growing, and in Scandinavia alone there are reports that indicate a potential to convert nearly 200 ferry routes to electric within the next decade; Europe-wide over 1,000 ferries could be converted.

World's Largest Mobile Harbor Cranes

Four years ago Montecon challenged Liebherr Maritime Cranes to design and built a pair of mobile harbor cranes, the world's largest, that would be able to reach up to 22 rows of containers, a feat of dockside logistics never seen before. The project was recently successfully completed, courtesy of the recent delivery of two Liebherr LHM 800 mobile harbor cranes to Port of Montevideo. Liebherr Maritime Cranes developed the LHM 800 at Montecon's request because there were no mobile harbor cranes big enough to meet the needs of the largest ships.

Images: Liebherr

MARITIME REPORTER AND ENGINEERING NEWS

2017 EDITORIAL CALENDAR

JULY

AD CLOSE: JUN 23

The Marine Communications Edition

Market: Fishing Vessel Quarterly
Market: Tugboat, Towboat & Barge
Technical: Oil Spill Response & Recovery
Product: Maritime Software Solutions
Design: Offshore Accommodation
Roundtable: Ship Management
Special Report: Marine Electronics Equipment & Supplier Guide (MarineElectronics.com)
Region Report: Europe

AUGUST

AD CLOSE: JUL 25

The Shipyard Edition

Market: Shipbuilding: The World Report
Technical: Heavy Lifting Solutions: Maritime Cranes, Winches, Windlasses & Capstan
Product: Ballast Water Technologies
Design: Icebreakers
Roundtable: Big Data
Special Report: Cruising Europe
Region Report: Russia

BONUS DISTRIBUTION:
Seatrade Europe: Sep 6-8, Hamburg, Germany
NEVA 2017: Sep 19-22, St. Petersburg, Russia
Offshore Marine & Workboats: Sep 25-27 Abu Dhabi, UAE

SEPTEMBER

AD CLOSE: AUG 24

Maritime Port & Ship Security Edition

Market: U.S. Navy Quarterly
Technical: Drones
Product: Clean Water Technologies
Design: Interior Design: Onboard Amenities
Roundtable: Environmental
Special Report: Offshore Deepwater: Structures & Systems
Region Report: Denmark

BONUS DISTRIBUTION:
INMEX / SMM India: Oct 3-5, Mumbai, India
Shipping Insight: Oct 10-12, Stamford, CT
OTC Brazil: Oct 24-26, Rio de Janeiro, Brazil
KORMARINE: Oct 24-27, Busan, Korea

OCTOBER

AD CLOSE: SEP 22

The Marine Design Annual

Market: Fishing Vessel Quarterly
Technical: Marine Firefighting, Safety & Salvage
Product: Software Solutions: CAD/CAM
Design: Naval Architecture & Marine Engineering
Roundtable: Ship Classification Societies
Special Report: Propulsion, Thrusters & Gears
Region Report: The Netherlands

BONUS DISTRIBUTION:
SNAME: Oct 23-28, Houston, TX
Europort: Nov 7- 10, Rotterdam, Netherlands
Marintec China: Dec 5-8, Shanghai, China

NOVEMBER

AD CLOSE: OCT 25

The Workboat Edition

Market: Shipbuilding: Workboats
Technical: Alternative Marine Fuels
Design: Offshore Wind Power
Roundtable: Marine Coatings & Rust Control
Special Report: Top 50 Marine Equipment Distributors
Product: Deck Machinery, Winches & Ropes
Region Report: U.S.A.

BONUS DISTRIBUTION:
Workboat Show: Nov, New Orleans, LA
Interferry 2017: Split, Croatia
Clean Gulf: Dec 4-7, Houston, TX

DECEMBER

AD CLOSE: NOV 22

The Great Ships of 2017

Market: U.S. Navy Quarterly
Technical: The Autonomous Ship
Design: Marine Engine Guide (MaritimePropulsion.com)
Roundtable: Ship Registries
Special Report: Prolific Ship Owners & Buyers
Product: Welding & Cutting Equipment

BONUS DISTRIBUTION:
Surface Navy Association 2018: Jan 2018, Crystal City, VA

**Editoral calendar content may be subject to change

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Viega: Maintaining the Flow

Viega Group has a history spanning more than 115 years and today is more than 4,000 employees worldwide, a leading manufacturers of pipe installation technology for shipbuilding, industrial, commercial and residential projects. In the U.S., Viega LLC employs nearly 500 people and offers more than 3,000 products, including Viega ProPress for copper and stainless, Viega MegaPress for black iron pipe and Viega PEX Press systems in Zero Lead bronze and high-performance polymer.

While the company serves many markets, it has been particularly active on the cruise ship front, primarily providing products and systems for repair and refit out of its U.S. office. "The cruise sector is huge, a key segment and a growing industry," said Yasmin Fortuny, Technical Manager, Shipbuilding & Cruise, Viega, on the sidelines at the Cruise Shipping exhibition in Fort Lauderdale earlier this year. She explains that cruise is wholly unique from other commercial maritime sectors. "It's a very high maintenance and time sensitive segment, as these ships are in port for only a few hours," so it is essential that they have the right parts when they need them.

"With cruise ships it more about how fast can you get it onboard," as it is essential to keep those ships running, at full service, without delay.

In particular, Fotuny points out a number of key areas of efficiency that have fostered Viega's growth in the sector, including:

- **Ease of installation**, to help multitasking technical crew;
- **Five systems** are able to be manipulated with **one tool,** helping cruise customers and installers to minimize the footprint of tooling onboard the ship;
- **Viega's press ring** allows an installer to efficiently make a pipe fix with minimal disruption to surrounding walls, ceilings and structures.

We go on ship checks and work with the chief engineer and the plumber, to see how they are currently using Viega, Fortuny said, and to see if there isn't a way that they can use our systems to their benefit, noting that her team has many "tips and tricks" that can show installers how to use the system more efficiently. In fact, out of all the maritime markets served by Viega, including military, navy, cruise, oil and gas, megayacht, and commercial, the cruise industry is the most "press friendly" today, because they build with press technology, they are familiar with the press technology, Fortuny said.

In a few months Viega's MegaPress will be made available for stainless pipe.

The MegaPress solution is of particular interest to the cruise sector, as it is a new fitting that presses onto a metric or standard pipe. "We take the logistic worry out of the process, alleviating concern about which type of pipe is available in a given port at a given time."

Leading the Fight for Water Quality

Legionella is a waterborn pathogen that can cause Legionnaires disease, a severe respiratory infection. The cruise ship industry is particularly keen to meet and thwart outbreaks of disease such as Legionnaires on cruise ships, first and foremost for the health and welfare of their paying customers, but also for the public relations fallout. Accoriding to the U.S. Centers for Disease Control & Prevention most (69%–88%) passenger dispensary visits are due to medical conditions, of which respiratory (19%–29%) and gastrointestinal (GI) (9%–10%) illnesses are the most frequently reported diagnoses. The most frequently documented cruise ship outbreaks involve respiratory infections (influenza and Legionnaires' disease), GI infections (norovirus), and vaccine-preventable diseases other than influenza, such as rubella and varicella (chickenpox).

Legionella organisms are not transmitted from person to person, rather contaminated ships' whirlpool spas and potable water supply systems are the most commonly implicated sources of shipboard Legionella outbreaks. Improvements in ship design and standardization of water disinfection have reduced the risk of Legionella growth and colonization, and companies such as Viega can play a central role in delivering the products to keep cruise ships and passengers safe.

"Keeping the water moving is critical to prevent Legionella from growing," said Renn Burling, Technical Manager, Viega, but it is not the only factor, as water flow, temperature and chemical treatment are all key.

In fact, Burling explains, Viega offers three products to help do the job:

- **Viego ProPress Double Drop Elbows:** A unique fitting keeps fresh water close to each fixture, improving water quality by reducing stagnation.
- **Viega ProPress Venturi Press Insert:** The fitting induces flow in remote, seldom-used fixtures using the same principle used to balance single loop radiant systems.
- **Viego SmartLoop System:** A proprietary internal recirculation system keeping water hotter longer, reducing water waste and maintaining temperature.

The MegaPress solution is of particular interest to the cruise sector, as it is a new fitting that presses onto a metric or standard pipe.

Photo: Viega

The cruise industry is arguably the most "press friendly," because they build with press technology, they are familiar with the press technology.

Yasmin Fortuny
Technical Manager, Shipbuilding & Cruise, Viega

All photos: Viega

Photo: Roxtec

New Pipe Seal Simplifies Shipard Safety

St. Johns Ship Building Inc. in Palatka, Fla. ensures watertight pipe penetrations in decks and bulkheads by using the Roxtec SPM seal. When building the tug Delaware, the shipyard also used the seal as vibration hanger in the compartments.
"Roxtec seals have greatly simplified our pipe installations," said pipe manager William Mann. "Where I once needed three people to weld and provide fire watch, now I only need one."
The pipe installation team used to weld in a steel fitting and install a screw pipe. This work took time, and occasionally caused issues with dissimilar metals.
The yard managed to save hours of work by installing the seals also as vibration hangers in already painted compartments. There was no need to go back in, cut extra holes, weld in hangers and then clean and repaint the areas.

www.roxtec.com

Photo: Wouter Witzel

Wouter Witzel Butterfly Valves

Wouter Witzel butterfly valves excel wherever critical applications demand maximum reliability and are suitable for various applications, including cargo and ballast systems, engine rooms, bilge systems, firefighting systems and hull valves. Designed in accordance with the latest international standards, Wouter Witzel butterfly valves meet the most stringent quality requirements and are guaranteed by numerous international product certificates and approved manufacturing survey arrangements. Wouter Witzel offers an unmatched 5-year warranty on their rubberlined butterfly valves. The Wouter Witzel butterfly valves not only reduce operational costs and down-time – they keep maintenance expenses to an absolute minimum.

www.worldwidemetric.com

Photo: W&O Supply

W&O Supply

Founded in 1932, Garbarino developed into one of the most complete marine pump suppliers in the industry. World-renowned for centrifugal and positive displacement pumps, Garbarino serves the commercial marine industry and many of the world's Navies. Garbarino and W&O have partnered on projects that must meet marine criteria: ABS, DNV-GL, RINA, NKK, BV, LR including Mil-Spec. W&O is the premier marine solutions provider for Garbarino pumps. With 18 strategic locations through North America, Europe and Asia, W&O is able to service your pump needs from anywhere in the world.

www.wosupply.com

Eltorque

Eltorque Valve Control

Eltorque's 'Safe Intelligence' concept is a prototype line of battery-assisted failsafe valve actuators that will guarantee full functionality in the event of power or signal loss. The concept rounds out the intelligent control offered by all Eltorque actuators, Eltorque's intelligent battery solutions keep valves under control, even in an emergency. Besides being failsafe, Eltorque's intelligent battery solutions go beyond standard pneumatic spring-return functionality. Compact and lightweight as well, they are designed tocontribute to a lighter vessel with more efficient use of space. Eltorque has honed and refined its mission-critical actuators to incorporate serial connections and a hybrid, CANbus connector cable that not only controls the actuator, but relays information to and from the unit, enabling operators to monitor in-situ status while exercising precision control over the valve. Now that information is supplemented with battery status and capacity.

https://eltorque.no

Victaulic

Victaulic

Victaulic grooved end valves provide 360 degrees of rotation to ease installation and on average are 58% lighter than flanged assemblies. Why is this important? The smaller product footprint and the need for only 4 bolts/nuts can cut installation and maintenance to half the time.

www.victaulic.com

Viega MegaPress

Viega MegaPress is a carbon steel press fitting system approved for use in hydronic, gas, fuel oil and fire protection applications. Make secure press connections on Schedule 5 to Schedule 40 black iron pipe in less than seven seconds with no heat or manual tightening. Press technology joins black iron pipe securely through the engineered design of the fittings and the use of the press tool. With a black EPDM sealing element, the MegaPress system provides maximum performance for both hydronic and gas applications. The Viega press fittings offer the patented Smart Connect feature, a quick and easy way for installers to identify unpressed connections during pressure testing. World Wide Metric offers Viega MegaPress fittings in a wide variety of configurations and sizes, with over 200 engineered fitting configurations available for water and gas applications.

www.worldwidemetric.com

Viega / World Wide Metric

OceanTUFF Marine Drainage

Known for its thermoplastic piping system innovations, Spears Manufacturing Company offers OceanTUFF, a CPVC Marine Drainage System. Recently awarded U.S. Coast Guard approval, OceanTUFF provides a durable, lightweight and cost effective alternative to traditional drainage materials used in marine applications. OceanTUFF meets the low flame, smoke and toxicity requirements of the 2010 FTP Code and may be installed in concealed spaces in accommodation, service and control spaces without meeting the additional requirements of 46 CFR 56.60-25 (a) (2). Assembled using simple plumbing tools, the corrosion resistant OceanTUFF system installs easily using a one-step solvent cement process. Ideal for black and gray water systems, OceanTUFF is available in sizes 1-1/2 inch to 12 inch and offers a wide range of traditional DWV pattern fittings such as P-Traps, Combo Wyes, Floor Drains and Cleanouts. OceanTUFF also has an ABS Type Approval.

www.spearsmfg.com

Spears Manufacturing

Natural Gas as a Transportation Fuel and IMO – MARPOL's VI

BY WILLIAM P. DOYLE

Preparing for .50 percent fuel oil sulfur content, January 1, 2020

The International Maritime Organization's (IMO) Marine Environment Protection Committee (MEPC) will meet July 3-7, 2017, in London, where the January 1, 2020 implementation of the .50 percent m/m (mass by mass) global sulfur content limit for shipboard fuel oil will be discussed. At this time, it appears that delays past the 2020 implementation date will not be entertained.

In anticipation of 2020, many of the large scale ship owners and operators have announced plans to build ships that can be powered by natural gas. Most of the ships being delivered are of the dual fuel type meaning they can operate on low sulfur diesel or natural gas.

How did we get here?

IMO

The IMOs regulations are not U.S. laws that were drafted by Congress and signed by the President. The IMO is a United Nations agency that develops international regulations pertaining to worldwide shipping. The U.S. has been a member of the IMO since 1950, and there are currently 173 member states.

Specific treaties under the IMO include the International Convention for the Safety of Life at Sea (SOLAS), the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the International Convention for the Prevention of Pollution from Ships (MARPOL).

MARPOL Global

In 1997, Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL Convention) was adopted to address air pollution from ships.

Annex VI regulations are designed to control airborne emissions from ships including sulfur oxides (SOx), nitrogen oxides (NOx), ozone depleting substances (ODS) and volatile organic compounds (VOC).

The global sulfur content level for shipboard fuel oil was set at 4.5 percent in 1997. In 2008, the sulfur content was reduced to 3.5 percent with an implementation date of January 1, 2012. The date of January 1, 2020 for the global .50 percent was set in regulations that were also adopted in 2008. However, the 2020 implementation date was not actually set-in-stone because at the time, it was unclear whether the world could produce (refine) enough marine gas oil to meet the demands of the global shipping industry. Indeed, in 2008, natural gas or LNG as a marine fuel was not really envisioned as a commercial solution for oceangoing vessels. Therefore, the IMO adopted a look-back provision to review the availability of low sulfur fuel oil. A review that would have to be completed by 2018. As drafted, the IMO would look at the availability of low sulfur fuel and either allow the implementation of .50 percent m/m in 2020 or delay the implementation until 2025.

That review was completed in October 2016, and the 2020 implementation date was preserved. In its announcement the IMO sated in part:

"The review concluded that sufficient compliant fuel oil would be available to meet the fuel oil requirements. The Ships can meet the requirement by using low-sulfur compliant fuel oil. An increasing number of ships are also using gas as a fuel as when ignited it leads to negligible sulfur oxide emissions. This has been recognized in the development by IMO of the International Code for Ships using Gases and other Low Flashpoint Fuels (the IGF Code), which was adopted in 2015."

MARPOL Local

In 2008 MARPOL designated Emission Control Areas (ECAs). ECAs established under MARPOL Annex VI for SOx are: the Baltic Sea area; the North Sea area; the North American area (covering designated coastal areas off the U.S. and Canada); and the U.S. Caribbean Sea area (around Puerto Rico and the U.S. Virgin Islands).

Under the rules (as amended), ships trading in the ECAs (specifically, North American Emission Control Area) would be required to use fuel oil with a sulfur content of 1.00 percent with an effective date of August 1, 2012. Further, the sulfur content in the ECAs would again be lowered to .10 percent on January 1, 2015. Thus, since January 1, 2015 the sulfur content limit for fuel oil used by ships in ECAS established by IMO has been 0.10 percent m/m.

Note: The North American ECA encompasses most of the United States and Canada's coastal waters out to 200 nautical miles from the coastline. It does not include the Pacific U.S. territories, smaller Hawaiian Islands, the Commonwealth of Puerto Rico and the U.S. Virgin Islands, the Aleutian Islands and Western Alaska, and the U.S. and Canadian Arctic. In 2011, the U.S. Caribbean ECA was established and includes the waters adjacent to the Commonwealth of Puerto Rico and the U.S. Virgin Islands out to approximately 50 nautical miles from the coastline. The U.S. Caribbean ECA requirements became effective in 2014.

Natural Gas as a Transportation Fuel

The U.S. has led the way for commercial use of LNG as a marine fuel. The concept of LNG as a marine fuel is not new. LNG tankers were designed to use their boil-off gas as the fuel to create the steam to roll the turbines. In fact, LNG has been used as a fuel on LNG takers since 1959 – on the world's first LNG tanker, the Methane Pioneer. The Pioneer, originally built in 1945 in Duluth, Minn. was a general cargo ship. It was converted to an LNG carrier in Mobile, Ala. in 1958. Aside from LNG tankers, the U.S. has taken a leadership role in building modern oceangoing ships that are LNG fueled and/or LNG ready. To date, U.S. shipyards have delivered or have on order 22 LNG ready vessels. The first two LNG ready vessels were delivered in 2015 and the order book continues out to 2019. This is not including the smaller vessels that have led the LNG marine fuel way, i.e., Harvey Gulf Marine's fleet of offshore supply vessels. General Dynamics NASSCO in San Diego delivered the world's first LNG powered containership, the Isla Bella, to TOTE Maritime in October, 2015.

Clean Energy Fuels Company provided the bunkering services and fuel from its Boron, Calif. liquefaction plant for the the Isa Bella and Tote's second NASSCO-bulit LNG powered vessel the Perla Del Caribe. As of now all of the LNG bunkering is taking place in Florida through trucking in LNG from Georgia. However, Crowley Maritime is constructing a new shore side-side LNG facility at Jaxport's Talleyrand Terminal. Crowley has partnered with Eagle LNG Partners on the project. Chart Industries recently delivered two 260 ton cryogenic storage tanks to the site.

Pasha Hawaii selected Keppel AmFELS in Brownsville, TX for the construction of two new ***LNG fueled containerships****, with the option to order two additional vessels.*

Pasha Hawaii

Photo: FMC

About the Author

William P. Doyle is a Commissioner with the U.S. Federal Maritime Commission. The FMC, among other things, regulates liner companies, ocean transportation intermediaries and marine terminal operators. The thoughts and comments he expresses here are his own and should not be construed to represent the position of the Commission or his fellow Commissioners.

New Developments: Oceangoing Vessels

The oceangoing cruise ship industry is getting involved. Carnival Group, MSC Cruises and Royal Caribbean Cruise Lines have placed orders for LNG fueled ships. Carnival Group, has seven LNG-powered vessels on order. Royal Caribbean Cruises placed orders for two LNG and fuel cell powered vessels to be built on a prototype platform.

On June 5, 2017, MSC Cruises announced its order of four 200,000-ton LNG-fueled cruise ships. The cruise ship orders are expected to be delivered between 2022-2026.

Importantly, bunkering and sourcing of LNG for the ships is being addressed. Shell Global announced in September 2016, it had signed a supply agreement with Carnival to supply LNG to fuel two of the world's largest passenger cruise ships. One cruise ship would refuel from a special purpose Shell LNG bunker vessel. The gas would be loaded onto the bunker vessel at the Gas Access to Europe terminal in Rotterdam, the Netherlands. The second ship is expected to refuel at one of the ports in the Western Mediterranean.

Shell Global has been busy. Shell Western LNG B.V. announced in April that it executed an agreement with Sovcomflot to supply LNG to fuel the first Aframax crude oil tankers in the world to be powered by LNG.

The four Aframax tankers will operate in the Baltic Sea and Northern Europe. The ice-classed, dual-fueled tankers are scheduled for delivery in 2018. In its announcement Shell stated:

"More ship owners and operators are choosing LNG fuel over traditional marine fuels to respond to sulfur and nitrogen oxide emissions regulations, including the IMO's recent decision to implement a global 0.5 percent sulfur cap in 2020."

On May 12, 2017, Pasha Hawaii announced that it had selected Keppel AmFELS in Brownsville, Texas, for the construction of two new LNG fueled containerships. Delivery of the first vessel is expected in the first quarter of 2020, with the delivery of the second vessel in the third quarter of 2020. According to Pasha, the ships will operate fully on LNG from the start of the service.

Containerships, a Finnish logistics and container shipping service, recently announced it intends to transition the company completely to LNG throughout its logistics supply chain. It is expected that four LNG cargo ships will be built. In addition to the new ships, Containerships is investing in LNG trucks. Its plan is to increase the fleet of LNG trucks and invest in an LNG refueling station located in the U.K.

Japanese container shipping company Mitsui O.S.K. Lines (MOL) this year took delivery of the MOL Triumph, for now the 'world's biggest containership' and the first 'megaship' to pass the 20,000 TEU threshold.

MOL built the Triumph as LNG ready, with a retrofit option to convert to LNG fueled ship in the future as the 'International Maritime Organization's new regulation to limit SOx emission in marine fuels comes into effect in 2020.' MOL is building six 20,000 TEU-class LNG ready containerships.

United Arab Shipping Company (UASC) is continuing with its LNG fueled newbuilding program of 17 LNG-ready ships, comprising six 18,800 TEU vessels and 11 of 15,000 TEU. UASC was recently acquired by Germany's Hapag-Lloyd.

According to UASC, upgrading the LNG-ready capability of the UASC ships to run on gas will happen when the necessary bunkering infrastructure is in place. UASC, in co-operation with Qatargas and Shell, is exploring LNG bunker supply options at a Middle East location, perhaps in and around the Suez Canal region.

RoRos are moving forward with the full LNG fuel and bunker program. United European Car Carriers (UECC), an NYK/Wallenius Lines joint venture will receive the world's first LNG-powered pure car and truck carriers (PCTCs). The vessels will be bunkered through ship-to-ship transfers by the Engie Zeebrugge, the world's first purpose-built LNG bunkering vessel.

Natural Gas – MARPOL Connection

Shipowners have taken notice. LNG is an option that can help them meet the international standards required for emissions. The ship part seems to be taking care of itself with the advancements in technology – meaning the ships engines can be built to run on diesel or natural gas. What needs to happen next is the supply of bunking facilities and bunker vessels must increase worldwide.

We'll see what comes out of the IMO meeting London in July!

A Shipyards

A.1 Repair & Conversion

Viega
12303 Airport Way, Suite 395
Broomfield, CO 80021
Phone: 800-976-9819
Contact: Marine/Shipbuilding Inside Sales
Email: marine@viega.us

B Propulsion

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MaK Marine Engines and generator sets from 2,880Kw – 16,000Kw

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B.2 HybriDrive Solutions

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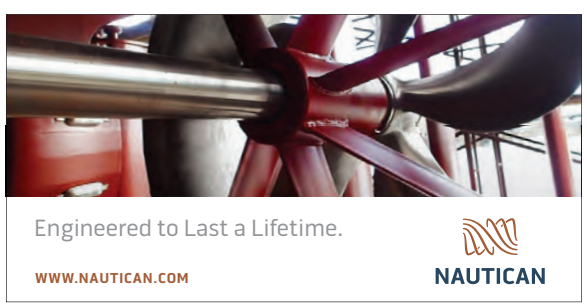

B.4 Propellers

B.5 Rudders & Rudder Systems

C Measurement and Control Devices

C.1 Monitoring Systems

High-definition vibration and bearing analysis
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D.1 Welders & Welding Solution

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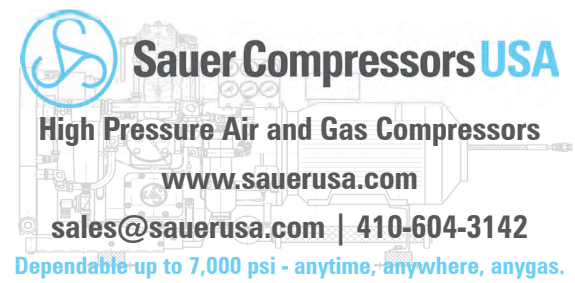
D.3 Stabilizers

E Hydraulic and Pneumatic

E.1 Valves

E.2 Compressors & Blowers



F Corrosion Protection

F.1 Paints & Coatings

F.2 Surface Preparation

G Navigation and Communication

G.1 Communications & Headsets

H Deck Machinery

H.1 Cranes

H.2 Winches

JonRie InterTech, LLC
982 Whispering Oak Circle
Manahawkin, NJ 08050
Contact - Brandon Durar
bjdme@marinewinch.com
(609) 978-3523

H.3 Windlasses

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(920) 738-5432 • Fax: (920) 738-5435

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I.2 Consulting Engineers

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12303 Airport Way, Suite 395
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Phone: 800-976-9819
Contact: Marine/Shipbuilding Inside Sales
Email: marine@viega.us

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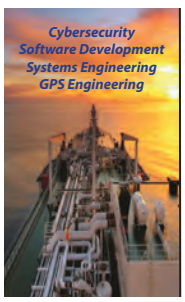
J.2 Maritime Certification & Education

K Maritime Services

K.1 Regulatory Compliance Services

K.2 Cybersecurity



L Environmentally Preferred Products/ VGP 2013

L.1 Lubricants

L.2 Cleaners

L.3 Sanitation Systems

M Ship Safety

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N Marine Safety Equipment

N.1 Safety & Survival Gear

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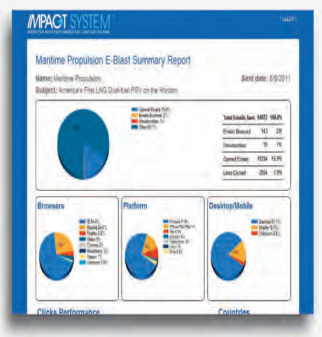
O.1 Impellers



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

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Driveline Service of Portland, Inc., 9041 NE Vancouver Way, Portland, OR 97211 , USA , tel:(503) 289-2264, fax:(503) 289-5838, info@driveshafts.com contact: Kevin McCaffrey, www.driveshafts.com

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

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San Jacinto College, 8060 Spencer Highway Pasadena, TX 77505

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

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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

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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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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

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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

MONITORING SYSTEMS

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

NAVAL ARCHITECTS, MARINE ENGINEERS

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

JMS Naval Architects, 70 Essex Street, Mystic, CT , USA , tel:(860) 536-0009 EXT 2, fax:(860) 536-9117, RickF@JMSnet.com contact: Rick Fernandes, www.JMSnet.com

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Hale Propellers LLC, 2 Custome Drive Old Saybrook, CT. 06475 USA , tel:860-399-4600, r3@halepropeller.com contact: Randy Hale, www.halepropeller.com

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

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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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Blohm+Voss GmbH, Hermann-Blohm-Strasse 3 20457 Hamburg Germany , tel:+49 (0) 40 3119 1400, shipservices@blohmvoss.com , www.blohmvoss.com

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

WASTE WATER TREATMENT

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

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Marine Jet Power Inc., 6740 Commerce Court Drive Blacklick, OH 43004-9200, USA, Columbus , tel:(614) 759-9000 , www.marinejetpower.com

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Contact
Human Resources Associate
Email: stephaniem@kitsaptransit.com
Work Phone : 360-475-0211
60 Washington Ave Bremerton, WA, 98337 United States
Position Summary: We are looking for a Marine Mechanic to join our team. The person in this position will perform preventive maintenance on a small ferry vessel, execute light to medium repairs, and supervise heavy repairs in conformance with agency policy. This position is also responsible for conducting daily preventive maintenance, ad-hoc repairs, organizing and ordering spare parts.

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Category: Shipboard Officer / Personnel / Crew
Description:
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Description:
Bouchard Night Dispatchers are the points-of-contact after business hours for communication with the fleet, terminals and customers to ensure an efficient and safe operation.

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Salary: $ $7163 - $9632/ month DOE , Full Time
Category: Vessel Operations
Job Location: 60 Washington Ave Bremerton, WA, 98337 United States
Contact
Human Resources Associate
Email: stephaniem@kitsaptransit.com
Work Phone : 360-475-0211
60 Washington Ave Bremerton, WA, 98337 United States
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Position Summary: We are recruiting tor two captains to join our team. The person in this position will perform as the master of a small ferry vessel, operating the vessel safely, reliably, and in conformance with Kitsap Transit policy. This person will also be responsible for leading emergency operations according to the rules and regulations of the United States Coast Guard.

Deckhand
Salary: $ $29.98- $40.32 per hour , Full Time
Category: Vessel Operations
Job Location: 60 Washington Ave Bremerton, WA, 98337 United States
Contact
Human Resources Associate
Email: stephaniem@kitsaptransit.com
Work Phone : 360-475-0211
60 Washington Ave Bremerton, WA, 98337 United States
Position Summary: We are looking for four deckhands to join our team to perform deckhand duties on a small ferry vessel and assist in operating the vessel safely, reliably, and in conformance with agency policy.

Fleet Manager
Keystone Shipping Co.
Full Time
Job Location: One Bala Plaza East Suite 600 Bala Cynwyd, PA, 19004 USA
Description:
Keystone Shipping Co. is looking for an experienced, self-motivated, and hands-on maritime professional to fill the position of Fleet Manager in their Duluth, MN office. This position is responsible for the overall operational management of 9 self-unloading bulk carriers operating on the Great Lakes.

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Full Time , Engineer
Category: Engineer / Naval Architect
Job Location: One Bala Plaza East Suite 600 Bala Cynwyd, PA, 19004 USA
Skills:
KeyLakes, Inc., a subsidiary of Keystone Shipping Co.,

is currently seeking a qualified maritime professional to fill the position of Port Engineer in the Engineering Department of our Duluth, MN office, to manage our fleet of self-unloading Great Lakes bulk carriers. This position reports directly to the Fleet Engineer of the KeyLakes office and the Vice President of Engineering.

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Salary: $ $73,479 Per annum , Full Time , Mid Career
Description:
Title, Series, Grade (Code) Medical Services Officer, WM 9996-27 (902) Base Salary: $73,479 Per annum Type of Appointment: Excepted Service Career-Conditional Opening Date: June 5, 2017 Closing Date June 19, 2017 Location: Military Sealift Command (MSC) Vessels Worldwide Who May Apply: All United States citizens and current Military Sealift Command Civil Service Mariner (CIVMAR) eligible to apply under the Veterans Employment Opportunities Act (VEOA). Relocation expenses are not authorized for this position.

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3	Man Diesel & Turbo	www.primeserv.man.eu	Please visit us online
63	Marine Turbo Diesel	www.marineturbodiesel.us	(510) 236-3525
13	Maritime Professional Training	www.mptusa.com	(954) 525-1014
35	Military Sealift Command	www.sealiftcommand.com	(888) 891-4577
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29	Navtor	www.navtor.com	+47 51 49 22 00
25	Omnithruster	www.omnithruster.com	(330) 963-6310
C4	R.W. Fernstrum & Company	www.fernstrum.com	(906) 863-5553
55	Resolve Maritime Academy	www.resolveacademy.com	(954) 463-9195
49	Saab Transponder Tech AB	www.saab.com/maritime	Please visit our website
17	Scania USA	www.scaniausa.com	(210) 403-0007
59	Seahawk Services	www.seahawkservices.com	(856) 845-4142
65	SNAME	www.sname.org/smc	(703) 997-6705
38	Sohre Turbomachinery, Inc.	www.sohreturbo.com	(413) 267-0590
23	Tecnico Corp.	www.tecnicocorp.com/marine	(757) 545-4013
31	Transas	www.transas.com	Please visit us online
5	Viega	www.viega.us	(800) 976-9819
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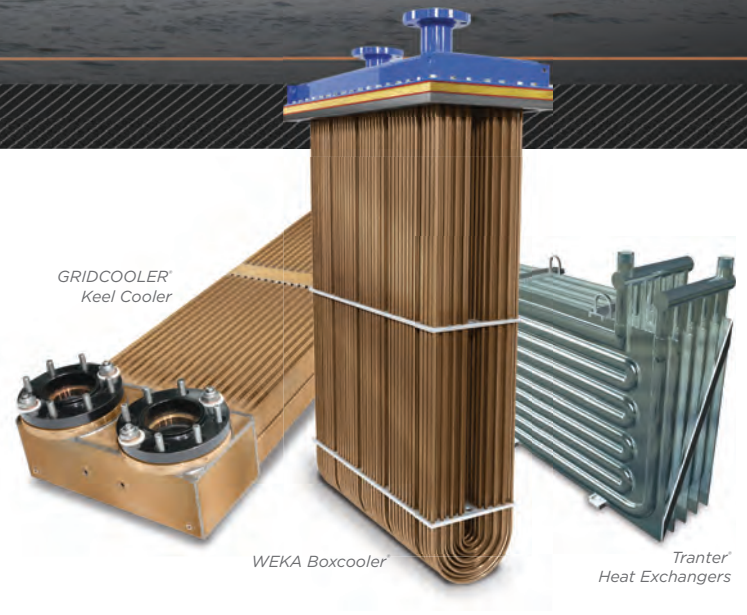

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