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MARITIME REPORTER AND ENGINEERING NEWS

SINCE 1939

November 2019

SOUTHERN TOWING CEO ED GRIMM & THE CASE FOR Z-DRIVES ON TOWBOATS

THE OSV MARKET
WHICH WAY IS UP?

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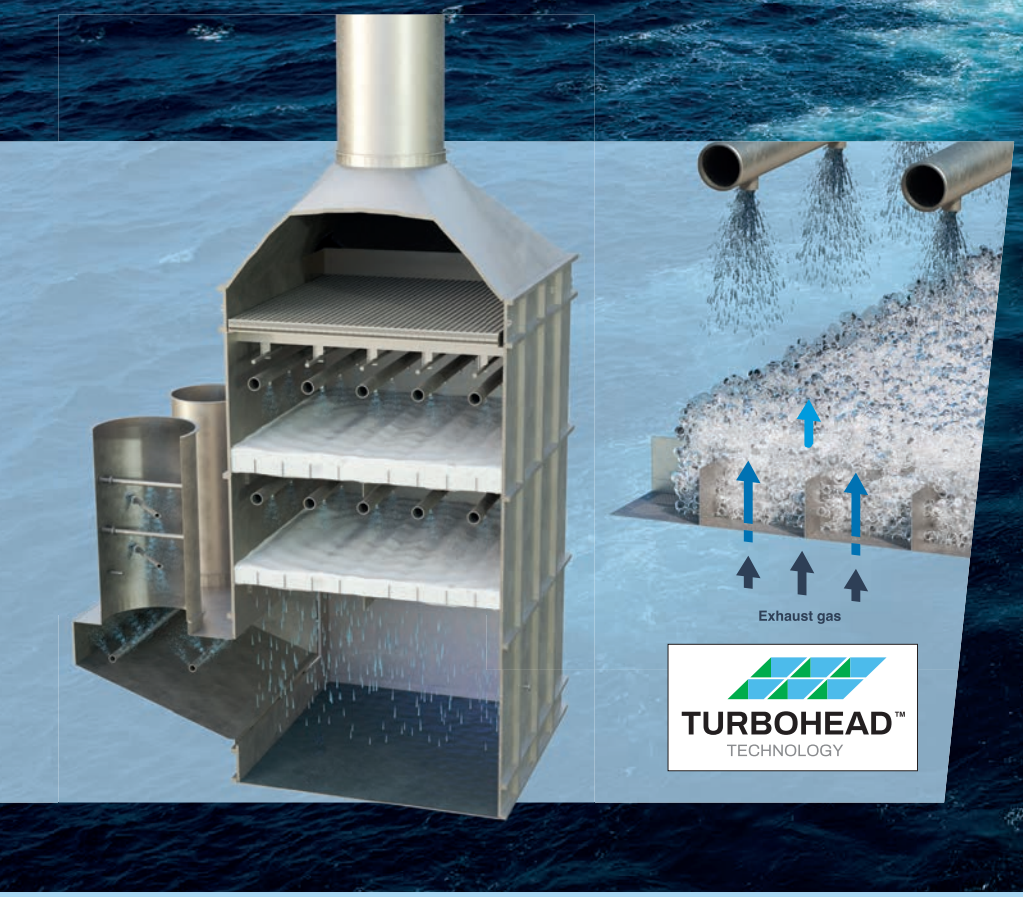

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Editorial

Rolling on the Rivers

I think it is generally agreed that this is truly a transcendent period across all maritime sectors, with the convergence of sweeping environmental legislative mandate pushing ships and boats toward carbon neutrality, while digitalization and the overall technology revolution continues to pick up pace and direction, helping to transform the maritime industry from stem to stern. While it is generally presumed that maritime is ultra conservative and slow to change, from my seat this too is starting to change – albeit slowly – as ever larger conglomerates of maritime operators and suppliers emerge to be a more dominant force.

Our cover story this month, an interview with Southern Towing President and CEO **Ed Grimm**, is the perfect juxtaposition to the change that swirls around us, as Grimm is a traditional maritime guy, a former Coastie, an innovator in his own right and the holder of multiple maritime patents, a long-tenured executive that embraces the opportunity to think outside the box.

When I visited with Grimm earlier this year in his Memphis, Tenn., office, I was struck by a number of things, but mostly his direct manner of speaking. Grimm speaks his mind, as I will assume most everyone who knows him already knows, and Southern Towing is one of the country's preeminent haulers of fertilizer. While Southern Towing's roadways are the historic U.S. the inland waterways, his fleet is anything but traditional, with a number of Z-Drive vessels operating on the nation's shallow draft rivers. He and his team are not interested in new and emerging technology simply for the sake of new technology, as STC relies on data to help steer its business. Quite frankly the title of the feature – ***"In God we trust. All others must have data"*** – is one of the most appropriate titles I've written in years.

While there remain many naysayers regarding the value of Z-Drives on the rivers, Grimm and his team manage the fleet by the numbers, and for certain applications the fuel consumption numbers coming from his Z-Drive units tell the story. I don't want to blow the punch line here, but instead invite you to turn to page 34 for a insightful story on an innovative company and its partners at ZF Marine, making the business case for Z-Drives on towboats for specific applications.

Switching gears for us is Barry Parker and his overview of the Offshore Service Vessel market, which most of you know is not a pretty sight. Starting on page 28 Parker breaks down the recent history and near term future for this beaten down sector, and while I would hesitate to call his conclusion a 'rosy' picture, the story and numbers that support it are perhaps more encouraging than you might imagine.

A brighter picture, near term, is the nascent offshore wind industry. As we have written many time in these pages and those of our sister publications, while the U.S. offshore wind energy market is a generation behind that of Europe, it has an amazing potential to deliver both clean energy and a serious maritime resurgence in one fell swoop. The dynamics and potential are undeniable, as significant offshore wind construction projects would give a tremendous lift to everything from maritime design to construction to equipment supply and jobs, too. This month's thought leadership section is all about offshore wind with a trio of articles starting on page 20, with insights on the new offshore wind job opportunities and challenges; the role of government in helping to facilitate the new generation of offshore wind opportunities; and a look inside Equinor's investment in solar and wind energy in Brazil.

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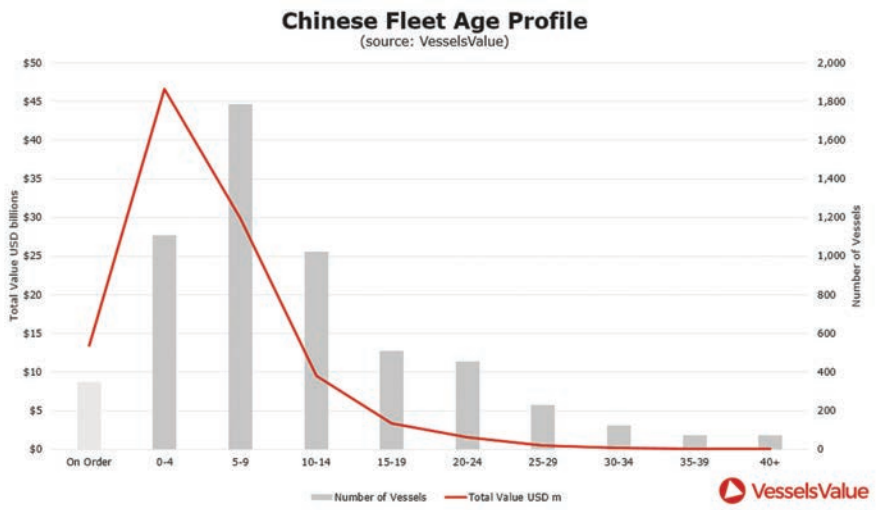
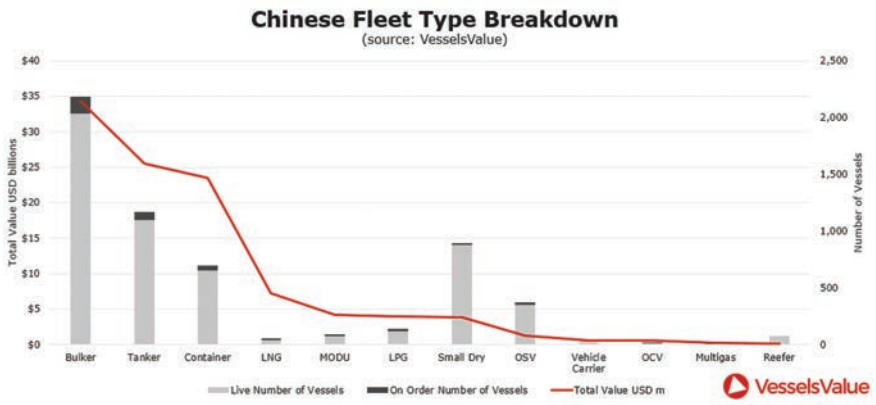


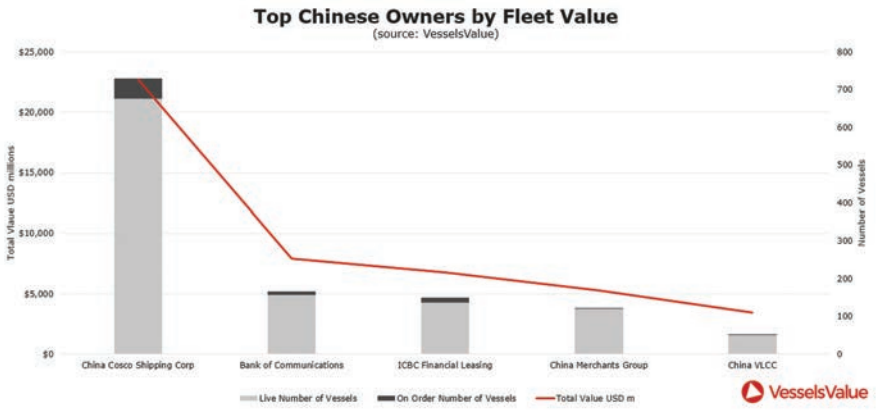
Chinese Fleet Age Profile

Age Group	Number of Vessels	Total Value USD m
On Order	349	$13,471
0-4	1,109	$46,622
5-9	1,788	$29,870
10-14	1,023	$9,527
15-19	509	$3,385
20-24	454	$1,617
25-29	229	$475
30-34	124	$203
35-39	74	$111
40+	72	$70
Grand Total	**5,731**	**$105,353**



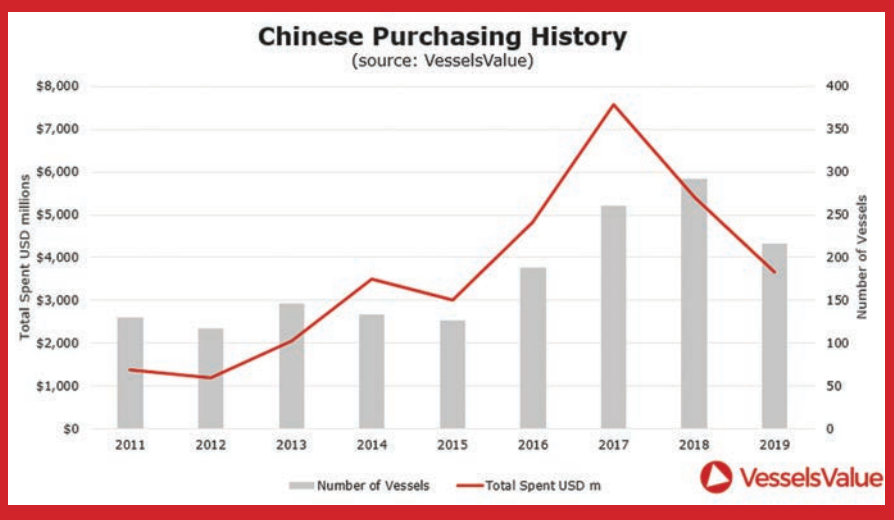
Chinese Fleet Type Breakdown (Live & On Order)

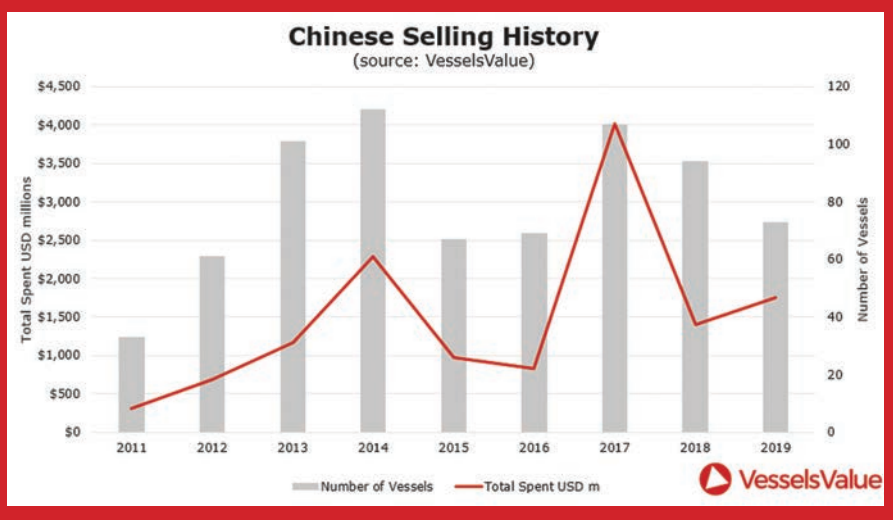
Vessel Type	Total Number of Vessels	Total Value USD m
Bulker	2,185	$34,334
Tanker	1,170	$25,478
Container	699	$23,471
LNG	53	$7,279
MODU	86	$4,194
LPG	138	$3,953
Small Dry	895	$3,883
OSV	369	$1,272
Vehicle Carrier	42	$602
OCV	14	$538
Multigas	4	$202
Reefer	76	$148
Grand Total	**5,731**	**$105,353**



Top Chinese Owners by Fleet Value (Live & On Order)

Vessel Type	Total Number of Vessels	Total Value USD m
China Cosco Shipping Corp	729	$22,695
Bank of Communications	167	$7,931
ICBC Financial Leasing	150	$6,758
China Merchants Group	121	$5,303
China VLCC	53	$3,454





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Training Tips for Ships
Tip #6 – Taking the Stress out of Tests

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We must assess our trainees. Yet we have all heard the complaints they raise about assessments: "I am a bad test-writer", "this test was much more difficult than I expected", "I know the material but I did not understand the questions", "I was nervous, and my mind went blank", etc. These are not the occasional concerns of weak or lazy trainees – they are the norm. And we must listen because our trainees are telling us that we cannot rely on our assessment results as an accurate reflection of what they know. Furthermore, these concerns alienate people from training programs, make them nervous, and further the impression that training is a punitive rather than supportive activity.

There are many issues that lead to these concerns and complaints about assessment. But most agree that the root case of a majority of these concerns is lack of familiarity and experience with test taking. Remember – most of our trainees are not expert students but rather expert mariners.

Courses, classes and test are not the norm for them. Thus, to most of our trainees, tests are occasional, unpredictable, painful, stressful, high-stakes experiences. Imagine being placed in a situation that you've rarely encountered before, where you don't know what to expect, and where the outcome may be pivotal to your future. This is a very difficult experience for many trainees, and this difficulty can greatly reduce the validity of the assessment results. We don't want any of that. Yet we must assess. So, what do we do?

This is not a new problem, and there are many proposed solutions involving alternative models of assessment. For example, we have alternatives such as project work, portfolio creation, "authentic" assessment, game-based assessment, and others. However, these are a bridge too far for most organizations as a first step. Fortunately, we can make a dent in all the issues raised above with a simple tool: self-assessment.

The technical description for a self-assessment is "formative". That is, its purpose is to support rather than evaluate the learner. Self-tests can be administered by paper (and "peer-graded" by other trainees to reduce your workload) or on-line through an LMS. In the case of on-line self-tests, the benefit is that trainees can do them over and over, whenever it best fits their learning progress, and each time get a different mix of questions.

The key is that the results of self-tests are not recorded. Therefore, trainees know that taking a self-test is a risk-free and supportive experience for the sole purpose of making them successful on the final exam.

Specifically, self-tests address all the issues raised above. First, they provide practice. This shows the trainee what to expect in terms of assessment process and knowledge. It removes surprise. Trainees see what a test looks like and the style and difficulty of questions to expect.

Secondly, self-tests are an excellent opportunity for the organization to convey its expectations as to how deeply the materials should be studied. Trainees can then tune their learning to the organization's expectations by continuing to study until such point as they are successful in the self-tests. This reduces both over- and under-study, and greatly increases the chance of a successful learning outcome.

This is good for everyone. For trainees, assessments become familiar and more routine. They know what to expect, their stress is reduced, and the end result will be a final assessment which is more reflective of their actual knowledge. Equally importantly, they will feel better supported and see your organization more as a partner in their success rather than a barrier to it.

It's simple. If you would like to improve nearly every aspect of your assessment program, incorporate as many opportunities as possible for self-evaluation.

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The Internet of Maritime Things

The Internet of Maritime Things (IoMT) is coming! Start planning now.

The Internet of Things (IoT) is already with us. You can get a doorbell camera that allows you to see on your smartphone who is at or approaching your front door. You can also get a refrigerator that keeps track of items inside and will advise you when you are running low (maybe on beer). It can also automatically place orders with your local grocery store for replenishment. Your automobile will attempt to keep you in your lane and avoid collisions while keeping track of where you are, getting you to your destination, and entertaining you. There is also a black box that keeps track of your speed. This black box also records your location, driving habits, and automotive health (among other things) and automatically sends that information to the car's manufacturer. Smart speakers in your home or office will play the radio station or music you request. They are always on and can record other audio events, such as conversations. These recordings (or at least portions thereof) are automatically transmitted to the speaker's manufacturer. And this is only the beginning.

Technological promise

If ports and vessels are all interconnected, transits could be arranged for optimum performance and safety. Cargoes could be loaded and unloaded with maximum efficiency. At sea, passages could be optimized, accounting for weather, sea conditions, marine hazards (such as rocks and shoals), and other traffic. The deck officer (whether physically or virtually present) would largely be there to meet legal requirements and to take the fall when things go wrong.

Computerized machines will monitor their own performance and schedule preventive maintenance. Sophisticated technology is being developed that will shut down if the purchaser attempts their own repairs or alterations. Manufacturers will have to work out how to maintain computerized equipment that has an extended lifespan. Currently, most computerized items, such as smartphones, are only supported for five years. Ships, though, have lifespans of three or more decades.

What happens with future computerized ships? Who will keep the software and hardware operational and up-to-date when the ships are 10 or 20 years old? Will the then owner/operator/master install updates and changes as released? Will the ship builder (and its contractors) be able to monitor the vessel worldwide like car manufacturers can now? Can the ship builder shut down the ship (or certain equipment) if certain repairs are attempted without its authorization?

What happens when things go wrong? In the 1970s, the guided missile cruiser USS Yorktown (CG 48) was one of the most sophisticated warships in the US Navy, being known as a 'smart ship'. On 21 September 1997, a storekeeper on board was ordering supplies while the ship was underway in the North Atlantic on an unescorted operation. A 'division by zero error' occurred.

The ship's computer system overloaded and shut down. The main computer was connected to everything electronic on the ship. All of that equipment ceased to operate. There was no propulsion. There was no ventilation. There were no regular lights. There was no radar. There was no fire control for the weapons systems. There were no communications. It took several hours to restore rudimentary radio contact so that the casualty could be reported to the chain of command. Other warships were diverted to render assistance. The cruiser was then towed back to its homeport in Norfolk. The incident was classified for some time.

What measures can a commercial vessel take if its computerized controls fail? In February 2019, a container ship approaching New York reported that its onboard computer network had been 'totally debilitated' by malware. A thorough analysis revealed that the malware significantly degraded the functionality of the ship's computer system. Fortunately, in this instance, the essential vessel control systems had not been connected to the computer system. If they had been, this commercial vessel may have been found itself in a situation similar to that suffered by USS Yorktown. Adding more interconnected electronics in future smart-ships, though, increases the number of potential points of failure.

Cybersecurity

There is another issue to consider – cybersecurity.

When all computerized equipment is tied together (such as in a 'smart home' or a 'smart ship'), access to one item can lead to access to all the connected devices. While some or even most of the connected devices may have high-level cybersecurity, if any of the devices have no or minimal security, it may allow a hacker access to the entire system. In 2017, a casino purchased an internet-connected fish tank, designed to allow remote control of the water temperature and salinity. The fish tank controls were placed in a unique portion of the casino's computer network, separate from all financial systems. Hackers were able to gain access to the fish tank controls and then breach the entire network, copying a large amount of sensitive data. The more computerized equipment that are integrated into a system the greater the number of potential targets for hackers.

Manufacturers of computerized equipment are aware of the vulnerability and have the means to reduce the risks. Few, though, invest much time and effort into the process. Risk reduction for each piece of equipment can be time-consuming and expensive, requiring the writing of complex lines of code and utilization of more capable and costly chips. There is little incentive to make those investments.

Purchasers generally buy such equipment based on factors other than cybersecurity. Even if cybersecurity protocols are provided by a manufacturer, purchasers often fail to change the default passwords, effectively leaving the door unlocked.

If hackers can access a smart ship's computer system (in either a targeted or random attack), they can effectively take control of the operation of the ship. Hackers have demonstrated the ability to take control of smart cars, operating the stereo, the windshield wipers, the engine, the brakes, and the steering wheel. Imagine what could be done with a compromised ship.

Summary

The Internet of Maritime Things is coming. It holds great promise, but also great risk. Industry's role must be to optimize the promise while minimizing the risk.

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Maritime Contracts
5 Common Mistakes

Often clients or prospective clients come to me with a commercial contract issue perched on the precipice of full-blown litigation or arbitration. When I ask to see the contract, often times I see errors in drafting that either (1) give rise to the problem before me or (2) could create a bigger problem for the client in the future.

The risk of drafting error is higher for Europeans looking to contract with American companies. While all the parties to the transaction may speak the same language, the legal language (and precedent) is vastly different from Europe to the United States. What follows are five common mistakes I see in maritime contracts in my practice.

Mistake #1 – Not Adequately Specifying the Applicable Law

The General Maritime Law of the United States ("GML") – the body of judge-made case law from the U.S. Federal Courts – as well as a litany of federal statutes govern most maritime matters in the United States. But, if the Supreme Court of the United States ("SCOTUS") has not issued a decision on an issue, the 13 different Federal Courts of Appeal (each covering a geographic region of the country) have the power to make rules that apply only in their jurisdiction. When these courts disagree, what is known as a circuit split exists – and sometimes SCOTUS will resolve it, other times the rules will vary from New York to Texas to California.

Additionally, the SCOTUS decision in Wilburn Boat in 1955 determined if the GML is silent, state law can "fill in the gaps." So, on top of the federal precedent, certain decisions from individual state courts or state statutory laws can supplement the GML.

And, there are some federal statues, such as the Outer Continental Shelf Lands Act ("OCSLA") that extend concurrent jurisdiction for state and federal courts, and, depending on the activity, can actually force state law to supplant the GML.

Obviously, this overlay of what law applies (and the situations in which it applies) is vastly different than what is present in Europe. A good choice of law clause can help the parties avoid most, but not all, of the issues related to which law applies.

Mistake #2 – Not Specifying the Forum/Method of Dispute Resolution

The second problem area ties directly into the first – many maritime contracts lack either a forum selection clause (picking the location of the litigation) or an arbitration clause, which are normally favored in commercial and passenger disputes but are less available in the case of injured workers. SCOTUS has repeatedly held both of these types of clauses to be generally acceptable in a maritime contract.

A forum selection clause is usually a good idea if the parties don't want to arbitrate, as it fixes the location of the lawsuit. Depending on how the clause is phrased and the nature of the dispute, the parties could avoid state court entirely, and also waive the right to a trial by jury.

In an international agreement, many parties favor arbitration clauses. There are advantages to arbitration such as limitations on discovery and, in the case of parties from different countries, it is easier to enforce an arbitration award than to domesticate a foreign judgment.

A corollary issue is the use of permissive language instead of mandatory language. I see this often in dispute resolu-

tion clauses that are not drafted by trial attorneys, but instead by transactional attorneys. If the language is not sufficient, the clause is merely optional, and an aggrieved party can sue anywhere where they may be able to establish jurisdiction.

Mistake #3 – Failure to Launch on Indemnity

Many times, especially in a master service agreement context, parties will agree to reciprocally defend and indemnify each other for certain types of claims or situations. However, a failure to understand (1) where the contract will be performed and (2) the applicable law resulting therefrom can nullify what would otherwise be a valid indemnity agreement. Two examples of state statutes that can nullify such agreements are the Louisiana Oilfield Anti-Indemnity Act and the Texas Anti-Indemnity Act, especially if OCSLA applies to the contract. Depending on the circumstances, the parties may not be able to contract around these state laws with a choice of law clause. However, creative language does exist that can reduce the chances of a state law invalidating an otherwise acceptable indemnity agreement.

Mistake #4 – Not Addressing Limits on Liability

The GML as well as state law allow for limitations on damages, especially in commercial contracts. Many times, I see poorly drafted damage waivers that will either not survive judicial scrutiny or don't offer the protection the parties believe.

An example is the $500 package limitation in the Carriage of Good by Sea Act.

While COGSA applies by default, parties can work around the package limitation either by (a) defining a package and the package value in the bill of lading and/or (b) excluding the application of COGSA from the transaction in the contract at issue. However, reliance on old forms will likely not provide the limited exposure sought by the parties.

Mistake #5 – Fine Print Waivers or Indemnity Clauses

In the late 1970s and 1980s, the rock band Van Halen had a clause in a technical rider to the band's contracts with concert venues whereby 1) the arena had to provide a bowl of M&M candies at sound check with 2) all brown M&Ms removed. This seems like typical rock star/diva behavior. However, National Public Radio reported in 2012 that Van Halen used this language to make sure the arenas and venues read the fine print in the contract on the technical specifications needed for Van Halen's equipment and stage set up. Brown M&Ms in the candy bowl meant the venue had not read the contract, and there would be far bigger problems with the set up and safety.

Along these same lines, I often see a huge drafting error: defense and indemnity clauses or limitation of liability clauses are in the same typeface/font/size as the rest of the contract. Most U.S. jurisdictions, as well as the GML, require that an indemnity agreement be "specific and conspicuous."

The easiest way to fix this is to use a completely different font, and font size.

And, the lack of a specific or conspicuous indemnity clause can, like the presence of a brown M&M in a dressing room, be an indicator of far greater problems with the contract at hand.

I appreciate the need for businesses to reduce cost. I also appreciate the need not to reinvent the wheel. However, failing to use a knowledgeable admiralty or maritime attorney on the front end of a transaction, either with assistance in contract negotiation and/or drafting/reviewing the same can and often does lead to a much larger cost on the back end, when something goes wrong and litigation or an arbitration arises.

Rik van Hemmen is the President of Martin & Ottaway, a marine consulting firm that specializes in the resolution of technical, operational and financial issues in maritime. By training he is an Aerospace and Ocean engineer and has spent the majority of his career in engineering design and forensic engineering.

Taming Ferry Wakes & Reducing CO2 to Boot

Will Moon was one of my very early engineering interns (and also helped me finish out the second story of my house decades ago). He has since moved to the West Coast and has worked for the naval architecture firm Glosten for quite a while now. In Marinelink I saw a quick flash of a foiling passenger ferry and the name Glosten and I contacted him for a closer look.

Will provided me with more information and this is one of those cases where I really like what I see. This is still an early concept that was developed with the designers and composites engineers at Bieker Boats, but it has a bunch of features that may be of real benefit in future ferries (and other work boats, such a crew boats) and opens a much larger discussion of what we want ferries to be like when we all grow up.

Foiling ferries have been around for decades (I actually interviewed for the Boeing Jetfoil program when I graduated college), but they never made it past a very tentative go.

From what I could see there were technology issues. The control systems were very expensive and difficult to design, the foils were expensive to manufacture, the most suitable materials were aluminum for the hulls and steel for the foils, there were few suitable powerplants and, most of all, the drive train could only be described as a bear (there are other terms I could use, but you get the drift).

In the last decades we have actually made a huge amount of progress in those departments and to get a ferry to foil is techni-

This foiling passenger ferry from Glosten is still an early concept that was developed with the designers and composites engineers at Bieker Boats

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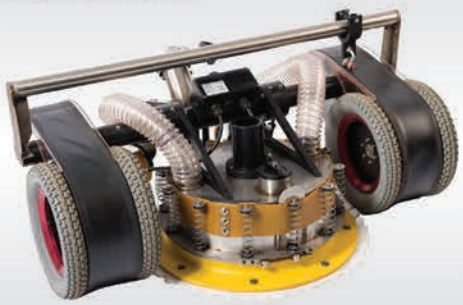

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-cally no longer so difficult.

Foiling math is fun, and it is now well established in the high-performance sailing world. Foilers do not operate with a large amount of hump drag and therefore they do not need a large amount of installed power to get over the hump. Once they get on foil, a well-designed foiler can burn as little as 50% of the fuel a catamaran burns. But that is only the beginning of the fun, a foiler has inherently low wake and is less affected by waves. The Glosten/Bieker design dials in on these advances in materials, controls, and propulsion. It also reaches back to an ancient planing hull design, a Seasled hull, which is just about perfect for a foiler like this.

Ferries are always optimized for a run, so let's look at this design for my favorite run; Atlantic Highlands to NYC. It is a great run for a ferry of this type. (But there may actually be less challenging runs out there in deep rivers, fjords and bays). The ferry is a little small in today's Atlantic Highlands traffic, but let's make her an off-hour ferry, and use her for the lower density runs throughout the day, including a nice late night run that can get me home after a broadway show and a post-show drink.

In this application she will need retracting foils to deal with the shallow water depths at Atlantic Highlands. At present the bow foils do not retract, but Will tells me that can be changed rather easily.

If she has electric propulsion pods in her aft foil, they can simply be raised to provide sufficient bottom clearance. If there are nice sleek off-the-shelf propulsion pods in the 250 kW range (I would like to use four and she is a 1000 kW boat) it could be even more interesting. Glosten suggests two 600kW generator units to deal with Tier 3 to Tier 4 issues, although, theoretically, a single engine would be even more efficient. Remarkably, battery electric propulsion is not out of the question. Remember, once power requirements go down, battery realities go up.

The Glosten design shows the engine at midship, Will tells me that is related to CG and foil lift proportioning issues. I know it is possible to refine that and I would insist on a stern mounted engine room. That would require only one sound proof bulkhead and result in a much better cabin with the added benefit of being able to use a zero deadrise seasled transom (more efficient lift, cheaper to build and a better engine room).

I would like her to be a bow loader (for one thing bow loaders do not get damaged as easily during docking and operators are cagey about composite ferries due to impact damage issues). It would need to be a nice aerodynamic bow loading arrangement that can interface with existing bow loading dock arrangements, but, again, that is related to inspired design and is not a deal breaker.

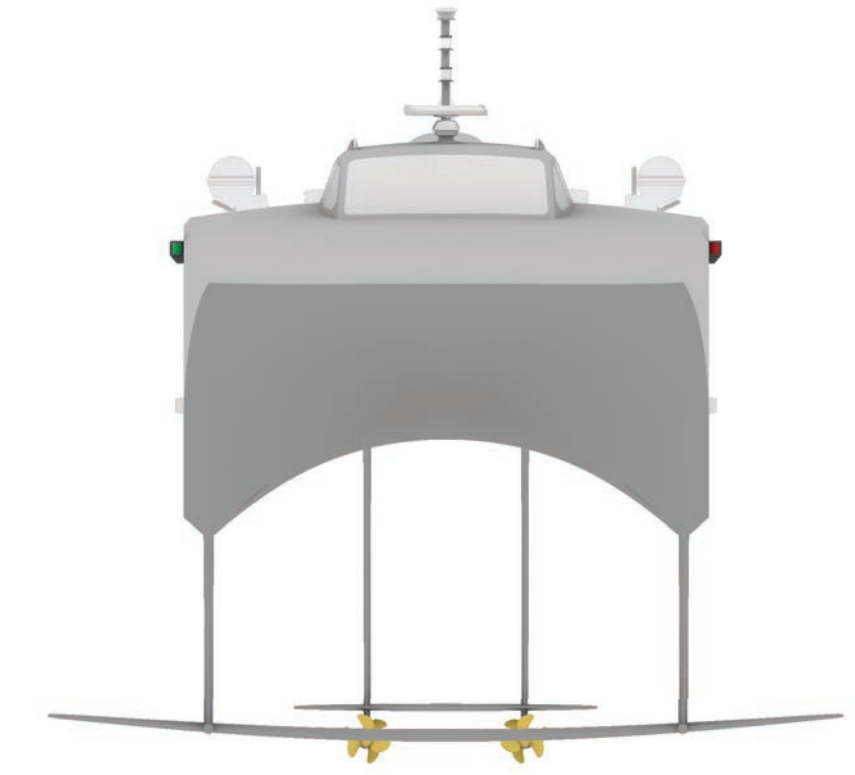
Configured that way, she can get into the shallow water ports, load passengers, accelerate to foils speed, do her 27 nautical mile run in occasionally rough water in less than an hour, and get me there in comfort and style, with reduced wake and fuel consumption. It sure would make me happy.

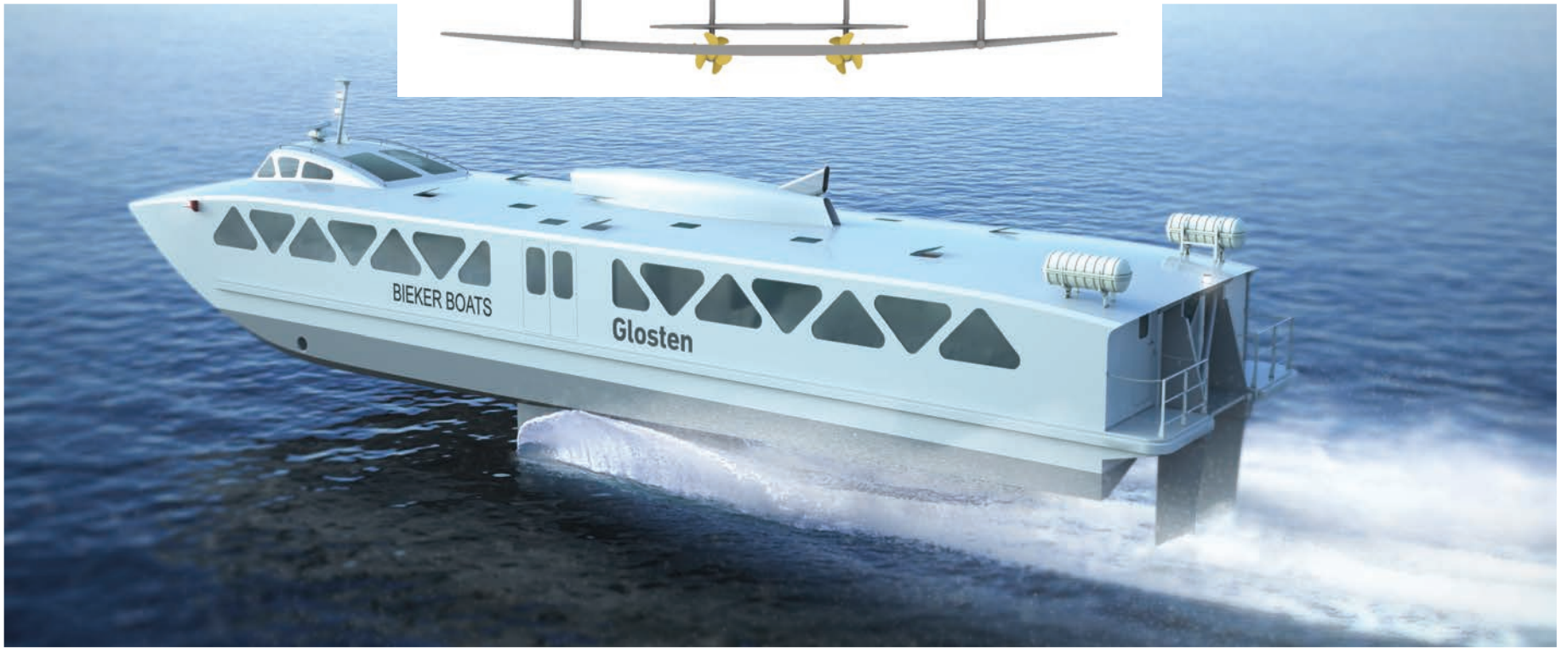
I am not saying it will be easy, more deep thinking will be required, such as seating to keep passengers safe in foil collisions, and interpretation of present rule restrictions for larger composite passenger ferries. At first glance there are no 250 kW permanent magnet off-the-shelf high speed propulsors, but based on a quick internet search I could be wrong; they may be out there though.

But even while we are waiting for those propulsors we can do further refinements, discuss USCG regulations, and have some fascinating hull structure discussions. For example, is this a 20 knot hull (which is the take off speed where she will no longer impact waves) or is it a 35 knot hull (in case she has a rough landing with a foil collision). I am sure that will also be solved; you can already see that some pretty slick composites designers have worked on this concept; forget about square windows, they are a waste of good structure, hence the truss sides to make this boat really light.

Proof of concept vessels are important. I know there are some wealthy people who commute to New York City by water, maybe they would be interested in a 1/3 scale commuter, no more worrying about big waves in a small boat. Spread the word. I like what I see on paper, I'd really like to see it in real life.

For each column I write, MREN has agreed to make a small donation to an organization of my choice. For this column I nominate 350.org, https://350.org/ one of the main international grass roots advocates for keeping atmospheric CO2 at 350 ppm. We have already exceeded that limit and it is not slowing down yet, but, as an engineer, I know we can do it.





Images: Glosten

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Joan Bondareff is of counsel in Blank Rome's Washington, D.C., office who focuses her practice on marine transportation, environmental, regulatory, renewable energy, and legislative issues. She currently serves as Chair of the Virginia Offshore Wind Development Authority (VOWDA), an appointment by Virginia Governors Terry McAuliffe and Ralph Northam, where she promotes offshore wind and renewable energy for the Commonwealth of Virginia.

Dana Merkel is an associate at Blank Rome LLP and prior to joining Blank Rome, she worked through the International Organization of Masters, Mates, and Pilots as a Third Mate and Qualified Member of the Engine Department (QMED) for several international shipping companies in the container, dry bulk, and tanker segments of the industry.

New Offshore Wind Jobs:
Industry, Schools Must Prepare Now

The offshore wind industry in the United States is growing exponentially, with multiple projects in the development stages off of the Atlantic coast. The total megawatt capacity of U.S. offshore wind farms is anticipated to reach 22,000 by 2030 and 43,000 by 2050. To support this growth, U.S. Department of Energy reports estimate over 40,000 new jobs will be created by 2030.

The new jobs anticipated to support the offshore wind industry include a wide range of types, including engineers, trade workers, surveyors, scientists, technicians, managers, and seafarers. Wind turbine technician has been one of the fastest growing occupations in the United States in recent years. The educational requirements for these new jobs also varies widely from high school diploma to Ph.D. There is a growing concern that the United States will not have a sufficiently trained workforce capable to support offshore wind farm development, construction, and maintenance. A recent Department of Energy study focused on the Wind Energy Workforce in the United States highlighted the workforce gap issue. Although focused on land-based wind farms, the study identified significant gaps in wind and renewable energy educational programs and hiring percentages from those programs.

Development of Training and Safety Standards for Offshore Wind

The first step in ensuring a qualified workforce is determining what topics should be taught and what standards should apply. Many offshore wind companies mandate use of training standards developed by the Global Wind Organisation ("GWO"), a non-profit founded by wind turbine manufacturers and operators. GWO created training standards are implemented and taught by GWO-certified training providers. Currently six trainings are available, including: Basic Safety, Basic Technical, Advanced Rescue, Enhanced First Aid, Blade Repair, and Slinger Signaller. As these training classes have been critically reviewed by the worldwide offshore wind industry and mandated as the baseline safety training for employees of numerous internationally operating offshore wind operation and support companies, they are an important baseline for development of U.S. trainings. Although the baseline GWO trainings may be sufficient for some of the anticipated new positions, most will require some type of additional education, such as trade school certificates, undergraduate degrees, or even post-graduate level degrees.

Education and Development of the Offshore Wind Workforce

• Investment in Workforce Development

Concerned about the forecasted lack of U.S. citizens qualified to fill the projected offshore wind jobs, the United States and a number of states, as well as offshore wind developers have been taking action to invest in the education and development of a qualified offshore wind workforce. Federally, the Offshore Wind Jobs and Opportunity Act (the Job Act) was introduced this year and is currently pending in Congress. The Job Act would provide up to $25 million in federal grants to colleges, unions, and nonprofits to prepare "a new generation of offshore wind workers."

A number of states have also developed programs for offshore wind training and development programs. The Maryland Energy Administration introduced the Maryland Offshore Wind Workforce Training Program, which provides grant funding to training centers to "ensure Maryland has a ready and able workforce capable of contributing to the construction, installation, and operations & maintenance of an offshore wind energy project." The program has a budget of $1.2 million for 2020.

Massachusetts awarded $721,500 earlier this year to six academic institutions for offshore wind workforce training and development programs. One of the recipients is the Massachusetts Maritime Academy, which put the award towards funding construction of an offshore wind crew transfer training facility and establishing the GWO courses. The Academy aims to be the first institution in the United States to offer the GWO courses.

New York is working with the private industry to create an Offshore Wind Training Institute and created a $3 million Community and Workforce Benefits Fund to provide New Yorkers with the skills and safety training needed to participate in the offshore wind industry.

Finally, private offshore wind farm developers are investing in the education and development of their own future workforces in the United States. Offshore wind developer Vineyard Wind's Windward Workforce program will "recruit, mentor, and train residents of Massachusetts, particularly southeast Massachusetts, for careers in the Commonwealth's new offshore wind industry." With $2 million dedicated to the program, it will be a partnership with vocational schools, universities, and associations. $200,000 of the awards made by Massachusetts came from this fund.

Ørsted and Eversource, partners in the Sunrise Wind development, have also committed to contribute $10 million to create a National Workforce Training Center in New York with Suffolk County Community College and leading labor unions.

• Offshore Windfarm Training for the Seafarer

A maritime industry trained and ready to engage in offshore wind farm construction is necessary to facilitate offshore wind development. Although a number of colleges and unions are providing classes and training on various aspects of offshore wind farm work, Massachusetts Maritime Academy is the only maritime school thus far creating courses and building resources specific to the seafarers' role in this growing industry. Course development focused on offshore wind farm work and funding at other maritime colleges and trade schools is critically needed to ensure the availability of capable, experienced seafarers to support a growing offshore wind industry. The Maritime Administration should take the lead in creating a new curriculum for offshore wind workers with training at Kings Point and the six state schools. MARAD should also engage with Congress on the Job Act to add a component for maritime workers and funding for their training at the above institutions. The U.S. Offshore Wind industry is growing and seafarers and their benefactors should take advantage of this growth with new programs graduating mariners ready to take on this role.

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AOT is working to develop a new port, specifically configured to serve Atlantic Ocean wind projects, on 30 acres along the Arthur Kill tidal strait between Staten Island and New Jersey.

Boone Davis,
President & CEO, Atlantic Offshore Terminals

By Tom Ewing

On September 26, the State University of New York Maritime College hosted a conference on the emerging east coast offshore wind industry. "Offshore Wind Power, Planning for America's Ocean Energy" focused on four fundamental topics:

- ***East Coast Wind Farm Overview – Status of the Industry.***

- ***Jobs and Supply Chain Technical Working Group.***

- ***Wind Farm Port Development.***

- ***Offshore Wind Maritime Operations.***

In some ways, actually clocking in for a day's work on an offshore wind turbine is tantalizingly close. Ditto for power flowing from an offshore substation to a mainland interconnection. In other ways, though, these tangible, physical endpoints remain on the horizon, ebbing back and forth; seemingly close one day, distant again the next.

After the conference, I followed up with a number of the SUNY panelists. I asked for details on what they said to their peers to keep OFW implementation moving along. (Not everyone responded to an interview request.)

One top issue: there needs to be decisive moves on port development. More specifically, officials need to select one port as a regional center for offshore wind. Until that's settled, big infrastructure investments won't happen.

It's often said that with taxes and fees government sets a market context, establishing conditions to channel private sector investments. Power purchase mandates and renewable energy credits, for example, signal clear public policy preferences for renewable generation. These are frequently called "market based" policies that don't pick winners and losers since any company can seek to participate in this new fair and open market.

It may not be that innocent. With port development, governments may have to pick a winner to advance the larger public policy goal of renewable energy.

These selective decisions, though, are politically awkward. That's because state and local governments are counting on offshore wind to turn ports into centers of economic activity, at a big scale, something like a new GM plant in Detroit in the 1950s.

Critically, though, there aren't going to be 25 such economic engine ports on the east coast. More realistically, the New York–New Jersey Bight will likely have one central OFW port.

There are a number of reasons for this. An OFW port requires vast space, unrestricted overhead clearance, and heavy, weight-bearing infrastructure. It needs deep drafts for berthing and maneuvering. There aren't many of these locations. And, an OFW port adds up to a very expensive asset. You don't want to build five of them.

In fact, these specific requirements exclude most east coast ports. That's the assessment from Boone Davis, one of the panelists in the SUNY discussion on "Wind Farm Port Development." Davis is President and CEO of Atlantic Offshore Terminals (AOT). He was the project manager at the Block Island Wind Farm Project.

AOT is working to develop a new port, specifically configured to serve Atlantic Ocean wind projects, on 30 acres along the Arthur Kill tidal strait between Staten Island and New Jersey. Davis says the AOT site would be the only offshore wind port in New York with direct ocean access and no bridge clearance issues. AOT's first-to-market readiness and location makes it likely the new facility would capture the majority of all East Coast staging and assembly work.

That's quite a victory. But is it too self-serving, unfairly benefiting one company? Maybe there are workarounds for bridge clearance problems. Maybe port location should be decided on other issues, say, workforce development, particularly building a diverse workforce, a top concern among policy makers. If workforce is the analytical filter, maybe a port in Brooklyn would better meet OFW's social goals. [New York officials from the SUNY conference did not respond to interview requests.]

New York is making $200 million available to help fund OFW land-side projects. Davis and his team will apply for some of that funding. Again, there can't be two or three or five of these major ports. Whatever the criteria, decisions are needed now if actual ocean-based construction is to start in the next few years and scarce resources, i.e., money, are used to greatest impact.

Of course, it gets more complicated. Is a NY port acceptable to New Jersey politicians and ratepayers and voters who also expect some pretty hefty returns

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"The US needs to develop a workforce from scratch," noting that a massive campaign was undertaken in the UK, something that needs to start now in the United States.

Laura Smith,
USA Director for Atlas Professionals

from renewable energy? NJ wants to develop 3.5GW of OFW. Will that be built through a New York port? Or would NJ pay to build its own "home port," if you will, in Newark or Bayonne, just a few miles, say, from Staten Island, in order to maximize home state employment and social benefits? That's not likely but if there are to be formal interstate compacts regarding project labor agreements, community benefits and revenue sharing, again, that work needs to be finalized ASAP.

Interestingly, NJ has taken a close look at ports best suited for OFW staging. In 2014, SUNY professor Dr. Shmuel Yahalom published a report titled "Offshore Wind Development Research FINAL REPORT" (FHWA-NJ-2014-008) written for the NJ Department of Transportation. It lists 5 priority ports:

- Port Jersey
- Port of Bayonne
- Port Newark
- Beckett Street Terminal (Camden)
- Port of Paulsboro.

Dr. Yahalom was a participant at the September SUNY conference, on the panel focusing on jobs and supply chain.

In the 2014 report, Yahalom writes: "Every port on the short list has to invest in order to accommodate the OSW industry. Some investments include infrastructure investments associated with accessibility from a highway or rail." Urban highways: complex, expensive. Railroads: make highways look easy.

Interestingly, when asked about Dr. Yahalom's report, NJ DOT officials would not comment. They referred questions to the State's economic development team, who could not find the report.

The concern here isn't sloppy library work, it's time – lost time. Five years after completing an extensive presentation of challenges and recommendations, developed by NJ itself, state officials are again promising a rigorous look to help fast-track a brand new industry.

There are other reasons requiring a deliberative, focused approach to port development. Offshore wind proponents are casually confident in references to employment and economic benefits. Those benefits, though, aren't inevitable. Laissez faire may not be enough.

The topic of OFW and ports and public sector benefits was part of a critical focus at an October forum in California. Researcher Robert Collier and a team from the UC Berkeley Center for Labor Research and Education presented results from a paper titled "CALIFORNIA OFFSHORE WIND: Workforce Impacts and Grid Integration."

Collier's study presents some sobering conclusions from the UK, the world leader in offshore wind.

- Most of the offshore wind workforce is white collar rather than blue collar.
- The Scottish Trades Union Congress found that predictions of fast job growth in offshore wind were exaggerated.
- Governments failed to adopt policies to create a local supply chain of turbine manufacturing.
- The Union report described a "failure to build a domestic industrial base and an over-reliance on imported goods and services."
- Production shifted overseas, to state-protected industries with an uncompetitive advantage.

In remarks at the CA conference Collier raised another rather surprising concern: many port officials, including those from LA, Long Beach and San Francisco, don't really want wind sector business.

The reason: to protect traditional port activities – moving freight, facilitating through-put. Port officials do not want to maintain huge industrial sites. Collier said that California needs a port-by-port analysis to prepare for offshore wind. His prediction: "the results will be scary."

Workforce development is another issue closely linked to port development. Laura Smith is the USA Director for Atlas Professionals, a staffing and recruitment company that specializes in maritime related employment. In 2017, Smith moved from England to the US (Houston) to help the company work on offshore wind projects on the East Coast. Smith participated in the SUNY discussion panel on "Jobs and Supply Chain."

In an interview after the Conference, Smith said the potential US OFW workforce is comparable to its European counterpart when wind projects were first proposed. "The US needs to develop a workforce from scratch," she said, noting that a massive campaign was undertaken in the UK, something that needs to start now in the US.

She looks for a dynamic that is somewhat unusual in the US: encouraging people to move to port areas with new opportunities. She notes a sincere commitment among US workforce professionals, but she wonders whether training requirements and programs are ready now, ready to start. "Maybe we should have done it (workforce development) before the projects took shape," Smith commented.

She expects some "sticky conversations" between American trade unions and emerging supply chain issues regarding Project Labor Agreements (PLAs) and Collective Bargaining Agreements, resulting from possible misalignments between an American workforce working within a largely European corporate milieu.

She noted further that some partner companies have specialized equipment and assets requiring years of training. Companies will want to see allowances for "flexibility and variances, regarding, for example, work rotations, shifts and breaks. It will be complicated."

Smith listed three priority workforce tasks for 2020:

1. Increase diversity among the potential workforce pool.
2. Standardize training and establish cross-state cooperation.
3. Public sector officials need to formally establish the conditions for collaboration – within supply chains, trades, academia and industry partners. "Everyone needs to be open to a hybrid personnel situation," Smith advised, "something necessary just to get the job done for these initial early phase projects."

Getting the job done. The public sector cannot remain distant. That side of the partnership will be critical for years to come.

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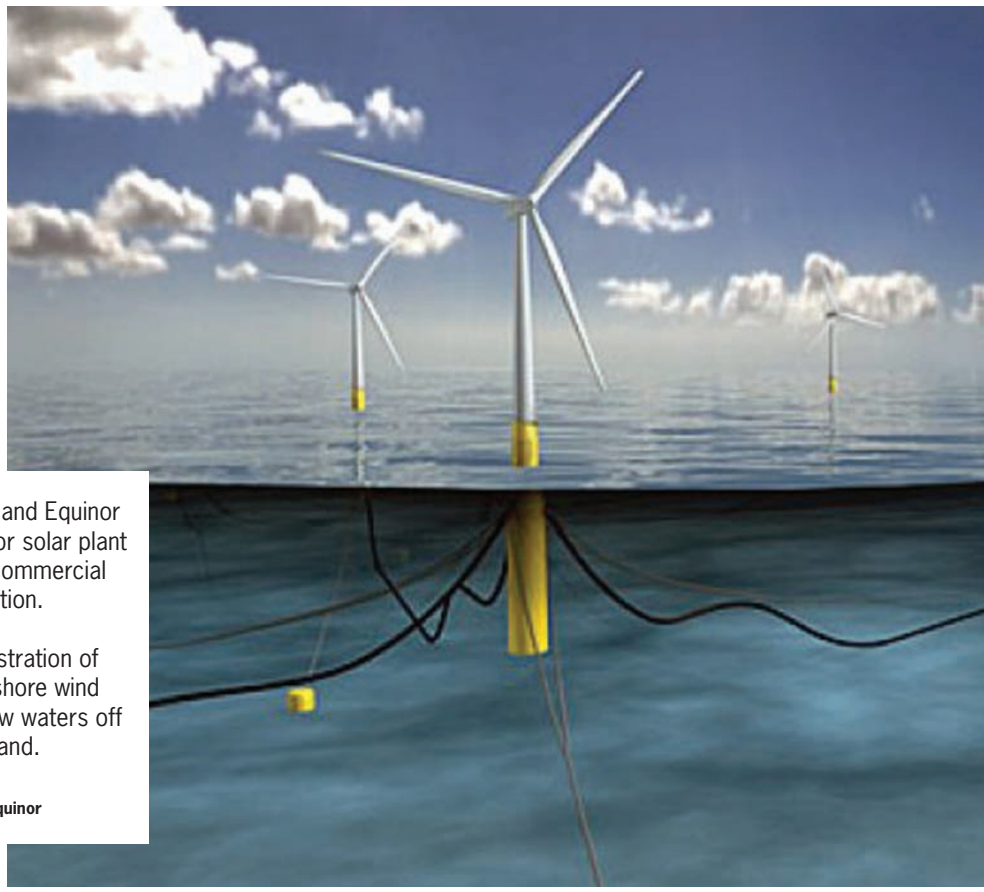
Equinor Invests in Solar & Wind Energy in Brazil

By Claudio Paschoa



Scatec Solar and Equinor have first major solar plant in Brazil in commercial operation.

Equinor illustration of Hywind offshore wind farm in shallow waters off Scotland.

Photo: Equinor

New technologies have contributed for clean energy sources to be aggregated to the main business plans of major O&G companies looking for global sustainability options. Some IOCs have looked with interest at Brazil's clean energy market in search of new opportunities for acquiring renewable assets in the country, seen as one of the most attractive in the world for investments in solar and wind energy generation. The search of alternative energy sources in Brazil is spearheaded by Norway's Equinor - which already owns clean energy assets in Brazil - along with France's Total, Royal Dutch Shell, and possibly also UK´s BP.

Equinor opted for a comprehensive business strategy, therefore, along with being a major player in the local oil and gas sector, it has been working on expanding its portfolio in Brazil by way of renewable energy projects with investments in solar and wind energy. Brazil is strategic to the company´s clean energy production plans. Equinor´s first solar energy project in the world is in Brazil – the Apodi solar power plant in the northern state of Ceará. According to Margareth Øvrum, Equinor´s president in Brazil, this change in policy was highlighted by the change of the company´s name from Statoil to Equinor last year. "If we go back a few years before this name change announcement, we can see that Equinor was already developing itself into a company with ample energy interests, producing the oil and gas which the world still needs, but with lower emissions, at the same time that it built a lucrative portfolio within the renewable energy market," said Margareth. Equinor is at the top of the ranking of O&G players most prepared for a low carbon future, according to CDP, an international organization that helps companies and governments to undertake actions to lower emissions. Equinor is also a supporter of the Paris Accord on emission control. According to Margareth, Equinor works in conjunction with other sectors of society to offer answers to the many changes the world is going through – defining what kinds of resources are produced and how they are produced - "We are working strongly to reduce emissions in our ongoing operations and development projects," said Margareth. Equinor is working systematically in bettering its energy efficiency, tracking and reducing methane emission in all its natural gas value chain, working with its suppliers to reduce CO^2 emissions in its logistics chain and innovating by capturing and storing CO^2 in all its operations.

Equinor´s new strategy triggered a series of internal transformations which reflect on daily business practices. One of their aims is for its total oil and gas portfolio to reach 8kg of CO^2 per barrel of oil produced, a number significantly below the industry average of 17kg of CO^2 per barrel. Their investments are on a rise in terms of renewable energy, mainly related to solar and offshore wind energy. Equinor has earmarked around 15 to 20% of its total annual investment for the development of new energy solution until 2030. Much of these resources are pegged for innovative projects, such as deepwater offshore wind energy farms, placed on barges. To date there are three major offshore wind energy projects in the North Sea and it is hoped that the constant offshore winds present off the coasts of north and northeast Brazil will prove to be ideal locations for large offshore wind farm projects.

Other offshore wind projects are in development in the United States and Europe, in Europe alone, these projects are responsible for supplying energy to over one million residences. Up to now, around $2.3 billion have been invested in this area and Equinor´s proprietary technology in floating wind farm platforms should permit its use in deepwaters, which may be another solution for producing clean energy to be used on remote pre-salt production units offshore Brazil. It is important to note that until 2030, Equinor will invest $15 billion in its strategic operations in Brazil, the largest foreign investment that the major player is committed to globally. A significant part of these funds is tar-

Equinor has earmarked around 15 to 20% of its total annual investment for the development of new energy solution until 2030.
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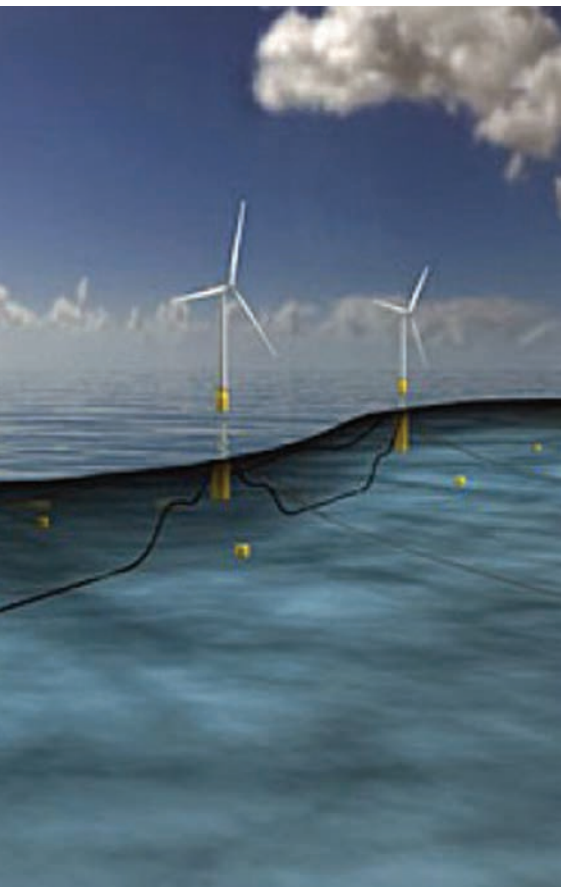


geted at clean energy projects. Presently, Equinor has major O&G projects in the Campos and Santos basins, such as the Carcará development, which is the first large pre-salt project being developed by an IOC in Brazil. The Carcará reservoir is believed to contain at least 2 billion boe of recoverable hydrocarbons. Beyond these investments in traditional O&G plays, Equinor has a large solar energy farm in the state of Ceará which began production in 2018 and is operated by its partner Scatec Solar. This project alone is already producing 162MW of solar energy. Equinor also has a strategic partnership with Petrobras to evaluate offshore wind energy production. “Brazil has a great potential for solar and wind energy generation and we are carefully evaluating business opportunities in the country. We have signed a memorandum with Petrobras to begin to evaluate potential business opportunities in these areas. It´s early and we are talking to various interested parties to better understand the best form of operation,” said Margareth.


EIKLAND VENTURE

Photo courtesy Ulstein Group/Marius Beck Dahle

OSV Market

Which way is Up?

The environment in oil patches onshore and offshore alike has been challenging throughout 2019; worries about an economic slowdown – whether cyclical or induced by a trade war – have weighed heavily on oil prices, even in the face of reduced production by the big producers. **Though storm clouds persist, there appears a clearing on the horizon**

By Barry Parker

CAROLYN CHOUEST: Edison Chouest vessel working Pacific waters.

Photos: Iain Cameron

The fate of Offshore Service Vessels (OSVs) is, naturally, closely tied to the price of oil. Seacor Marine's John Gellert, in reviewing its Q2 results, said: "Activity levels in the U.S. Gulf of Mexico remain tepid as customer demand is highly sensitive to oil and gas prices." In spite of these efforts, and in the face of demand slowdowns, stockpiles of oil have continued to grow, as increases in demand have been minimal. Data from the International Energy Agency (IEA) showed OECD oil stockpiles approaching 3 billion barrels, down slightly from the record inventory levels following the 2014 – 2015 price plunge. In mid-October IEA reduced its estimates of demand growth for the second month in a row, and said: "We expect growth in 2019 to be the weakest since 2016, following evidence of a slowdown in several major consuming regions and countries …"

At present, oil prices will not support large scale investment in new fields. Moving towards year-end, the forward price curves, starting with nearby months in the mid $50's/barrel (basis WTI) are essentially downward sloping, with a slow glide down to around $50/barrel for positions two years out. Prices for Brent oil, slightly higher (with nearby at around $60/ barrel) follow a similar pattern. Natural gas prices also remain near their long-term lows, with supply increasing from a raft of new landside production initiatives. Though the average full cycle costings for new projects in the U.S. Gulf of Mexico hovers just under $40/ barrel (basis a 2018 study conducted by IHS Markit for the Bureau of Ocean Energy Managment), the top half of the cost dispersion reaches above $70/barrel suggesting that many projects would not see Final Investment Decisions.

Demand for OSVs and workboats in the oil patch begins with the underlying drilling activity which, in turn, flows from views of the broader oil markets going forward. The offshore drillers have seen the deleterious impacts of the difficult macro environment, and the lack of sentiment for a sustained demand driven upward turn in the prices for oil and gas. In mid-September, the unprecedented attack on Saudi oil facilities led to an initial price hike, but this was based on reduced supply, not on improving economic conditions. As predicted, the prices retreated as supply was quickly restored. Indicative of geopolitical risks, oil markets saw temporary (but slight) jitters as an Iranian tanker sustained a missile attack in the Red Sea a month later. At the same time, by mid-October, Saudi production was back on track. Not surprisingly, listed drilling entities, and many of the service providers, continued to see their shares trading at multi-year lows.

Consultants McKinsey & Company, in a mid-2019 report, offered that: "2019's market started with some of the lowest activity levels seen in 20 years, with rig demand about 3 to 4 percent lower than it was in 2017. In that same vein, operators have not increased offshore exploration capital expenditures. Although some premium rigs have been reactivated recently, we anticipate that the market will be slow to recover."

Rystad Energy, in a 2019 report on the U.S. Gulf of Mexico, explained to clients that: "After 2015, the offshore rig market in the U.S. witnessed an unprecedented shift, with the pendulum swinging from the long-standing dominance of jack-up activity in shallow waters, to becoming predominantly a market for mid-water and deepwater floaters." On an early summer Evercore ISI podcast, Transocean (NYSE: RIG) Senior Vice President Roddie Mackenzie, looking for an uptick in 2020 and 2021 with continued momentum in the U.S. Gulf of Mexico, stressed the new openings for independent oil companies (IOCs) in Brazil and in Mexico.

Looking into the future, as the focus of non-national oil companies moves into deeper waters, the McKinsey consultants see continued scrappage of jack-ups, against the backdrop of annual demand growth at 1%. In a discussion of demand for "floaters" beyond 2019, the consultants are saying: "… growth—to the tune of 6 percent per annum between 2019 and 2027, is expected to follow. Key growth regions will be Africa, Brazil, and the Gulf of Mexico…" By mid-2019, there were signs of life. Consultants Westwood Global Energy wrote, in a briefing, "High-impact exploration drilling activity increased substantially in the first half of 2019 with 51 exploration wells completed, compared to 36 in the same period in 2018." They identify Guyana as an important offshore region.

For the operators of the OSVs, staying afloat, and following the money comes down to riding those trends (to deeper waters), while at the same time exercising "discipline"- which means not reactivating "stacked" vessels in response to short term price blips and, rather, consid-

DEMEREST TIDE: Tidewater vessel now working Eastern Mediterranean

Photos: Iain Cameron

ering longer term sentiments. A reckoning in an early September 2019 conference presentation by Tidewater (NYSE: TDW) reveals a total industry supply of 3,419 vessels, roughly evenly divided between anchor handlers and platform supply boats.

Within these fleets, roughly 1,000 are classified as "stacked" with a little under 300 described as "idle". More telling are the approximately 650 (in the stacked category) laid up for more than two years. Within these, 360 units are more than 15 years old.

Financiers also note the overhang of older oil service vessels in the marketplace. Speaking at Capital Link's Ship Finance Forum at London International Shipping Week, Kevin O'Hara, from AMA Capital Partners said that "…offshore is in much worse shape…" than other segments of shipping. We have not seen the amount of assets reduce at all … we've seen sales of fleets … when the vessels are sold, none of them go for scrap." For Tidewater (with a clean balance sheet following its mid-2017 emergence from bankruptcy, and an industry topping fleet of 198 OSVs following its subsequent acquisition of GulfMark International), its prospects are brightening. Its presentation notes that 57% of revenues are derived from deepwater units, and that dayrates for high spec OSVs are rising. In North Sea, where 21 Tidewater units are operating, its slide deck points to a near doubling of day rates for large PSV's from $7,400/day up to nearly $14,500/day (with similar, though less dramatic upticks in the U.S. Gulf and in West African waters).

Large peers have faced rough currents. The parent company of Bourbon Marine Logistics, second in the vessel count with approximately 175 OSVs (part of a much larger fleet of nearly 500 vessels), had filed for "reorganization" in late July, after lengthy efforts to reach accommodations with its lenders. Its daily business will continue while discussions are underway to re-jigger its debt obligations and payments; it will continue to implement a bold strategic plan dubbed BOURBONINMOTION, where smart technology deployment will ultimately lead to manpower savings. The reorganization is a moving target; in early October, the group said that it had received a purchase offer from a "company owned by a group of French banks."

The pickup in areas identified by McKinsey may benefit the U.S. outfits.

Todd Hornbeck, on his company's Q2 conference call, brought the high level focus down to specifics, describing fresh activity "…not just in the Gulf of Mexico, Brazil, the whole Northern Coast of South America, Mexico, this whole hemisphere is really starting to be able to point to actual demand drivers when they are coming in, the companies that we service are making announcements that they are doing new projects. "

Tidewater's activity in West Africa encompassed 50 units (more than the 15 operating in the U.S. GOM). Mexico, where Hornbeck Offshore Services (NYSE: HOS) has a large fleet working the Bay of Campeche, also saw Tidewater operating 13 vessels. Brokers Bassoe had noted that (in contrast to the U.S. trend), "Mexico has become a key region for jack-ups again."

Privately held Edison Chouest, active in the GOM (working closely with multiple oil "majors"), also maintains a large presence in Brazil, another area pegged for a possible rebound. Guyana has attracted attention as exploration has ramped up in the face of recent discoveries; active in the area since 2016 (with nearly a dozen vessels working), Edison Chouest, working for Exxon Mobil, established an office there late last year.

Beyond the Americas, operators in the North Sea are seeing a stronger market.

Seabrokers (with offices in Stavanger, Aberdeen and Brazil), in their October market report, point to average utilization in the North Sea of 78% for large Platform Supply vessels, 66% for medium size Anchor Handlers, and 61% for large Anchor Handlers, which were seeing dayrates just above $40,500, more than double those of a year earlier. As contrast, Seacor pegged its Q2 fleet utilization in the U.S. Gulf at 34%, well below its overall measure- at 72%.

The tide may be turning, with the statistics beginning to bear out the optimism of Todd Hornbeck and others. Evercore ISI's James West, a long-time analyst of listed companies, explained to investors in the rigs which drive demand for OSVs, in a late September briefing, "We believe 2020 will be the 'Year of Acceleration' for offshore rig utilization and dayrates. The marketed utilization for both jackups and floaters has climbed above 80%, and jackup dayrates are moving solidly higher across all regions. The acceleration, if that's what happens, will flow through to workboats serving those rigs. The gradual drift of oil production to deeper waters gives rise to higher demand for service vessels; in a presentation at Pareto Securities' Offshore Conference, Tidewater noted: "In general, production support represents 45-55% of the demand for OSV's. OSV intensity for production likely to increase due to complexity of field developments and distance from shore." Todd Hornbeck summed up the dynamic: "We have to get stabilization through utilization first. You got to have the utilization and then we can start trending to higher rates." For now, it's still a waiting game.

HORNBECK (HOS)
vessels at Port Fourchon.

Photos: Basil Karatzas


STC
CAPT TOMMY PARRISH
ST LOUIS MO

Photo: Southern Towing Company

"In God we trust. All others must have data."

When Ed Grimm took the helm of Southern Towing Company (STC) as President and CEO, he inherited an enviable team of leaders, engineers, mentors, communicators and analysts. Today STC is a clear leader on the inland waterways, pioneering and proving the business and safety value of Z-Drives on the river towboats.

By Greg Trauthwein

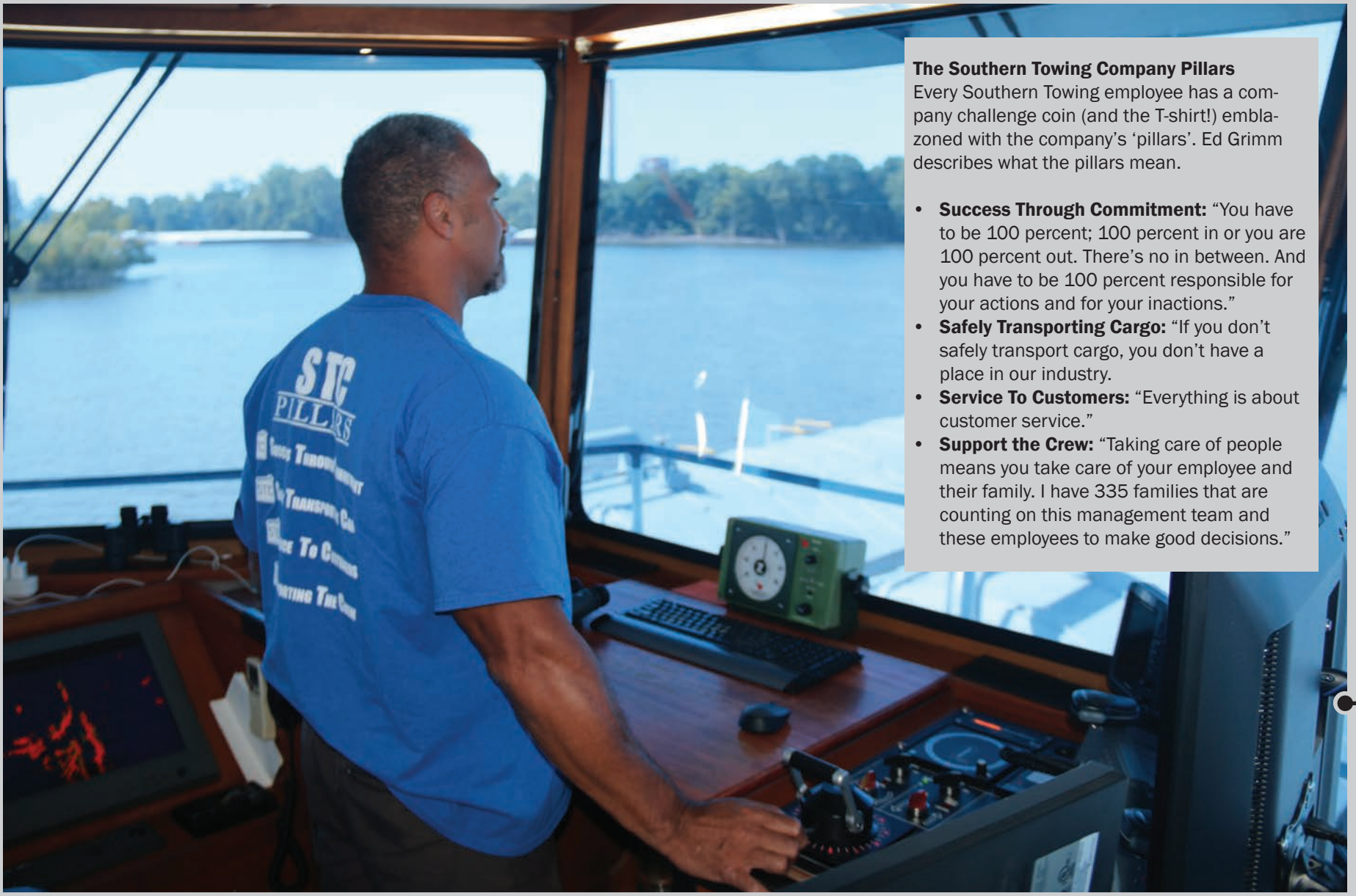


Photo: ZF Marine

The Southern Towing Company Pillars
Every Southern Towing employee has a company challenge coin (and the T-shirt!) emblazoned with the company's 'pillars'. Ed Grimm describes what the pillars mean.

- **Success Through Commitment:** "You have to be 100 percent; 100 percent in or you are 100 percent out. There's no in between. And you have to be 100 percent responsible for your actions and for your inactions."
- **Safely Transporting Cargo:** "If you don't safely transport cargo, you don't have a place in our industry.
- **Service To Customers:** "Everything is about customer service."
- **Support the Crew:** "Taking care of people means you take care of your employee and their family. I have 335 families that are counting on this management team and these employees to make good decisions."

How did you come to the top spot at Southern Towing Company?

I started in the energy industry at 16 working at an oil storage depot in New York Harbor, working there through high school and putting myself through college. After college I went to Coast Guard OCS and was fortunate to get a vessel, as only about 10 percent of the OCS grads at that time received vessel assignments. I spent 310 days at sea the first year, a great opportunity to get underway time.

And we started the second year on the same clip, and after 17 months as a commissioned officer I got an opportunity for my own command, reporting to a patrol boat as an ensign. It was humbling and it was scary in some respects, but it got me to Texas where I met my wife, who was working for a marine company.

How did your career (and your life) change trajectory with this meeting?

The marine company didn't want to lose my wife with my transfer to my next duty assignment, so they made me an offer I couldn't refuse. I left active duty, stayed in the reserves, and stayed in Texas. She and I worked together for the first 11 years of our marriage which was awesome.

The company that I was running was bought by Houston Marine Services, so we moved from the Port Arthur to Houston where I spent 18 years, finishing as the Chief Operating Officer before the company was sold. I then spent 10 years with Martin Midstream Partners running Martin Marine. About five years ago a private equity firm came knocking, so I came to Memphis to run Southern Towing as its CEO.

I see from some of the patents hanging on your wall that you have a vested interest in the technology side of marine.

I was fortunate on my first (USCG) ship that the captain believed in mentoring young people. I was a deck officer but I asked if I could get involved in engineering so I could learn how the propulsion takes me from Point A to Point B. I always believed that when you go out to sea, if something breaks down and you don't fix it, you're not getting home. The captain said that as long as it didn't affect my deck duties, I could approach the head of engineering, who was a gruff warrant officer. But he took me under his wing and taught me a lot about engineering.

When I left the vessel I was the Damage Control Assistant, which was normally an engineering function, so it was a great opportunity to get experience on the deck and get experience in engineering.

Perhaps more importantly, it fostered my idea that engineering is as exciting as command.

From that point I got involved in wanting to find engineered solutions. If you look on that wall there's a blue frame, and it says "the greatest joy in life is accomplishing what others say you cannot do." And anytime someone says it's never been done before, or "you can't do this," it just sets my mind in motion that I'm going find a way.

So tell me about the patents you hold.

The first looked at heating product on a barge using waste gas heat from the main engine on the tug. If you heat product on a barge, typically you're running the boiler and burning fuel, meaning it's a cost and also a carbon footprint. Waste gas heat has common uses in the shipping industry, but not in the barging industry. I

"It's health, it's safety, it's security, it's environmental, its quality and it's training. *That is our license to operate, and if we take care of those things first, a lot of times everything else just falls into place.* **I like to say we are in a 5 mph business – nothing's so important to rush and sacrifice safety."**

Photo: Southern Towing Company

Ed Grimm, *President & CEO, Southern Towing Company*

hypothesized you could take the heat from the exhaust of the main engine on the tow boat and use it to heat product on a barge; albeit, you have to circulate heat transfer oil across the interface between the barge and the tug. I worked with a naval architect to help put the idea together and we were awarded the patent.

Another patent is around hot oil products and improving the efficiency of maintaining the heat, i.e. burning less fuel to maintain the temperature of the product. Both of these patents were filed when the International Maritime Organization (IMO) started talking about low sulfur fuel. My theory was that (with the advent of IMO 2020) the price of fuel would spike – the price of diesel fuel would spike – and the cost to heat product on barges would go up. I wanted to find a way to help mitigate that. It's not that it's a panacea, but I looked at this as a way to defer or lower the cost to heat product in the inland barge business.

It sounds simple, and what's funny is you look at a lot of patents – they are simple. There's a lot of really neat solutions that if people just put them on paper and talked to a patent attorney, they could go out and do it. Imagination drives innovation.

So, in essence, innovating and staying a step ahead of regulation as a business imperative?

It's kind of like Subchapter M. Early on we identified our gaps and started to address them to make an easier transition come 2019? An we are very far along.Did we take a risk by doing things that maybe we didn't have to do? Perhaps. But I think we were far ahead in the preparation for Sub M. So it's not all about price-per-barrel-moved, it's total dollars to move a product. So total cost per unit delivered is what traders and customers look at. So how can you help lower the cost without giving away your margin?

When you joined Southern Towing, what attracted you to the position?

It was an opportunity to be a President and a CEO, which I had not experienced at that point. I had run operations, but I was not the CEO. I have a desire to pass on the experiences that I've gained over the years to younger executives. Having previously concentrated on petroleum products, I thought it was a great opportunity to learn a different part of the marine transportation industry, which is fertilizers and dry cargo. I knew some of the people (in the business) and I really respected them. I loved the idea of Z-drives, and I thought there was a lot of potential to take those to another level.

How is the Southern Towing that you joined five years ago most the same? How is it most different?

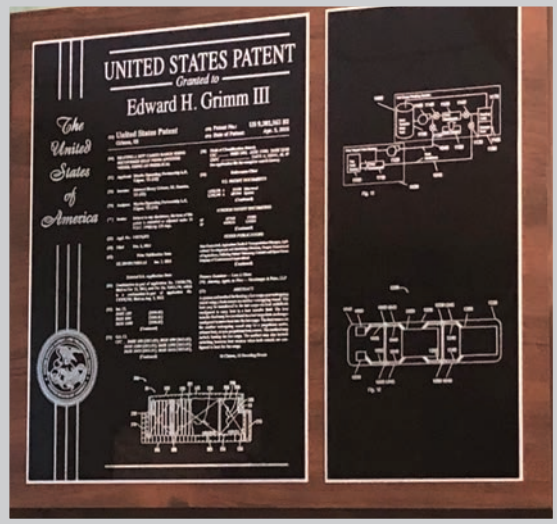
A lot of CEOs of American corporations say that people are their greatest assets, and I think some of that is not sincere. But we really have a great group of professionals at STC, for example VP of HR celebrates 45 years with the company this year.

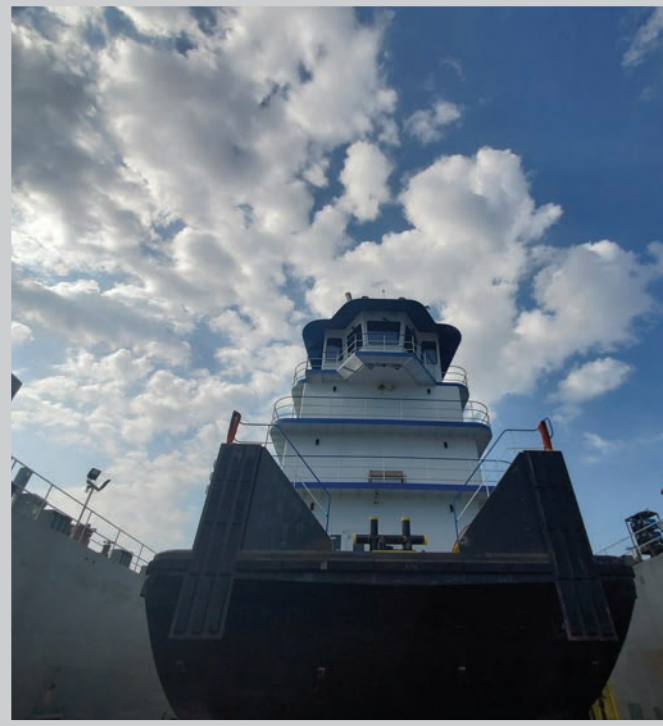
That's a long tenure!

Yes it is. His son works here too. Our lead captain has been here almost 40 years. (Top to bottom) it's just a great group of people that are dedicated to teamwork and serving the customer. One of the senior guys said, ***"Don't worry about the mule – just load the wagon."*** It's just a great testament that people are focused on getting the job done.

How do you attract and retain good people?

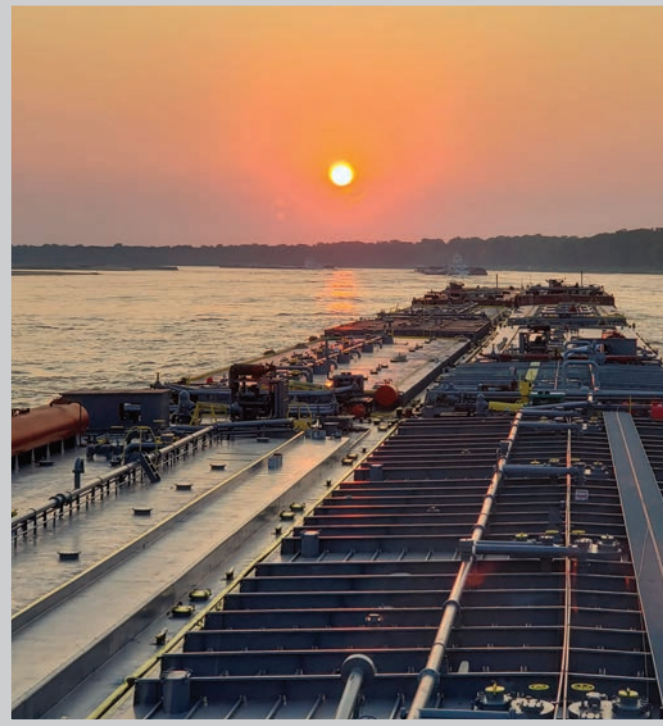
How do you put your money where your mouth is?





When Ed Grimm took the helm at STC five years ago, he rode the boats for 90 days to get to know the operation and the people. What did he find?

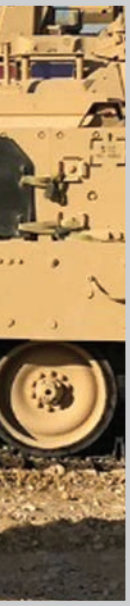
"Pure pride of the brand. Pure pride of the history and the safety record. That pride of the quality of their crews," said Grimm. "It was an interesting time to get to know individuals, and understand their families and their wants and their needs. On my first day here I told everybody I was going to invest in boats, barges, and people. And if it didn't fit those categories, I wasn't going spend money on it until the organization was where I wanted it to be."

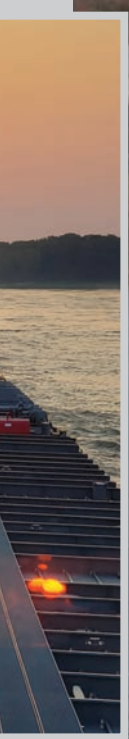


Henry Crown "The Colonel"

The name of the new construction towboat is "The Colonel," named after Henry Crown, the founder of our new ownership group. "The Colonel" was his nickname.

Photos: Southern Towing Company






LAURA TAMBLE
C568
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Photos: ZF/Martin Meissner

Career development. Opportunity and investing in the people. And we have gone way out of our way to put together a career development ladder that is very much in line with how military organizations spell it out. And every position in the company has practical factors you need to accomplish before you can attain that position. They're all published. There's a method. There's a way to help them succeed, there's a way to get them help on their vessel to learn the practical factors. Everything is based on a best qualified, not a seniority basis. And as much as that may upset some of the people who believe in the seniority method, it really reinforces that our focus is on quality and what you put in is what you get out. So you reap what you sow. Everything is databased. I have a phrase: ***"In God we trust. All others must have data."***

And we want people to come up with data-driven suggestions, solutions or proposals. It shows that people have done some research, and they've developed some data, and formed quote/unquote "statistics." But I have a book that I got my freshman year in college in freshman economics, and it was the first book we had that year, and he handed it out, and it's "How to Lie With Statistics." In short it says is you can make statistics say whatever you want. So besides having data, you have to have data that has validity of purpose, not trying to accomplish proving a position.

When you started at Southern Towing, I understand that you rode the boats for 90 days to familiarize yourself with the company outside of the spreadsheets. During those 90 days, what did you find?

Pure pride of the brand. Pure pride of the history and the safety record. That pride of the quality of their crews. I found crews that were worried about the next 60 years and sustainability; worried about their families and their kids. All of the same things that most people worry about. It was an interesting time to get to know individuals, and understand their families and their wants and their needs.

Are you able to keep that effort up? How do you continue that effort to keep connected to your employees?

We have a regular conference call. We tune in all the boats at the 11:30 watch change so that we can have as many crew on the call, as many crew members that the captain thinks is safe for the environment they're in. Every once in awhile, someone will miss the call and they'll call me on my cell phone later. We talk to them on a regular basis, because I like them hearing from the horse's mouth versus the rumor mill, which is a cancer.

I could easily write memos, but a lot of people don't take time to read, and then they interpret. I'd rather they hear it directly from me. Everybody has my cell phone and all employees can call. I have some captains that call on a regular basis. You have to communicate to build a relationship. You have to have a relationship in order to build trust. A lot of times the marine professionals out in the field don't trust the people on shore, so we worked hard at building that trust. Trust is doing what you say you're going to do.

STC is a big company with many moving parts. Distill for me the essence of the company.

It's health, it's safety, it's security, it's environmental, its quality and it's training. That is our license to operate, and if we take care of those things first, a lot of

"No vessel can maneuver a tow into or out of a dock as good as the Z drive. *And then you start talking about bumps and bruises on your barges, a lot of which come when you're docking and undocking* ... **the safety contribution that Z-drives makes to marine transportation – especially barge marine transportation – is dramatic."**

times everything else just falls into place. I like to say we are in a 5 mph business – nothing's so important to rush and sacrifice safety.

As you have come from the petroleum side to moving fertilizer, is there any material difference in the two industries or the cargos?

If you're just a transporter, then it's a box. Barge transportation is barge transportation. What you're trying to understand is what's important to the customer, and how we can offer strategy or insight to help them better reach their goals. And so, I think the moving from Point A to Point B is the same – a barge is a shoebox in the water, you have engines, you have transmissions. But to understand what's important to the customer, I think, is the biggest difference. I try to use that knowledge to better understand how I can help solve problems, because I think we are problem solvers in addition to being transporters of product.

When you look at your competitive view today, what do you see?

Our main concentration is around moving fertilizer, but there are other people that haul fertilizer. I don't take for granted that there's only a few (competitors) in it, because the moment you assume a position of safety, is the moment you compromise your drive to get better every day. We have some great barge lines in this country that do a great job moving product. But I don't look at them necessarily as competitors. I try to focus on the customer – the needs of the customer – and how can I differentiate myself because everybody has boats, everybody has barges. How do you differentiate? That's in person-to-person service, that's in problem solving, that's in flexibility. I think we have to give the customers things that differentiate us from other people that have boats and barges.

A point of differentiation for me is the fact that Southern Towing has been a pioneer in its use of Z-Drives on inland towboats. How does that help you a competitive advantage and help to better serve your customers?

The Z-Drive itself is a wonderful application for the inland business. I have to say when Southern was first looking at it, I was a skeptic. In fact, I was working with a another naval arch to pursue another way of improving efficiency in propulsion.

It wasn't until I got to Southern and started really digging in that I fully understood the benefits of the Z-Drive propulsion system. And I am now a firm believer that in river segments where tow size is restricted – i.e. locks, locking systems, or the canal – that the Z-drive has a tremendous advantage over conventional propulsion.

We have, with a particular customer, developed data that more than supports this belief, and in fact it is surprising how much of an advantage it is. In fact we've signed a contract to build tw new Z-drive boats (at Steiner Shipyard in Bayou La Batre, Ala.), and we hope to sign an additional option to build multiple more.

Can you be more specific on the efficiencies?

From a performance, speed over ground, miles attained per day, upriver-downriver, we compete evenly or better than vessels that have significantly more horsepower than us, so consequently, less fuel consumption. But I think, over a term, I'll say the efficiency gains are between 22-30 percent, depending on application.

That's significant …

It is significant. There are still naysayers, but that's what makes the world go 'round. Why does someone like a Chardonnay and someone like a Cabernet? Beauty is in the eye of the beholder, but I think we have strong, factual evidence and we believe in it enough that we're continuing to build.

As you know, technology only moves the ball so far, so fast. Without support, particularly when it's a new application, even the best tech can fail. We understand that you've built a good relationship with ZF that covers the lifecycle maintenance.

When I came to Southern people would ask 'why are you going there? Those Z-drives are horrible.' I think in the early years that Southern owned the Z-drives, they had operational reliability issues, meaning the percentage of the year were they up and running. There were questions in the industry as to the units robustness.

At the time ZF acquired ownership of HRP, a Dutch manufacturer, in 2009, it had taken a thruster designed for blue water and brought it straight to the river. In my belief, it's kind of like the first-year model of a car, not just a car but a revolutionary car. Typically those first-year models – one, two or three – were not as refined as they were later. And there were design criteria in a Z-drive that could be improved.

My first year here, I spent a good amount of time looking into the issues we were having, specifically asking why were we having these failures? What contributes to the failures? Are they human in nature? Are they environmental in nature? Are they design in nature? We brought in an outside failure engineer, a consulting company, to help us analyze the actual failures and see if we could point to the causes to help us look for a solution. In my first 12 months my conversations with ZF were challenging to them. There was friction, but there was also a push to work together to solve the problem. I think too many customers point at vendors and say, "you have to solve the problem"

And vendors should solve problems, but sometimes vendors don't take the care to get close enough to see it from the customer's point of view. And one of the neatest things that ZF did was they sent their head of R&D to Memphis for three days to understand our application of their product, and to see if a better understanding on their part of the application could help them in looking at solutions.

And while they were here, we presented them with a bunch of our failure analysis and they went back to Germany and did their homework. They came back and said, "We think you have something on this particular area. Let's work together." And from that point on, we have refined the Z-drive we presently use, and the uptime has improved to a point that in 2017 we had 100 percent uptime on all of our ZF thrusters.

So what were some of the physical manifestations of the changes that were made to the thrusters?

One was how the nozzle and lower unit were attached to the steering tube that goes to the vessel. We worked with ZF to change the design and spec of the hardware.

That, along with some other design modifications, resulted in the connectivity points strengthened so much that it eliminated that issue.

Another was using vibration analysis to detect minor changes in the propeller from striking debris in the water, thus catching it early and changing out a propeller versus leaving it on, with the vibration causing damage.

Photos: Southern Towing Company

C'est La Vie: Every day Ed Grimm enjoys a glass of champagne to celebrate life. Why? Ed survived a pulmonary embolism, right afer a triple bypass surgery, something that only 1/10th of 1% survive. Pictured with Ed on the left is **Chris Sullivan**, who represents STC's new ownership group, CC Industries of Chicago.

ZF … From Supplier to Teammate: Pictured above are members of the ZF Marine team that earned STC Service Award jackets, a rare accomplishment for anyone outside of company. Pictured are: L to R: **Gerald Rowe**, Head of R&D ZF Marine, **Wolfgang Schmid**, Head of ZF Business Unit Marine and Special Driveline, North America; **Andre Koerner**, Head of Product Line Commercial and Fast Craft, ZF Marine and **Reiner Viebahn** – Plant Manager ZF Krimpen (commercial thruster production).

Are the Z-drives as robust as conventional? No. But life is a compromise and in certain applications it can outperform conventional propulsion. In other applications, conventional solutions are more appropriate.

So when you look at some of the performance parameters that you count as the key to the Z-drive, what are the top advantages?

Maneuverability. They can maneuver so much better than conventionals. The conventional propeller, as the propeller designers look at it, they have to be able to back with a certain amount of efficiency. In order to give a propeller the ability to back, it takes away from forward performance. The nice thing about the Z-drive is it is designed 100 percent to go in one direction because the thruster itself turns 360 degrees. And in conventionals, you have the rudder that directs the thrust, and some of that thrust slips off the exterior edges of the propeller. You can have a cort nozzle that solves that, but as the thrust comes out, the rudder has to redirect it and it doesn't do it with 100 percent efficiency. In a way, when you turn a rudder at a 10 or 20-degree angle, it's almost like a brake. It creates a drag. So the more times you steer, the more drag you've inserted into the propulsion model and the less efficiency you have.

No vessel can maneuver a tow into or out of a dock as good as the Z drive. And then you start talking about bumps and bruises on your barges, a lot of which come when you're docking, undocking, going into a lock, leaving a lock. And sometimes those bumps and bruises turn into incidents.

The safety contribution that Z-drives makes to marine transportation – especially barge marine transportation – is dramatic. If you want to stop, you can turn these thrusters at 90 degrees and you have more of an effect on slowing down the vessel at 90 degrees than you do turning them around 180 degrees. It's like a big brake. And the ability to stop a tow with a Z-drive in a distance, call it, say, "stopping distance," is dramatically improved with the Z-drives versus conventionals. And one that a lot of people don't talk about is the ability to back up quickly, safely.

The 'best of the best' (captain) may be able to back, maneuver and steer a tow in the reverse direction, which is difficult with a conventional drive. The Z-drives make it easier, and the enhanced maneuverability really improves our margin of safety.

How has it been getting the captains of your boats to adopt the Z-Drive?

The ones that want to get involved get involved and we aggressively try to invest in them. The Seamen's Church Institute simulator system in Paducah is awesome, it is just a phenomenal organization.

We now have Z-drive simulations and it has really helped our folks, as initially we went out to the West Coast for the Z-drive simulation training, so we're blessed to have it right here in the inland system. Bless The Seamen's Church and what they do, not only from an educational point of view, but what they do for our mariners.

Bottom line, you give them the opportunity and then you put them out on a boat and you let them try. In fact when the downturn in the industry came in late '15-'17, a lot of people cut their wheelhouse development programs. We kept ours, and to some extent accelerated it. You have to invest in people. On my first day here I told everybody I was going to invest in boats, barges, and people. And if it didn't fit those categories, I wasn't going spend money on it until the organization was where I wanted it to be.

Photo: U.S. Coast Guard photo by Chief Petty Officer Nick Ameen.

An emperor penguin poses for a photo in front of the Coast Guard Cutter Polar Star in McMurdo Sound near Antarctica on Wednesday, Jan. 10, 2018. The crew of the Seattle-based Polar Star is on its way to Antarctica in support of Operation Deep Freeze 2018, the U.S. military's contribution to the National Science Foundation-managed U.S. Antarctic Program.

Polar Security Cutter

will provide meaningful presence in polar regions

By Edward Lundquist

The Coast Guard needs a ship that can do more than just break ice; it needs a multi-mission ship to provide for the nation's security, asserting its sovereign rights, and protecting its long-term economic interests. That ship is the Polar Security Cutter.

Since Russia cashed the check in 1867 for the purchase of Alaska the U.S. has been an Arctic nation. Today, it is one of eight countries that have territorial land or seas above the Arctic Circle or in the polar region (six of those countries have Arctic Ocean coastline or an exclusive economic zone above the Arctic Circle). The U.S. has also conducted significant research activities in the Antarctic region for many years.

Global interest in the extreme latitudes has increased, especially in the Arctic, where the amount of multiyear ice has decreased dramatically, and the presence of open water has attracted attention from shippers, fishermen, tourists, scientists, and the military, as well as interest in extracting minerals, oil and gas. Seafood is a multi-billion-dollar industry. There are also communities in the region requiring support and protection if needed. Protecting America's interests in the region requires a meaningful presence, and that requires ships, aircraft, systems and people capable to operate there. With icebreaking one of the Coast Guard's 11 statutory missions, the service operates the nation's icebreakers. But these ships are old and must be replaced. In fact, the service currently has just one operational heavy icebreaker and one medium icebreaker.

"As the region continues to open and strategic competition drives more actors to look to the Arctic for economic and geopolitical advantages, the demand for Coast Guard leadership and presence will continue to grow," states the Coast Guard's Arctic Strategic Outlook, released in April 2019.

"In order to prosecute its missions in the Arctic, the Coast Guard must fully understand and operate freely in this vast and unforgiving environment. Effective capability requires sufficient heavy icebreaking vessels, reliable high-latitude communications, and comprehensive Maritime Domain Awareness. In order to respond to crises in the Arctic, our Nation must also muster adequate personnel, aviation, and logistics resources in

the region. The Coast Guard is the sole provider and operator of the U.S. polar capable fleet but currently does not have the capability or capacity to assure access in the high latitudes," the strategy said. "Closing the gap requires persistent investment in capabilities and capacity for polar operations, including the Polar Security Cutter."

In testimony before Congress in April, Coast Guard Vice Commandant Adm. Charles Ray said "Our recently published Arctic Strategic Outlook reaffirms our commitment to American leadership in the region through partnership, unity of effort, and continuous innovation, and establishes three lines of effort to achieve long-term success. First, we will enhance capability to operate effectively in a dynamic Arctic domain; second, we will strengthen the rules-based order; and third, we will innovate and adapt to promote resilience and foster prosperity."

Competition and Cooperation

Dramatic and dynamic changes in the Arctic have opened the region to levels and types of activity not seen before, and that is creating a demand for Coast Guard services.

"We have a new region that's open to man, and there are significant natural resources there," said Coast Guard Vice Commandant Adm. Robert Ray, speaking at the American Society of Naval Engineers Arctic Day symposium in September. "There are multiple people interested in it, so you're going to have competition." Russia is one of those competitors, but with a legitimate stake in the Arctic. "Twenty percent of Russia's landmass is north of the Arctic Circle, and both onshore and offshore resource (minerals, oil, and gas) development is crucial to the Russian economy. Russia is also advancing the growth of the Northern Sea Route (NSR) for trans-Arctic shipping and other commercial opportunities," said Ray in his April testimony.

With nearly 50 icebreakers that include four operational, nuclear-powered heavy icebreakers, and three new heavy, nuclear-powered icebreakers currently under construction, Russia maintains the capabilities, capacities, experienced crews, and infrastructure necessary to operate into the Arctic year-round and surge as required. In fact, since 2013, Russia has built 14 new icebreakers and built or reoccupied six military bases.

"China has recently taken an active role in Arctic development, pursuing economic investments with every Arctic nation in key strategic areas, such as oil and gas development, ports, railways, and infrastructure. With the release of their Arctic Policy in January 2018, they have declared themselves a nation intrinsically tied to the Arctic, and signaled their intention to play a security and governance role in the region," said Ray.

"While we've got competition, that doesn't mean that there has to be conflict," said Ray. "Anything that we do in the Arctic or Polar regions in general requires a collaborative effort. We are much better off as a nation when we operate in coordination with other nations that have similar interests there," Ray said.

Ray pointed to a number of initiatives, such as the Arctic Council, Arctic Coast Guard Forum and Pacific Coast Guard Forum, where the U.S. can cooperate with the other nations on matters of mutual interest. But America must have a visible presence of its own.

"The center of gravity of what we need to do as an Arctic nation is capability, and capability provides presence," said Ray. "Diplomacy, governance and regulations—all that is interesting conversation if you don't have presence in the Arctic region."

Urgent requirement

The Coast Guard's icebreaking fleet is in a precarious predicament. To say that the Polar Star and in-active sister Polar Sea are old is an understatement. For Rear Admiral Nathan Moore, the assistant commandant for engineering and logistics and the chief engineer of the Coast Guard, the Polar Star was his first ship after graduating from the Coast Guard Academy in 1992. "When I reported as an ensign aboard Polar Star, the person who showed me around told me that the ship was really old and the Coast Guard was going to get rid of it."

But while the Coast Guard icebreakers are old, they are still capable. The missions they perform cannot practically be carried out by other platforms. There aren't a lot of viable alternatives.

The Polar-class icebreakers are the most powerful in the world, but they are a single mission ship. "Polar Star, when its running with all three engines up on line, and the communications with the computer are working, it is an incredible icebreaker," said Capt. Michael Davanzo, chief of the Office of Cutter Forces. "But it's very limited in what it can do outside of breaking ice."

The 420-foot Healy is also an impressive icebreaker—it was the first surface

Photo: NyxoLyno Cangemi/U.S. Coast Guard

The U.S. Coast Guard Cutter Healy (WAGB-20) is in the ice Wednesday, Oct. 3, 2018, about 715 miles north of Barrow, Alaska, in the Arctic. The Healy is in the Arctic with a team of about 30 scientists and engineers aboard deploying sensors and autonomous submarines to study stratified ocean dynamics and how environmental factors affect the water below the ice surface for the Office of Naval Research.

vessel to reach the North Pole unaccompanied—but it is designed primarily for scientific research.

The PSC, however, will not be "just an icebreaker," Davanzo said. "It must be able to launch and recover boats and aircraft, both manned and unmanned, and perform virtually all of the Coast Guard's missions, including law enforcement, aids to navigation, search and rescue, marine safety, commercial and the vessel inspections, living resources management, marine security, ports and national defense."

But until replacements arrive, the current ships must carry on. The Polar Star needs a shipyard maintenance period each year when she returns from Antarctica, and Healy needs a mid-life overhaul, which will be spaced out over three years so she will still be able to support science missions in the Arctic summer. "Our challenge is to do that maintenance without missing a mission," Davanzo said.

Breaking new ice

Originally called the Polar Icebreaker (PIB) program, the name was changed to better reflect the versatility and capability of the ship. The PSC program is planned to procure three heavy polar icebreakers, followed by up to three medium polar icebreakers in the future

The Coast Guard and Navy Integrated Program Office for the PSC program awarded a $745.9 million fixed-price, incentive-firm contract for the detail design and construction (DD&C) of the first PSC to VT Halter Marine of Pascagoula, Miss., on April 23, 2019. The contract includes options to build the second and third PSCs. The shipyard's design partner is Technology Associates, Inc. (TAI) of New Orleans, La., which based the PSC design on the Polar Stern II, an icebreaker currently being built in Germany.

The PSC will be 460 feet long with a beam of 88 feet and a full load displacement of about 33,000 long tons. The diesel electric propulsion will deliver more than 45,000 horsepower that will enable the ship to break ice up to eight feet thick. In addition to TAI as design agent, VT Halter Marine has teamed with Caterpillar for the main engines, ABB/Trident Marine for the Azipod propulsion system, and Raytheon as the command and control systems integrator. The first ship delivery is scheduled to occur in 2024, the second in 2025 and the last delivering in early 2027, if the options are exercised.

The ship will have to undertake long transits to get on station and conduct operations with limited or no logistics support. The vessel will accommodate 186 crew and research personnel for missions up to 90 days. And it must be able to perform a range of missions in a very inhospitable environment. The Arctic region yields extremely cold air and water temperatures with the summer's high temperatures only reaching near 40°F and water temperatures rarely reaching above 30°F. McMurdo Station in Antarctica averages 228 days below 0°F each year. The approaches to the polar regions pass through storm-filled seas, and any ship transiting from North America to Antarctica must be equipped to deal with the equatorial heat.

The PSC will be a "Polar Class 2" vessel, based on the standards agreed upon by the International Association of Classification Societies (IACS), and "able to conduct year-round operation in moderate multi-year ice conditions."

While icebreaking is one of the Coast Guard missions, Martin Mardiros, Polar Security Cutter Ship Design Manager, said that it is only a means to an end. "Icebreaking is just getting access to operate and conduct the missions we need."

That's why the PSC will be fundamentally different. "We're not building a more capable Polar Star or Healy, we're building a new type of ship," said Mardiros. The number one mission for the new PSC will be to carry out the annual "break out" of McMurdo Sound to resupply Operation Deep Freeze at the McMurdo Base in Antarctica. But Ray said the Coast Guard needs at least three heavy icebreakers to provide the ability to operate anywhere, anytime. "The goal is to provide access to the Arctic, even in the winter, if we need to be there, or at least to expand the shoulder season."

Polar Star took part in Operation Deep Freeze 2019, but the mission was not without engineering challenges. The ship experienced power outages during icebreaking operations, a fire that damaged the electrical systems and a propeller shaft seal leak that required diving operations to resolve.

Commandant of the Coast Guard Adm. Karl Schultz said "Events like these reinforce the reality that we are only one major casualty away from leaving the Nation without any heavy icebreaking capability."

"With increased activity in the maritime reaches and growing competition for resources, we cannot wait any longer for increased access and a more persistent presence in the Polar Regions," said Schultz. "Our sustained presence there is imperative to ensuring our Nation's security, asserting our sovereign rights, and protecting our long-term economic interests."

Meet The "Fleet"

USCGC Polar Star (WAGB 10)
Commissioned 1976

USCGC Polar Sea (WAGB 11)
Commissioned 1978
(Currently out of service)
399 feet, 13,000 tons, Range 27,000 miles; CODLOG, three shafts, CRP propellers, 75,000 shaft horsepower
Able to break 21 ft. of ice by backing and ramming; Steam continuously through 6 feet of ice

USCGC Healy (WAGB 20)
Commissioned 1999
420 feet, 16,000 tons, Range 37,000 miles; Diesel-electric, two shafts
Able to break 10 feet of ice by backing and ramming; Steam continuously through 4.5 feet of ice

Polar Security Cutter
460 feet, 23,000 tons
Range 80 days; Diesel electric; Azipod system; 45,200 horsepower;
Able to break 21 feet of ice by backing and ramming; Steam continuously through 6.5 feet of ice

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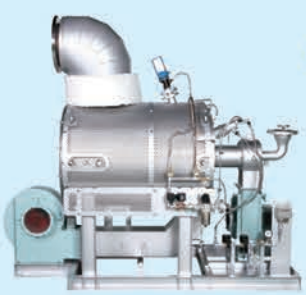

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Green Ship Recycling

A vessel placed in dry-dock in preparation for recycling.

Photos: Grieg Green

Ship scrapping has long been controversial, the province of poorer nation with a laundry list of safety and environmental hazards. But times are changing, and Grieg Green has set out to raise the bar on ship recycling.

By Joe DiRenzo, PE

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In May 2014 National Geographic wrote an in-depth article on shipbreaking operations in Bangladesh where they listed shipbreaking as one of the deadliest professions in the world. The images from these shipyards are well circulated among professionals in the shipping industry. Individuals without personal protective equipment cutting and grinding into a ship that was haphazardly beached and torn asunder by unskilled laborers. Pollution swirl in the nearby tidal area and soot belches into the air. Large sections of ships come careening off endless rows of vessels that litter the beach.

Shipping companies that have erred in selling their ships to unsavoury cash buyers have felt the consequences to their reputation and income sheets. One of the recent main headlines includes the Harrier case, formerly Eide Carrier, in Norway in which a scurrilous cash buyer attempted to circumvent EU waste management laws to send the vessel to a scrapping yard in Pakistan. Similarly, in March 2018, shipping company Seatrader was fined in a Dutch court for using substandard shipbreaking facilities in Southern Asia to recycle their vessels.

As a result of these stand-out headlines, there is tremendous pressure from both government regulators and within the shipping industry to change the status quo when it comes to ship recycling. This pressure has created an interesting market space for ship recycling consultancies that will assist shipowners in managing the ship recycling process and ensure that they are being conducted in accordance with international regulations and industry best practices. One such company involved in this field of work is Grieg Green whose main office is located in Oslo, Norway.

Mrs. Elin Saltkjel, Head of Quality Assurance and Business Development at Grieg Green offered insight into changing dynamics within the ship recycling industry and growing trends. Specifically, she explains how ship recycling consultancies like Grieg Green allow ship owners to hedge risk against ship recycling projects which may result in damage to the reputation or their bottom line. Current events have shown that this risk may exist even after ship owners have sold the vessel to a cash buyer and no longer owns it. This article explores how the development of this interesting business model could eventually lead to the shipbreaking operations around the world becoming more humane and sustainable.

The Wrong Way to Recycle A Vessels

To place pressure on both shipowners and government regulations, a number of Non-Governmental Organizations (NGO) have sprung up to help "clean up the business" of ship recycling. One such NGO called "NGO Shipbreaking Platform" outlines how a network of unscrupulous shipowners, cash buyers, shipping insurance companies, and shipbreaking facilities have, in the past, circumvented international laws and regulations.

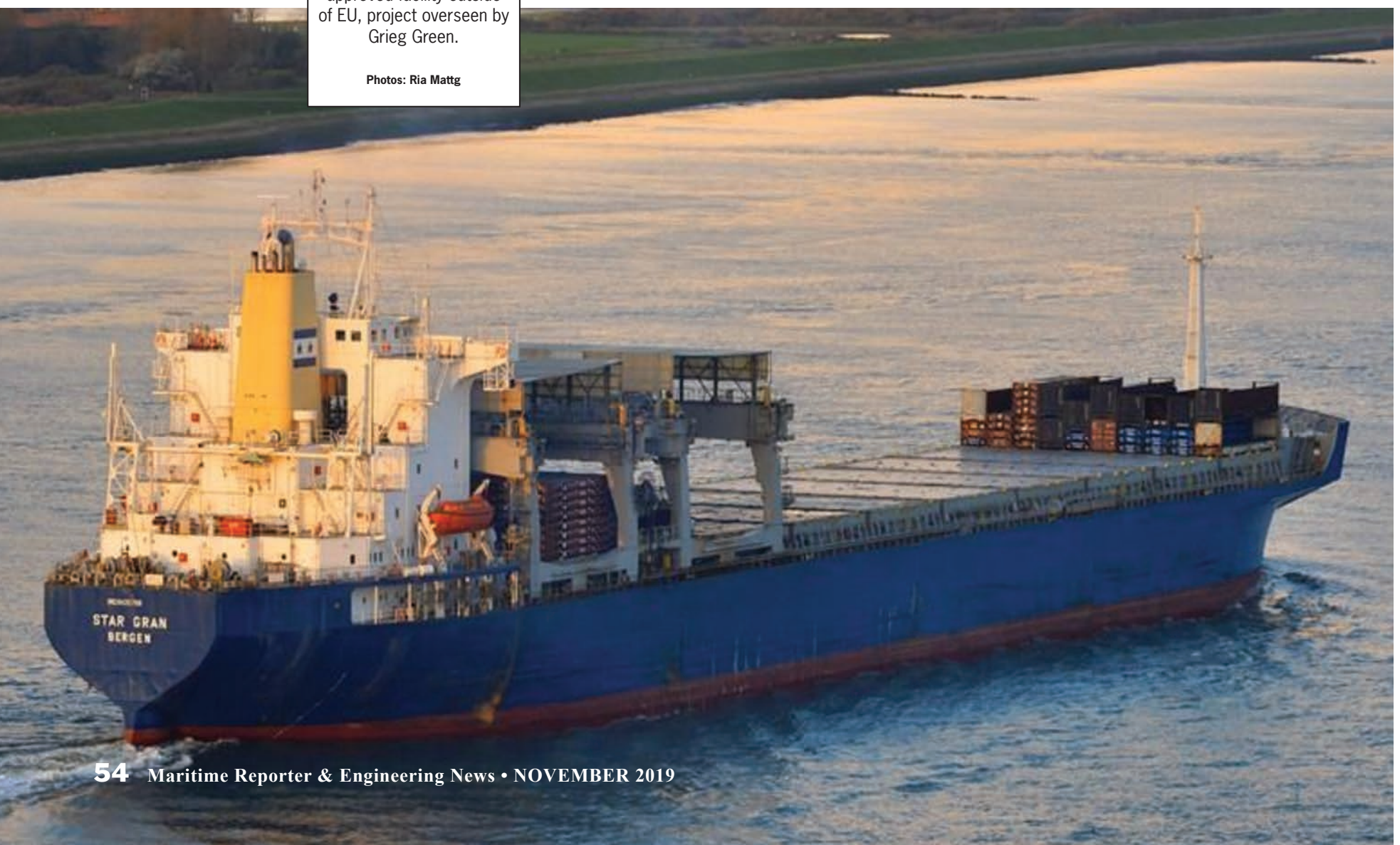
Critical to the ship recycling transaction (honest or otherwise) is the "cash buyer". According to NGO Shipbreaking Platform, a cash buyer is essentially a middleman who "pay[s] ship owners up-front before the ship reaches its final destination to be dismantled, and then re-sell[s] the ship to the breaker that can offer the highest price, thereby making a profit with the price difference". In cases where shipowners have been held accountable for this practice, an often-used excuse is that the shipowner was unaware that the vessel would eventually end up at these notoriously dangerous and pollutive shipyards. Recent court rulings, such as the Harrier case, have indicated that this lack of awareness does not indemnify the ship owner of liability if the ship is recycled in an improper manner. Once purchased by a cash buyer, the new owner will use a number of different tactics to skirt international maritime ship recycling regulations such as shifting to a flag of convenience. According to NGO Shipbreaking Platform, "an end-of-life sale with the help of a cash buyer usually includes a change of flag to one of the typical last voyage flags, and the registration of the vessel under a new name and a new post-box company". Unfortunately, dishonest cash buyers will ultimately choose shipyards with associated downstream recycling operations that maximize their profit regardless of how much human suffering and environmental damage is caused in the process.

Ship Recycling Conventions and Regulations

Although not exhaustive, the Basel Convention, Hong Kong Convention and EU Ship Recycling Regulations form the crux of current ship legal framework in the European Union (EU) and European Economic Area (EEA). According to Norwegian based maritime legal firm Tommessen AS in a primer called "Scrapping of Ships: Is beaching illegal?", the Basel Convention, created in 1992, "forbids transportation of hazardous waste to countries that have not ratified the Convention, and transportation of hazardous waste between member

MV Star Gran, the first vessel recycled at an EU approved facility outside of EU, project overseen by Grieg Green.

Photos: Ria Mattg



states when the recipient country cannot deal with the waste in line with the Convention". The convention treats ships which have reached the end of their lifecycle as "hazardous waste" because they may contain hazardous substances like "asbestos, lead, and PBC". In practice, the Basel Convention is implemented in the EU/EEA countries through the Waste Regulation and Cross-Border Regulation.

In order to create a set of regulations that specifically targets the practice of ship recycling, the International Maritime Organization (IMO) adopted the International Convention regarding Safe and Environmental Recycling of Ships, known in the shipping industry as the "Hong Kong Convention" (HKC). Although not ratified by the requisite number of countries representing 40% of global shipping by gross tonnage, the EU has implemented the convention through the EU Ship Scrapping Regulation (SSR) (Regulation 2013/1257). As of 2018, these regulations have entered into force for all European flagged vessels. Additionally, by the end of 2020, a number of facets of these regulations will be applicable for non-EU flagged vessels which call on European ports or anchor off the European coast.

Most notable of these regulations is the requirement for all vessels to carry an Inventory of Hazardous Material (IHM) which is an active list of all hazardous material carried on the vessel. According to the IMO's website, "ships will be required to have an initial survey to verify the inventory of hazardous materials, additional surveys during the life of the ship, and a final survey prior to recycling".

When it comes time to recycle a vessel, the IHM is a critical living document used by both by the shipyard and ship recycling experts like Grieg Green to verify that all hazardous material is removed and disposed of in an appropriate manner. Another important outcome of the HKC and SSR is the need for the vessel to be recycled at an EU approved ship recycling facility with a class certified Ship Recycling Facility Plan (SRFP). Finally, before the recycling process begins each vessel is required to have a Ship Recycling Plan (SRP) which has been uniquely tailored to the vessel.

The Right Way to Recycle A Vessel

Given the recent international pressure on shipowners to change past practices, many shipping companies are turning to ship recycling consulting experts like Grieg Green to conduct the IHM survey and oversee the ship recycling process. Mrs. Saltkjel indicated that Grieg Green acts as an agent of the shipowner and will oversee either parts of the ship recycling process, like the actual shipbreaking activities at an approved yard, or through the entire process which includes the contract negotiations with buyer, export/import applications and delivery.

When asked about how Grieg Green's functions differ from class societies,

Mrs. Saltkjel stated, "We are careful not to use the words 'certifying' or 'validating'. We have our own checklist based on the Hong Kong Convention and the EU SSR.

We always start with an initial visit where we walk around the facility, talk to [the management and workers at the Ship Recycling Facility] and look at their documentation to get an impression of their adherence to the regulations and how well they understand them. It is important to get the feel for the management….Is this really a commitment from their side [to comply with the Hong Kong and EU SRR regulations] or more like 'hey, can you approve this so we can get more business'"?

One of the unfortunate realities Mrs. Saltkjel points out is that sometimes class societies will validate that the SRFP meets the guidelines stated in the HKC and SSR but either the shipyard surges resources during the inspection to appear as though they are compliant or they comply but choose not to follow the regulations when they are not being externally monitored.

"The problem is that the follow up of the adherence to the rules is [for example] two years in between. [Class societies] come just for a few days to inspect …Many yards have Hong Kong convention compliance certificates, but the yards are not following the rules between the inspections. Unless the local authorities take some ownership for it and they make their own follow up which is what the EU expects from their member states then you cannot be sure when you go to one of these facilities that it will not be polluting".

In order to protect the reputations of shipowners, Grieg Green is selective about which yards and cash buyers they recommend for projects.

"We have to find that link where we can trust the yard [and] have a clean settlement organization… and an owner who genuinely wants it to happen in the right way."

In order to ensure that EU SSR and HKC are adhered to in-practice, Mrs. Saltkjel noted that in contracts managed by Grieg Green, "there is a requirement that [Grieg Green] is supervising at the yard during the entire process of ship recycling … The main goal for us is that it was done in the right way and that it can be documented in full to the customer".

Unlike class societies, Mrs. Saltkjel illustrated that companies like Grieg Green also consider several "subjective" factors when determining if they will add a yard to their own list of vetted ship recycling facilities. For example, Mrs. Saltkjel listed "cooperation, knowledge, management style, and commitment" as some of the subjective factors that Grieg Green considers when they determine if they will recommend a yard to shipowners.

"It is really important to us to work with the yards where the management has been involved in the documentation themselves so they have really understood what they are promising and they are making procedures that fit the actual equipment and work cultures that they have".

When describing the ship recycling process, Mrs. Saltkjel noted "it has to be a very structured process.

For recycling a specific ship or rig you have to make a Ship Recycling Plan, which is a vessel specific addition to the Ship Recycling Facility Plan detailing the steps from delivery to completion". Stressing the importance of the IHM, Mrs. Saltkjel pointed out that "you detail [in the specific Ship Recycling Plan] how you are removing each of the materials. From going onboard and marking the location of the materials listed in the IHM to stripping all materials and inventory and finally cutting the steel in a safe manner.

The IHM gives estimated weights or volumes. As material is removed from the ship, consultants from Grieg Green will track the amounts versus the IHM to ensure that this material is accounted for through the entire ship recycling project.

Grieg Green personnel inspecting a vessel in preparation for recycling.

Photos: Grieg Green

Furthermore, all of this material can be traced downstream to a licenced disposal facility".

Given the ongoing public pressure on shipowners to ensure their legacy assets do not end up at one of these notorious harmful shipbreaking operations, it appears that the desirability of ship recycling consultants like Grieg Green are on the rise. Mrs. Saltkjel ended the interview noting, "companies in third worlds will make investments if it will give them business. So there has to be a balance. You cannot lean back and say that they have to fix everything so that its perfect and shiny, and then we'll give them business. At some point in the development you have to test a yard with an actual ship recycling project to find out how theory fits practice. We always keep an open and constructive dialogue with both yard and previous owner in this process…That's how you evolve…".

Right: Grieg Green inspectors witnessing the proper disposal of asbestos containing insulation material at a licensed landfill.

Below: CEO of Grieg Green, Petter A. Heier (left) and Head of Recycling Magnus Hammerstad (right) touring a Ship Recycling Facility.

Photos: Grieg Green

Bigger, **Bolder,** Heavier

Europe's offshore wind market is growing faster than anyone expected, posing a challenge for the existing installation fleet.

By Elaine Maslin

While offshore wind is seen by many as a maturing market in Europe, with the first subsidy free offshore projects being planned, it's not without its challenges.

In Europe, there is more than 18 gigawatts (GW) of installed offshore wind capacity. Last year, 2.4GW was added and that's expected to be how much will be added per year over the next 10 years, according to consultancy and analysts Wood Mackenzie.

The UK, Germany and the Netherlands are the biggest markets, with France now also moving in, with plans to start feeding power into the grid in 2020/21, and Belgium and Poland eying their potential.

A huge focus has been reducing costs, which has happened – faster than any expected, especially in the last 2-3 years. Indeed, the first zero subsidy bids were made for offshore wind parks in 2017, when Germany's EnBW and Denmark's Ørsted made bids for German projects.

"A large part of it (cost reduction) is attributed to a faster design cycle in turbine evolution," says Shashi Barla, senior analyst at Wood Mackenzie, with turbine manufacturers unveiling new, larger systems faster. "12- to 14-mega-

Voltaire: The Voltaire is named after the French writer, historian and philosopher François-Marie Arouet, known by his pseudonym Voltaire and as an icon of the European Enlightenment of the 18th Century.

Source: Jan De Nul

Brave Tern and Bold Tern in port of Esbjerg

Source: Fred. Olsen Windcarrier

watt (MW) turbines could be available in the timeframe of those projects. That could be cost effective and provide power at zero subsidy." But, a faster design cycle means that the broader industry has to face up to shorter supply cycle, he says.

It's not that long ago – 2011/12 – that vessel owners were building assets for an industry building out 6MW turbines. This year, 9.5MW turbines with 164-meter-diameter rotors will be installed at the Northwester 2 offshore wind farm in Belgium. Siemens Gamesa will also be prototyping its 10MW SG 10.0-193 DD prototype turbine, with a 193-meter-diameter rotor, at the Danish National test center for large wind turbines in Oesterild, Denmark. The firm expects the turbine to be commercial by 2022. Meanwhile, GE is working on the Haliade-X, a 12 MW device. "It might not be long to go until a 14 MW is being developed," says Barla.

Meanwhile, according to the UK Chamber of Shipping, in 2017, offshore turbines were installed at an average depth of 27.5 meters and located 41 kilometers from the shore on average. Last year, the numbers were more moving into 100-150 kilometers offshore, where bottom-fixed turbines were being installed in 40-50 meters depth.

This puts pressure on installation contractors and there are questions over whether there is capacity in the market. "If companies are not making investment today in these vessels and other balance of plant equipment, there may be a bottle neck in handling these large turbines and blades," says Barla. "We're talking already 100-meter-long-plus blades and heavy components. Some nacelle components you're talking 800 metric tons. You really need big machines, bigger cranes to handle these."

Arnstein Eknes, segment director for Offshore Service Vessels in classification society DNV GL, says there are two

key dimensions when installing larger turbines; longer blades and heavier nacelles. "Today, we are talking about blades maybe 100-105 meters long. The nacelles are the heaviest component and they need to be lifted 130-140 meters up in to the air, so hoist distance is an issue. We see that the wind farm installation vessels built initially, they are too small today without retrofitting new cranes. Even those built 6-7 years ago are too small and they are retrofitting larger cranes, which is not an easy task. The cranes were maybe designed for 300 to 400 metric tons and now need to be for 700, 800, 900, maybe even 1,000 metric tons. It's about weight and altitude." But, these are not the only issues, he says. These vessels mostly have to jack-up to perform installation operations. "Subsequently, we need to recalculate the strength and whole hoisting system of the jack-up in order to lift these components. So, it's really not straightforward to retrofit a crane, and it really is a headache for wind turbine installation vessels (WTIV) owners to know how to prepare for what the end customer will do," – i.e. how large turbines will go.

Indeed, some developers have already been seeking consent to use 20MW turbines on developments in the North Sea, which could see rotor diameters extend to 280 meters. "That's doubling the weight and capacity of the existing largest wind turbine," says Eknes.

While this could exert more pressure on the WTIV market, it may also result in fewer turbines being built; with 20MW turbines instead of 10MW units, half the number of turbines would need to be installed to create the same size farm. But, it could also mean added complexity, says Eknes, which might mean there's a practical limit to the size of turbines that comes before the technical limit. That poses are very difficult investment decision for WTIV operators.

Some are investing.

Just four years into entering the offshore wind installation market, Belgian firm Jan de Nul is making a splash, with the Voltaire on order from COSCO Shipping Heavy Industry in China. The newbuild, due to be delivered in 2022, will have 3,000-metric-ton lifting capacity, using a Huisman leg encircling crane and lifting capability, up to 270 meters in up to 80 meters water depth. "The Voltaire will be able to install at unrivalled hub-heights up to 165 meters with the standard boom," says Manager Offshore Renewables at Jan de Nul Peter De Pooter. "This will allow the installation of the next generation turbines, with blade tips that might end up as high as 270 meters above the sea level."

The Voltaire comes on top of Jan de Nul's offshore jack-up installation vessels, Vole au vent, acquired just four years ago, and Taillevent, which are able to install turbines up to 10MW, says the firm. "They can lift all the components up to the actual max hub height of 120 meters," says Jan de Nul.

"The next generation of turbines +10MW will become a challenge for all installation vessels currently available on the market," De Pooter. "Foundations will be heavier; blades will be longer. The size, weight and heights will limit the quantity of turbines that can be transported per cycle (on board of today's installation fleet) to one or maximum two. A vessel with the appropriate technical characteristics is the answer to this challenge."

De Pooter sees a wider market for this vessel. "Offshore wind outside Europe and China is starting to develop," he says. "Taiwan is working on its first full scale wind farms and Jan De Nul Group is one of the main contractors for the two first engineering, procurement and construction (EPC) contracts: the 120MW Formosa 1 wind farm in 2019 and the

Seajacks's Scylla.

Source: Seajacks

110MW Changhua wind farm in 2020. Both wind farms are currently under construction."

Seajacks

UK-based Seajacks has been operating in the offshore wind business since 2006. Since then, it's built the Kraken, Leviathan, Hydra, Zaratan and most recently, Scylla jack-ups. Seajacks expects to see the next generation turbines, eg. 12MW and, in number from 2023-25 and it is in discussion with developers over installing 12 or 15MW units with Scylla, which entered service in 2016 and has a 1,500-metric-ton leg-encircling crane and can work in up to 65 meters water depth.

"We think there is still a good number of vessels in the market that can install the larger wind turns, (dependent on site characteristics), when they arrive in the market. However, to install 10-15MW turbines, many of the current units will need to be upgraded and modified in order to stay relevant," says Max Paterson, commercial manager at Seajacks. "The main issues for older smaller vessels in the market will be hook heights for nacelles and variable deck load, to carry heavier and larger components, and deck space. This means new cranes and leg extensions etc. and it is likely that these necessary upgrades will have a negative effect on how fast these vessels can install."

Having said that, Paterson also thinks demand and supply should be well balanced. "The market might become tight in some years, in the peak installation months over summer, if multiple projects are planned over the same time," he says. Conversely, ensuring vessel utilization is also key for owners, which is why Paterson expects WTIV vessels will need to work around the world in the various new markets, like Asia and the US.

"Larger turbines, eg. 10-15MW, will mean a smaller number of turbines will be required to reach a wind farms generation capacity, likely resulting in fewer utilization days for vessel owners," Paterson says. "It is already a challenge keeping vessels occupied all year round.

"We already have an extremely competitive WTIV supply chain," he adds, "with a lot of cost-effective equipment in the market. Will it make sense to move the turbines weights and dimensions to a level where only two or three vessels are suitable? Only time will tell, but with the ferocious focus on lowering cost, particularly on installation, I am sure developers and turbine manufacturers will be very mindful of supply and demand dynamics in the WTIV market."

Fred. Olsen Wind Carrier

Petter Faye Søyland, Head of Engineering, at Danish firm Fred. Olsen Windcarrier agrees that to move to 10MW+ turbines, many of the older vessels in the fleet will need to be modified to meet requirements on lifting height and capacity. "The majority of the J/U fleet in the wind industry is capable of 8MW installations, with a few exceptions," he says.

Fred. Olsen Windcarrier's fleet is currently suitable to install a selection of 10MW units, he says. "The Brave Tern and the Bold Tern (jack-ups) have been thoroughly upgraded. Both have been subjected to

Esteyo's ELICAN concept.

Source: ALE

14-meter leg extensions to manage offshore sites with deeper water and higher survival storms, such as the North Sea basin. Moreover, the cranes' booms have been upgraded with a 20-meter boom insert, enabling them to install turbines with a higher hub height. Both Brave Tern and Bold Tern have replaced the deck crane to enable lifting of tools and equipment to the transition piece, for faster and more efficient installations. In addition, the vessels have undergone under-deck modifications and strengthening, as well as modifications to the tank arrangement to enhance the probabilistic damage stability; both to enable transport of higher and heavier turbine components.

We also asked Seaway 7 (formerly Seaway Heavy Lifting) and DEME Group for their views, but neither company responded.

Potential for disruption?

Others are looking for alternative engineering methodologies to make offshore installation easier. Last September, Heerema Marine Contractor's Aegir heavy lift vessel (launched as a kind of 'Swiss army knife' for the oil industry during its boom in 2013) installed a new design wind turbine concept, called the Delft Offshore Wind Turbine Concept (or DOT), in just one hour, using the first slip joint connection concept in the industry.

The DOT wind turbine had already been installed on a monopile connected by the slip joint and was picked up in a single lift by the Aegir from Sif Rotterdam's quayside and taken to the installation site, the Eneco Princess Amalia Wind Park. There, it was installed by the Aegir as a floating vessel using dynamic positioning.

The slip joint connection was designed under the Slip Joint Offshore Research project (SJOR), launched by a collaboration between research partners TU Delft, TNO, Van Oord and Sif group, and project stakeholders Eneco and Heerema Marine Contractors in 2016. The concept is based on friction, where the weight ensures a firm and stable connection. This means that installation is done by simply sliding the wind turbine over the monopile without the use of grout or bolts, reducing costs, materials, equipment, personnel and schedule, says HMC.

Meanwhile, Spanish firm Esteyco is leading the ELICAN consortium which has designed and installed a 5MW prototype Elisa self-installing telescopic tower concept that would reduce need

The new Siemens Gamesa 10MW offshore wind turbine, artist's impression.

Source: Siemens Gamesa

for installation vessels.

The prototype system was installed in 30m water depth in August last year – using WiFi – offshore Gran Canaria, Spain, and started producing power in March. It comprises a self-floating gravity-based structure (GBS) and a self-lifting telescopic tower, both made of concrete, with a 5MW Siemens Gamesa turbine on top. The structure can be fully assembled onshore, including the turbine, and then towed to the installation site where, after ballasting the GBS to the seabed, conventional heavy-lift strand jacks which are reused to lift one tower level after the other, lifting two sections weighing a total 960-tonne into their final positions. The recoverable jacks that lift each level are supported by the one below, which also guides the hoisted tube as it rises, in a self-installing procedure in which the tower itself is the only supporting structure required. All works are carried out from a single access platform, which is removed once the turbine is installed.

The consortium, comprising Esteyco, Siemens Gamesa, Ale Heavylift, Dewi GmbH and PLOCAN (the Oceanic Platform of the Canary Islands) claims this method could reduce installation costs by more than 35% when compared to jackets or XXL monopiles in deep (35 meters plus) water. The project partners also say the design is scalable would be "a readily available means" to install new 12MW turbines.

Room for improvement

The first offshore wind project was built in 1991, at Vindby, Denmark (and is now decommissioned) and there's now more than 18GW of offshore wind capacity. "But, to put that in perspective, the global onshore wind capacity is about 600GW," says Barla. "So, from a volume perspective, offshore still has the biggest room for improvement." This could be in policy, process, technology and then supply chain, he says.

In terms of technology, there's a move towards use of carbon fiber in blades. "Historically, manufacturers have been reluctant make investment into sourcing carbon fiber because it's expensive and with very few supplying it, controlling the supply chain can be challenging," says Barla. "If you look at the biggest players, Siemens Gamesa, all their offshore turbines have been glass fiber. Now, they've announced the 8MW DD167, a prototype of which was installed a few months ago, and the 10MW DD193, both of which incorporate carbon fiber. There's been a paradigm shift in the largest players in the industry."

"In terms of processes, we are still not there yet," he adds. "It you talk about the automotive industry, with assembly lines and efficiency, they are far ahead, but they're a 120-year-old industry. Offshore started many years ago, but the real commercial projects only started in the last seven years. There is still a huge learning curve, Europe and globally." But, while there's room for improvement, the lessons already learned in Europe can be replicated now in other markets, to help them scale up faster.

Photo: Lloyd's Register

5 minutes with LR's *Nick Brown*

By Greg Trauthwein

"LR research suggests that **the cheapest zero carbon fuels are going to be at least double** the price of fuels today."

Nick Brown, Lloyd's Register

To kick things off, share your insights and perspective on the scope and pace of change facing the maritime community today.

We are seeing the two megatrends of digitalization and decarbonization combining to drive one of the largest periods of change that the maritime industry has ever seen.

The only comparable change affecting the entire world fleet that I can think of during my career has been the entry into force of the International Safety Management (ISM) code where the focus moved to the management of assets and not just the condition of the asset itself. One could tell that its introduction in July 1998 was clearly going to impact both the management and operation as well as the design of ships going forward. Since joining LR in 1996, I have seen a complete industry transformation. You simply need to look at safety levels and the demands on environmental protection. Collisions, casualties, loss of crew, and the potential for environmental pollution has been dramatically reduced due to a plethora of initiatives introduced over the last 23 years, more than we'd seen for a number of generations.

This recent impetus brings confidence that we can manage the long-term strategic decarbonisation aims required as the industry works towards the 2030 and 2050 IMO goals, and utilize the rapidly developing digital technologies smartly to improve operational efficiency.

How have these industry changes impacted LR and the way in which you go about your business?

Five years ago, LR didn't have an internal innovation team. Instead we had technical departments focused on long-term research programs. These research programs would last for many years and would culminate in a new set of rules or the revision of an existing set of rules. These would then be adopted, and perhaps after a few years, vessels would enter service having been designed and built using those new Rules. The gestation period from concept and research through to application was around five years or sometimes even longer. But now we are seeing digitalisation and more recently, decarbonisation accelerate into our industry.

Consequently, as a result of the new risks and opportunities presented by these mega trends, we have adjusted the way that we support and advise the industry.

Over the past five years our innovation team has focused on engaging with our clients on addressing specific challenges that they face to build a better understanding on how we can collaborate - using data and information insights. More recently, this focus has shifted to new fuels and new technology to solve future challenges together.

Another recent example would be the rise of cyber threats in the maritime sector, and therefore we decided to invest in Nettitude in 2018 and bring in cyber security specialist services to our portfolio of offerings, again to ensure that we are well placed to support the challenges our clients are facing.

In addition, vessel design optimization and operational performance improvement, where we've been using Artificial Intelligence (AI), Machine Learning (ML) and Natural Language Processing (NLP) to rapidly analyse structured and unstructured data to provide insights around the improvement of operations for our clients.

What are the top priorities on the LR agenda in the coming 2 years?

The top item is the most immediate and obvious one - supporting the industry through the transition that comes with IMO 2020 and providing advice on the technical, operational and safety challenges in the months ahead.

Number two is working with shipowners, shipyards and Original Equipment Manufacturers (OEMs) to produce suitable and safe deep sea zero emission vessel designs and managing the safety risks that might be presented with new fuels and adoption of technology.

Three is evolving the way LR will deliver our traditional services to customers in a data-driven world, where information from sensors, control systems and maintenance logs can be combined with analytics facilitating the move away from time-based inspection and survey regimes so that they are data-driven and risk-based, which will ultimately include remote inspection techniques to provide equivalence to our traditional class services. Lastly, is promoting our Safety Accelerator program and the need to unlock, harness and nurture new potential – the innovators, inventors and start-ups who have the ability to increase the health and safety performance status of the maritime industry.

Realistically, how do you envision the push for decarbonization playing out in the coming years?

We have to consider decarbonization from three angles – the industry's technological readiness, the commercial attractiveness of change and the regulatory environment.

To have a credible conversation about decarbonization we need to understand what is technically viable. Over the last few years we've been working with industry stakeholders to develop concepts and approvals in principle of

what we believe will be prototype vessels, contracted and constructed in the next decade. For such vessels to be viable, shipowners, and charterers need to know that the fuel supply chain and land-based infrastructure will be in place to support their fleets. They will also need to have an idea of pricing implications of new fuels.

And this is where I believe the industry can learn from other sectors and engage much more proactively with government and other industry stakeholders to ensure a level playing field exists in the transition to zero-emission vessels, one that doesn't penalize first movers - and enables the industry to move at the necessary pace to meet 2050 targets.

In my view, one of the biggest advantages that the maritime industry has is that we are globally regulated. That gives a huge advantage over many other hard to decarbonize industries such as steel manufacturing or concrete. And clearly, global regulation by the IMO will be critical to achieve the 2050 targets.

LR research suggests that the cheapest zero carbon fuels are going to be at least double the price of fuels today. However, given societal expectations it could be that the end customer is prepared to absorb the additional costs, particularly when we consider the very fractional element that shipping currently contributes to the end price of delivered goods around the world.

The digitalization trend is also materially impacting the way in which companies conduct their business at sea. To start, what is the 'reality on the street'?

Digitalization is primarily driven by the larger companies, those with fleets of 50 or more vessels, with many of the solutions being developed considered critical to the company's sustainable performance for the future. Many are built in-house and are company specific to give competitive advantage.

Looking more widely, there is a common trend around operational efficiency – examples being voyage, speed and trim optimization as well as weather routing but these can only go so far. I believe the significant gamechanger will be connecting the ship to the shore, or the tanker to the terminal. We're all aware that charter parties do not make it easy for operators to adjust speeds subject to arrival times in line with live conditions or terminal congestion. This will change with better connections and would result in not only significant fuel costs savings for both charterer and shipowner, but also significantly reduced emissions.

How is LR benefiting from digitalization?

Digital enables us to see industry trends much quicker as we gather more data about the assets in our fleet and the equipment onboard. Using these insights, we are able to complete the feedback loop that has existed for centuries much more quickly, so lessons from new designs and how they are performing in service can be fed back into the next generation of designs at a much faster pace.

Digitalization has also enabled LR to introduce enhanced surveying practices using modern communication tools and technology, such as live video feeds and this greater ability to stream high-quality images and video around the world enables our surveyors to access the data they require in more reliable ways, sometime without the need to be onsite. We are therefore able to provide support to owners, operators, port state control etc. on a remote basis, in many situations where until very recently, physical attendance would have been required.

What is your biggest challenge in leading LR today?

LR is a people organization. Change is necessary, but change isn't necessarily comfortable for everybody. One of the biggest challenges I have experienced is making sure that colleagues understand the reason for change and that an environment of change is the new norm. One also needs to reiterate that change really provides more opportunities than it does risks.

Photo: Lloyd's Register

Trailblazer

Boriana Farrar is a familiar face in maritime circles, the Vice President and Counsel and a Senior Claims Executive and Business Development Director for the Americas at the Ship Owners Claims Bureau, Inc. managers of the American P&I Club. We met with her in her NYC office to discuss her path from her native Bulgaria to a top maritime professional position.

By Greg Trauthwein

When Boriana Farrar moved from her native Bulgaria to the United States in 2001, she did so to be close to family, her mother and her sister who had already established a life in the U.S., some 5,000 miles from her homeland. At the time, a career in maritime was the furthest thing from her mind.

"The truth is that I fell into it; I come from a town surrounded by mountains, so never in my wildest dreams did I think I would be working in shipping. But here I am and I love it." said Boriana. "I always wanted to be an international commercial lawyer, but as an intern with a law firm (Sher Garner) in New Orleans I started working on maritime cases. I found it interesting and challenging, and I fell in love with the subject."

"I decided to specialize in maritime law and obtain another LLM in Admiralty Law at Tulane Law School, which is the best in this field in the country, if not worldwide. I find that the maritime world is very dynamic and still enjoy being part of it."

Boriana Farrar is a Vice President, Senior Claims Executive and Counsel at the American P&I Club in New York.

Boriana had many mentors along the way who helped shape her career especially Joe Hughes, Vince Solarino and Dorothea Ioannou at the American P&I Club and Greg O'Neill at her old law firm Hill, Betts & Nash LLP. But she credits Judge Stephen Plotkin, a 4th Circuit Louisiana judge and a Fulbright Scholar at the University of Sofia, from which Farrar is a graduate, instilling in her that "Everything in life is possible. No matter where you come from. No matter your background." And now that nearly 20 years has passed, through education and much hard work, she is firmly established as a leader in global maritime circles.

Actively Involved

Boriana is active in the maritime community outside the walls of her '9 to 5', and perhaps one organization that has stood out has been her connection with WISTA, the Women's International Trading and Shipping Association which has grown steadily in influence from its roots in 1974 and its official renaming and founding in 1984.

"I became involved in WISTA as a young lawyer in 2007. At the time there was a New York chapter, but it was not very active," said Boriana. She and a colleague Christine Ready decided to throw a reception to help reinvigorate WISTA, and over the past 15 years she has watched as the membership and influence has grown. "We have more than 600 members and I've been serving on the board for four years, so I've been involved closely in the oversight of the growth of the organization, and I was the head of the New York/

SCI Mountain Challenge teammates (L to R): Boriana Farrar, **Jeanne Grasso** and **Blythe Daly** from WISTA USA.

New Jersey chapter for five years."

While the progress has been steady, she still sees much work to do to ensure that the female maritime workforce continues to grow in influence. "We have done a lot, but there is a lot more to be done in terms of taking women seriously, and the participation of women in leadership roles throughout the industry," said Boriana. "I have to say that the Shipowners Claims Bureau, Inc. has been extremely supportive in this regard."

Boriana is an energetic sort, and her industry involvement doesn't stop with WISTA. She is also actively involved in the Seaman Church Institute, serving on the board of an organization that is hands-on involved in the daily welfare of seafarers, a mission that she says "closely overlaps with the objective of the Club. I have been incredibly impressed with the work that Seamen Church Institute has been doing, especially in the field of mental health." The American P&I Club, together with Seamen Church Institute, issued a joint guidance in that regard.

In addition, Boriana is involved in the Maritime Law Association in the United States, previously serving as a board member and currently serving as Vice Chair of the International Conventions Committee. "As a 'recovering lawyer,' being part of this wonderful legal community is important for me," she said. Finally, she serves on the board of MICA – Marine Insurance and Claims Association, "a really a wonderful organization as to promoting the insurance industry, which is important. Without insurance, we know, many companies can't function."

The more things change …

While this is a transcendent period in maritime history – with strict new emission reduction regulations coming into force globally, the advent of digitalization and all of the promise (and peril) it encompasses, and the dawning of the age of autonomous operations – the business of the American P&I Club and the role of P&I clubs globally remain comfortably familiar. "When you look at the P&I world, for the last 100 years and beyond, it has not changed dramatically," said Boriana. "It is an international group of 13 clubs who have a pooling agreement amongst each other essentially in a reinsurance scheme that provides for a very affordable insurance globally; that scheme has not changed dramatically in the way it functions for many years. And this is a good thing because as it allows shipping to operate at a relatively low cost because of international group and the reinsurance arrangement."

Today about 90 percent of the worldwide fleet is insured with a P&I club in the international group of 13, a reinsurance and pooling arrangement that makes large claims – like Costa Concordia – to be covered effortlessly.

But that's not to mean her world is not impacted by the dramatic changes afoot in maritime today.

New IMO 20/20 rules coming in January 2020 have created a great deal of uncertainty among shipowners in regards to the best technical and business solutions to meet the new requirement today and in the future. The American Club, and in fact all P&I clubs, have been proactive to help fill the information void.

"Together with our loss prevention department,

Boriana enjoys giving back to the community which has supported her throughout her career, pictured here with **Martin Davies**, the head of the Admiralty Law Center at her alma mater Tulane Law School, where she recently gave a presentation to students.

we have prepared compendium for our members for some potential issues that could arise," said Boriana, noting a series of seminars and training made available throughout 2019 to help members prepare for potential disputes. "It is essential that we provide information as due diligence for owners and their crews as to the new technology that is being installed, it an issue that everyone is focused on."

While much focus and attention has been on the IMO2020 fuel rules, the advent of autonomy and cyber risk has proven another hot topic within walls of all maritime insurers.

While the technology to permit autonomous operations has continued to evolve rapidly, generally the global regulatory issues and the insurance sector are considered to be the two biggest hurdles to clear.

"(Autonomy) is indeed a hot topic and we're talking about this all the time," said Boriana. "It's happening, it's unavoidable, and it's the future." While it is still a fairly limited and exclusive number of early adopters, there is a growing reference list, particularly coming out of the innovative Nordic countries, that are working toward autonomous vessel solutions for specific, local routes. "I don't see trans-ocean journeys made by autonomous ships anytime soon, but that doesn't mean that it won't happen in the future," she said. "From a risk evaluation perspective, we have a very capable underwriting department with formulas to calculate risk, and part of that calculation involves the human element." So when the onboard human element is removed from the equation, the calculation will change dramatically, but Boriana has confidence in her colleagues throughout the industry to adjust. "The insurance industry is a well-oiled machine, and it is also very adaptable. So if there is a product, we'll find insurance for it. Overall, we are excited about it (autonomy). It's the future."

Full Speed Ahead

Boriana truly embodies the spirit of participation, and it is easy to see that she gets as much as she gives from being an active participant in the maritime community. "I'll allow myself to rephrase a quote by Kennedy: 'Don't think what you can take from shipping, think what you can contribute to it.'"

While she no longer is a practicing lawyer as she works in-house, she credits her legal background with providing a solid foundation for future growth.

"I want to talk about that a little bit because there is so little regard and respect nowadays to being a good lawyer," said Boriana. "The grace of the profession seems to have gotten lost in some regard, but being a good lawyer – or having a good lawyer – can make or break a company, a relationship, a deal or a life."

Her role today also focuses on the business development side, helping to ensure that her organization grows in step with an ever-changing industry. "I love being a rain maker, and my great-grandfather was a trader at a very successful practice, so I guess that's in my blood. Having a commercial approach, developing business strategy and bringing in business is something I have grown to love."

So when she looks back remembers herself as the young girl who grew up in Socialist Bulgaria, finding her desire to be a lawyer after watching *"Kramer versus Kramer"* and *"Twelve Angry Men",* moving to America and growing and evolving to become a leading maritime industry voice with an office in lower Manhattan overlooking the Statue of Liberty and a global presence, her advice and formula for success to all young people rings particularly true: "Work hard, keep trying and never give up. Never give up."

A Good Read

"My favorite book of all time is The Old Man and the Sea," said Boriana. "I think it symbolizes a lot what we deal with in life, and sometimes in the maritime industry. It is not, per se, connected to the economics of shipping. But coming from the perspective that the human spirit cannot be defeated, but at the end of the day you cannot defeat the sea, is a philosophy that we shouldn't forget in shipping. It is also something that, as a claims person dealing with casualties, we are reminded (too often). We have to love Mother Nature; we can't defeat her."

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Chevron Shipping
& Unlocking the Value of Flag

Photo: Chevron

Choosing which Flag to register your ships with is not a decision to be taken lightly. More and more, shipowners are demanding high levels of standards from the Flag in order to protect and manage their own operational, commercial and reputational risks.

Chevron Shipping Company's General Manager of Fleet Operations, Steve Herron, believes that choosing a Flag purely for financial reasons has no place in today's shipping market.

Drawing on the company's collaboration with the Bahamas Maritime Authority (BMA) over the past 25+ years, Herron highlights the importance of working with a Flag that not only has shared values and goals but a commitment to 'doing the right thing'.

Herron has seen first-hand how sailing under the right flag can help shipping companies make decisions that lead to long-term success. Low taxes and low expectations have helped make some open registries popular in the competitive maritime market but choosing a flag for financial reasons can be a mistake. Herron – who hails from Scotland - started sailing with Chevron after completing his cadetship with BP in 1984. Since joining Chevron 30 years ago, Herron has moved to sunny California where he is General Manager of Fleet Operations.

As a Shipping industry veteran, Herron has seen his fair share of operators using flags for financial benefits. While cost savings might be enough reason for some commercial shipping companies' choice of flag, it's not enough for Chevron Shipping.

The business of transporting oil for Chevron is not motivated solely by money. Risk, instead of profit, is Chevron's main concern — each decision is evaluated in terms of managing operational risk, commercial risk, and perhaps most importantly, reputational risk.

As Herron explains, building a solid reputation can take decades, but losing a reputation can happen overnight, making risk management the primary role of Chevron Shipping: "As a shipping company that is part of an oil company, our primary role is managing marine risk, our secondary role is transporting oil."

Upholding the high standards needed to minimize risk requires partnering with a flag that plays an active role in shaping global regulations at the International Maritime Organization (IMO), by providing guidance to help ships meet shared standards. "Whenever we've had any issues, we've always found the BMA open to dialogue and open to addressing issues in a responsible way. It's one thing to say they're business friendly, it's another to say they understand the business we're in," said Herron

Raising the BMA

Open dialogue between Chevron and the BMA not only helps ensure alignment of shared values and expectations, it also helps the fleet continue to improve

Photo: Chevron

> "As a shipping company that is part of an oil company, **our primary role is managing marine risk,** our secondary role is transporting oil."
>
> **Steve Herron,** GM of Fleet Operations, Chevron Shipping

and develop. A certain trust has developed between Chevron and the BMA. Whenever issues arise, Herron is "more than happy to pick up the phone and get in touch with someone at the BMA." Out of these conversations, new possibilities emerge that help Chevron stay ahead of industry developments and with implementing progressive solutions that comply with international regulations.

An example of the benefits of this collaborative relationship is an initiative Chevron established to improve medical resources onboard their vessels. According to Herron, merchant vessels aren't required to carry qualified medical personnel onboard.

When accidents occur, the crew relies on first-aid facilities. Unfortunately, first-aid facilities onboard some vessels are often found to be sorely lacking, with some of the equipment unchanged since the end of World War II.

Discussions between the two organizations revealed this critical safety issue. Chevron, with the support of the BMA, initiated the development of an iPad medical platform, which amongst other things, can record and transmit electrocardiography in the event a crewmember has a heart problem — an innovation described by a Herron as a "gamechanger for the industry".

While new technology remains a significant driver of change in the shipping industry, Herron believes, "the biggest changes will be driven by environmental regulations adopted by the IMO, and compliance with the regulations will drive the development of technology."

At present, Chevron is in the process of renewing its fleet of 30 tankers and is relying on assistance and guidance from the BMA to ensure the ships comply with all regulatory requirements being adopted by the IMO — including the 2020 commitment to lower sulfur fuel oil and the broader greenhouse gas strategy. As it becomes clearer as to how regulations and technology will work together to enable these changes, Chevron — through the BMA — has the ability to not only influence the direction of these regulations from the perspective of a ship owner, but also drive progress within the industry and ultimately, chart the best possible future course for Chevron Shipping Company.

Scrubbers: A 360-degree solution for shipowners and the environment

By Scott Poulter, founder and CEO, Pacific Green Technologies

As part of the IMO's commitment to reducing the maritime sector's output of greenhouse gases by 50% over the next 30 years, January will herald the new global 0.5% sulfur cap.

This is a major transition for ship operators and owners, but they have several options.

Many shipowners are switching to low sulfur fuel oil (LSFO), but this will mean a significant leap in vessel operating costs. The price of LSFO on 1 January 2020 is not yet known, but analysts have estimated that the price could be between USD100-300 per tonne more than HSFO. With hints of global recession sparked by trade wars, this is a price increase few can afford.

Similarly, for most shipowners and operators considering compliance with the new global sulfur cap, converting a vessel to LNG would be prohibitively expensive.

As a result, it is estimated that by 1 January 2020, 4,000 vessels will have fitted exhaust gas cleaning systems (EGCS), also known as 'scrubbers'. While this does entail an investment, it's one that will pay for itself within the first year.

As LSFO is expected to be so much more expensive than HSFO, the potential savings (i.e. savings gained from installing a scrubber and burning HSFO instead of burning LSFO) can quickly offset the scrubber installation cost. Furthermore, HSFO will continue to be cheaper than LSFO in the years to come, and those using HSFO will continue to save money.

Some refiners have suggested, that with the switch to LSFO, there will not be enough HSFO to supply those vessels still using it. They say that new refineries being built are super-modern and will not produce HSFO in the short or medium term. This may be true.

But the supply of HSFO is not likely to be an issue in the short and medium term, because there are 700 established refineries around the world, and the vast majority will not be immediately upgraded to be able to deliver the extra levels of refining required for LSFO and other distillates (such an upgrade would cost each refinery an estimated $3bn).

And there will still be plenty of demand for HSFO when the new regulations come into effect - there will be 4,000 vessels with scrubbers installed by January 2020 and many more to follow. Even if the established refineries upgrade over the short-to- medium term, shipowners with scrubbers will still be able to enjoy significant financial advantages in the interim period.

The second compelling reason to install a scrubber is the benefit to the environment.

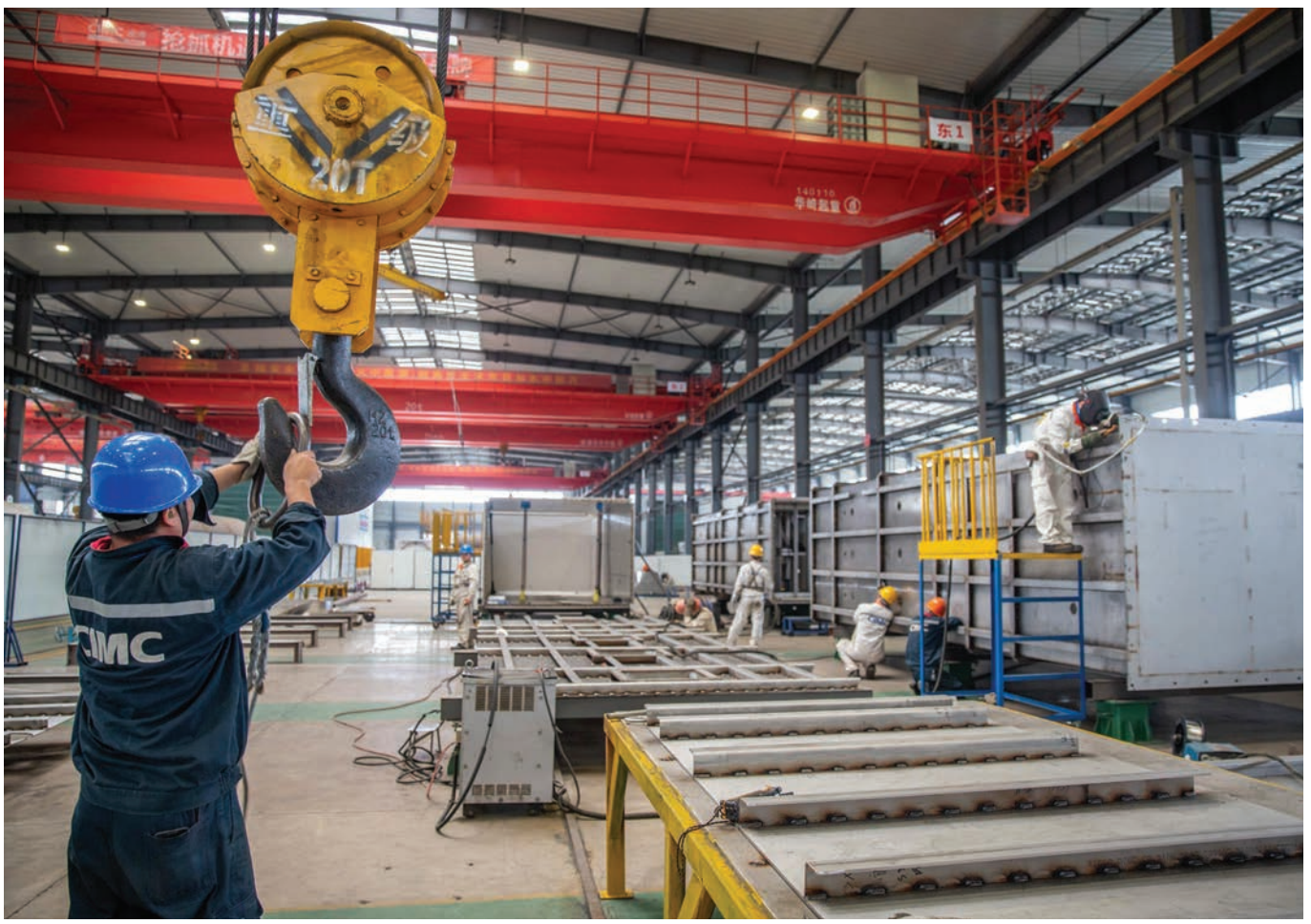
Shipowners and operators could learn from Toyota Prius drivers. Launched over 10 years ago as the world's first mainstream green vehicle, the Toyota Prius wasn't as green as it was first assumed.

While the car's emissions were lower in GHGs, once the full production process of the vehicle was taken into account its green credentials were not nearly so solid. Studies by the US Department of Energy's Argonne National Laboratory revealed that the production of hybrid vehicles consumed significantly more energy, burnt more fossil fuels, produced more GHGs including sulfur oxide, than the manufacture of a standard vehicle.

The same is true for LSFO. Shipowners and operators who choose LSFO as their means of compliance, believing it to be more environmentally friendly, and therefore an economically and politically safer alternative, are failing to understand LSFO's true carbon footprint.

According to a recent study published by Norway's SINTEF, the energy required in the global production of LSFO produces far more GHG than in the production of HSFO. And this will be an even bigger problem when the volume of demand for LSFO after 1 January 2020 is taken into account. The SINTEF study concluded that from well-to-wake, the continued use of heavy sulphur fuel oil with an exhaust gas cleaning system (EGCS) – a scrubber – actually offered the best way to meet the IMO's GHG emissions targets – both in terms of cost-effectiveness and in terms of GHG emissions. The author of the report, Dr. Lindstad, concluded that the use of HSFO with scrubbers offered the most benefits to marine and port environments and, as a result, human health.

A scrubber is an EGCS which is fitted to the outlet of a ship's engine to clean



Pacific Green Technologies

the exhaust gases before they are discharged into the atmosphere, allowing a ship operator to continue to use HSFO but meet the compliance requirements of the IMO's regulations.

Open-loop technology has been endorsed by the IMO, but some ports around the world seem to be denying the scientific evidence that informs and supports the IMO's 2020 regulations. Some are even banning open-loop scrubber technology, despite the research. In effect, they are acting as enforcers and, as a consequence, undermining the IMO.

To counter these fears, after more than a decade of designing, planning, manufacturing and implementing scrubbers on vessels, Pacific Green Technologies recommends its ENVI-Marine system, which is fully flexible and can be supplied as open-loop, open-loop hybrid-ready or fully hybrid system capable of both open and closed mode operation, depending on the sea's alkalinity and the effluent emission regulations wherever the ship is located.

The ENVI-Marine system is a new generation of scrubbing technology, based on a simple concept. First, it quenches the flue gases, then it cleans them by specialized frothing through pure seawater using its patented TurboHead™ process, then, it polishes and releases them as harmless salts, or stores them for safe disposal.

ENVI's unique patented TurboHead provides a highly interactive contact between the seawater and the exhaust gas in a turbulent zone containing a high amount of surface area for gas/ liquid absorption. This high energy liquid/gas interaction ensures both the residence time and complete interaction required to achieve the high efficiency removal of sulphur from the exhaust gas and the extreme turbulent interaction transfers the particulate matter from the gas to the scrubber fluid. Used in its open-loop function the ENVI-Marine discharges neutralized sulphur into the sea, used in its closed-loop mode, the system uses caustic soda (NaOH) or magnesium hydroxide (Mg(OH)2) as supplemental reagents, and the solution can be processed and simply stored for disposal ashore.

Scott Poulter, CEO Pacific Marine Technologies, explains: "Depending on the size of the ship, retro-fitting the ENVI-Marine technology can take between just two or three weeks during maintenance downtime, and offers numerous benefits including a customized flexible shape, an eco-friendly footprint and attractive capital and operational costs. The ENVI-Marine system really is at the forefront of technological advancement, offering exceptional flexibility and the very best 360-degree solution for IMO 2020 emissions compliance."

Photo: Wärtsilä

The agreement between Wärtsilä and Norsepower will promote the use of Rotor Sails & support sustainable shipping.

Wärtsilä, Norsepower Sign Agreement

The technology group Wärtsilä and Norsepower, a provider of low maintenance, software operated, data verified auxiliary wind propulsion systems, have signed a service cooperation agreement.

This will enable Norsepower to order service work from Wärtsilä, while Wärtsilä can pursue and sell Norsepower Rotor Sail projects with support from Norsepower. The agreement was signed in Q3 2019.

With the growth of Norsepower's manufacturing capacity and the anticipated increasing demand for its Rotor Sails, the collaboration will help the organisation work at scale and further strengthen its customer service offering in cooperation with Wärtsilä's global service network. The main target sectors include tankers, passenger ferries and cruise ships, as well as dry cargo vessels.

Since being launched in 2014, Norsepower Rotor Sails have been installed on three vessels, resulting in a reduction of their CO2 output by an estimated 5000 tons. A fourth installation is already planned for 2020. The size and number of Rotor Sails to be installed are tailored to match the vessel's operating profile, and to provide a versatile and safe solution.

Schottel Propulsion for Emission-Free Push Boat

Photo credit: TU Berlin, Department of Design and Operation of Maritime Systems

The Elektra push boat ordered by BEHALA, Berlin harbor's warehousing and logistics firm will be equipped with rudder propellers from Schottel.

Elektra will be a hybrid canal push boat powered by a combination of fuel cells, batteries and an electric motor. The boat is currently under construction at the Hermann Barthel shipyard in Derben (Germany), and is planned for testing in Berlin in 2020.

"Elektra shows what is possible," said Prof. Dr.-Ing. Gerd Holbach, Project Manager at TU Berlin for the Department of Design and Operation of Maritime Systems. "It demonstrates – not only as a push boat, but in particular as a model for electrical energy concepts for many maritime areas – that an energy turnaround is quite possible."

The 20- x 8.2-m canal push boat will be equipped with two Schottel Rudder propellers, type SRP 100 with nozzle (200 kW each) and a Schottel steering and control system. A minimum service speed of max. 10 km/h is reached and a maximum thrust load of 1,400 tonnes is available.

The vessel will use the fuel cell technology for the basic energy supply of the power train and for the shipboard electrical system. At peak loads, additional energy is provided by the batteries. The hydrogen supplied to the fuel cell is generated via electrolysis from green electricity generated by wind power.

'eTug' Powered by Battery, Hydrogen Fuel Cell

Photo courtesy of e5 Lab Inc

Tokyo Kisen Co., Ltd. and e5 Lab Inc. have jointly developed the new concept design of "e5 Tug," electric propulsion harbor tugboat powered by large-capacity battery and a hydrogen fuel cell.

The e5 Tug is a harbor tug fully electrified and designed to minimize environmental footprint and is equipped with a propulsion system running on "e5 powertrain platform", devised and planned by e5 Lab, which utilizes a large-capacity battery system as a main power source and a hydrogen fuel cell and generator as the auxiliary power source. This electric propulsion system will ensure sufficient bollard pull and continuous cruising time necessary for harbor tugboat which requires a large-capacity power to function. Furthermore, CO2 emission is minimized by incorporating fuel cell. This joint project is drawing upon knowledge and experience of Tokyo Kisen as a tugboat operator and e5 Lab is undertaking concept planning / development, design, and project management.

We will proceed with the project by seeking advice from the Ministry of Land, Infrastructure, Transport and Tourism, ClassNK, and others for the regulatory compliance. After the final investment decision we aim to launch the tug for commercial operations at Yokohama Port and Kawasaki Port in 2022.

AMETEK Land Emissions Monitoring

AMETEK Land, a provider of combustion efficiency and environmental pollutant emissions monitoring instrumentation, has launched two new continuous emission monitoring systems (PM-CEMS) to provide accurate and reliable measurement of particulate matter from industrial combustion processes in stacks and ducts.

The AMETEK Land 4650-PM is an extremely stable and accurate low-range particulate matter measurement system designed for CEMS applications where condensed water is not present in the flue gas. Consisting of a stack-mounted probe and separate control unit, 4650-PM's forward scattering laser measurement detects particulate matter at low concentrations. This enables closer emissions control, with a more accurate measurement than similar PM monitoring systems.

Maximum measurement stability is achieved by the 4650-PM thanks to an advanced optical system with a lower angle of incidence than competing systems, resulting in a lower detection limit, while the optics are fixed for measurement reliability. The 4650-PM meets US-EPA Performance Specification 11 (PS-11) and is ideally suited for users who need to comply with US EPA rules, including MATS and Boiler MACT.

Out of the two new models, the 4650-PM has a superior calibration check mechanism and is less susceptible to changes in particle size, which is required where accuracy is key. It provides a highly sensitive measurement and is capable of measuring concentrations from 0.01 to 200 mg/m3. Offering the highest stability and reliability, 4650-PM can be used in stack temperatures up to 500 °C / 930 °F.

The additional new monitor, the AMETEK Land 4750-PM, also provides accurate and reliable measurement of particulate matter where condensed water is not present but uses a high-sensitivity back scattering technique. With a rugged design suitable for a wide range of applications, it features a highly stable optical system, with large-area collection, offering a low detection limit of less than 1 mg/m3.

Photo: AMTEK Land

TUVdotCOM approved to EN 15267, the 4750-PM measures concentrations from <1 to 10,000 mg/m3. It is not affected by flue gas conditions and operates to standard temperatures up to 250 °C / 400 °F.

Suitable for less-demanding applications, the 4750-PM comprises a stack-mounted sensor with combined internal user interface. All inputs and outputs are connected to the sensor for simple installation and ease of use. Digital and analogue outputs are sent back to the data acquisition system directly, as required. Remote triggering of calibration and purge fail sensor are additional options, as is a flue gas protector. The 4750-PM monitor has no moving parts; therefore, it will give years of trouble-free operation. A simple manual calibration check allows the instrument's zero stability to be verified while the process is operating.

Both models provide a cost-effective and reliable continuous emission monitoring system to plant operators in electricity generating units, industrial boilers, glass works, cement plants, metal refineries and process heaters who are required to monitor their particulate emissions for regulatory compliance or for control purposes.

Photo: ExxonMobil

Mobilgard for Plug-In Hybrid

ExxonMobil is supplying Mobilgard ADL 40 engine oil for Color Hybrid, Color Line's latest addition to its fleet of ferries. The vessel is the world's largest plug-in battery hybrid ship. The vessel, which is already in service between Sandefjord, Norway, and Strömstad, Sweden, is capable of carrying 2,000 passengers and 500 cars. It combines four conventional Rolls-Royce Bergen B33:45L in-line diesel engines with electric propulsion.

ExxonMobil's MobilGard range of specialist lubricants includes formulations that can help extend engine life, improve bearing protection, reduce oil consumption and cut maintenance costs. ExxonMobil is also supplying Mobil SHC Aware H 68 hydraulic oil for use in Color Hybrid's stabilizers. Mobil SHC Aware H 68 and the full range of Mobil SHC Aware lubricants are certified environmentally acceptable lubricants (EALs), which means they are biodegradable and minimally toxic. The 160-meter ROPAX vessel uses the Ulstein hybrid propulsion concept, a combination of diesel-mechanical and diesel-electric systems, which is more economical than conventional diesel-electric designs.

Crew Care: Managing Mariner Medical Care

By Joe Keefe

The competent authority shall require that, prior to beginning work on a ship, seafarers hold a valid medical certificate attesting that they are medically fit to perform the duties they are to carry out at sea. **[Source: MLC 2006/ Standard A1.2 – Medical certificate.]**

While it sounds simple enough, in practice it is much harder to carry out with any degree of certainty.

Seafarers are an essential workforce to the global economy with as many as 1.5 million working day and night, securing the safe and efficient transportation of more than 90% of the goods that move across the globe. The remote character of that working environment defines them as a 'hard-to-reach' population group. And, the vulnerability of these seafarers makes their health and wellbeing a concern and a priority in a public health point of view. Nevertheless, their collective wellbeing is an underserved aspect of the global supply chain and one which, if left unchecked, could place us all in peril.

According to Natalya Butakova, Business Development Director at AP Companies, a global medical assistance company that caters to the maritime sector, today's seafarers actually have a 1 in 11 chance of being injured on their tour of duty – much higher than any other occupation. Exacerbating this phenomenon is any one – or a combination – of the following risk factors for mariners:

- Exposure to physical and psychological strain
- Spending periods of time in countries with low quality healthcare
- Exposure to epidemic diseases
- Changes in diet
- Dangers posed by ship and port environments
- Contact with individuals of questionable health
- Exposure to sudden climate change
- Exposure to devices with electromagnetic, vibration and sound radiation
- Delays in medical assistance

At the same time, the Maritime Labor Convention also states that seafarers must receive equal quality of care as the population on shore enjoys. But, that's not always the case. In case of sickness on board, seafarers might find themselves in need of medical evacuation and/or repatriation.

Direct and Indirect costs are entirely covered by the employer, which could be as much as ten times the amount of direct costs. Indeed, and in 2013, it was estimated that the annual costs of evacuation and medical treatment for the shipping industry amounted to a total of 760 million euro. Much of that cost, primarily a function of poor or indifferent planning on the part of ship operators, is avoidable. Engaging a case manager is one way to mitigate most of that risk.

"MLC 2006 is a global document, it covers a number of different subjects, but it is not that detailed in terms of healthcare coverage, and that leaves a lot of space for very different options of healthcare cover, depending on the size of the shipping companies and the goodwill/opportunities of the ship owners," said Butakova. "To our mind, the healthcare standards for crew, should be more standardized." And, that's at the heart of the AP companies' mission.

A Standardized Solution

AP Companies is an international company specializing in providing emergency and planned medical services for crew members, travelers, and expats around the world. Its direct medical provider network includes more than 37,500 medical providers spread between 180 countries. AP companies provides medical assistance to Crew members globally, arranging pre-employment (PEME) and re-employment (REME) medical evaluations, as well as perform medical evacuations to different parts of the world. In a perfect world, well prior to the embarking any mariner, a trusted medical consultancy is already at work, mitigating seafarer issue, and client risk. That's because, unfortunately, often the importance of PEME tests are underestimated. Left to the responsibility of the seafarer, and/or treated as a formal requirement, eventually leads to costly claims on board that can manifest as a direct threat to the crewmember's life.

The last thing a seafarer wants is to be classified as unfit for duty. But, some individuals are not – and should not be embarked, for their safety and that of others, and yes – the bottom line of the vessel operator. That's because on board medical emergencies, in particular those conditions not declared during the PEME, can result in huge costs that involve the deviation or delay of the vessel.

Today, says Butakova, a large percentage of shipowners delegate the responsibility of conducting PEME to the Crew Member and this can brings significant challenges. For example, she says, "Not all the seafarers hold sufficient funds for a reliable facility. And not all the seafarers are keen to get truthful and objective medical examination, as they might be declared not fit for duty and would be refused a job based on this fact. The objective of the seafarer, at the end of the day, is not the evaluation itself; in most of the cases he/she is not interested in finding out the actual state of his health, the main objective is a 'Fit for Duty' certificate."

The PEME at first glance might seem an insignificant formality, but at its heart, it is the foundation of the seafarer's wellbeing and safety, a guarantee for his family and a vital cost containment tool for the ship owner. For its part, AP Companies has been facilitating quality medical check ups for seafarers globally since 2012. There are several key aspects to this service, including the careful selection of the PEME/REME facility itself. To ensure the continuity of sampling and testing, an objective evaluation of test results is necessary. All 'Fit for Duty' certificates are evaluated by an AP staff doctor. That starts with transparency and the clear management of expectations, for all parties involved.

This includes the manning agency (who often wants the mariner employed at all costs), the shipowner and the seafarer himself. Often, there is a time crunch in the event of a 'pierhead jump,' but under AP companies' protocol, shortcuts are not allowed under any circumstances.

AP Companies' global network of medical providers (hospitals, multispecialty clinics, specialists, GPs, dentists, ambulance and air ambulance companies) is assembled and maintained via strict credentialing procedures, ensuring the highest possible quality of care – no matter where that care is provided.

On Board, but Not Forgotten

Emergency and planned medical care in foreign ports of call, where unfamiliar surroundings and unknown caregivers present risk, and sometimes inflated costs, is obviously important. The benefits of managing home country medical care, on the other hand, are less transparent. The challenges of home country medical treatment for shipowners are many.

For starters, crewmembers for just one shipowner can hail from as many as 80 different nationalities. The standards of care can differ from country to country, but seafarers nevertheless must get medical help that corresponds to international standards. Once ashore, however, and without a standardized care regimen, there's no guarantee that adequate care can be found and/or that the medical opinion given to reinstate a previously injured/ sick seafarer is trustworthy.

Beyond the obvious risk of boarding (or reboarding) an unfit mariner, medical care that does not satisfy the mariner (for whatever reason) may instigate legal

Risk vs. Reward: How do you handle your 'ports of call' medical events?

Care Arranged by Trusted Contract Provider	Arranging Care 'in house' or via Local Agent
Extensive medical provider network in Port of call	Expensive treatment
Original invoice from provider attached to every claim	No control over utilization
Accumulating volume of cases / access to discounts	Medical care not the specialty of agent
Access to the price lists in hospitals for locals	Lack of transparency / No itemized bill
Compliance w/personal data protection requirements	No effective cost/quality/fraud control
Effective cost control/Effective fraud control	Additional staff for case management
Medical care quality control	Confidentiality issues

"Medical care has to be managed by medical professional companies to ensure that cases are handled in the most appropriate way, crew members get highest quality of medical care at the most reasonable price. Additional requirements of GDPR put even additional pressure to streamline medical cases and even more- medical and personal data- through companies who are in full compliance with this regulation. "

Natalya Butakova,
Business Development Director, AP Companies

action. The number of legal cases arising from this increases every year. It is complicated, it changes from nation to nation as to what constitutes adequate care, and it is a nightmare for manning agencies and shipowners to keep track of. Beyond this, local medical facilities will overprice seafarer treatment simply because there is a lack of control of those charges in the first place.

By having an effective and professional health and safety management system to mitigate the risks of occupational illnesses and accidents onboard, companies will be able to reduce loss time incidents, reduce medical costs and workers' compensation costs, improve employee morale and productivity and comply with national and international regulations.

Moreover, the General Data Protection Regulation (GDPR) is a legal framework that sets guidelines for the collection and processing of personal information from individuals who live in the European Union (EU). GDPR compliance and data security is just one more layer – and a frequently neglected aspect – of the multinational healthcare dilemma facing the flag of convenience operator.

The answer can involve the organization of an internal and extensive medical department; one that would contract with hospitals, negotiate prices, make appointments, get the documentation and keep an eye on the quality of medical care. In reality, no one in this freight market can afford those costs; certainly not on an international, multi-national scale. Alternatively, shipowners can roll the dice and hope for the best when it comes to homegrown medical certificates and healthcare – a practice that is fraught with risk. The prudent shipowner or manning agency, however, can outsource these functions to a trusted third-party partner.

Turn Key Solutions

According to AP Companies data, during the time frame of 2016 through 2018, the firm arranged some 15,000 visits for clients. The top three reasons for these medical events were injuries, dental health issues and digestive problems. Twenty years of cost comparisons between 'managed' visits and the typical costs associated with an unexpected port of call event shows – according to AP companies data – that clients save approximately 24-31% in costs related to 'Ports of Call' visits and another ~45% in home country cases.

MLC-compliant, efficient and compassionate care begins, says Natalya Butakova, "with a good and thorough pre-employment medical examination. A tailored package that ensures the quality of that initial examination is important."

Butakova continued, "Once the member is on board and working, the risk of health problems related to injuries and traumas is very high, and in this case prompt and efficient medical help in the ports (in case of minor issues) and in the home countries (in case of long term treatment) is key for the ship owner. AP Companies is the right partner to assist in both cases and to make sure the level of care and cost of medical services is the best combination for the ship owner."

Sovcomflot Names New Arctic Shuttle Tanker

On October 6, 2019, a naming and flag raising ceremony was held in Vladivostok for **Sovcomflot's** latest Arctic shuttle tanker. The vessel was named after Mikhail Lazarev, a prominent Russian admiral and explorer known for his discovery of Antarctica.

The tanker was ordered by Sovcomflot to transport crude oil for the Novy Port project, under a long-term agreement between Sovcomflot and **Gazprom Neft**.

The ceremony was attended by Oleg Melnikov, Vice-Governor of Primorsky Region and Sergey Frank, Chairman of the Board of Directors of Sovcomflot, as well as faculty and cadets of the Admiral Nevelskoy Maritime State University (MSU) and Vladivostok Presidential Cadet School, representatives of Sberbank, the Russian Maritime Register of Shipping, and other companies and organizations.

Mikhail Lazarev is the latest in a series of shuttle tankers of the Shturman Albanov series, designed for the year-round transportation of crude oil from the Gulf of Ob (the Kara Sea) for the Novy Port project, operated by Gazprom Neft. The first three ships in the series were delivered in 2016 and have since safely transported 9.5 million tonnes of oil across the Northern Sea Route. The high performance of these tankers under extreme Arctic conditions and the further growth of Novy Port project have facilitated the addition of an additional vessel of the series.

"This newest Sovcomflot tanker is named after Mikhail Lazarev, an illustrious Russian explorer. We pay tribute to the deeds of Russian seafarers who have discovered Antarctica and placed it on the world map, as well as making a major contribution to the unique Russian school of high-latitude navigation. The vessel's characteristics place our newest Arctic shuttle tanker, Mikhail Lazarev, amongst the most advanced ships in the global tanker industry", said Sergey Frank. All vessels of this series are designed for year-round operations in the Arctic Sea basin. With an ice class of Arc7, they are capable of sailing independently through ice up to 1.8 m thick and operating at temperatures down to minus 45 degrees C. The design of these vessels takes into account the specific features of the Gulf of Ob, and allows the tankers to maneuver freely in the shallow waters of the gulf.

The same year, Sovcomflot was awarded first prize at the International Competition of Scientific, Technical and Innovative Developments aimed at the Exploration and Development of the Arctic and the Continental Shelf, held under the auspices of the Russian Ministry of Energy, for the development and practical implementation of technological solutions enabling year-round oil shipments from the Gulf of Ob. Mikhail Lazarev flies the Russian flag and has Saint Petersburg as her home port.

Principal particulars:

Deadweight:	41,012 tonnes
Ice class:	Arc7
Length:	248.9 meters
Breadth:	34 meters
Draft when loaded:	9.5 meters
Operating speed:	14 knots

Seaspan Shipyard Delivers OFSV

Seaspan Shipyard

The future Capt. Jacques Cartier, numbe two of three Offshore Fisheries Science Vessels (OFSV) to be designed and built by Seaspan at its Vancouver Shipyards (VSY), began sea trials on October 10, 2019 from Seaspan's Vancouver Drydock where final outfitting, set to work and commissioning has taken place since its launch in June. "With the future Capt. Jacques Cartier headed out to sea today, excitement in our NSS program is growing," said Mark Lamarre, CEO, Seaspan Shipyards. "We are looking forward to delivering this second vessel to the Coast Guard later this year, which will enable them to do their critical work focused on the protection, preservation and conservation of Canada's coastal waters." This milestone on the second OFSV follows her launch on June 5 and the delivery of the first OFSV, the CCGS Sir John Franklin, on June 27. The CCGS Sir John Franklin is the first large vessel to be built and delivered under the National Shipbuilding Strategy. Given the important scientific work to be performed by the OFSV Class, specific attention is also given during Sea Trials to the extensive array of ship sensors that are embedded in the ship's Drop Keel and to the quietness with which the ship's engines perform at cruising and at fishing speeds and when in idle.

VLGC for Astomos Energy Named

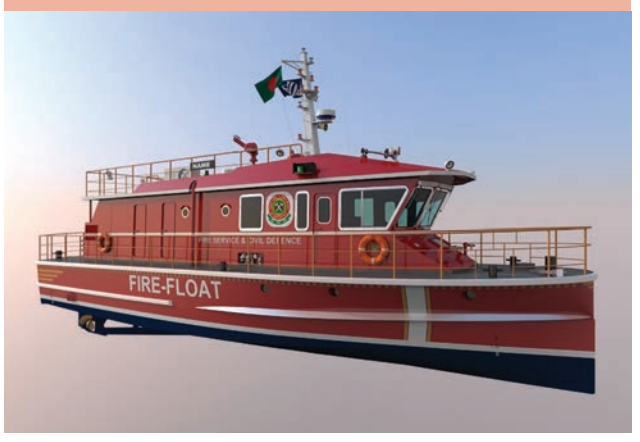
A naming ceremony was held in Kumamoto Prefecture at the Ariake Shipyard of Japan Marine United Corporation for a new VLGC (very large gas carrier) that NYK will charter under a long-term contract to Astomos Energy Corporation, pre-eminent liquefied petroleum gas (LPG) company.

The ship was named "Lily Promenade" by Kazuhisa Otsuka, senior operating officer of Astomos Energy Corporation, and the ceremonial rope holding the vessel in place was cut by Mariko Kurokawa of Astomos. Akira Kono, NYK managing corporate officer, attended together with others from the company.

The ship is the first new NYK-owned VLGC to include an SOx scrubber that is compliant with the International Maritime Organization's (IMO) more stringent SOx emission regulation, which is scheduled to become effective in January 2020. The ship will be about 10% more energy efficient (reducing CO2 emissions per unit of transport), exceeding the IMO EEDI phase 1 requirements that will become effective in 2020. In addition, an energy saving devices and the low-friction paint make the ship a more fuel efficient tanker.

18 Meter Fire-Floats for Bangladesh

Robert Allan Ltd. has delivered a design of two unique fire-floats to **Khulna Shipyard Ltd.** in Bangladesh. The boats will measure 18.9 m x 5.3 m with a special hard chine semi-displacement hull designed for river service and fitted with twin open style skegs for debris protection. The all aluminum hulls will be powered by two 560 kW 6135SFM85 **John Deere** main engines for a speed of 20 knots. Reduction gears will be **Reintjes** WAF 244 with 2.5:1 reduction ratio driving stainless steel shafts and bronze propellers. Engines are easily removed from vessel via matching hatches in main deck and overhead in-house top. Self-propelled CFD simulations run by Robert Allan Ltd. confirm the design speed of 20 knots is achievable. A single **Westerbeke** 23.0 EGED generator provides electrical power. Two 2,000 liter/minute fire pumps will be fitted, each driven by a 55 kW **IVECO** diesel engine. The pumps are located low in the boat so priming systems are not required. Two 2,000 liter/minute fire monitors are located on the house top within view of the operators in the pilothouse. Foam concentrate capacity is 500 liters and six hydrants are located fore and aft on the main deck.



Robert Allan Ltd.

Photo: NYK Group

45m Cat for AZAM

Photo: Incat Crowther

Incat Crowther has announced the launch of Kilimanjaro VII, a 45m catamaran passenger ferry for Azam Marine of Tanzania, Africa. This vessel is the tenth vessel designed by Incat Crowther for the operator, and the seventh vessel built for the operator by Richardson Devine Marine. The 500-passenger, 35 knot vessel features the operator's trademark parallel boarding system, whereby five ramps per side load passenger and cargo in segregated flows. VIP and Royal Class passengers board into a discreet stair tower directly to the upper deck cabin, whilst economy passengers load separately aft and midships. The fifth ramp is dedicated to luggage trolley movements. The boarding system ensures passenger classes and luggage trolleys are segregated, reducing turnaround time and improving safety, whilst promoting exclusivity for the higher yield passengers.

The vessel seats 224 passengers in its main deck economy cabin, 72 VIP passengers and 18 Royal Class passengers in full lie flat seats on the mid deck, with the remainder being economy passengers in separate areas over three decks. A major enhancement from earlier vessels is the relocation of the wheelhouse to the third deck. This configuration results in panoramic windows forward on the mid deck, creating a class-leading experience for occupants of this high-revenue space. The luggage room houses up to 10 tonnes of luggage and cargo, whilst IMO HSC code-compliant stability enhances her safety credentials. Kilimanjaro VII is the first fast passenger vessel to use a pair of Cummins QSK95-M main engines, although Incat Crowther is familiar with this model, having utilized them in recent offshore deliveries. In this specific project, the large twin engine solution is an effective way of providing more speed whilst avoiding the through-life cost and complexity of a four-engine power train. Engine room accessibility is improved over a four-engine arrangement, and maintenance and operational requirements are reduced. Additional dividends are realized in the routing and a reduction in the duplicity of systems.

Kilimanjaro VII excelled in sea trials, operating at a fully loaded speed of 30 knots at low proportion of MCR to offer very long engine life. She has a top speed in excess of 37 knots and has proven extremely smooth and quiet.

This latest design further demonstrates the deep operational understanding Incat Crowther shares with its clients. Part of Azam Marine's enormous success has been based on the vessels being fuel efficient, reliable and simple to maintain, a crucial trait in Africa.

Incat Crowther 45 Main Particulars

Length, o.a.	148 ft./45.1 m
Length Waterline	140.7 ft/42.9 m
Beam o.a.	37.7 ft./11.5 m
Draft (hull)	5 ft./1.5 m
Depth	14 ft./4.25 m
Construction	Marine grade aluminium
Fuel Oil	4914 gallons / 18 600 liters
Fuel Oil (Day tanks)	1057 gallons / 4 000 liters
Fresh Water	528 gallons / 2 000 liters
Sullage	793 gallons / 3 000 liters
Passengers	477
Crew	8
Speed (Service)	30 knots
Speed (Max)	37 knots
Main Engines	2 x Cummins QSK95-M
Power	2 x 2684kW @ 1700rpm
Propulsion	2 x KaMeWa 80-S4 Waterjets
Generators	2 x Cummins 6-CP 136DM/5
Flag	Tanzania
Class/Survey	DNV-GL/NSCV 1C

Damen Patrol Vessels for Offshore Nigeria

Damen recently delivered a pair of FCS 3307 high-spec patrol vessels to be operated by Homeland Integrated Offshore Services (Homeland IOS Ltd) in Nigeria, and now the boats are being prepared for their assignments.

The boats will be deployed in the Gulf of Guinea to protect and support the offshore assets of Homeland's clients which include many international oil companies. Features of the 33m vessels include Damen's trademark Axe Bow hull form that is designed to deliver excellent fuel economy and a top speed of 29 knots. The power comes from three Caterpillar main engines with a cumulative 3,579 bkW with each driving a fixed pitch propeller via a Reintjes WVS series gearbox. Capable of accommodating up to six crew and 12 security personnel they can remain at sea for up to four weeks and travel 1,200 nm in and around Nigeria's coastal and offshore oil fields. The security packages installed by Damen on both vessels are purely defensive. The bridges are bullet proof and armored 'citadels' within the hulls protect non-combatants.

In addition to their security role, each Damen FCS 3307 Patrol has a 75 sq. m. cargo deck aft rated at 2.5 tons/sq. m. that adds an additional level of versatility and cost effectiveness to the benefit of Homeland's clients. The decks allow them to deliver equipment and spares to offshore installations.

Additional equipment specified by HIOSL includes thermal imaging sets, diesel powered SOLAS fast rescue craft and Fuel Trax fuel monitoring systems as well as redundant fuel oil separators to protect the engines and generators from contaminated fuel.

Photos: Damen

VLCC with New SOx Scrubber Delivered

The very large crude oil carrier (VLCC) Tanzawa, the first new NYK-owned vessel to include an SOx scrubber, has been delivered into the NYK fleet.

On October 3, a naming and delivery ceremony was held at the Kure shipyard of Japan Marine United Corporation, and attended by Akira Kono, NYK managing corporate officer, and other related parties.

Photos: NYK Group

Vessel Particulars	
Length o.a.:	339.5 m
Breadth:	60 m
Depth:	28.5 m
Gross tonnage:	160,597 tons
Deadweight tonnage:	311,374 tons
Flag:	Panama

The new vessel is equipped with a scrubber that is compliant with the International Maritime Organization's (IMO) more stringent SOx emission regulation, which is scheduled to become effective in January 2020. The ship will be about 23% more energy efficient (reducing CO2 emissions per unit of transport), exceeding the IMO EEDI phase 2 requirements that will become effective in 2020. In addition, a highly corrosion resistance steel has been used in the cargo tank, making anti-rust paint unnecessary.

Virginia-Class Submarine Delivered to U.S. Navy

Huntington Ingalls Industries' (NYSE:HII) Newport News Shipbuilding division on Friday delivered the newest fast-attack submarine to the U.S. Navy. Delaware (SSN 791), which successfully completed sea trials earlier this month, is the ninth Virginia-class submarine to be delivered by Newport News and the 18th built as part of the teaming agreement with General Dynamics Electric Boat.

Photos: HII

The submarine is the second ship to be named for the country's first state, the first being the dreadnought battleship USS Delaware (BB 28), which was delivered by Newport News in 1910.

More than 10,000 shipbuilders from Newport News and Electric Boat have participated in Delaware's construction since the work began in September 2013. The submarine was christened by Jill Biden, the former Second Lady of the United States and the ship's sponsor, during a ceremony in October 2018.

The future USS Delaware (SSN 791) will be commissioned next year.

Cimolai Technology

Heavy Lift to Assist Shipbuilding Operations

Images: Cimolai Technology

Cimolai Technology Spa, the Italian company specialized in the supply of lifting and handling equipment, reports a strong year in growth and turnover. Cimolai Technology Spa supplies 100% made in Italy products, taking care of the design, the fabrication, the installation and the after-sale assistance operations performed by a staff of engineers, design-technicians, electricians, plumbers, software developers and qualified assemblers.

The company operates in the supply of handling equipment for construction/precast sector, lifting and transporting elements in industry plants and in the shipbuilding, providing ad-hoc studied equipment.

For shipbuilding, the flagship of Cimolai Technology Spa are the self-propelled portal cranes on tires. For Fincantieri, Cimolai Technology Spa has supplied two units, each with a 1,000-ton used for the manufacturing and the setting up of cruise ships. Each of the two units has a span of 60 m and height of 60 m and four independent lifting points so as to lift ship blocks weighing up 1000 ton and turn elements weighing up to 500 ton. The two portal cranes travel on 64 tires and are provided with diesel engines that supply a total power of 1600 Hp. The control of the machines is managed by remote control and the system is assisted by GPS. The equipment are also provided with a tele-system which allows for the supervision from a remote workstation.

Cimolai Technology Spa can supply also solutions on rails, such as luffing and goliath cranes, that are used to manufacture ships or perform the loading and offloading of cargo vessels.

Cimolai Technology Spa recently delivered a rail gantry crane of 320 ton for Cantiere Navale Visentini at Porto Viro (RO). The crane is equipped with two independent hooks that allow for combined maneuvers at max loads, aimed to facilitate the operations of lifting, turning and positioning of ship blocks.

Cimolai Technology Spa has been also involved in an ambitious shipbuilding project in Saudi Arabia, for which the Italian company will supply 23 cranes on rails of various capacities. Moreover, the company is manufacturing four luffing cranes for Vard Braila SA in Romania, each with a capacity of 100 ton at 30 m.

Regarding the lifting and transportation operation in the shipbuilding industry, Cimolai Technology has recently implemented the range of its products with the manufacture of the first CIMOLIFT, a ship lifting platform of 19 m x 95 m having a capacity of 3300 ton, which has been installed in Palumbo Superyachts shipyard at Ancona. The CIMOLIFT has been completely developed, designed and manufactured by Cimolai Technology Spa. The company has also taken care of the on-site installation of the whole system.

The range of Cimolai Technology Spa's products includes also self-propelled modular trailers SPMT and rail transfer systems to support the ship lifting platform or used independently to perform the transportation and parking operations of the vessels within the shipyards. For the shipbuilding and the refit yards, in Cairns, Australia, Cimolai Technology recently supplied a mobile boat hoist 1120 – which is actually the biggest unit in the world. Moreover, the company is suppling a bigger unit, having a capacity of 1300 ton, to a shipyard in New Jersey, USA.

Cimolai Technology not only proposes innovative and performative solutions but also pays the attention to the compliance with the current norms, suppling environmentally friendly machines. To this end, the installed diesel motors complies with the highest standards regarding the exhaust emissions EPA/CARB Tier 4 F and Stage V. The company is also encouraging the production of electrical fed machines with the specific aim of manufacturing equipment that are not only technically advanced and reliable systems but also eco-sustainable.

www.cimolaitechnology.com

Photo: Greg Trauthwein

Tugpins' New Modular Caliper Escort Winch

Tugpins of Schiedam, Holland, is in the development phase of the Modular Caliper Escort Winch. As explained by Marco Beukers, Managing Director, Tugpins (pictured), "the winch has been developed for render and recovery operations when escorting large ships from the port through a narrow channel into the open sea." As most tech developments, this one was envisioned to solve a problem, specifically to keep very large bulk carriers on their line when transiting narrow channels. "The problem is when a ship goes out of direction, and the escort has to move quickly sideways to keep the ship in its line, you get really high peak loads on the gear box in the traditional winch." Kotug contacted Tugpins to help develop a solution, which came up with the Modular Caliper Escort Winch which "steps away from the traditional gearbox technology" and instead utilizes an electric motor and a caliper brake. "The whole idea with this winch is that response time is going from 4 seconds to about 0.2 seconds," said Beukers, to more quickly recover the line. "The response time needs to be reduced to take off the peak loads." Still under development and testing, Tugpins will deliver a full-scale model in the summer of 2020.

www.tugpins.com

MacGregor

MacGregor, part of Cargotec, completed the construction of FibreTrac, the first fiber-rope offshore crane to enter the market. The crane's full potential is being validated and its capabilities have been demonstrated at an event in Kristiansand, Norway. FibreTrac uses existing, proven technologies combined in a new application that offers deepwater load handling operators a simple pathway to some of the most significant cost-saving advantages seen in decades. FibreTrac is able to exploit its full lifting capacity because fiber-rope weighs virtually nothing in water, so no additional load is experienced by the crane, regardless of the length of rope used during load handling operations. This is in complete contrast to steel wire-rope cranes. Although the crane is new, the technology is tested, combining decades of MacGregor's load handling experience with the fiber-rope tensioning and handling skills of Parkburn Precision Handling Systems. Designed to comply with DNV GL regs, the FibreTrac crane has a 150-tonne safe working load (SWL) capacity and features an advanced rope monitoring and management system that maximizes rope lifespan and provides clear lift line status information for the operator at all times. MacGregor's experience in intelligent maritime cargo and load handling includes a strong portfolio of MacGregor, Hatlapa, Porsgrunn, Pusnes, Rapp and Triplex products.

www.cargotec.com

Images: MacGregor

Appleton Marine, Inc.

Appleton Marine, Inc. has been supplying marine deck machinery since 1971. Appleton Marine is not only a manufacturer of cranes, but a turnkey supplier of all types of handling equipment including winches, A-frames, anchor windlasses, capstans, and hydraulic power units. Past and current projects include packages for the U.S. Coast Guard, the U.S. Navy, NOAA, and various offshore oil installations. All equipment is manufactured in the U.S.

www.appletonmarine.com

JonRie InterTech

JonRie InterTech introduces its New Series "240" Escort Winch for 5,000 HP to 6,000 HP tugs. Line pulls from 50,000lbs. to 100,000lbs. and line speeds to 150 fpm. The new design comes with honey come drums, extra heavy shafting and Stainless-Steel brake drums. Independent Hagglunds drive level wind with a render block. The Level Wind motor will freewheel when not spooling and render when overloaded. Compact design with a Heavy Duty Hagglunds motor. The Diamond shaft was designed with long pitch lead to allow the diamond shaft carriage under extreme loads to rotate and slide to an unloaded position. Extra wide carriage and offset chute to accommodate eye splices. The Level Wind Carriage is fabricated with a Stainless-steel liner. The system also includes JonRie's Render/Recover blocks for the main drum Hagglunds motor, Free Wheel control to allow the master to quickly move away from a tow in an area with strong currents.

https://marinewinch.com

Schoellhorn-Albrecht

With over 130 years of experience, Schoellhorn-Albrecht is a leader in engineering, designing and manufacturing of marine deck equipment, dock equipment and vessel access systems. In addition to a standard product line, it also specializes in designing and manufacturing castings, fabrications, and specialized machinery to meet any customer's needs. In 1887 the Schoellhorn-Albrecht building was located on the west bank of the Mississippi River. It began by providing steamboat engines and deck equipment for river boats built in Alaska and used on the Yukon River during the gold rush days of the late 1800's. Today, Schoellhorn-Albrecht is located in Saint Louis County, Mo., supporting the marine industry worldwide.

www.schoellhorn-albrecht.com

Sennebogen

SENNEBOGEN will deliver the first of its new 895 E Series model to North American customers next year. At an estimated 390 tons and reach of more than 130 feet, the 895 E is the largest material handler ever built. The 895 E is powered by a 755 HP (563 kW) diesel motor or optional 670 HP (500 kW) electric drive motor. It's offered with a choice of three standard undercarriages.

www.senebogen.com

NABRICO

NABRICO sought to deliver both innovation and new standard of winch safety in the form of the FASST Winder Winch. Rather than using a ratchet handle, the new winch incorporates a handle and foot pedal at the right location to maximize return on energy, harnessing the unused power of the operator's arms, legs and gravity. The result: a FASST Winder would take stress off the operator's back and shoulders by engaging the leg muscles in the process. NABRICO discovered a core issue with the traditional ratchet winch. As winches are tightened, an operator's performance weakens over time due to natural fatigue. To solve for this, the new FASST Winder design allowed for a lower performance load (the amount of thought and strength required to safely perform a task) using gravity and the lever in the operator's favor.

www.nabrico-marine.com

ROSE POINT ECS FLEET SERVICES

Rose Point Navigation Systems is moving into the Fleet Management market with the announcement of their next level of product offering called Rose Point ECS Fleet Services. ECS Fleet Services is an optional add-on to Rose Point ECS Update Services.

The new set of features that ECS Fleet Services includes Real Time Vessel Tracking, ECS Update Service Vessel Group Management, Direct Vessel Messaging, Remote Chart Layer Management, and more. Come to booth 1905 at the International Workboat Show to ask about testing this new service for your fleet.

Contact joe@rosepoint.com for additional information and learn why Rose Point ECS Fleet Services is Simply Better.

EDITORIAL CALENDAR

JANUARY

Ad Close: Dec 31

Ship Repair & Conversion Annual

- Drydock & Shiplift Equipment
- Hull, Deck and Tank Coatings
- Sanitation / Wastewater Systems
- Welding & Cutting Equipment
- Engine Conversion & Repower

Event Distribution:

- EuroMaritime - Marseille
- FPSO Europe - London

FEBRUARY

Ad Close: Jan 27

Green Ship Technology

- Fuels & Lubricants
- HVAC & Compressors
- Emission Scrubbers
- Autonomous Ship Systems
- Coatings, Corrosion Control

Event Distribution:

- Sea Japan - Tokyo
- Asia Pacific Maritime - Singapore
- Green Ship Tech - Copenhagen
- NACE Corrosion - Houston, TX
- Intermodal Asia - Shanghai

MARCH

Ad Close: Feb 27

Cruise Shipping Annual

- Passenger Vessels / Ferries
- Bridge Electronics: Comms, Navigation & Controls
- Fluid Handling & Filtration
- Desalination & Reverse Osmosis Systems
- Interior Design and Finishes

Event Distribution:

- Seatrade Cruise Global - Miami, FL
- Ferry Safety - New York, NY
- CMA Shipping - Stamford, CT
- Sea-Air-Space- Baltimore, MD

APRIL

Ad Close: Mar 27

Offshore Energy Edition

- Offshore Wind Support Vessels
- Deck Machinery - Winches & Cranes
- Pumps & Valves
- Water Jets & Thrusters
- Surface Preparation - Water Jets & Scrapers

Event Distribution:

- OTC- Houston, TX
- MegaRust - San Diego, CA

MAY

Ad Close: Apr 24

Fleet Management

- Classification Societies
- Crew Training & Maritime Simulation
- Salvage
- Telemedicine
- Vessel Monitoring & Operation Software Solutions

Event Distribution:

- Posidonia - Athens
- Maritime Week Americas - Miami
- Marine Money Week - New York

JUNE

Ad Close: May 27

2020 Yearbook

- LNG & Hybrid Drives
- Luxury & Expedition Cruise Ship Building
- Navigation: Radar, ECDIS & Collision Avoidance
- Ballast Water Technology
- Lighting

Event Distribution:

- Electric & Hybrid Marine World Expo - Amsterdam
- Ballast Water Management - Houston, TX
- Cruise Ship Interiors Expo - Miami

JULY

Ad Close: Jun 16

Maritime Power Edition

- Piping, Valves & Fittings
- Emission Scrubbers
- Engine Room Ventilation
- Bearings, Seals and Couplings
- HVAC & Compressors

AUGUST

Ad Close: Jul 27

The Shipyard Edition

- Heavy Lifting: Cranes, Winches and Hoists
- Welding and Cutting Equipment
- Fuels and Lubricants
- Transmissions, Gears & Thrusters
- SMM 2020 New Technology Showcase

Event Distribution:

- SMM - Hamburg
- BWMTech North America - Ft Lauderdale, FL
- FMMS - VA Beach , VA

SEPTEMBER

Ad Close: Aug 28

Marine Design Annual

- Vessel Conversions
- Naval Architecture
- Design Software: CAD/CAM
- Anti-Vibration & Noise Control Equipment
- Ship Roll & Pitch Control Solutions

Event Distribution:

- SNAME- Houston, TX
- Interferry 2020 - Hobart, TS
- Seatrade Maritime Middle East - Dubai

OCTOBER

Ad Close: Sep 25

Shipping & Port Annual

- Satellite Communications
- Training and Simulation
- Cargo, Container & Material Handling Equipment
- Tank Gauging & Alarm Systems
- Rope, Wire & Cable

Event Distribution:

- Shipping Insight - Stamford, CT
- Commercial Marine Expo - Providence, RI
- Danish Maritime Days
- Breakbulk Americas

NOVEMBER

Ad Close: Oct 27

Workboat Edition

- ATBs
- Workboat Propulsion
- Deck Equipment - Winches & Cranes
- Fire Suppression and Safety Equipment
- Autonomous Workboats

Event Distribution:

- Int'l Workboat Show New Orleans, LA
- INMEX China - Guangzhou
- METS - Amsterdam

DECEMBER

Ad Close: Nov 25

Great Ships of 2020

- Fluid Filtration & Separation
- Gensets
- Surface Navy Shipbuilding
- Electrical Systems & Components
- Windows, Gaskets, Hatches & Doors

Event Distribution:

- Surface Navy Association 2021, Crystal City, MD

When it comes to Marine Marketing,
One size does not fit all!

Monthly Network Audience: **729,265**
Source: Google Analytics

The Maritime Media Network

It's a big industry and your clients (our readers) have specific interests when it comes to their professions and their information needs. It takes the Industry's largest exclusive network of specially focused media to deliver your message with the right content in the right environment to the right professionals.

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- Maritime Reporter E-News
- MarineElectronics.com
- MaritimePropulsion.com
- OEdigital.com
- MaritimeProfessional.com
- MaritimeJobs.com
- MaritimeUniversity.com

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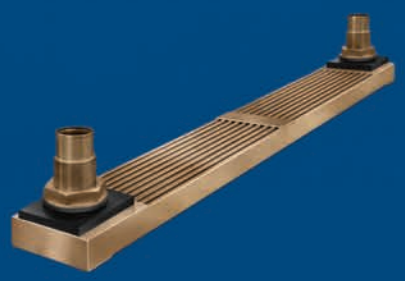

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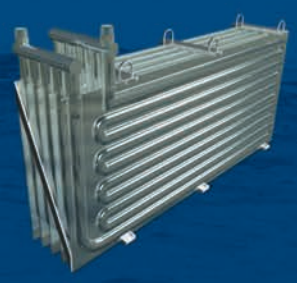

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