

February 2020

MARITIME REPORTER AND ENGINEERING NEWS

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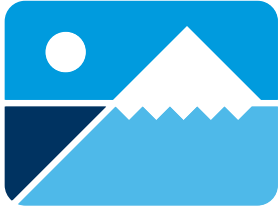
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Just when you think the news cycle has settled down a bit, Coronavirus erupts from mainland China and – courtesy of a seamless, interconnected transport system – starts to spread rapidly, globally. I am about as far from an ‘alarmist, sensationalist media guy’ that you’ll ever find, and even further from an infectious disease expert, but the impact on maritime, both in this isolated case and in planning for the inevitable outbreak of future cases, will leave an indelible mark on the risk management planning of our community. Massive cruise ships with thousands of passengers sitting in quarantine in various world locales is bad optics for the vibrant and growing cruise sector; it’s an even worse experience for the vacationers that simply wanted a little R&R at sea and in port. On the industrial side, the inability or reduced capacity to deliver and lift raw materials and finished products from the Chinese market, even in the short term, will have a profound impact. Stay tuned here and especially on MarineLink.com as the situation evolves.

Pandemic fears aside, welcome to the ‘Green Marine’ edition of *Maritime Reporter & Engineering News*. While I hesitate to say that any of our editions are easy to produce, this one ranks high on my list of favorites for the simple reason that there is a plethora of insightful, rich technical and business information available. The trick is picking the right direction to proceed.

Central to this edition is our interview with **Toyohisa Nakano**, Executive Officer, in charge of Ship Technical and Environmental Affairs for Kawasaki Kisen Kaisha,

Ltd. (“K” Line). “K” Line is one of the largest and most influential of the Japanese ship owners, and having this interview in this edition is timely not only to discuss the myriad of projects the shipowner has in the works to reduce emissions, but also because this is the edition will take with us to Tokyo and Sea Japan 2020. The interview starts on page 38, and it’s worth a read to discover how it is using “*The “K” Line Environmental Vision 2050*” to make technical and fleet decisions today regarding the look, size and outfit of its ships as it aims to slash emissions 50% by 2050.

The path to running a fleet of environmentally compliant vessels is neither straight, clear or inexpensive. Today there are more questions ranging from fuel choice to outfit; decisions that can make or break you financially. We offer here a pair of features to add perspective. Starting on page 20 is “Cutting through the Smoke” by Georgios Plevrakis of ABS, with some insightful commentary on the ins and outs of future fuels and their impact on ship design. In our “Scrubbers” feature starting on page 32, Barry Parker was given the mandate to look at the economic side of installing and operating scrubbers. From my experience if you ask 10 people you’ll get 10 different answers on the matter of scrubbers, but when all is said and done the tech choices made on environmental compliance are more dependent on another type of ‘green.’

Gregory R. Trauthwein
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SIMPLE ISN'T ALWAYS EASY...

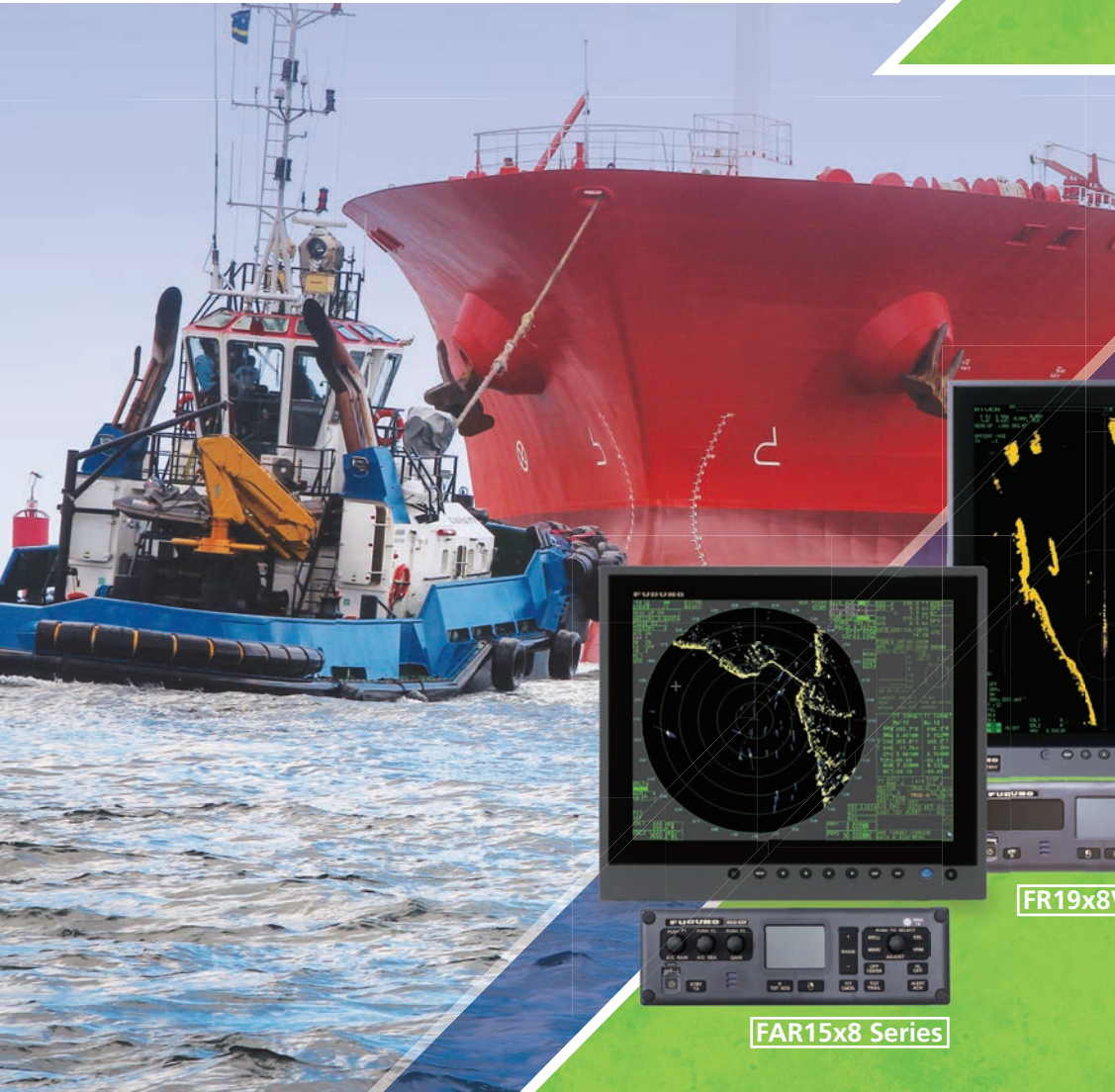
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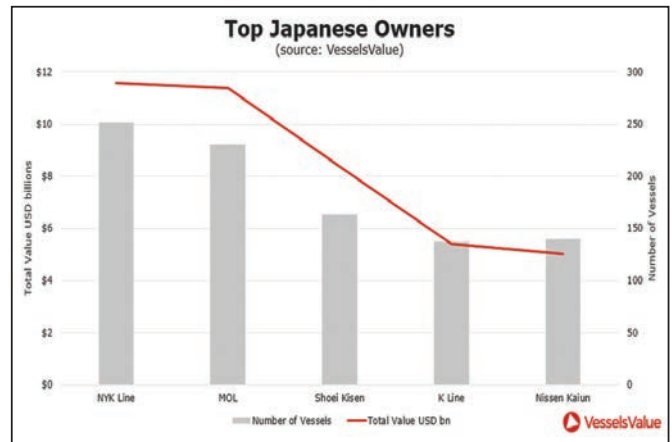
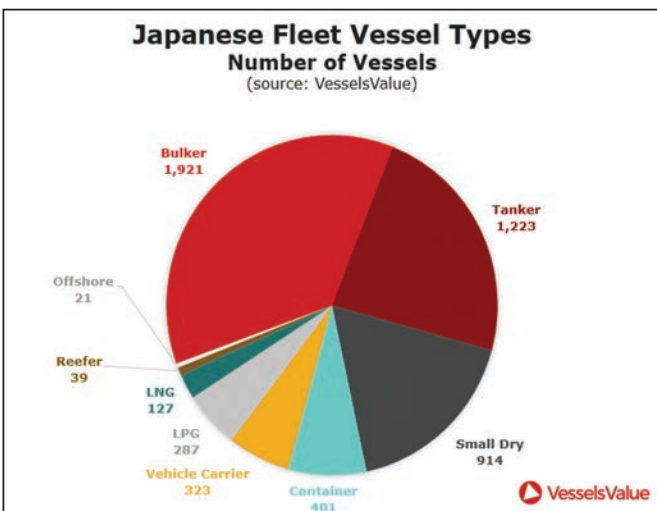
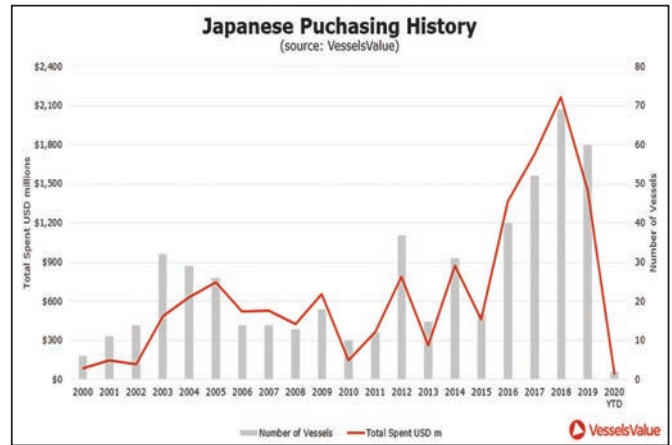
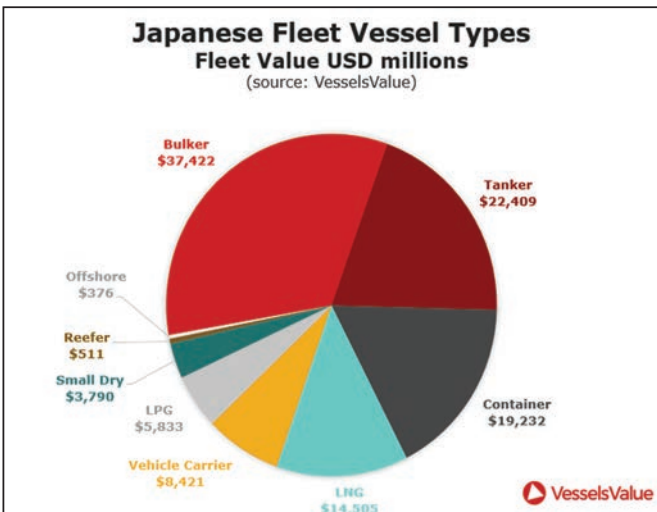
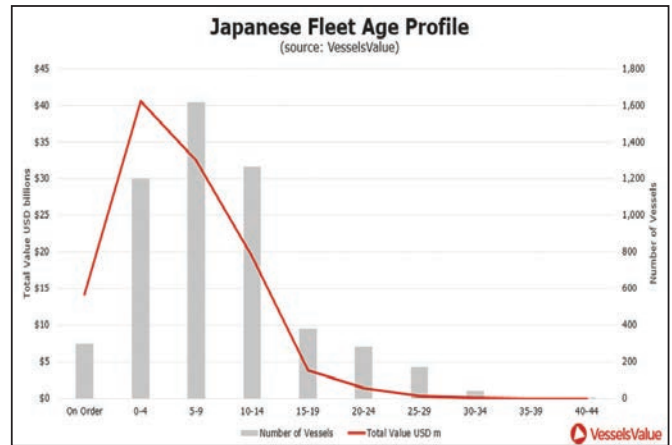
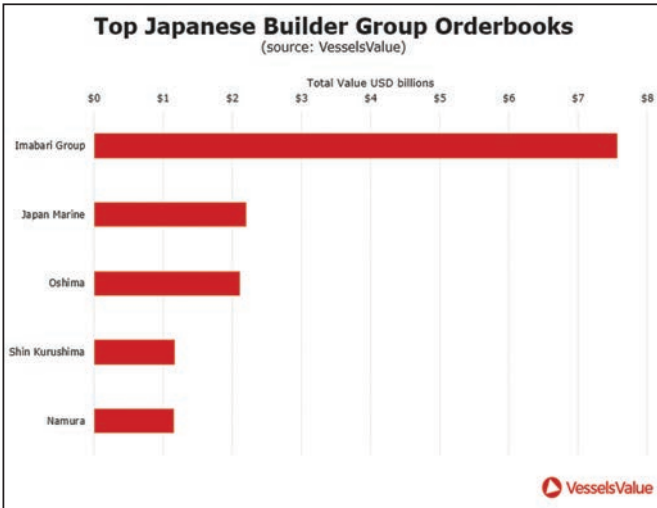
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Go East, Far East



Japan is an economic and technological powerhouse in the maritime sector, as the corresponding charts illustrate. With **Sea Japan 2020** on the horizon – albeit a month earlier than usual (March 11-13, 2020) due to the Tokyo 2020 Olympics – we thought it a good time to dig down on recent trends in the Japanese market.



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Captain Ben Moore
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Photos: Wärtsilä



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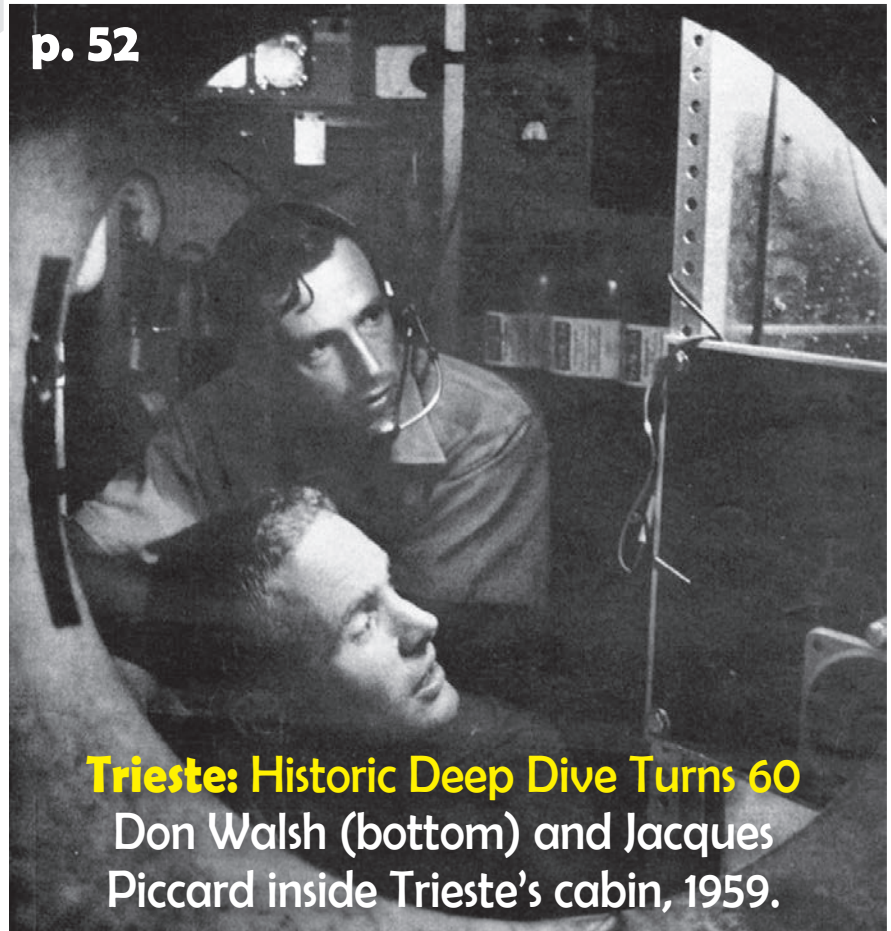
“Looking at data in different segments is where the big opportunity lies to reduce fuel consumption, but it also requires taking down silos in the maritime world.”

Roger Holm, Wärtsilä

Photos: “K” Line



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Trieste: Historic Deep Dive Turns 60
Don Walsh (bottom) and Jacques Piccard inside Trieste's cabin, 1959.

Image courtesy Don Walsh

“We are forecasting orders for 41 - 56 FPSOs and 8 - 12 FPU's between 2020 and 2024. The construction contracts are expected to generate expenditures of \$56 to \$77B.”
Jim McCaul, IMA/World Energy Reports

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“The “K” Line Environmental Vision 2050, aims to achieve a 25% reduction in CO2 emissions by 2030.”

Toyohisa Nakano
Executive Officer, “K” Line

**“Refineries in the United States ...
are well positioned to supply the
global marine-fuel market with
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Linda Capuano
Administrator of the Energy
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p. 32

Photos: U.S. Department of Energy

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Tip #9

MarTID 2020

A call to action.



The 2020 Maritime Training Insights Database (MarTID) survey has just been launched. The industry needs you to take 20 minutes to complete the survey at www.MarTID.org before it closes. Your contribution will enable the creation of 2020's

comprehensive, freely distributed, global maritime training practices report that members of our industry rely on more heavily each year.

The maritime training practices survey and its resulting annual report are non-commercial initiatives launched by the World Maritime University, New Wave Media, and Marine Learning Systems in partnership together. This year, like last, we have created three separate surveys: one to be completed by seafarers, one by vessel operators, and one by maritime training institutions. If you work in the industry, it is almost certainly the case that one of these applies to you. The more responses we have, the more accurate and useful the data in the report. And the early trend is excellent – the 2019 survey received twice the responses of the 2018 survey. Please help us double the responses again for the 2020 survey. So

again, please visit the MarTID website to complete the survey. It will not take long.

When visiting www.MarTID.org on your way to complete the survey, take the opportunity to review some of the revelations contained in the 2019 training practices report. There is some fascinating data there. For example, the report details what are considered to be the top training drivers (mostly

safety and regulations, but also others that might surprise you), how training budgets are changing (mostly going up – but with exceptions), and where some of the money is going.

Also, are you aware that training methods are shifting? If not, now would be a very good time to read the data. All forms of eLearning are on the rise as is simulator training. Face-to-face training is on the decline. Are you considering a move to more recurrent training? The report details what other organizations do in this regard. Likewise, see how organizations are assessing their seafarers so you can determine how the assessment methods of your organization compare. Do you use in-person demonstrative evaluations? Exams? Simulator-based assessments? There are important trends to be aware of, understand, and prepare for.

Additionally, the survey contains fascinating information on

Take the Survey

Why is MarTID Important?

This MarTID initiative is the first of its kind in the world. There is broad agreement that roughly 80% of maritime accidents involve human factors causes. As such, vessel operators and maritime training centers are pouring significant resources into creating best practice and innovative training programs. The MarTID database will grow in breadth and depth annually with your participation, shining a light on the training approaches and successes of global vessel operators and training centers. Insightful, hard-to-get information inside the report include global trends in training budgets, average training amount spent per seafarer and trends in training technologies and training models.

Vessel Operators:

<https://www.surveymonkey.com/r/2020MarTIDOperator>

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Training Tips for Ships

the major new maritime training initiatives underway and being planned by operators and training institutions across the globe. If you are involved in training, this list may provide some outstanding ideas to consider at your organization.

The 2019 report also focuses on the global discussion of, and progress toward, autonomous vessel operations.

It is fascinating to understand where operators are in terms of current level of autonomous operations, where (and how quickly) they expect autonomy to progress, what they foresee as the training challenges created by this movement, and their current level of progress in preparing to meet these challenges.

If the above has convinced you that the annual MarTID report is a valu-

able resource to you, then please go online to fill out the 2020 survey now. There you will find many of the same core questions about training budgets, methods, and trends. As a seafarer we will ask you about your training experiences. Additionally, this year organizations will see questions that focus on efforts to ensure training quality. How are organizations choosing training



Profiles in Training

Staten Island Ferries

By Greg Trauthwein

When **James C. DeSimone**, Deputy Commissioner, Ferry Division, New York City Department of Transportation, signed on to run the Staten Island Ferries in 2003, the organization was still in the aftermath of one of the most significant accidents in its history: the ferry Andrew J. Barberi allision of October 2003, an accident which included a number of fatalities and serious injuries. DeSimone, who had long-tenures in both the commercial and public end of the marine business, brought a unique perspective to the organization.

“For the city to go outside the system to hire (me) was huge,” said DeSimone. “At the time, both the mayor and city council had a strong mandate to improve ferry operations, and to make changes in the wake of this accident.”

The Staten Island Ferry is an iconic

part of New York City’s history and future, carrying more than 25.2 million passengers on a 5-mile, 25-minute trip per year, for free, courtesy of about 40,404 trips made annually. The system operates eight vessels on the route, ranging from 1,100 to 5,300 passenger capacities. Helping to ensure the vessels and terminals keep operating 24/7/365 is a workforce of about 650, including 400 vessel personnel and 100 in maintenance covering all trades.

The October 15, 2003 incident provided a wake-up call for the ferry service. DeSimone and his crew set about making changes, from the foundation of a new Safety Management System that took nearly 18 months to devise and implement, to a top to bottom review of maritime training and education.

“When I started here (training) was based on mentoring and shadowing,” said DeSimone. “Since then, all of the training, mentoring and shadowing has been standardized. Today we have three mates that do all of the training for new marine employees to ensure that training is as consistent as we can possibly make it.”

Standardized training for Captains and Assistant Captains is docking in every slip – from Manhattan to Staten Island to the organization’s maintenance piers – on every class of ferry and then signed off on by the captains. In addition, Staten Island Ferries has worked with Marine Learning Systems on a blended learning program. “John Garvey and I were sitting at a conference presentation given by Murray Goldberg, CEO, Marine Learning Sys-

centers? How are they vetting course quality? How many have staff dedicated to training quality? The new surveys cover these and many more important questions on ensuring training and assessment quality.

So – once again, please visit www.MarTID.org to fill out the survey and then watch for the release of the 2020 report. Until then, sail safely!

tems, and when he was done John and I looked at each other and said ‘This is exactly what we’re looking for,’” resulting in a new blending training platform for new deckhands and mates.

Staten Island Ferries owns and operates its own simulator, with another due to enter service soon, that is geared toward Bridge Resource Management (BRM) and ECDIS training. It seeks to maximize its training return by, for example, outfitting the new simulator with the actual equipment that will be featured on the newbuilds.

It also sends crew to SUNY Maritime for training as needed, with MITAGS carrying the heavier workload for Staten Island captain and assistant captain training courses in and out of the simulator.

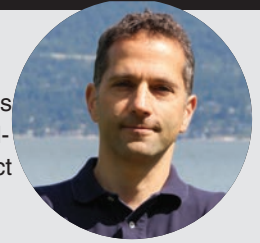
“MITAGS has the Navigation Skills Assessment Program (NSAP), with all of our operating officers participating,” said DeSimone. In today’s world, before anyone gets moved up to an assistant captain or captain, they must complete the NSAP program in addition to evaluations from other captains and administration.

“When it comes to promoting a captain and assessing their skills, human evaluation is subjective and some of that’s ok,” said DeSimone. “But we were looking for a solution that would be as objective as possible.” NSAP, combined with human evaluation, provided the solution.

The Author

Goldberg

Murray Goldberg is CEO of Marine Learning Systems which provides software and services to optimize knowledge, skills and behavior in maritime operators. Contact Murray @ Murray@MarineLS.com



ClassNK is a major supporter of the Digital Era

While the maritime industry is reshaping its structure due to digitalization, ClassNK’s role of ensuring the safety of ships and environmental protection as a third party organization remains the same. ClassNK is proactively applying digital technology to strengthen its services based on outcomes from a variety of research in areas including robots and analytic technology.

Further, ClassNK contributes to the digital transformation of the entire maritime industry by providing a platform for the collection and distribution of data. Together with industry players, ClassNK is promoting IoS-OP (www.shipdatacenter.com) consisting of clear rules for fair data use between data owners and users, along with a highly secured data center.

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Offshore Wind: Half Empty or Half Full?

With tremendous promise comes many questions.



As a new decade starts, offshore wind development continues to progress. Actually, it's probably more accurate to write that the development of the development of offshore wind (OFW) continues to, uh, well, develop.

Apologies for that mild sarcasm. But even a quick look-back at OFW always raises the same familiar question: is the glass half empty or half full?

Consider developments in the east coast leader in offshore wind: New York.

In a webinar in December New York's NYSERDA – New York State Energy Research and Development Authority – provided an update and summary on the State's 2019 offshore wind initiatives, including a brief look ahead for 2020. Beyond New York, NYSERDA is the lead agency in the Atlantic states offshore wind consortium. Unlike many state programs, NY has rich financial resources and it has developed specific programs to advance OFW work. As in most things, what New York does is important.

NY's Empire and Sunrise projects, totaling 1700 MW, in the New York Bight, are supposed to start generating energy by 2024, less than four years. That's a tough deadline. After 60 years, for example, it's likely that highway engineers know just about every detail regarding an upcoming project. But that doesn't mean they are easy. With OFW develop-

ment, New York has less than 60 months to develop a brand new industry, in its entirety, from basic R&D to production to distribution.

Consider, for example, NY's upcoming OFW research. There are three key "Pillar" areas:

- **Pillar 1** will address *Offshore Wind Plant Technology Advancement*, reviewing "array performance and control optimization," floating turbines and power system design.
- **Pillar 2** will study the wind itself as a resource and develop a "Metocean Reference Site."
- **Pillar 3** focuses on "Installation, O&M and Supply Chain Solutions," including analysis and recommendations on "heavy lift vessel alternatives."

Obviously, all important work. Again, it's at the starting line. NYSERDA references an extensive committee structure to help with advice and priorities. But meetings have been sporadic and informal. What's the 2020 work schedule to expedite this work? Don't know.

Workforce is another critical – and political – emerging topic. For NY's leadership, OFW is as much about employment and economic development as it is about energy. Sunrise and

Empire developers, European companies, could, of course, probably bring in their own crews and get turbines set up pretty quickly. But that's not what this is about.

It's about jobs, including new opportunities to develop a diverse workforce and jobs for people from disadvantaged communities. All are worthy goals. Electricians and welders from NY's skilled trades could no doubt make a quick transition to Empire Wind, assuming the price is right. But if you're parking cars at the Hilton, and you didn't finish high school, that's a tougher situation. Those future wind workers need to hit the books now.

New York has allocated \$10 million for OFW training between 2018 and 2025. Two years are gone already. NY officials were asked for an update on the Jobs and Supply Chain Technical Working Group referenced in the December webinar, particularly about the status of the Offshore Wind Training Institute, which is funded at \$20 million.

Like its R&D endeavors, NY's workforce training ideas are in the formative stage. The OWTI is really a new program, announced by Gov. Cuomo in his 2020 State of the State address in which he writes that -

"To support New York's growing offshore wind industry, Farmingdale and Stony Brook (Universities) will formally solicit partners for the \$20 million Offshore Wind Training Institute, so that training can begin in 2021."

Training is to start in 2021. Empire and Sunrise manufacturing and construction, though, are expected to start in 2022 or 2023; remember, generation is expected in 2024. How long does it take to become a trained - and maritime certified - OFW electrician, surveyor, assembler, welder, equipment operator or pilot? None of that is easy. Apprenticeships and on-the-job experience are likely necessary.

Importantly, Sunrise and Empire are just the first phase of NY's extensive commitment to OFW, expected to reach 9,000 MW. In fact, one 2020 NYSERDA priority is receiving approval by the state's public service commission to start work on the next phases.

Work force programs starting in 2021 would surely align with those upcoming, next-phase timelines. But New Yorkers are expecting payoffs from Phase I. Taken together, NYSERDA writes that Sunrise and Empire "will support more than 1,600 high-quality, well-paying careers backed by a prevailing wage and project labor agreements." That's a lot of ground to cover in four years.

The Author

Ewing

Tom Ewing is a freelance writer specializing in energy and environmental issues. He started writing for *Maritime Reporter & Engineering News* in 2018.



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Marine Casualties

Don't Miss the Near Misses

We all know that maritime can be perfectly safe, as long as we all know it is very dangerous. Knowing something is dangerous may not be as easy to figure as we like to think.

My company has been involved in Maritime Safety Management System development and evaluation since its earliest days, and we were a significant player in the struggle to get those systems to work. I prefer to think of SMS as a somewhat larger integrated system that also includes training, environmental and some other components. In the office we call it QESTH; Quality, Environmental, Safety, Training and Health (Human resources). These are the operational components that traditional ship owners considered to be a nuisance, and were ignored because they were imposed on them by the public. As such they could be called “For the Public Systems”. Today the best way to look at QESTH is to regard them as strategic profit makers, while direct operational issues such as fuel consumption, budgeting, financing, fleet investment, routing and chartering, are tactical profit makers.

I have long advocated that vessel crews should be faced with only having to deal with these two main operational components, and that the QESTH components function within just one management system.

Today, decades later, there are still too many SMS (and often additional “E” and “T” systems) out there that are nothing but lip service. On the other hand, it is a delight to inspect shipboard SMS’s that are actually working programs. A working program is a program where there are many non-conformances, because a ship that has no non-conformances thinks it is perfect, and is simply setting itself up for disaster. A ship that continues to log non conformances is involved in self-examination, and self-examination is the proper path to long term survival.

The very best systems are those that manage to record near misses. That rarely happens in standalone Safety Management Systems; with safety issues crews adjust and will hap-

pily walk past a broken handrail if there is a suitable alternative handhold. Meanwhile, when a new crew member comes aboard they reach where they expect to find a handhold and will not find it. They may get hurt and (hopefully) there will be a non-conformance report after that, or they may not get hurt, realize there is another suitable handhold and start using it. Rarely will the new crew member make a near miss report, and the near miss reports are the reports in a SMS that will prevent accidents.

Meanwhile, it is easier to train crew members in near miss recording when the system is a full QESTH system, because throwing Keurig cup in the regular trash (while maybe not illegal) is a frustration that can be seen by anybody who is environmentally sensitized. The crew member can then say: Hey Cap, I know how to do better with that. And the Captain can tell the crew member: write it up as a near miss and we will make a remedial plan at the next meeting (BTW, one of my junior engineers just made the Keurig Cup point to me in our office and hopefully we will be remediated soon). I once inspected a ship where crew members had written a near miss (I am sure with great glee), because a visiting Coast Guard officer left an empty Styrofoam coffee cup on top of a bollard. Maybe a little petty, but here was a ship that knew how to deal with near misses. Just teaching people how to recognize near misses is much more important than teaching people how to record things when they went wrong.

Near misses do not just exist on ships, they are at least as big a deal in the marine design game. The marine design field is filled with flawed designs that often are only remedied after there is a big disaster related to such a flaw. That does not mean that the flaw struck like lightning on a clear day. In too many cases there have been near miss indications, but they were not addressed properly. I will not fill Maritime Reporter's pages with descriptions of cases in support of that thesis (but cannot resist mentioning some names: Exxon Valdez, Prestige, Morro Castle, Marine Electric, Lady D, Estonia, Deepwater Horizon, Prestige, Fitzgerald). However, I will address one in particular, and that is the Costa Concordia. Besides all the 20/20 hindsight stupidity that resulted in this disaster, there was one takeaway that did not receive sufficient attention probably due to the astonishingly low death count on this disaster. Except for 32 unlucky souls, 4052 passengers and crew were evacuated from the vessel. However, as an industry, we have failed to recognize how fortunate we were. Evacuating passengers from a large passenger ship is a harrowing and near impossible task, and once a vessel lists more than 15 degrees it is an impossible task, when using only the ship's own egress system.

Bruce Hutchison, SNAME Taylor medal recipient, recognized this issue and wrote a white paper titled: "*Capsize Egress and Survival with Particular Reference to RO-RO and*

passenger vessels" that was presented at the 2017 SNAME annual meeting. SNAME recognized that the issues that Bruce presented were worthy by awarding Bruce the Linnard prize for the year's best paper. Within SNAME there is the Technology and Research (T&R) Committee. Over many decades this Committee has quietly performed mostly self-funded research and standard making through its members on a wide range of issues some of which were quite pressing (Oily Water Separators and small craft stability) and some of which have very quietly become industry standards (the SNAME sea trials standard and the anchor gear guide).

Based on Bruce's paper SNAME formed a T&R Ad Hoc committee to further study the passenger vessel egress issue.

In the past two years, through the Passenger Vessel Egress Ad Hoc committee, SNAME members have provided input and ideas on technical solutions for passenger vessel egress, but the industry, as a whole has failed to provide the support needed to follow up on the initial ideas and suggestions. Engineers are solutions people and like to provide solutions (sometimes even for free), but it needs to be remembered that the problems that receive funding provide engineers with the continuous focus to provide permanent solutions. At this stage SNAME, the technical society for naval architects and marine engineers has provided pro bono thinking on a potentially very serious issue. Maybe now it is time for the larger industry to provide a further incentive to prevent a possible future industry embarrassment.

And here I am actually gilding the lily, because in my experience, if there is a near miss that did not turn out to be a disaster, inevitably it will be a disaster if no preventative action is taken. One million dollars of prevention (a very ample sum for a properly detailed egress design guide produced through SNAME T&R) is worth billions of cure. The entire SNAME T&R budget is about \$25,000 per year; SNAME does not have one million. The passenger ship industry, collectively, easily does. Don't miss this near miss.

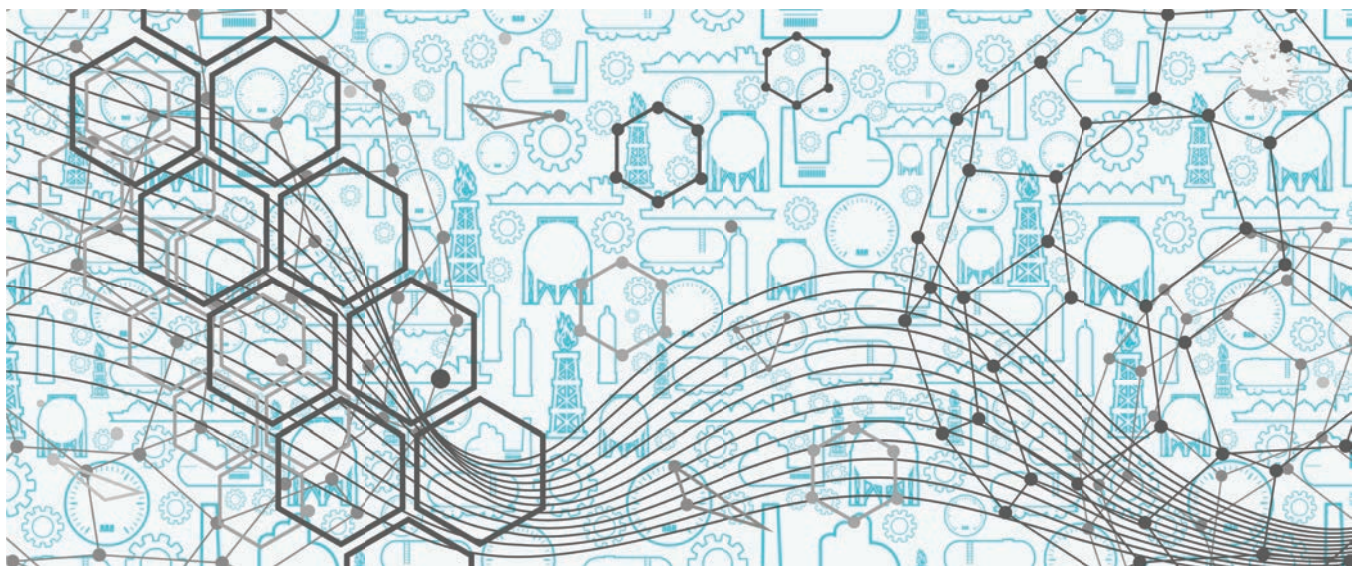
For each column I write, MREN has agreed to make a small donation to an organization of my choice. For this column I nominate SNAME T&R (www.sname.org). It is only a few dollars but if others follow my lead it can only benefit the entire industry.

The Author

van Hemmen

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.





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Future Fuels

Cutting through the Smoke

There remain more questions than answers.



Ship owners increasingly face complex investment decisions as they try to navigate the most efficient course to the low-carbon future. Ever since the IMO set the industry's ambitious emission-reduction targets for 2030 and 2050, owners have been inundated with information about future fuels

and technologies that may, or may not, ultimately lower the carbon footprints of their fleet.

Some of the new technologies hold promise, but the day-to-day viability of too many of them remains unproven; the same can be said for many of the potential fuels. For both, maturity timelines vary as widely as the prospective solutions. Yet, it is in these uncertain times that some owners now find themselves facing long-term investment decisions for new ships.

However, decisions may be less complex than they seem. The spectrum of available fuel solutions is wide, but in examining each onboard technology – engines, fuel supply systems, storage, containment, etc., – taxonomies arise that can be used to simplify decision making.

Once categorized, all enabling technologies (including fuels) need to be assessed for maturity (readiness for market) and carbon-reducing potential in the short, medium and longer terms.

Effectively, there are three fuel pathways to 2030 and beyond: The LNG, or 'light gas' pathway; the LPG/methanol (or alcohol) 'heavy gas' pathway; or the 'bio-/synthetic fuel' pathway. None of these are mutually exclusive.

The first two technology families already have emissions-reducing solutions available but, broadly, most practical, carbon-'neutral' and 'zero'-carbon solutions remain in development.

Perhaps most importantly, choosing the right technology should be predominantly influenced by two key criteria: (i) the type of vessel and (ii) its operating profile, i.e., where and what it will trade.

The Light Gas pathway

Generally, these are fuels characterized by relatively high-energy content and small molecules; they broadly require more demanding, mainly cryogenic, fuel-supply and storage systems.

The 'light gas' family includes, LNG (liquid methane) and bio-methane (in bio-LNG and bio-natural gas [BNG] forms); production of the latter family needs to be scaled up and technologies developed before it becomes a viable commercial fuel.

LNG is a relatively mature low-carbon fuel, reducing carbon footprint by around 20% if the impact of methane slip is

not considered. Likewise, bio-methane, derived from organic sources, can be considered carbon ‘neutral’, if methane slip is not considered.

For LNG and BNG, reducing the methane slip is critical to their commercial potential as future fuels, which is why the industry is actively trying to develop a range of related emissions control technologies. Without them, using LNG as a fuel could, in some cases, actually increase the CO2 output from shipping, relative to heavy fuel oil or marine gas oil (HFO, MGO).

From a tank-to-wake perspective – LNG consumption within the vessel –high-pressure diesel cycle engines already operate with negligible or no methane slip. And there are technologies in development and in the early stages of testing – methane slip filters, catalytic converters, etc., – that ultimately could minimize carbon output across the full LNG-production chain.

Given its relatively limited CO2-reducing potential in its present state, it would be easy – and incorrect -- to see LNG as just a contributor on the pathway to meeting the 2030 emissions-reduction goals. Its potential may be greater than

that, given time.

If bio-methane or electro-methane (see electro/synthetic section below) fuels prove viable on a commercial scale in the medium term, then LNG’s present carbon output could be further reduced proportionate to the fuel blend. BNG or electro-methane fuels are potentially carbon neutral and there is currently significant industry investment dedicated to exploring these solutions.

From a timescale perspective, at the end of the Light Gas pathway is hydrogen, which needs at least a decade to prove viable as a commercial marine fuel; and that is probably ambitious. There are a lot of technical obstacles in the way, the biggest being storage. Further research also is needed to confirm the most effective way to utilize hydrogen for marine propulsion: fuel cells and gas turbines are potential solutions, but they are a long way from operational viability, or cost-effectiveness.

Although hydrogen is the furthest of the light-gas family from viability, it holds significant promise. It might have the lowest energy density (energy per volume) but has by far the highest energy content (energy per weight); one unit would

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▼ **Once categorized, all enabling technologies (including fuels) need to be assessed for maturity (readiness for market) and carbon-reducing potential in the short, medium and longer terms. Effectively, there are three fuel pathways to 2030 and beyond: The LNG, or ‘light gas’ pathway; the LPG/methanol (or alcohol) ‘heavy gas’ pathway; or the ‘bio/-synthetic fuel’ pathway. None of these are mutually exclusive.**

deliver three times the energy of an equal volume of LNG or HFO. It could be a zero-carbon marine fuel, but a significant number of technological advancements are needed to make it a practical solution.

The Heavy Gas pathway

Generally, these fuels consist of heavy, more complex molecules and a lower comparative energy content than the light-gas family, and their fuel supply and storage conditions are less demanding.

Heavy gas fuels include liquid petroleum gas (LPG), methanol (and ethanol, as part of the alcohol family), bio-methanol and, ultimately, ammonia. Used as a fuel, methanol in its present form reduces CO₂ output by around 10%; if they become available on a commercial scale, bio-methanol and electro-methanol could be carbon neutral.

Because some of these fuels have a very low energy content, they may only be suited for limited types of vessels, trades and routes; the ability to make multiple fuel stops on a ship’s typical trading loop may be necessary. The exception is LPG, the use of which has not matured as rapidly as LNG, in part because it has less potential to reduce emissions, and faces different safety challenges.

In terms of maturity, like LNG, LPG and methanol are already part of the current technology mix; their bio-derivatives are medium-term considerations as shipping waits for the technologies to mature and for the fuels to be produced at scale.

Ammonia-fueled engines are not currently available and would require another 3 to 4 years for the first one to be delivered. The first movers might come from the Ammonia carrier community. Ammonia is potentially a zero-carbon fuel, if renewable energy is used during production, which adds cost. Its potential has seen recent designs unveiled for ammonia-

fueled feeder ships.

However, comprehensive supply-side infrastructure needs to be built for the fuel to be commercially viable – and new, stringent safety regulations implemented – so, practical use is best only to be considered in the longer term.

The Bio/Synthetic pathway

These are fuels that are produced through bio-derived raw materials and sources. In principle, in liquid form, their consistency is very close to diesel oil, which could minimize the number of new onboard technologies that would need to be developed for their use, as well as any changes to current ship designs.

Currently, the most widely used is biodiesel, or FAME (Fatty Acid Methyl Esters), which is part of the latest ISO (8217/2017) specification for marine fuel blends and is being offered by all of the oil majors. The standard allows for 7% biodiesel in the fuel blend, but some shipowners are testing richer blends, from 20-100%.

Because their production has an impact on the environment (limiting their potential to reduce lifecycle emissions) and they compete for food crops, this first generation of biofuels is controversial

Another proposed biofuel is HVO (hydro-treated vegetable oil), which has a high-energy content, similar to MGO. HVO can be produced in existing refineries where the hydro-treatment takes place. The final product is a significantly stable fuel with very good properties and low risk of oxidization.

The bio/synthetic family of fuels includes gas-to-liquid, or GTL, varieties, produced either through carbon capture and electrolysis, or conversion of the syngas that is produced from biomass into liquid fuels, such as methanol or diesel.

These fuels are mid-to-long-term options for shipowners. However, because they could be ‘plug-and-play’ solutions

(drop-in biofuels) that would minimize capital expenditures, electro-synthetic fuels are being actively explored by major national and sector-focused shipping organizations.

In the long term, 2nd- and 3rd-generation biofuels (e.g., from waste biomass, lignocellulose [woody plant fibers] or algae) also have the potential to provide international shipping with fuel volumes that exceed its current annual requirements.

Future-proofing ship-designs

With the maturity timelines for many mid- and long-term solutions currently very fluid, a way to future-proof the design of new ships is to introduce more electrical components, such as electric drives and/or propulsion. If an owner opts for an electric drive, the generation of the onboard electricity becomes fuel agnostic; it can be from fuel cells, batteries – or any combination – or an engine being run on LNG, or methanol, for example.

When/if a component needs to be upgraded at a later date, it already has an electric drive installed. This is the way the most advanced shipowners and charterers are looking at the future.

That way, when/if the propulsion system becomes outdated, it does not have to be wholly replaced; the engine can be updated to burn another fuel. Or, if fuel cell technologies advance enough over the next 20 years, they can replace the engines, if it makes economic sense.

Granted, current electric propulsion systems have some challenges to overcome, but owners would still be well counselled to start introducing electrical installations into their designs: power output or input; minimize the diesel generators; optimize generator and prime-mover loads; and make the whole design more efficient. In doing so, owners would take another small step towards minimizing the carbon-footprint of their fleet.

The Author

Plevrakis

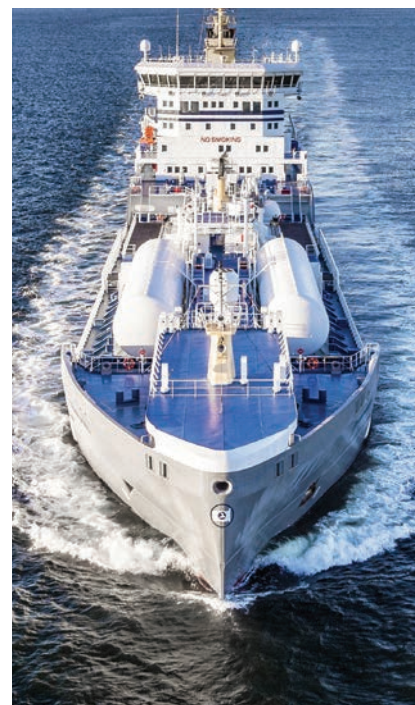
Georgios Plevrakis is the Global Sustainability Director at the American Bureau of Shipping.



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Floating Production Systems

Outlook is Strong for ‘Floaters’



Activity in the deepwater sector took a huge hit in the second half of last decade as a result of a global oil demand/supply imbalance, downturn in oil prices, hiatus in Petrobras production floater orders and large industry cutbacks in upstream spending. The downturn was the worst to ever hit the offshore sector. Orders for new equipment dried up, backlog fell and many suppliers were forced to cut personnel, while others were forced out of business. But the downturn has bottomed, and orders for production floaters are on the uptick, a large portfolio of new projects are in the planning stage and underlying market conditions are favorable to deepwater investment decisions.

Growing Number of Production Floaters

The number of floating production systems in operation has steadily increased since startup of the first production floater in the mid-1970s. Ten years were needed to reach 15 units in operation. By the end of the second decade more than 50 units were in operation. At the end of the third decade the number had grown to around 170 units in service. Now there are just under 300 production floaters in service or available – and another 29 on order (Exhibit 1).

But growth in production units has not escaped the long-term S-curve pattern typical of all industries. Growth in number of production floaters has slowed as field decommissioning offset new project starts. From 2005-2009, the number of floating production, storage and offloading units (FPSO) and floating production units (FPU) in operation or available grew 39%. From 2010-14 growth was 19% – and from 2015-19 the number of units grew 3%.

The 10-Year Trend in Orders

Contracts for 123 production floaters have been placed over the past 10 years – an average of around 12 units annually. FPSOs accounted for 97 of the contracts, and FPUs for 26 contracts. Included in the FPU contracts were 12 production semis, six tension-leg platforms (TLP), five spars and three barges. A high of 27 contracts was reached in 2010 when Petrobras ordered the hulls for eight serial FPSOs (two were subsequently canceled, one later rebid). The low was in 2016 when no orders were placed.

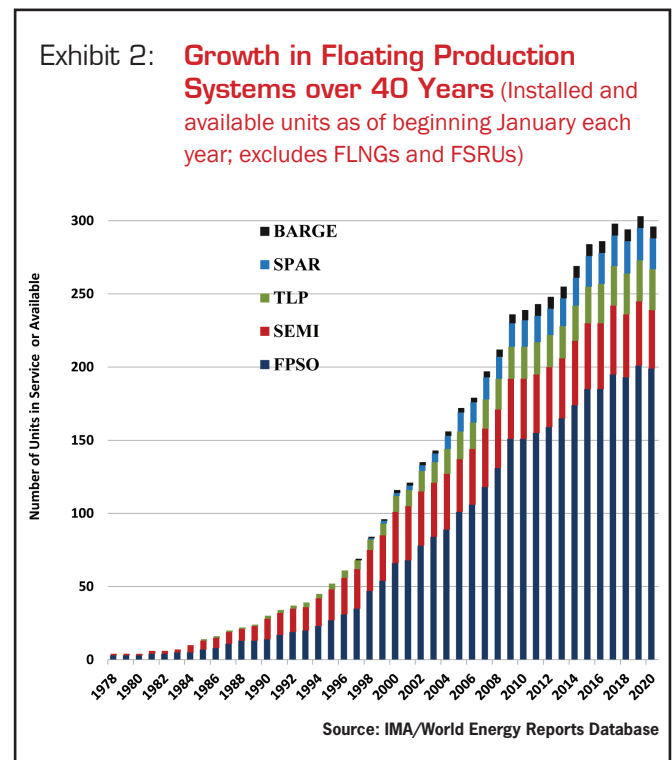
Orders returned in 2017 as the oil market recovered, and over the past three years 32 production floaters have been ordered, including 25 FPSOs and seven FPUs.

FPSO orders since 2017 include nine large units for use by Petrobras in Brazil (seven) and by ExxonMobil in Guyana (two). Not counted in the FPSO total are two speculative FPSO hulls ordered by SBM in December 2019 – they will be included when a field contract is executed. In 2020 there has been one FPSO order as of mid-January. The seven FPU contracts since 2017 include six production semis and a small production barge. No production spars or TLPs have been ordered over the past five years. The latest spar order was in 2012. The last TLP order was in 2013.

Exhibit 1: **Floating Production Units Installed, On Order and Available (As of 1/1/20)**

Type Floater	Total	Installed	On Order	Available
FPSO	221	178	22	21
Barge	9	8	1	0
Semi	46	37	6	3
Spar	21	21	0	0
TLP	28	28	0	0
All Units	325	272	29	24

Source: IMA/World Energy Reports Database



Production Floaters Now Being Built

Included among the 29 production floaters now being built are 22 FPSOs, six production semis and a production barge. A third of these units are well into the construction program, with production start planned in 2020/21. Two-thirds are more recent contracts where construction is at an earlier stage and production start is planned in 2022/24.

Seven (32%) of the 22 FPSOs being built are for use offshore Brazil. The rest are for use offshore West Africa (three), Guyana (two), Northern Europe (two), India (two) – and Mexico, Israel, China and Australia (one unit each). The remaining two FPSOs are speculative hulls that at the moment have no field assignment – but are likely to be used on future contracts in Guyana or Brazil.

Thirteen of the FPSOs are being built on new hulls. Nine are conversions or upgrades to existing units. China is clearly the major location for FPSO construction and conversions. Eighteen of the 22 FPSOs on order are partially or fully contracted to Chinese yards. Singapore has retained second position, with three orders. One FPSO contract has been placed in Korea. Top-side plant fabrication and integration is spread over a variety of contractors in Asia, Europe and Brazil.

Five of the six production semis now being built are destined for use in the Gulf of Mexico. The remaining unit is for use offshore China. Construction of these semis is divided among builders in Korea, China and Singapore – each location having two production semi contracts. Some topside fabrication and integration is being performed in the US.

Projects in the Planning Stage

We have been tracking 130 projects in the planning stage that are likely to require a production floater for development. They include 118 projects where an FPSO is the likely production solution, 12 where a production semi is likely to be required. Brazil is the dominant location for future production floater

requirements – with 38 projects in the planning queue. Other major locations with floater projects in the planning stage are Africa (30 projects), Southeast Asia (16 projects), Northern Europe (12 projects) and the Mexico/US Gulf of Mexico (10 projects).

Some of the projects are near term,

some further out. Of the total, eight projects are at the bidding or contract negotiation stage. Another 10 are in the near term investment queue and eight are in front-end engineering design (FEED) stage. Another 79 projects are further out in the planning stage – either in development concept definition (45),

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▼ “Based on our analysis of future market conditions, we are forecasting orders for 41 to 56 FPSOs and 8 to 12 FPUs between 2020 and 2024.

The construction contracts are expected to generate expenditures of \$56 to \$77 billion. Brazil is expected to account for 30 to 40% of the FPSO orders over the next five years.”

exploration and appraisal (25), priority prospect (seven) or commercial framework negotiation (two).

The remaining 25 projects in the planning queue are stalled. Some are stalled due to economics. Some are awaiting field partner or agreement on field commercial terms. Others are stalled by government opposition, field rights issues, operator failure or sanctions that prevent the project moving forward (Exhibit 4).

Five Year Outlook for Contracts

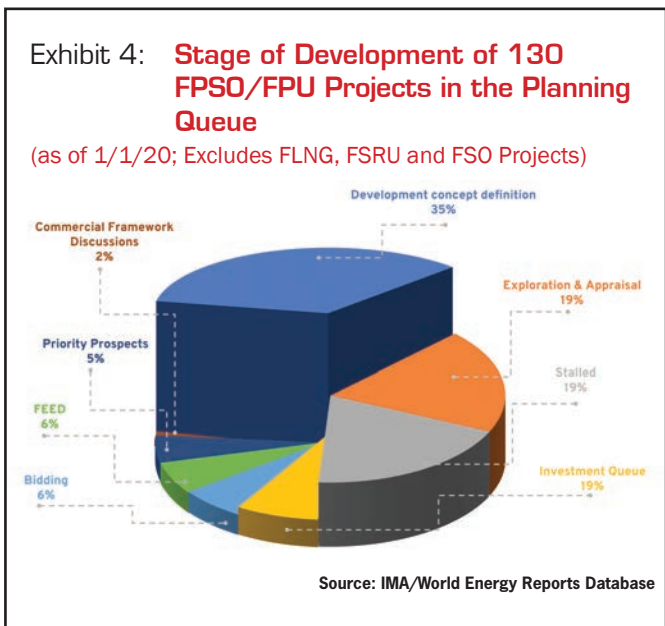
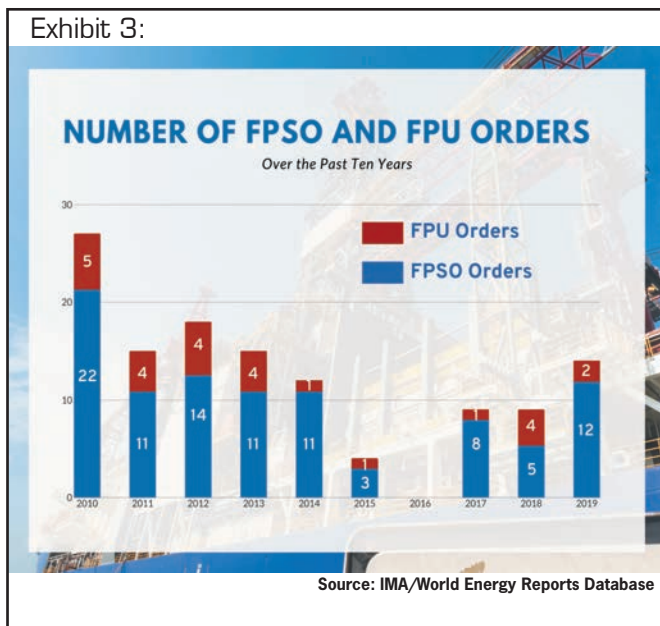
While 130 FPSO/FPU projects are at various stages of development planning, underlying market conditions will influence if and when individual projects move forward to the investment commitment and placement of a floater construction contract.

IMA/WER each year looks in detail at conditions likely to exist in the deepwater market over the following five years.

Here’s how we see the market situation between 2020 and 2024.

In the (mostly) positive category are:

- **Future demand growth** – Oil demand is likely to grow 0.9 to 1.3% annually through the 2020s, then taper off in the 2030/50 timeframe, perhaps eventually peak in the second half of the century.
- **Deepwater future supply role** – Deepwater production now accounts for approximately 10% of global oil supply and we expect it will continue to provide 8 to 12% of world oil supply over the next 20+ years.
- **Supply disruption risk** – Global supply of oil and natural gas is fragile and the possibility of major supply disruptions very real; the disruption threat incentivizes investment in deepwater development as a supply security cushion.



- **Oil prices** – We expect Brent crude to trade in the \$55 to \$65 price range over the next five years, gradually increasing to \$70 to \$75 through 2035 in our most likely scenario.
- **Deepwater/shale competitiveness** – While tight/shale rock development remains the major competitor to deepwater investment, productivity gains are slowing, creating upward pressure on tight/shale rock breakeven price.
- **Cost of capital for deepwater exploration and production (E&P)** – The deepwater sector remains attractive to banks, hedge funds and others, and financing is readily available for production floaters backed by long-term lease with substantive counterparty.
- **Access to Brazilian deepwater resources** – The government has been opening foreign investment opportunities in Brazilian offshore resources and has relaxed some local content requirements.

In the (mostly) negative category are

- **Engineering, procurement and construction (EPC) contractor constraints** – Capacity of major FPSO leasing contractors to simultaneously perform multiple large FPSO EPC+ lease contracts could constrain the near term pace of FPSO projects. E.g., Modec now has seven large FPSO contracts at various stages of completion. Modec has never had a backlog this large – execution of which will test the depth of the company’s project management capabilities.
- **Upstream investment constraints** – Capital spending on upstream projects continues to be weak as oil companies emphasize “fiscal discipline” and set-aside available cash for dividends, stock buybacks.

In the unknown category are

- **Black swans** – Negative and positive unexpected events

impacting activity in the deepwater sector will undoubtedly occur over the next five years. They have in the past – e.g., 2010 Macondo oil spill.

Based on our analysis of future market conditions, we are forecasting orders for 41 to 56 FPSOs and eight to 12 FPU between 2020 and 2024. The construction contracts are expected to generate expenditures of \$56 to \$77 billion. Brazil is expected to account for 30% to 40% of the FPSO orders over the next five years. Africa is expected to be the second largest source of FPSO activity, with around 25% of the orders. Next in line are Northern Europe and Southeast Asia/China, each with around 10%.

We expect that 20% to 25% of FPSO projects over the next five years will involve use of a redeployed FPSO. Assuming the most likely forecast scenario, we expect 10 to 13 FPSO projects will entail redeployments. FPU orders over the next five years will be principally, if not wholly, comprised of production semis. Most will be for projects in the US Gulf of Mexico or offshore Australia.

No TLP and few spar projects are currently visible.

The Author

McCaul



Jim McCaul is Managing Director and founder of International Maritime Associates. He has extensive market analysis and strategic planning experience in the maritime and offshore oil and gas sectors, and has managed more than 400 consulting assignments in over 40 countries.



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Coatings as a Service?

Digital Transformation Poised to Revolutionize Marine Paints & Coatings Industry



igital technologies are transforming many aspects of the paints & coatings industry. Marine applications of coatings are set to see the greatest impact, according to a new study by Frost & Sullivan.

Investment in digital technologies is currently booming across all industries and the chemicals sector is no exception. In a March 2018 report by Frost & Sullivan (Impact of Digitization on the Chemical Industry), coating formulators were identified as the companies most likely to have a digital strategy. However, they put it to use in only a limited number of digital domains. Since that time, the use of digital technology by coatings companies has accelerated.

A new study by Frost & Sullivan has predicted that new digital business models such as data monetization and coatings-as-a-service will completely transform the way the paints and coating industry operates in the next 10 years.

“In an industry as highly competitive as paints and coatings, product innovation is an important area of differentiation,” noted Brian Balmer, Industry Director, Chemicals & Materials at Frost & Sullivan. “Digital transformation will significantly enhance innovation in this sector, enabling manufacturers to deliver much more than just a tin of paint to customers in the near future.”

Frost & Sullivan’s latest research, Global Digital Transformation in Paints and Coatings, 2019, tracks the digital transformation of the global paints and coatings industry and seeks to identify future opportunities for further use of this

technology.

The role of digital leadership, especially Chief Digital Officers (CDO), is poised to explode in 2020, thereby addressing the lack of top-level digital strategy management that remained a challenge for the paints and coatings industry to date. The proper adoption of digital concepts will be disruptive for the industry, and it requires a different way of thinking. With a CDO at the helm, companies will be able to realize their digital transformation goals quickly and effectively.


“The coatings industry is clearly moving away from a model based solely on producing litres of paint. Successful companies in this sector will sell not just paints and coatings, but also their key attributes, such as protection, color etc., as a service,” noted Balmer. “In making this transformation, companies will be able to identify new potential customers who could also benefit from the data being generated.”

Impact on Marine Applications

The examples below showcase how the coating industry is using digital technology to transform its offering to the marine industry.

Digital Business Models

A unique aspect of coatings relates to the nature of transactions. In many coating markets (including marine), coatings can be an infrequent purchase. However, when coatings are purchased, they may be bought in large quantities. Demand forecasting can therefore be a challenge. This has led to digi-




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tal solutions such as data analytics to optimise the delivery of refinish coatings to match the customers' maintenance schedules. Jotun is an excellent example, and is using vessel Estimated Time of Arrival (ETA) data from DNV GL to optimize deliveries.

Digital Product

For coating companies accustomed to a business model built on formulating coatings, the idea of a digital product can be an alien one. The effects are being felt first in industries such as automotive refinish, where digital color-matching tools offer real synergies with the paint.

But color is just one property of a coating. Could a digital product be developed to complement other aspect of a coatings performance? Absolutely.

One example is DryDoQ Insights from AkzoNobel, a digital product that supports the ability of a coating to provide surface protection. Launched in May 2019, the solution is aimed at the shipping industry, where the maintenance cycle of protective coatings is a critical part of operations. AkzoNobel's tool enables predictive maintenance and uses digital technology to link the real-life operations of a fleet to the requirements for a fresh layer of paint.

Digital Customers

The use of digital technologies by the marine industry itself will have a huge knock-on effect on the coatings sector too. The development of ISO 19030 in particular has seen a rapid surge in the use of digital technology by the industry. One aspect of digitalization is in monitoring a ship's fuel efficiency. One of the biggest contributors to efficiency is the marine paint used on the hull. All leading suppliers of marine coatings have developed a digital concept. These include Jotun's Hull Performance Solutions, AkzoNobel's Intertrac Vision, and SHAPE from Hempel.

Digital Marketing

As the marine coating industry continues its digital transformation, it is clear that a huge amount of data can be generated by monitoring the condition of a coating. Data not just about the coating, but about the asset that is being protected. Coatings companies can gain a great deal of insight into the performance of their customers' highly secure assets.

Coatings must be trusted to protect customers' assets, and coatings companies also have a responsibility to ensure the security of customer data.

To date, most of this data has been used for the benefit of either the coating producer or the asset owner. However, it is also possible to use the data for the benefit of others. An excellent example of this is a solution being developed by AkzoNobel – PortShield.

Ships are now starting to be turned away from ports if they

are deemed to be posing a biosecurity risk by bringing in harmful invasive species. However, assessing this is difficult and dangerous. AkzoNobel identified a way in which the biosecurity of a vessel could be inferred from other shipping data. By creating this service, AkzoNobel has created a digital product that it can sell to a brand new customer base – ports. The company's success lies in identifying an important data need – in this case, the growing scrutiny on biosecurity within the shipping industry.

As the industry's digital transformation continues, other such innovative solutions are sure to appear.

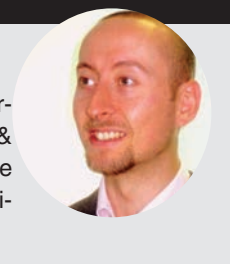
For more information visit:

<https://store.frost.com/global-digital-transformation-in-paints-and-coatings-2019.html>

The Author

Balmer

Brian Balmer is Industry Director for performance materials research at Frost & Sullivan. He has 20 years of experience researching coatings and related materials markets.



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Roger Holm Marine President, Wärtsilä

The environmental hurdles in maritime will require a comprehensive, multi-faceted solution set.

Roger Holm lends his perspective.

“**L**ast year saw a quite considerable change in how environmental aspects are discussed within the maritime community,” said Holm. “Shipping is involved in a huge amount of trade and is already the most environmentally friendly way of moving goods. But there is the opportunity to do even better.” Tangible change is happening, as evidenced by a recent proposal to establish a research trust funded by a \$2-per-ton levy on ship fuel. Earlier in 2019 several banks developed ‘The Poseidon Principles,’ a set of criteria for financing green ship investments. Significantly, Wärtsilä is among 74 companies in an international cooperation, the Getting to Zero coalition, to develop a zero-emission deep-sea merchant ship by 2030.

Continuing the conversation will be critical. Central to Wärtsilä’s approach is the view that shipping’s environmental challenges must be solved collectively rather than by each individual company. The vision is of a ‘smart marine ecosystem’, whereby shipping stakeholders work together using technologies to drive inefficiency from the entire logistics chain. “It’s about much more than the fuel,” said Holm, “it’s about how you connect and collaborate with the whole ecosystem and make it more efficient by getting data moving in a different way.”

The concept of ‘just-in-time’ sailing highlights this approach. Cargo ships traditionally sail faster than necessary in order not to miss valuable port berthing slots or to avoid contractual penalties, but often end up having to wait at anchor for slots regardless. There is a huge environmental and efficiency benefit in cutting waiting time.

Just-in-time sailing relies on both connectivity and voyage planning technologies to facilitate the exchange of accurate arrival times between ports and ships. Wärtsilä is working with ship operators to enable just-in-time sailing through its existing technologies. Holm said that applying the concept globally today is a challenge due to lack of connectivity as well as varying approaches to data and communications, but he expects the industry to move in this direction. And with



Source: Wärtsilä

fuel efficiencies as well as emissions benefits, there is clear advantage in being an early adopter.

“Looking at data in different segments is where the big opportunity lies to reduce fuel consumption, but it also requires taking down silos in the maritime world and that will be one of the hurdles. To get it to work on a global scale requires quite a lot but that doesn’t prevent us from starting to use these concepts in corners of the maritime world.”

An excellent example is a deal signed with ship manager Anglo Eastern, an agreement to roll out Wärtsilä’s voyage planning and execution, engine performance and fuel efficiency monitoring systems across the fleet of 600 ships. The Fleet Operations Solution (FOS) integrates otherwise separate processes to optimize planning, weather routing, fuel consumption, and speed; functionality that is a pre-requisite of just-in-time sailing. But shipowners cannot maximize the efficiency of shipping on their own. As just-in-time sailing illustrates, ports must also play a role.

Using data and an ecosystem approach to optimize operations will help ships use only the fuel they need. But that is just part of the solution to shipping’s environmental challenges. The other element, which has arguably taken a bigger share of the industry discussion, is which fuel ships should use to eliminate emissions. At a time when no carbon-free fuels are available for shipping, there is much discussion about which fuels may emerge. With its engine portfolio Wärtsilä is

▼ “Looking at data in different segments is where the big opportunity lies to reduce fuel consumption, but it also requires taking down silos in the maritime world.”

well-placed to assess fuels as they emerge. But for now, said Holm, the watchword is flexibility.

“No one knows exactly which way fuels will develop but we will see a greater mix of fuels than we do today,” he said. “That’s where you need fuel flexibility. And here the combustion engine is one of a kind. Today, for example, you have dual-fuel engines running on heavy fuel oil and LNG. In the future it might be that you use a mix of hydrogen and LNG. You will need technology that is as future proof as possible and that can be converted if needed.”

Wärtsilä has supplied dual-fuel engines to the shipping and power generation markets for nearly 30 years, and its engines can all be converted to use many clean fuels, including blends of green ammonia, hydrogen and methanol. But until zero-carbon fuels emerge at scale, LNG is a solid option.

“We see an uptake of LNG as a fuel in all shipping segments,” said Holm. “It’s also a bridge to the future in the sense that LNG will still play a big role in the market in 2050. But using LNG now also enables ship owners to use other new fuels as they emerge, such as synthetic LNG, or to mix fuels like hydrogen with LNG to reduce carbon content.”

Data Flexibility

The need for flexibility also applies to the other side of equation – improving operations through data. With the rapid pace of development in both data use and fuels, there is a significant risk of selecting the wrong technologies for a vessel that must serve for 20 years or more. Future-proof systems as

well as flexible powering are a necessity, said Holm.

“A combustion engine is one part of it. The other thing is to look at how you enable the use of data for your asset to the greatest extent. The vessel you have today and the ones we will have in 10 years will be very different in how they use data as well as the fuel they use. But to get where we need to go, we can’t wait for three years until the path is clearer.”

One example of that rapid pace of change is the drive towards vessel autonomy. Holm said that the pursuit of greater autonomy is driven by a desire to further optimize operations, rather than reduce crew numbers. One example of this approach is Wärtsilä’s work with harbor and towage operator PSA Marine in Singapore to develop a smart tugboat that incorporates multiple systems to enhance safety and efficiency. “For me the heart of this development is optimization,” he said. “We see it in the car industry already, where data is used to optimize the usage of the battery and the engine in hybrid cars, and to help the driver to drive safely. It is similar in shipping and while there are segments where unmanned operation will be a target – in some coastal shipping for example - we see increased optimization as the main goal of greater autonomy.”

Naturally, with its vast resources, Holm reckons Wärtsilä is a trailblazer. “There are few players that can look at this in a broader perspective. We are one. In fact, this is our purpose of enabling sustainable societies with smart technology extremely well. For us, to drive this development is to drive our business.”

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Scrubbers

By the Numbers

By Barry Parker

QUANTUM OF THE SEAS

SCRUBBERS

▼ “The chaos, volatility, and noise expected by many across the industry around fuel spreads are playing out, at least for now.”

Greg Lewis, Stock Analyst, BTIG

Approximately three weeks after January 1, 2020, the day that lower limits on sulfur in marine fuels kicked in, Kitack Lim, the Secretary General of the International Maritime Organization (IMO) declared that the transition was a great success. In a statement, the IMO said: “Information from various sources has indicated a relatively smooth transition to the 0.50% sulfur limit. Prices for compliant fuels, very low sulfur fuel oil (VLSFO) and marine gas oil (MGO), rose quickly initially but now appear to be stabilizing.”

The economics of exhaust gas cleaning have been integral to the discussions of IMO2020, even though scrubber fitted vessels comprise a relatively small portion of the oceangoing fleet.

“According to the data from our Alternative Fuels Insight (AFI) platform, the number of vessels with installed scrubbers or planned installations until end of December 2019 stood at 3,028,” said Martin Wold, Senior Consultant Environment Advisory at DNV GL.

“However, due to the complexity of scrubber retrofits, not all of the vessels with reported scrubber installations have hit the water yet. Looking into 2020, we expect these delayed installations will be completed and additional 800 ships with scrubbers on board will be added to the fleet, totaling around 3,800 vessels.” The fleet of deep sea vessels has been estimated at approximately 50,000; so the proportion of scrubber fitted vessels forecast for end 2020 is still under 10%.

The cruise sector had been an early adopter of scrubbers, starting in 2015 with the reduction of sulfur limits in ECA zones (which include cruise hubs in U.S. waters and northern Europe) to 0.1%. At the time that the cruise majors began planning for their scrubber installs, around 2012- 2013, burning high sulfur fuels made financial sense in view of high distillate (low sulfur fuels) prices and uncertain availabilities at that time. At Royal Caribbean, its Quantum of the Seas, delivered 2014, was one of their earliest ships equipped with scrubbers.

Scrubber fitted vessels are able burn less expensive high sulfur fuels. For accounting types, the “repayment” from an investment in a scrubber (with costs estimated variously at between \$3 million to \$5 million depending on equipment type and how yard time is allocated in calculations) comes from the lower cost of high sulfur fuel, compared to low sulfur blends and gasoil. The matrix below shows the impacts on repayment calculations, where the initial capital investment is repaid over time due to the advantages of cheaper fuel. The impacts are not uniform; a bigger vessel (consuming more tons of fuel each day) on longer voyages (more days at sea, less in port) would see a quicker payoff.

Cruise Control

Quantum of the Seas was one of the first scrubber equipped cruise ships.

Photos: RCCL



SCRUBBERS

Photos: Cleaves Securities



“As we enter the post IMO-2020 era, all shipping stakeholders must cope with a myriad of new variables related to vessel earnings.”

Joakim Hannisdahl
Analyst,
Cleaves Securities

	Voyage length	Fuel consumption	Fuel price spread	Scrubber price (incl. yard time)
Quicker \$ payoff	Longer voyages, more sea time	More consumption	Wider spread	Lower cap cost, faster install
Slower \$ payoff	Shorter voyages, more port time	Less consumption	Narrower spread	Higher cap cost, slower install

Analysts of listed shipping companies have delved deeply into these impact for stock “names” that they have under coverage. One leading equity analyst, Amit Mehrotra, who covers shipping and other transport sectors at Deutsche Bank, wrote in an early January report to clients on dry bulk specialist Star Bulk (symbol: SBLK): “A key consideration of our bullish call on SBLK shares is the company’s ability to capture the spread between high and low sulfur fuel prices for the benefit of equity holders. This view is increasingly being realized in our view, with the price of low sulfur fuel in Singapore at \$730/ton today... about \$340 above the price of high sulfur fuel.”

In a conference call with investors, Mehrotra and his team identified Scorpio Tankers (“STNG”) as another top investment pick, based on underlying strength in the product tanker markets, supercharged by the cost advantages of a scrubber equipped fleet.

Another well respected market observer, Randy Giveans of Jefferies and Company, wrote: “The lead up to IMO 2020 led to several short-term disruptions in supply across multiple

sectors which acted as a tailwind throughout the quarter, especially for tankers.” In a late January report, the analyst opined: “Continued geopolitical tensions, increasing crude exports from the Atlantic Basin, ongoing IMO 2020 slate switching, and delayed scrubber retrofits during 1Q20 should help drive continued strength in the crude tanker market.”

One school of thought has suggested that U.S. refiners preference for heavier “sour” crudes would spur oil imports to coastal refineries, while lighter “sweeter” oil from the Eagle Ford and Permian Basin (and other sources of shale oil) would be more suitable for European refineries. The U.S. Department of Energy’s Linda Capuano, Administrator of the Energy Information Administration, said in Dec 2019 testimony to a Senate Committee, “Refineries in the United States, where much of the refining capacity has downstream units that upgrade residual oils into more valuable and lower-sulfur products such as diesel, are well positioned to supply the global marine-fuel market with low-sulfur bunker fuel.”

She added that: “We believe that U.S. refiners will export much of the increased production of diesel fuel and other re-

“Refineries in the United States ... are well positioned to supply the global marine-fuel market with low-sulfur bunker fuel.”

Linda Capuano
Administrator of the Energy
Information Administration,
U.S. Department of Energy



Photos: U.S. Department of Energy

financed products that will result from higher refinery runs. As U.S. refiners export diesel and low-sulfur residual fuel oil to supply an increasing share of the global demand for low-sulfur bunker fuel, we anticipate that exports will continue to grow in 2020.”

Though not a direct consequence of maritime sulfur reductions, changing flows have bolstered both crude and product tanker markets.

At investment bank BTIG, longtime stock analyst Greg Lewis told clients: “The chaos, volatility, and noise expected by many across the industry around fuel spreads are playing out, at least for now. Depending on vessel size and trading patterns (larger ships and longer voyages drive better scrubber economics) scrubber equipped ships look to be out-earning their non-scrubber competitors by anywhere from \$5k-\$20k/d with MR product tankers at the low end and VLCCs at the high end in terms of the premium. Bottom line: scrubber equipped ships (we note scrubber installations cost \$2-4M) look set to outperform non-scrubber ships in the near term.”

In a review of a BTIG investor event regarding scrubbers (which included participation from STNG and also Eagle Bulk (“EGLE”) on the dry side), Lewis explained: “While the current fuel spreads point to a scrubber pay-off time of under a year for larger ships, the decision to invest in scrubbers today is still not an easy one.”

But the BTIG analysis suggests that payoffs for owners considering scrubber retrofits in 2020 will not be as rosy as the experiences of STNG, and dry bulk brethren SBLK and EGLE, noting that: “With shipyard availability for scrubber installations largely sold out into the back half of 2020, and

potential scrubber investors staring at a fuel curve spread of around \$180/MT for 2021, it was definitely better to be an early adopter (not late) of scrubbers.” Oil analysts see the spread reducing in future years, as refiners fine-tune their operations and maritime fuel buyers adjust to new supply patterns.

Of course, freight market realities bring in more complexities than analysts’ simulation models. In real life, the ability to pass on increased fuel costs, or not, depends on both market and contractual factors. In its January, 2020 presentation, EGLE explained that optimal speeds (and indeed trading patterns) are being driven by fuel prices. A consequence for the market also noted by EGLE is that: “Higher fuel costs encourage slow steaming to reduce fuel consumption, particularly in lower rate environment.”

Analyst Joakim Hannisdahl at Cleaves Securities, wrote, in a mid-January report: “As we enter the post IMO-2020 era, all shipping stakeholders must cope with a myriad of new variables related to vessel earnings.” Citing the data source published by Clarksons Research, he wrote further: “The Shipping Intelligence Network are now operating with four different TCE spot rates, depending on vintage and scrubber installations.” He cites a notional 2010 built VLCC, retrofitted with a scrubber, able to earn \$117,000/day in the strong tanker market of January 2020, some \$10,000/day more than a more modern VLCC burning low sulfur fuel. In the same report, he calculates the “payback period”, based on a \$3.2 million scrubber cost (not including yard time) on the 10-year-old VLCC at an astoundingly short 154 days. In the view of EGLE, a modern scrubber fitted Supramax bulker, at sea 260 days per year, could earn \$5,500/day more than an otherwise

SCRUBBERS

Photos: DNV GL



“According to the data from our Alternative Fuels Insight platform, the number of vessels with installed scrubbers or planned installations until end of December 2019 stood at 3,028.”

Martin Wold
Snr, Consultant Environment
Advisory, DNV GL

equivalent ship burning low sulfur fuel, if the “differential” is around \$300/ton.

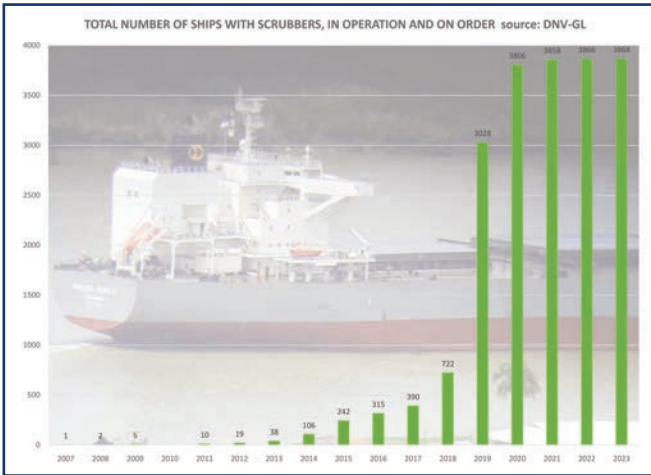
But, as Cleaves notes, the fuel spread varies widely between ports, which has the impact of bringing the fuel optimization practices of EGLE (actually shifting trading patterns, where possible, to enable bunker procurement where high sulfur fuel

is cheapest) and others with sophisticated strategies, to the fore. EGLE, in its January presentation, stated: “While we historically trade at many smaller ports, we are able to adjust our trading patterns around major bunkering hubs, where HSFO is expected to be readily available at the most attractive pricing.”

An over-riding and sometimes vexing issue in the market-



Box it.
Tanker Silverway showing
scrubber enclosure.
Source: Iain Cameron



place is the ability (or inability) of owners to fully realize the higher time charter equivalents (TCE) for ships with lowered fuel costs in the marketplace. As noted above, analyst reports are now routinely citing differentials where scrubber equipped vessels are “worth” more, on a daily basis, than ships burning higher priced low sulfur fuels. But, the ability to realize these differentials is market dependent. In the current strong tanker markets, owners are more likely to capture the types of differentials referred to Mr. Hannisdahl. In the tottering dry bulk markets, charterers may be reluctant to agree to premiums, where vessels burn cheaper high sulfur fuels.

While analysts like Jefferies’ Giveans and BTIG’s Lewis have kept a weather eye on out-of-service vessels waiting for scrubber retrofits, and their impact on hire markets, evidence of lengthy delays has been anecdotal, rather than rigorously reported. Around the end of Q3/beginning of Q4 2019, as the dry bulk market had strengthened, the conference circuit was full of chatter about how months-long waits for vessels at shipyards installing scrubbers would pull ships out of the market and drive capacity utilization to levels approaching 90% where market “inelasticity” brings about sharp rises in charter hires. These delays abated, as tanker owners cancelled yard work the sudden surge in tanker hires (tied to Mideast instability). Meanwhile, the dry bulk market sagged in Q4, with the sector’s shipping equities also pulled down.

Scrubbers are still a relative new solution in maritime circles, and when the dust settles the investment in scrubber kit can be viewed as a “good” investment, with quicker paybacks than most maritime financiers could expect on other assets (a vessel, for example). However, the overall health of shipping company finances, and the views of equity investors who might buy and sell company shares, are still driven by the same very old and very familiar factors of supply, demand and geopolitical instability.

SAVE MONEY

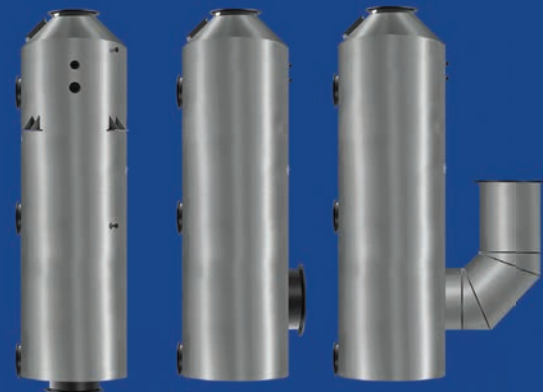
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“K” Line Green

Last year Kawasaki Kisen Kaisha, Ltd. (“K” Line) – one of the world’s most influential ship owners with 478 ships comprising 40.5 million DWT and more than 6,000 employees – celebrated its 100th anniversary. **Toyohisa Nakano**, Executive Officer, in charge of Ship Technical and Environmental Affairs for “K” Line, is a 30+ year veteran of the company. He discusses with Maritime Reporter & Engineering News the ship owner’s strategy to meet ever-tightening ship emission regulations.

By Greg Trauthwein



en Initiatives

Source: Kawasaki Kisen Kaisha, Ltd.

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In looking at your overall operations, by ship type, by region or by both, where do you see opportunities for growth?

We will further refine our strengths and increase competitiveness in our four core business operations of dry bulk, energy transportation, car carrier and logistics/shortsea-coastal services.

In looking at your maritime operations today, what do you consider to be the top three challenges to running efficient, safe ships?

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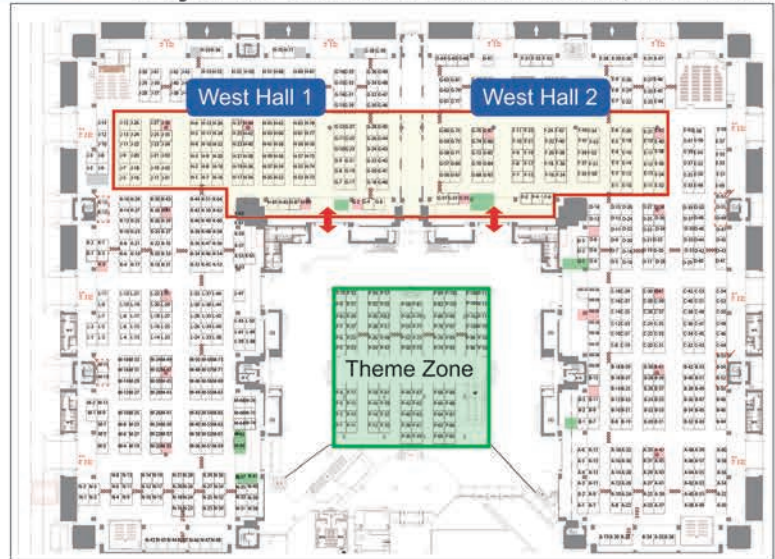
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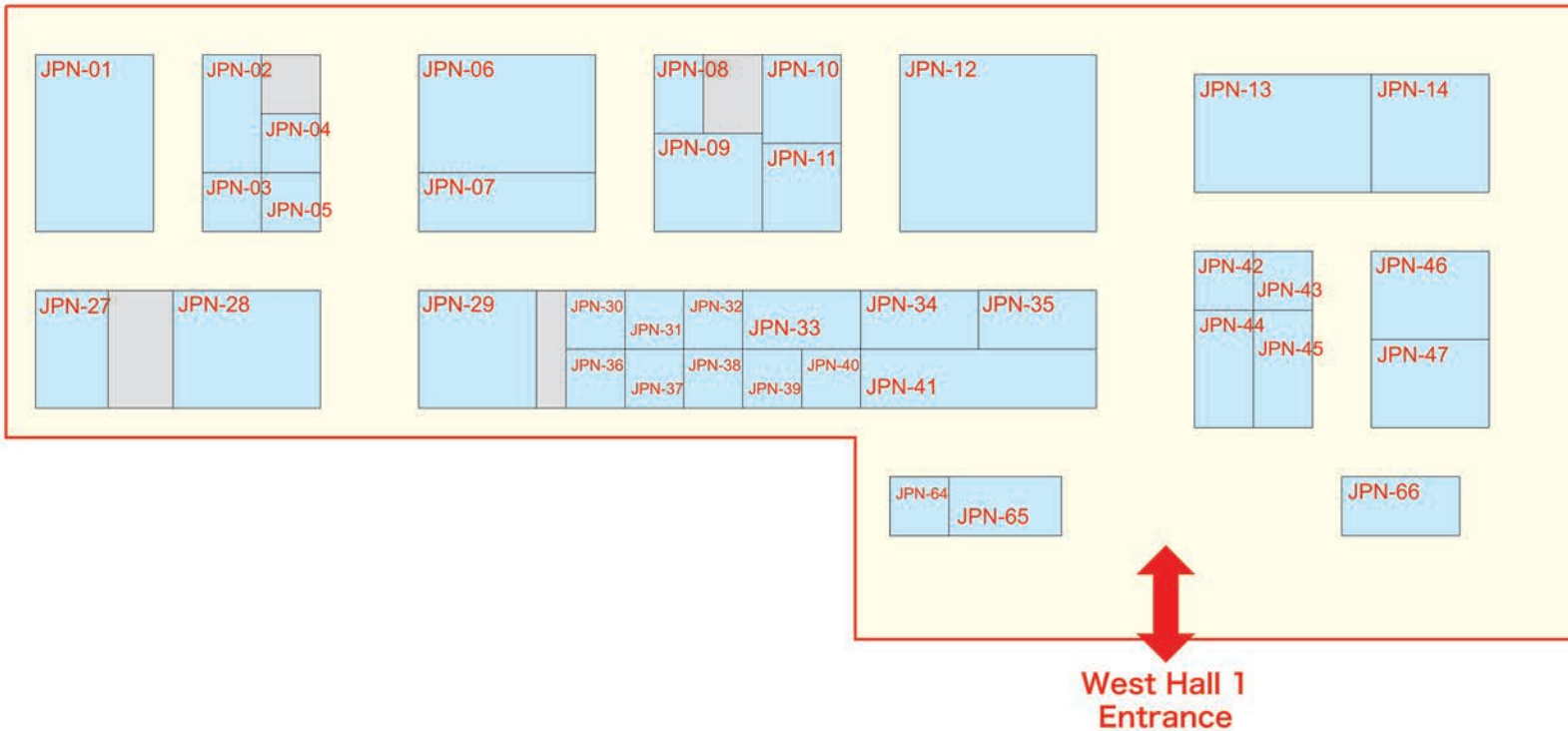
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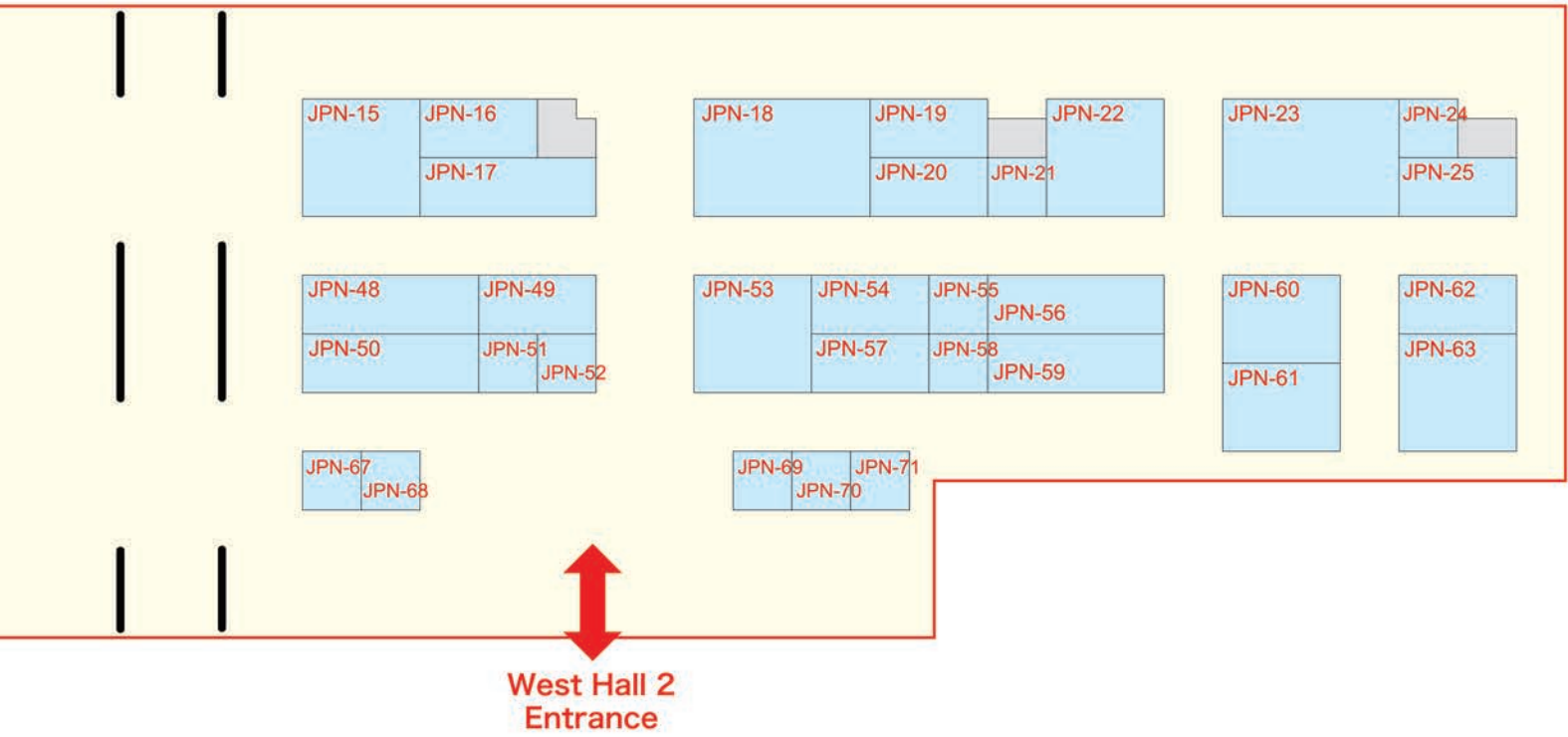


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JPN-28	Fuji Trading Co., Ltd.
JPN-20	Geislinger K.K.
JPN-71	Hien Electric Industries, Ltd.
JPN-12	Hisaka Works, Ltd
JPN-09	Hitachi Nico Transmission Co., Ltd.
JPN-13	IHI Power Systems Co., Ltd.
JPN-48	Ibuki Kogyo Co., Ltd
JPN-29	JFE Engineering Corporation
JPN-18	JRCS Mfg. Co., Ltd
JPN-15	Japan Engine Corporation
JPN-06	Japan Radio Co., Ltd
JPN-69	Japan Weather Association
JPN-10	KEI System Co., Ltd
JPN-52	Kamome Propeller Co., Ltd
JPN-31	Kanagawa kiki Kogyo Co., Ltd
JPN-22	Kawasaki Heavy Industries, Ltd
JPN-52	Kay Seven Co., Ltd
JPN-39	Kokosha Co., Ltd
JPN-58	Kosaka Laboratory Ltd.
JPN-19	Kyokuyo Electric Co., Ltd
JPN-45	Manabe Zoki Co., Ltd
JPN-49	Matsui Corporation
JPN-40	Maritime Reporter and Engineering News
JPN-66	Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.
JPN-12	Mitsubishi Kakoki Kaisha, Ltd
JPN-05	Mizuno Marine Co., Ltd
JPN-08	Mitsumoto Valve Mfg. Co., Ltd
JPN-03	Murayama Denki Ltd.

Booth No	Company Name
JPN-16	Musasino Co., Ltd
JPN-55	N.Y. Co., Ltd.
JPN-17	NYK Trading Corporation
JPN-57	Nabtesco Corporation
JPN-47	Nakashima Propeller Co., Ltd
JPN-32	Naniwa Pump Mfg. Co., Ltd.
JPN-33	Nippon Hakuyo Electronics, Ltd
JPN-07	Nishishiba Electric Co., Ltd.
JPN-01	Okumura Engineering Corporation
JPN-12	Sasakura Engineering Co., Ltd.
JPN-24	Satake Corporation
JPN-44	Sekigahara Seisakusho Ltd
JPN-25	Shimada & Co., Ltd
JPN-54	Shinko Ind. Ltd.
JPN-56	Shonan Co., Ltd.
JPN-21	Suction Gas Engine Mfg. Co., Ltd.
JPN-35	Sunflame Co., Ltd.
JPN-46	Taiko Kikai Industries Co., Ltd.
JPN-59	Taiyo Electric Co., Ltd.
JPN-70	Tanabe Pneumatic Machinery Co., Ltd.
JPN-30	Teikoku Machinery Works, Ltd.
JPN-68	Techno Kashiwa Corporation
JPN-62	Terasaki Electric Co., Ltd
JPN-64	The China & Japan Marine Industries., Ltd.
JPN-23	Tokyo Keiki Inc.
JPN-02	Tokyo Nisshin Jabara Co., Ltd.
JPN-34	Ushio Reinetsu Co., Ltd.
JPN-42	Utsuki Keiki Co., Ltd.
JPN-43	Volcano Co., Ltd.
JPN-37	Wakefield Corporation
JPN-41	Woods Corporation
JPN-67	Yamashina Seiki Co., Ltd
JPN-27	Yamato Metal Co., Ltd.
JPN-63	Yanmar Co., Ltd.
JPN-11	Yokogawa Electric Corporation
JPN-61	Yokogawa Denshikiki Co., Ltd.

West Hall 2





Photos: "K" Line

The "K" Line Environmental Vision 2050, aims to achieve a 25% reduction in CO2 emissions by 2030 versus 2011 levels, and then cut our emissions by 50% by the year 2050 ... We will work on optimizing our operation by utilizing our data and improving of energy-saving technology."

Toyohisa Nakano Executive Officer, "K" Line

and introducing and utilizing AI and IoT in our business to meet customers' needs, we will further enhance our strengths of Safety, Environment and Quality in both tangible and intangible applications.

Please describe in detail "K" Line's strategy to reduce emissions across the fleet.

We continue to carry out initiatives in line with "K" Line Environmental Vision 2050, which is our long-term policy that we formulated in 2015. In this vision, we aim to achieve a 25% reduction in CO2 emissions by 2030 versus 2011 levels and then cut our emissions by 50% by the year 2050.

Towards 2030, we will work on optimizing our operation by utilizing our data and improving of energy-saving technology. 2030 target includes not only new ships but also existing ships, and energy-saving design method for ships has been already deeply researched. So we pursue not only improving energy saving performance of ships' hardware, but also combining various plans such as fuel conversion, operational improve-

ments, and cooperation with another kind of business.

We think that it is necessary that technology of zero emission is put to practical use in around 2030 to achieve 50% reduction of GHG total volume in 2050 target, and expressed its concurrence with "Getting to Zero Coalition", a corporate alliance launched at the United Nations Climate Action Summit in September 2019. Also, we think that it is important to develop fuel infrastructure as well as ship's own to respond in new fuel.

Much talk revolves around the 'fuel of the future.' While today it is generally agreed that there is no single 'silver bullet' solution to achieve decarbonization, is there a technology or a fuel where K-LINE is more heavily invested? Please provide details.

It is still technically and financially challenging to adopt CO2 zero emission method such as carbon free fuel, natural energy and electrical propulsion and so on. On the other hand, there are some technically improved methods such as LNG and LPG fuel, so we will consider combining those methods.

Source: Kawasaki Kisen Kaisha, Ltd.



The "K" Line Fleet

(As of 9/30/20)

Type of Vessel	No.	DWT(MT)
Dry Bulk Carriers	195	25,339,430
Thermal Coal Carriers	29	2,580,614
LNG Carriers	47	3,953,514
Oil Tankers	17	2,546,549
Offshore Support Vessels	6	29,186
Drillship	1	-
FPSO	1	-
Car Carriers	84	1,384,734
Short Sea and Coastal ships	52	604,581
Containerships	46	4,082,343
Total	478	40,520,951

* The number of owned vessels includes co-owned vessels, and deadweight tonnage includes share of other companies' ownership in co-owned vessels.

* Includes flagships and spot and/or short-term activities at the end of term.

We expect that LNG fuel have potential used widely future and now considering the use for various types of ships. Also, we think that development of LNG bunkering infrastructure will redound to miniaturizing fuel tank, and LNG fuel will be fascinating for not only environmental aspect but also economical aspect.

Looking beyond fuel, can you describe the technology(s) onboard your vessels that you have found to provide good results.

We understand the goal of cutting GHG total volume by 50% is an ambitious target that needs 90 to 100% of improvement effectively. To have the results, we think it is necessary to utilize reproducible energy such as wind, wave, solar light on top of Zero Emission technology like fuel conversion.

We also believe it is necessary to have changes in logistics in the long term. Maritime transport is already an environmentally friendly option and we can have a bigger GHG reduction impact if we combine ship size enlargement and slower navigation. However, we need to make sure to obtain

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INTERVIEW TOYOHISA NAKANO, EXECUTIVE OFFICER, "K" LINE

full understanding of many individuals including shipper for these logistic changes.

"Autonomy" and all that it entails is also a driver in today's maritime world. To start, how does "K" Line define autonomy? Please provide an overview of how the company is investing in R&D or joint venture projects designed to advance autonomy.

At this stage, we direct to automated vessel based on with some human intervention (i.e. with seafarers onboard). We think such advanced machines' support to human will result improving safety of vessel and efficiency of work on board. For example, we are considering big-data collection with monitoring some additional sensors for preventive maintenance etc. In addition to that, we are working on optimal operation system using such big-data in order to achieve environmental friendly operation.

Hand-in-hand with autonomy and digitalization is Cyber Security. Can you share with us an overview of the importance "K" Line places on operating a cyber-secure business.

We believe that Cyber Security is essential for autonomy and digitalization, so we are working to strengthen it not only at sea but also on land.

What are the top three points of focus for K-LINE Research & Development for the coming years?

Reducing Greenhouse Gas (GHG) emissions, Digitalization, and Quality.

This may have been covered sufficiently in previous questions but can you discuss the top three most important current projects or Joint Industry Projects to "K" Line today.

In addition of reducing GHG emissions and Digitalization which we answered in another question, we are working on improving quality control system for ship management and logistics.

We understand that K-LINE has just celebrated its 100th Anniversary. As you explored your company history, what do you count as the overarching most impressive or important achievement that your company has delivered?

Throughout this 100 year history, we have been developed innovative ships like along with expanding our service worldwide. As the result of our challenge and good relationship with our stake holders. We would like to continue refining our strength for a brighter future.



Source: Kawasaki Kisen Kaisha, Ltd.



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Siemens Sends i

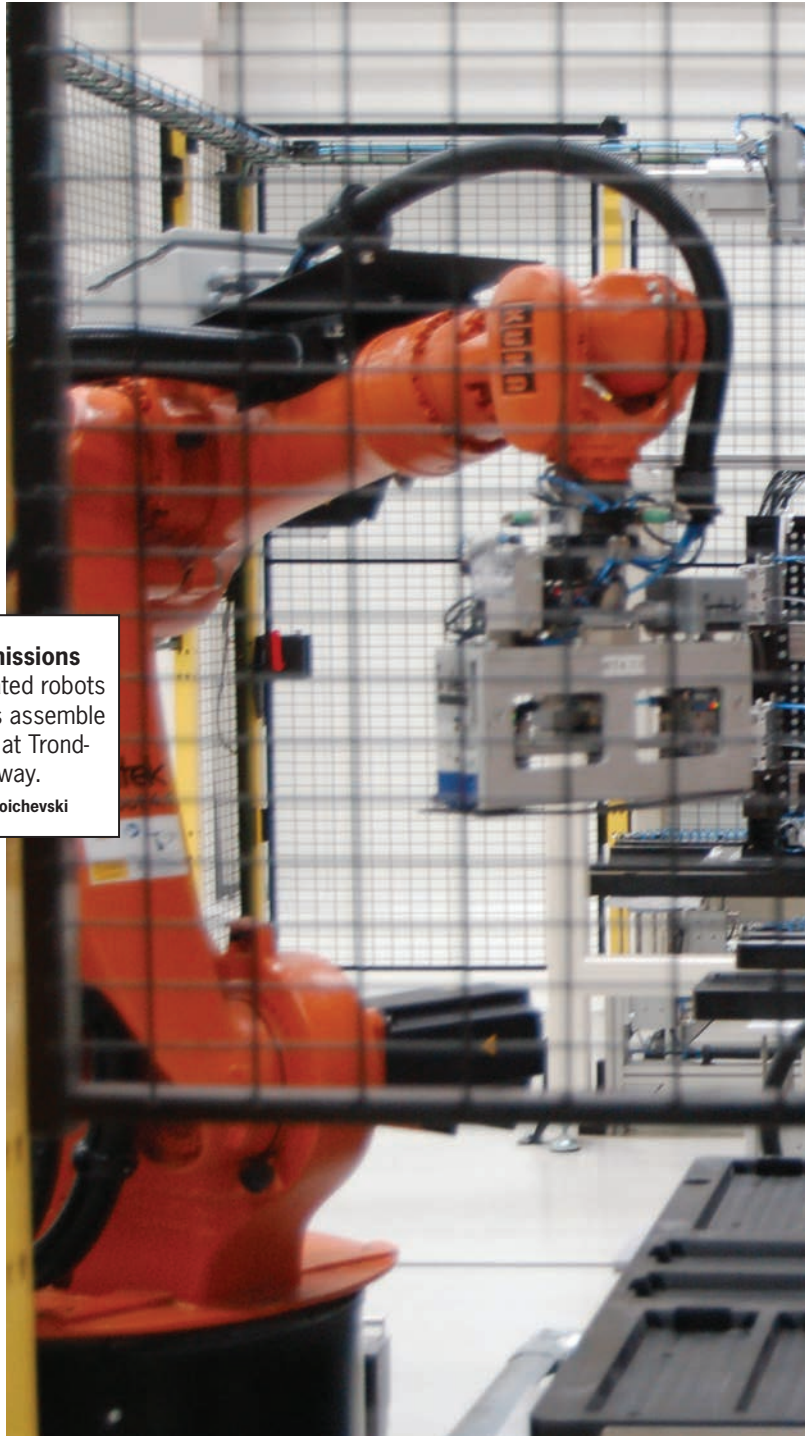
Encouraged by the success of a hybrid drives program, Siemens is going all out in Norway to automate production of that core marine energy storage enabler, the lithium battery. Offshore service vessel charterers, rig owners, ferry operators and ship owners are the target market. Trondheim's technical university and a recent history of hosting battery makers and system integrators has made it launchpad for new applications involving the new BlueDrive Plus C drives and batteries.

By William Stoichevski

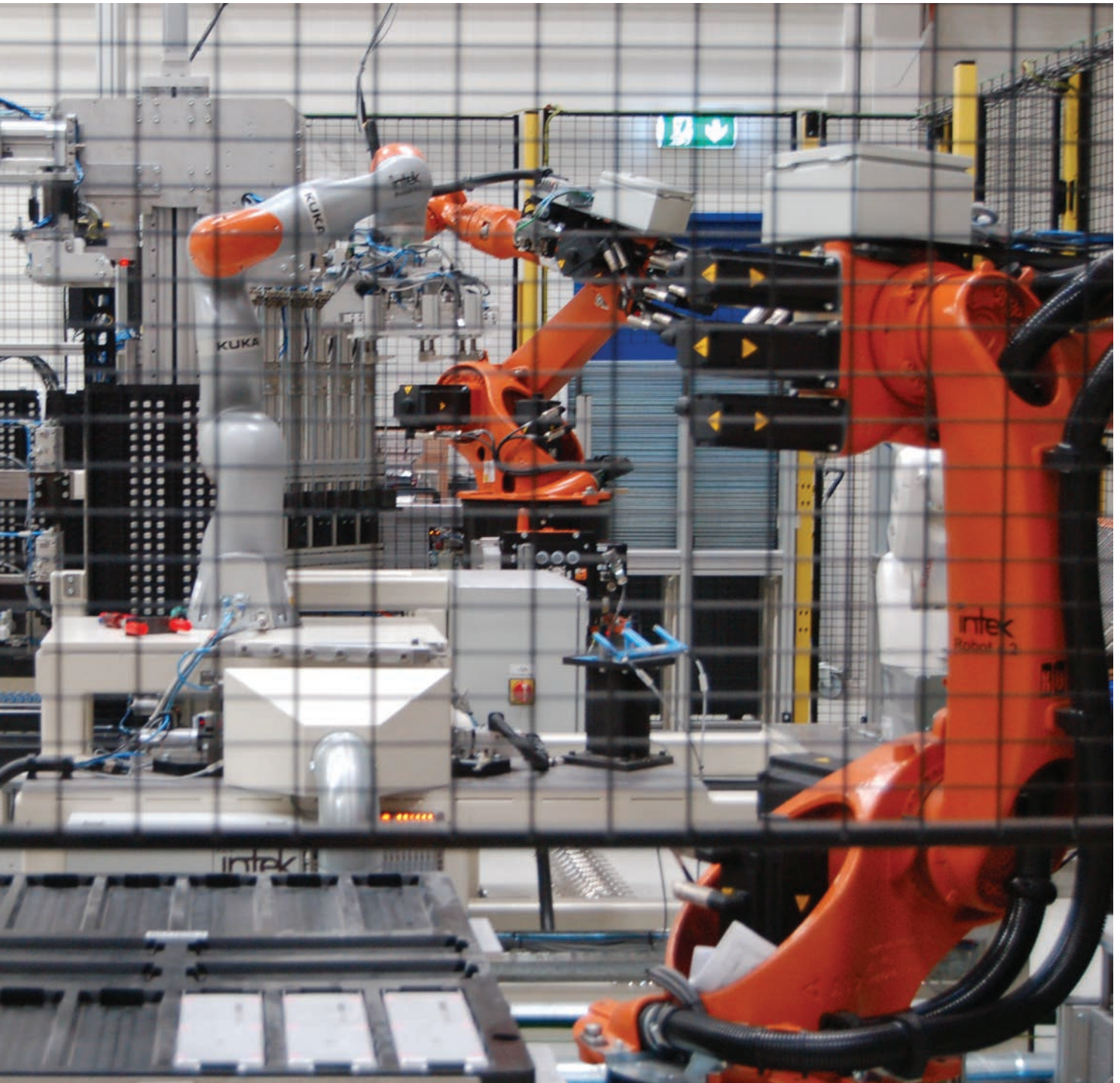
Robots v. Emissions

Siemens articulated robots of different sizes assemble battery stacks at Trondheim, Norway.

Photo: William Stoichevski



n *The Machines*



Siemens' Norwegian head of strategy and business development, Odd Moen, is full of insights: "You know that one kilogram of cod costs a trawler 0.5 liters of marine fuel oil to fish," he says, his serious expression becoming milder. "You really ought to put a bottle of (motor) oil on the table with your bottle of wine." In fact, cod's carbon footprint is said to be 356 grams of CO₂ for every 0.256 of fish, a nod to fishing hard on marine fuel.

His point made, Moen walks us into Siemens' brand-new factory for making marine energy storage systems, or ESS, the heart of a plan to equip and sell more BlueDrive Plus C drives. The new drive is said to be a safer, more profitable and a greener option for shipowners of all but the largest vessels. The factory is just a few weeks old but expects to serve "oil, gas and other future-oriented vessels". A year ago, the plant agglomerated batteries by hand (not the first to start that way). Now, robots do the mundane work of building stacks of battery packs from behind metal fencing. Several of these tireless, orange-armed workers stack and swivel at a steady clip.

"We expect the market will double in three years," Moen tells *Maritime Reporter* as others admire the slick machines. He gives a cautious nod to taking photos. After all, the making of marine ESS in Trondheim has, behind the scenes, been a battlefield of sorts. Of two Canadian companies, Corvus and PBES, only Corvus survives. PBES retreated to find life producing from a new factory in Germany.

Integrated integrator

Siemens, as both system integrator and marine ESS maker, has an obvious advantage in no longer having to wait on fitful battery production. Call it an integrated integrator. Needing to be served in the immediate vicinity are Norway's increasingly green fleets of all-battery and hybrid-power coastal ROPAX and offshore vessels. Increasingly, Moen

says, there are orders for ferries and a growing list of larger vessel types. "A small number of batteries yields huge results. Eight cubic meters of battery packs are all you need for the huge new vessels." To produce these in a hurry, Siemens sent over this very troop of 12 articulated, dual-arm and palletizing robots. We were among the first visitors, and some robots were still covered in their factory wrap. Digitally controlled production — with barcoded quality control throughout the value chain — was what we were watching, as robots simulated bent, burdened backs and the tool-twists of a handful of technicians. Already, Moen's bots can produce enough batteries for 300 to 400 ferries per year. On the product, we note that waver-thin channels for battery coolant seem to indicate a Siemens quality production technique from the Continent. "Not China?" we ask. "No," comes the answer. Moen, who has some of the air of a *M.A.S.H* surgeon, is at pains to explain the new-style Siemens battery's water- and cell-temperature transfers, as well as the wireless monitoring and control of these systems. Why wireless? "It would be too huge a number of signal cables otherwise," he says. One of these modules weighs 60 kilograms but can replace "tons" of gargantuan ship engine parts. Indeed, the BlueDrive Plus C drives also enable battery-only vessel power for ferry shorter-crossings.

Precursors

Integrating batteries into onboard power systems isn't new for Siemens. What's new is the demand — dozens, possibly hundreds of ferries plus a range of small and medium-sized vessels orders — and a pipeline of new concept vessels. The company has been in Trondheim for 110 years, and half of its 600 employees are engineers (although many, invariably, would be of a specialized Norwegian engineer cohort of old that might be more technician than engineer). Nonetheless, Siemens employees plenty new M.Sc.s and Ph.D.s here, and



nearby NTNU university is a hybrid-drive recruitment base. Outside, Moen points to a red-painted building where the company is developing electrical power for remote, subsea oilfield developments. Years of Siemens electrical switching development make it all possible, marine drives included.

In fact, Siemens first electrically propelled platform supply vessel appeared in Norway in 1998 after a ship-owner challenge that took three years to answer. Moen recalls that while it cut fuel use by 35 percent, getting it off the ground exposed supplier shortcomings: "How to speed up supply chain learning became a focus along the way, just as with the first LNG-powered ferry. We delivered it as well as the first (hybrid) long-liner fishing vessel."

Better with batteries

Three years ago, Edda Freya — "the most environmentally friendly offshore construction vessel" — delivered 30 percent fuel savings, charterer Equinor says, despite having six diesel engines driving its propellers and charging its four battery packs.

Before that, it was the "world's first

HYBRID DRIVES & AUTOMATION



AMAZON Style
Provider robots service the robot assembly team.
Photo: William Stoichevski

ever electric fishing vessel”, one that allowed more space for a fisherman’s haul and, if used throughout the fleet, would use 180,000 t less fuel yearly while emitting 540,000 t less CO₂ “after charging all night for about six euro”. That first vessel used an ESS with “the batteries of two Teslas” to cut fuel bills by 90 percent (assuming electricity prices of EUR 1.2 per kilowatt hour). “If you produced electricity in a (gas-fired power plant) you’d hardly (notice).”

As for biofuel — “We’re not against biofuel, but a fishing fleet purchase of firewood for fuel would have to fell 50 percent of all currently felled trees,” Moen says, adding, “Fishing vessels represent 17 percent of all marine fuel purchases (in Norway).”

High-profile cruise

Meanwhile, Siemens as systems integrator got full marks for enabling the 2019 Ship of the Year winner, Color Hybrid, setting the tone for cruise vessels with its battery-propelled 5 MWh of mean power at 12 knots. The vessel also boasts 20 percent less green house gases. This first incarnation of plug-in vessels showed Siemens BlueDrive Plus

C diesel electric hybrid system could make a difference in an industry-wide quest for low-emissions vessels. Already, zero-emissions operating profiles will be required to cruise the Norwegian fjords; steam into a number of European ports or ply Emissions Free Areas.

When operating in those areas, Siemens redundant brain for “plug-in” hybrid vessels — the Siemens Mind Sphere Cloud system — offers a forecast of optimum charging times. Regions with limited power (and usually high electricity prices) at certain times make up part of an electricity forecast that includes the effects of weather forecasts on charging availability (as in conditions and supply).

BlueVault battery tech

For this integrated provider, the list of vessel types is growing. Rows of battery cabinets on a car ferry that’ll serve the west coast of Norway are nod to the power redundancy needed on exposed stretches of coastline. As Siemens R&D is brought to bear, a 6-kWh power module is more evidence that batteries and drives are now available for different operational profiles. Vessel owners are being told they can have longer life batteries and shorter charge cycles. “Batteries are about to become of increasing importance to the marine industry,” Moen says, with the “Why” open for interpretation: competition, constricted operating areas and maybe conscience. However, system life — even with battery prices falling “10 percent yearly” — needs to improve from the 80 percent of battery capacity that remains when “end-of-use” is declared. And with this, the “pollution argument” goes “out the window”, as a seasoned shipping industry observer puts it. Yet, the emissions argument is still a good one.

Hybrid benefits

It took years of research to learn that drives could control power to provide better fuel savings than both liquefied natural gas and dual-fuel engines. Dual-

fuel and LNG plant also proved costlier to install. The lower CAPEX and greenhouse gas emissions said to be derived by hybrid drives is coupled by an incremental increase in available power, as an adjustable combustion engine is made to provide timely power output. It’s a selling point for captains, although ship owners might be more familiar with the “less wear and tear” aspect of these drives. Both are cost arguments, but as with less noise, LNG offers these benefits in spades. Siemens hybrid tech, however, now has upwards of 40 customer references in far shorter order that what happened with the scale-up with LNG. This newest raft of tech — the BlueVault batteries and BlueDrive Plus C — will need fewer batteries. “We’re still learning, but we’ve been pioneers in the use of batteries,” Moen says, a nod to Siemens battery integration efforts from Australia to Norway that have yielded at least 25 passenger ferry references, a major cornerstone of the battery-hybrid business. Five years on, the MF Ampere was first among a series of all-electric ferry newbuilds and retrofits paid for by a Norwegian government keen to take a green marine lead on the world.

There’s much at stake. A study reveals about half of all ferries in Norway (about 223) can be converted to electricity or hybrid. A slide Moen shows us suggests annual savings of 100,000 t of fuel and 300,000 t of CO₂ can be derived if 127 ferries went all-electric and hybrid. “The politicians understood it,” Moen says, adding that the logic of battery power was clear. Of course, as with hydrogen, there’s one glaring hole in the whole “let’s get on batteries now” argument, and that’s the prevailing “low grid capacity for charging”.

“All (local) dishwashers would go out,” Moen cautions, explaining that, “Traditionally, you’d upgrade the transmission lines, but putting batteries in huts on the dock would enable batteries to be charged from available energy then transferred to (a ferry). A smart grid uses the existing grid.”

HybriGen Power: Blazing the Path to Zero

*While hybrid solutions to meet emission reduction mandates are relatively new to maritime, they are routine to BAE Systems, with 20+ years of experience, working on the fifth-generation of hardware. **Not convinced?** How about the 24.6% fuel savings recently documented on one ACBL towboat.*

While the marine business has obvious differences to its air, rail and road brethren, stripped down the transport sector is similar: Moving people and goods from point A to point B seamlessly, effectively, reliably and (increasingly) with minimal environmental impact. BAE Systems is a well-known global brand across multiple industries, and it is now leaning on its hybrid propulsion experience: 20 years, five generations of equipment across multiple platforms, including 2000 systems per year from its Endicott, NY facility; to deliver clean, reliable power to the marine sector. “We’re trying to take a proven technology which has been demonstrated on

bus and highway, and apply it to the marine market,” said Peter Brooks, OEM Account Manager, BAE Systems. “It’s really the same thing: passenger transportation and the movement of people is moving to the waterways, where there is less congestion ... the marine industry is a growth sector.”

Proven on the Rivers

The inland rivers are a perilous proving ground for any marine technology, as it is populated with a multitude of smaller companies, where losing a vessel to a complex technical issue could jeopardize its very future.

“We’re now providing power from the

main engines for inland waterway towboats, so they can turn off their gensets and just run on the main engines for propulsion power as well as electric power for the vessel,” said Brooks, citing its reference system on an inland towboat for ACBL. “We’ve been working with Karl Senner LLC, they have been very active and there is a lot of interest building now that the (MJ Bradly) fuel study is out, people can see and understand the numbers, and see that the fuel savings is about 25%, between 13 and 32% depending on how they are working the main engines. For the towboat Christopher M. Parsonage they were predicting a 15,000 gal. fuel savings per year just

“On this specific project, Karl Senner, LLC collaborated with BAE and Reintjes to **develop a gearbox solution that allows the HybriGen system to be delivered as a single package.**”

Karl Senner, President,
Karl Senner, LLC

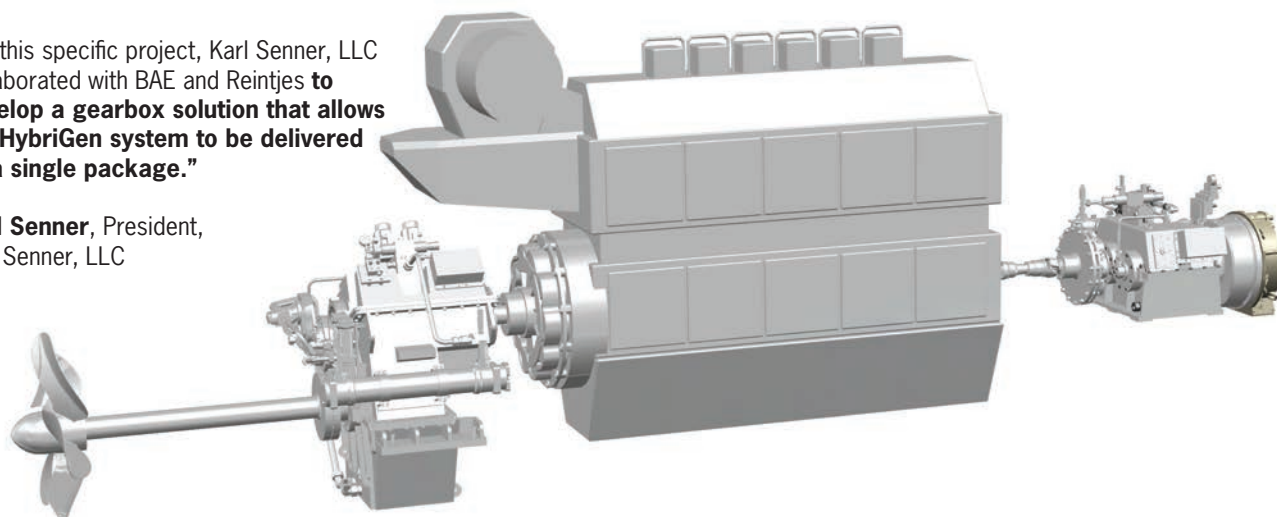


Image: Karl Senner, LLC

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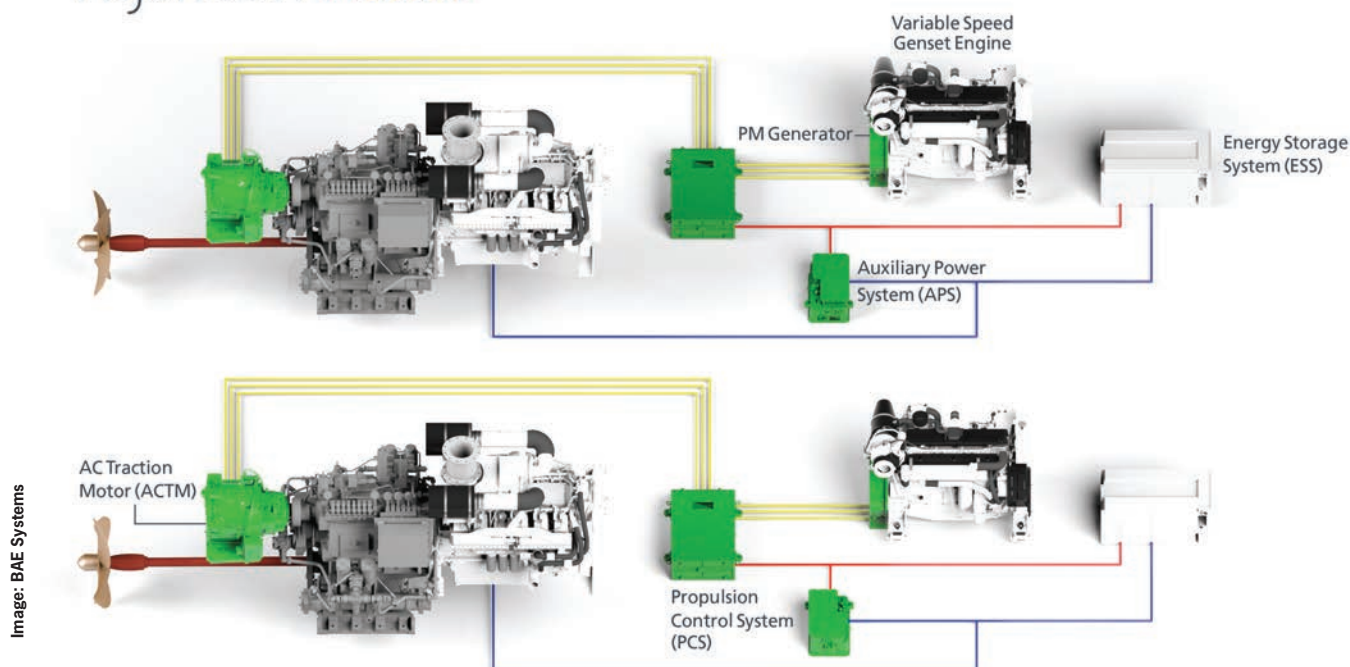


Image: BAE Systems

“Karl Senner is able to offer a wide array of REINTJES gearbox options that can accommodate various offsets, ratios, materials (aluminum or cast-iron housings), or the possibility to have the PTI/PTO/Boost in clutchable or non-clutchable configuration,” said **Chris Senner**, VP Sales and Marketing, Karl Senner, LLC

by getting rid of the gensets.”

“We’re giving them clean power direct off the main engine,” said Brooks, with a variable speed generator on the front of the main engine, meaning it doesn’t have to run a second genset.

“On this specific project, Karl Senner, LLC collaborated with BAE and Reintjes to develop a gearbox solution that allows the HybriGen system to be delivered as a single package,” said Karl Senner, President, Karl Senner LLC. “Most importantly this package incorporates the intermediate shaft line (available in various lengths), torsional coupling, step-up gearing, internal hydraulic multi-disc clutch, and the integrated bellhousing-mounted BAE generator. Delivering this system as a single unit allows for minimum footprint inside the vessel and for easy installation/integration at the shipyard.”

While fuel savings stole the headline, reliability steals the show. “The big find for us: while the focus was on fuel and maintenance savings, the report back

from ACBL is focused on vessel uptime,” said Brooks. Previously if they would lose a genset, they would have to pull over, take the vessel out of service and wait for the repair. “That impacts your revenue stream,” said Brooks. “This system is designed for 50,000 hours ... it doesn’t break. We are a defense and aerospace organization, and this mentality transcends throughout our design architecture. The system just doesn’t break.”

Bigger picture, Brooks is starting to see movement from a broader range of owners in taking steps to reduce emissions for the long haul. “We recognize that there is a PATH to zero emissions. There is not a step change, there’s a path. We’re trying to get people to understand you don’t have to jump to utopia. It is a path, start by making small changes, starting with a mild hybrid, then venture toward full electric and then perhaps fuel cells in the future.”

– Greg Trauthwein

Case Study

Name: Christopher M. Parsonage
 Built: 1998
 Owner: ACBL
 Length: 180 ft.
 Total installed power: 8,000 hp
 Gensets: 2 x John Deere 6090AFM85
 (175 kW), inline 6 cyl.
 298 bhp @1800 rpm, Tier 3

Upgraded 2016

Engines: 2 x EMD 16-710G7B,
 16 cyl. V, 4,000 bhp
 @ 900 rpm, EPA Tier 3

Hybrid: BAE HybridGen Power
 mounted to starboard engine
 120 kW (idle) to 230 kW (full)

Results: HybriGen yielded savings*
 • 2.81 gal./hr.
 • 13.4 to 31.6% fuel savings
 • 24.6% avg fuel savings

*Study: M.J. Bradley & Associates

Lean & Green

Greg Atkinson, founder and CTO at Eco Marine Power, has been on the ‘green’ track since the company’s founding nine years ago. We checked in with this Japanese-based tech company for an update on its activities.

By Greg Trauthwein

Eco Marine Power spent the last five years fine-tuning its design concepts, applying for patents and trademarks, and moving the first of its solutions through sea trials and eventually commercial release, according to Atkinson. “Along the way we have formed a number of key strategic partnerships with technology providers and manufactures, plus been able to establish links to several ship managers and ship owners.” Of note has been Eco Marine Power’s cooperation with Zeaborn Ship Management Pte Ltd. (Singapore) and during the last few years together it has installed its solar power and fuel monitoring solution onto MV Panamana.

“Our products that are now available include the fuel consumption and emissions monitoring system – Aquarius MAS, and our ship solar power system – Aquarius Marine Solar Power,” said Atkinson. Also, in cooperation with The Furukawa Battery Company it has also introduced new energy storage solutions and class-approved batteries including the FCR-50-12 and the hybrid VRLA battery – UB-50-12. “Our focus now is to get our combined wind and

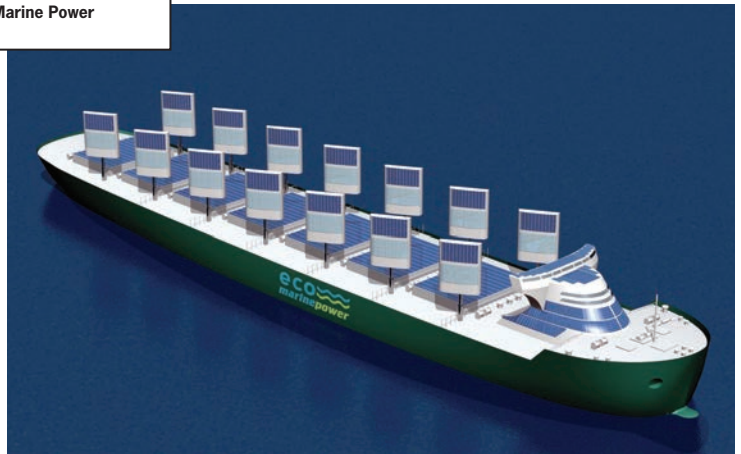
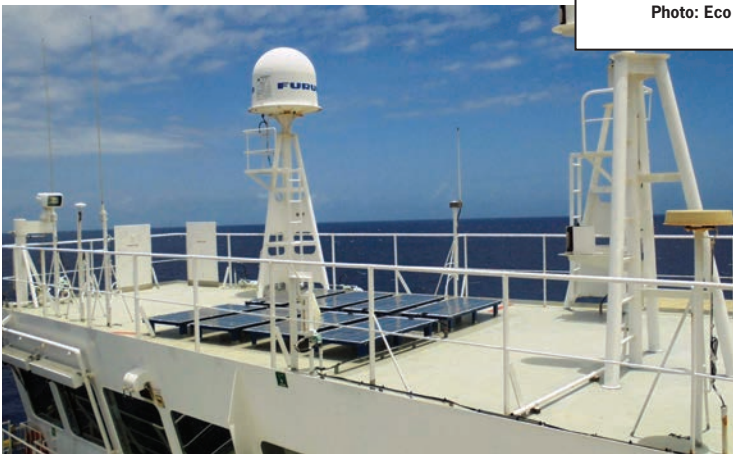
solar power renewable energy system – Aquarius MRE, ready for commercial release. This system incorporates our patented wind-assisted propulsion device known as the EnergySail.”

Nine Years and Counting

Eco Marine Power was originally started in 2010 to focus on the development of ideas that might lead to projects to design solutions that would reduce fuel consumption and harmful airborne emissions across shipping. “Back then there was an increasing awareness that Particulate Matter (PM) released into the air as a result of burning heavy fuel oil was a major health hazard and that shipping had to clean up its act,” said Atkinson. “But I recall there was quite a bit of resistance from many in the industry in regards to the need for further environmental related regulations and also skepticism in regards to the use of alternative power and propulsion technologies. Today there is more wide-spread acceptance of the need for regulations and more willingness to consider alternative propulsion and power options, but the sec-

Left: Eco Marine Power and Zeaborn Ship Management Pte Ltd. (Singapore) have had a cooperation, installing solar power and fuel monitoring solution onto MV Panamana.
Right: The Eco Ship.

Photo: Eco Marine Power



Shipping has certainly moved towards being more sustainable ... but there's also a fair amount of "greenwashing" in terms of companies stating they are implementing steps to be "green" where in reality the measures are often more focused on reducing costs or appearing "green".

Greg Atkinson, CTO, ECO Marine



Photos:ECO Marine

tor is still very conservative in terms of trialing or adopting new technologies.”

Being ‘green’ in the marine industry has changed over the last decade or so, but Atkinson remains skeptical that the changes are all real. “Shipping has certainly moved towards being more sustainable during the last 10 years, but as with other industries there’s also a fair amount of “greenwashing” in terms of companies stating they are implementing steps to be “green” where in reality the measures are often more focused on reducing costs or appearing “green,”” he said. “A notable example would be the cruise sector, where companies often state that they are committed to reducing their impact on the environment but meanwhile continue to build more and bigger ships. Judging by their media releases though you would think large cruise ships with theme park rides were shining examples of sustainable shipping. They’re not. However, there has definitely been a shift in awareness across shipping towards acknowledgement that more needs to be done. So I’d rate the progress so far as being below average, but there are positive signs that this will improve during the next 10 years.”

R&D

Eco Marine Power must live on the cusp of research and development, and it actively works with a number of partners globally in this regard. “These projects provide opportunities for technology providers and shipping companies to be part of the development process and share in the resulting benefits in

terms of part ownership of patents and intellectual property, plus gain from newly acquired skills and knowledge,” said Atkinson. “This year we plan to move our integrated wind and solar power system: Aquarius MRE, out to sea after finishing evaluation of the patented EnergySail at the Onomichi Marine Tech Test Center (MTTC) in Japan. This test center has been established with Teramoto Iron Works, a company with a history of providing high quality fittings to the shipping industry dating back to 1934.”

Aquarius MRE is designed to integrate with other ship systems and equipment, providing a platform for technology providers to “showcase their products during a major global project aimed at making a significant contribution towards reducing ship emissions.”

Japan Leads the Way

“The Japanese Government has for many years had a strategy in place to develop the “hydrogen economy” and has made funding available to assist companies in developing technologies aligned with this strategy,” said Atkinson in discussing his company’s ‘home turf. “In addition the government has made funding available over the past years to encourage the development of ship related technologies aimed at reducing fuel consumption and emissions I believe Japanese shipyards appreciate that they need to compete globally by producing ships that have a technological edge, and will be able to meet the expectations of ship owners in terms of being able to comply with existing and future environmental guidelines.”

Maritime Autonomy

Special report on the policies, technologies, challenges and the players

Business and Personnel Considerations in

The Age of Autonomous Ship Technology

There is much talk among maritime professionals about how automation and autonomous vessels will make the industry safer. In truth, innovation will be driven by the bottom line and will take time before it is commonplace in the industry. Early examples are likely to be limited to smaller vessels and coastal waters. Autonomous ships are predicted to reduce human error, a major driver of accidents, but crews will still have an important role on board vessels for the foreseeable future.

Recent Trials

In December 2018, Rolls-Royce demonstrated what it claims is the world's first fully autonomous ferry on a trip between Parainen and Nauvo in Finland. The UK-based engineering group plans to bring self-guided cargo ships to the world's seas by 2025. Three months later, in March 2019, a series of autonomous operations trials were held in the North Sea off the Netherlands coast by The Dutch Joint Industry Project: Autonomous Shipping to show the decision-making process of an autonomous system in ensuring safe sailing and avoiding collisions with other vessels.

Meanwhile, Norwegian shipbuilder VARD is currently building a small autonomous electric container vessel for fertilizer company Yara, planned for launch in early 2020 with autonomous operation expected by 2022. China is setting up a 225-square-mile test zone for autonomous ships while a group of Japanese shipping lines have formed a consortium to build remote-control cargo ships by 2025.

Adapting to the Technology

Most of us have experienced numerous instances in both our business and private lives where we were told that a particular technology would “not disrupt normal operations” or that implementation would be seamless and “you won’t even know it’s there.” A common theme that is put forth is that technology will be designed to adapt to the user. While this may be viable on the macro scale, it is not the case on the micro scale. I only have to think back to my last phone upgrade or the last time I bought a new microwave. All too often we adapt to the technology. In many cases, it is simply the way our brains are wired: tool use is a key component of our collective pasts. This is likely how it will play out for the marine industry with individuals adapting to the new technology versus the other way around.

Adapting to the New Environment

Another key issue is that as maritime autonomous technology begins to make inroads into our industry, the pace of change will accelerate. Once the technology becomes available, there will be numerous business pressures that will force the adaption of some form of the technology to be adopted. These may be regulatory, legislative or customer-driven demands.

So where does that leave vessel operators and their crews? All vessel operators should stay abreast of developments in the arena of autonomous vessel operations. The issue of maintaining a suitable manpower pool with the requisite skills is also critical. We are dealing with a new generation of mariner and boat operator entering the industry. While

some may discredit their overreliance of technology, we need to capitalize on the benefits it brings to the industry.

This is not the time to sit on the sidelines with the business operating profile of “we have always done it this way”. I look at it this way – yes there were still blacksmiths after Henry Ford, but auto mechanics soon outnumbered them. So stay educated on the latest developments and proactively adopt improved safety and navigation technology and procedures.

As an industry, we must drive this discussion and help steer innovations so that they help us operate safely and more efficiently. Keeping the status quo is not a viable option, nor is just looking to be “Grandfathered” in. The landscape of “Grandfathering” in vessels from a compliance standpoint is under increased scrutiny given some of the tragic losses that have occurred in our recent past.

Cyber Security a Major Concern

An important step that has implications for autonomous vessels is the need for operators to enhance cyber security for their shoreside and afloat infrastructure.

The United States Coast Guard developed guidelines with recommended action, including:

- **Conduct a Risk Assessment** – Begin by assessing what parts of your enterprise are controlled or supported by computer systems. What are the consequences should those systems become inoperable, controlled by outside parties, or misused by internal parties?

China
is setting up a
225-square-mile test zone for autonomous ships while a group of **Japanese** shipping lines have formed a consortium to build remote-control cargo ships by 2025.

- **Identify and Adopt Best Practices** – What information technology security standards are most applicable to your systems? Are your systems meeting those standards? Are your employees familiar with them? When were they last updated? What backup systems, redundancies, or replacements are available?
- **Secure Your Supply Chain** – As with just-in-time inventory and production systems, consider the cyber vulnerabilities and practices of your suppliers, customers, and other organizations critical to your company’s profitability. Discuss cyber security with those organizations and consider incorporating good cyber practices into marketing and contracting.
- **Measure Your Progress** – Test your cyber practices through drills and exercises. Identify any gaps or lessons learned, and set specific goals with timelines for making needed improvements.
- **Revise and improve security** – Review your latest risk assessment, evaluate any new cyber systems you may have added since that time, incorporate lessons learned and revise your cyber security policies and procedures accordingly.

One way to start this process is to take advantage of the Department of Homeland Security’s Industrial Control Systems Cyber Emergency Response Team (ICS-CERT). ICS-CERT provides

a wide range of information, tools, and services that can help companies assess their security, identify recommended practices, and improve their cyber security.

<http://ics-cert.us-cert.gov>

The Office of Port and Facility Compliance continues to collaborate with the National Institute of Standards and Technology (NIST) National Cybersecurity Center of Excellence (NCCoE) to develop customized maritime specific cybersecurity framework Profiles. Please check Homeport for the most up-to-date information on cyber risk management:

<https://homeport.uscg.mil>.

Insurance Implications

The use of new technology may lead to new risk scenarios, which underscores the importance for shippers to stay engaged with their brokers and underwriters. Insurers work closely with them to understand companies’ needs from an operational standpoint. This is not a one size fits all business, and every operating environment presents unique challenges. By staying engaged and understanding your current operations, insurers are able to help companies in the maritime industry navigate the challenges that lay ahead. Find an Underwriter who understands your market and will work with you to address your particular needs. Ensuring that you have properly trained and credentialed crew aboard your vessels will continue to be one of the most effective steps that

you can take to have a safe and efficient operation, both now and in the future.

Advancements in autonomous vessels continue to be made, particularly

with smaller vessels and in coastal waters, but further study is needed. As problems with container ships have shown, innovation and technology is not a panacea if the root cause of incidents and losses is not addressed. Innovations like autonomous vessels are driven by efficiency and do not automatically lead to improvements in the safety of shipping. For as long as it is driven by accounting, autonomous vessels will not lead to zero losses.

The Author

Kinsey

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



Footnotes:

1 Ventureboat.com, Rolls Royce demonstrates fully autonomous passenger ferry in Finland, December 2018

2 Hellenic Shipping News, Maritime autonomous surface ships on the horizon, February 2019

Maritime Autonomy

Special report on the policies, technologies, challenges and the players

Maritime Propulsion

Autonomous Surface Vessels ‘Go Electric’

A review of recent new autonomous surface vessels (ASVs) reveals that a growing number of these specialized craft are electric powered. To learn more about this trend, we turned to Torqeedo, a leader in the marine electric power space. We spoke with Steve Trkla, President of Torqeedo, Inc.

We note that Torqeedo recently passed an important milestone.

This year we are celebrating our 15th year of business and are delivering our 100,000th electric drive.

Do you see the ASV segment a growth market for electric propulsion?

Yes, we are seeing a definite move from gas outboards to electric propulsion in ASVs, both newbuilds and ret-

rofits. We have been actively involved with dozens of ASV builders, who tell us that their customers are increasingly asking for electric power.

There are several reasons. Some of them are obvious. Electric motors are quieter – an important consideration for boats involved in acoustic surveys. In addition, many times ASVs are required to work in environmentally sensitive waters where the noise and emissions

may be undesirable or in some cases limited by regulatory restrictions. Operating expenses are lower – not only in fuel savings but also ongoing maintenance.

Electric drives require very little regular maintenance.

And there’s always a safety concern with highly flammable gasoline on board. ASV operations are typically conducted at minimal speeds. Slow speeds mean lower power consumption, resulting on longer endurance times on station without depleting the batteries. Direct-drive electric motors also produce outstanding torque for towing and retrieving sensor arrays.

▼ **WAM-V from Marine Advanced Robotics. (R): Steve Trkla**

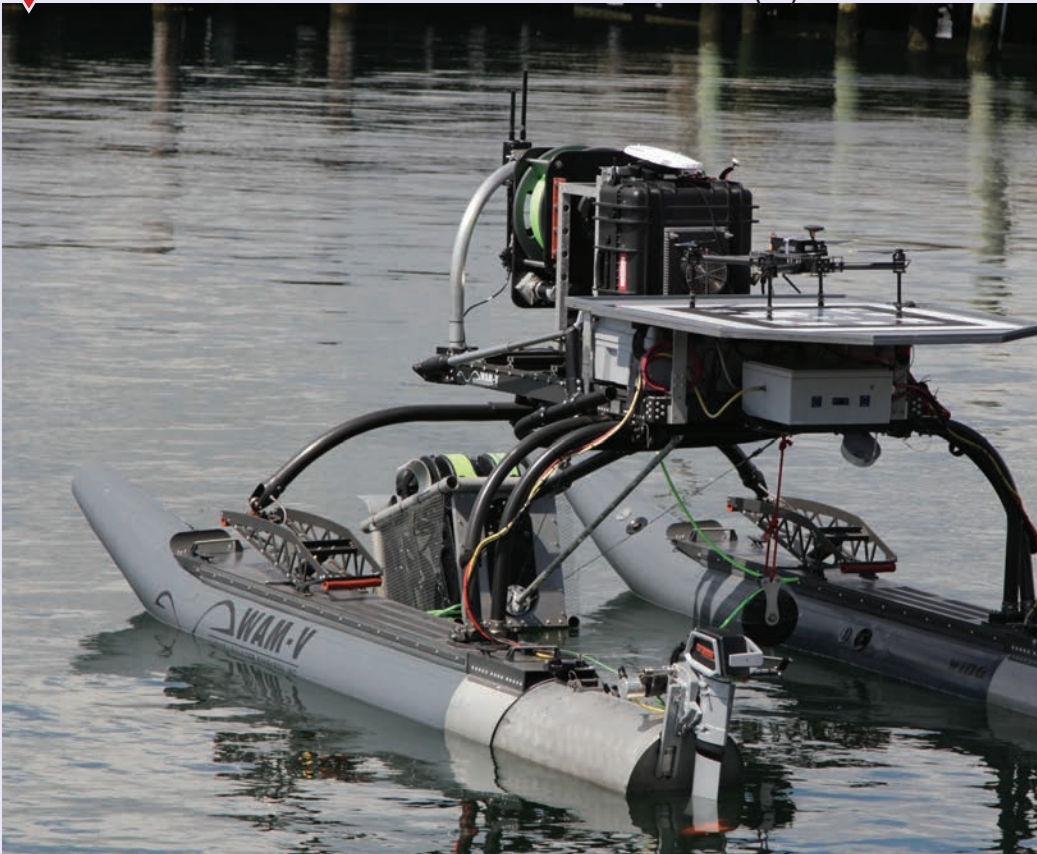


Photo: Marine Advanced Robotics



Photo: SeaRobotics

▲ Endurance 7.0 from SeaRobotics.

What about other benefits?

For one thing, for an ASV it's an absolute requirement for the propulsion and control systems to be fully meshed for remote control. Our electric propulsion systems are a totally integrated helm-to-prop solution with built-in connectivity to enable remote control or a fully autonomous computer mode.

Another important benefit for ASV operation derives from the direct-drive electric motors. Station keeping often involves rapid cycling back and forth between forward and reverse thrust under computer control. The gearless electric motors can switch back and forth indefinitely without damage.

Can you cite a few recent examples of electric ASV projects?

Sure. I'll start with the interesting and unique WAM-V from Marine Advanced Robotics. This very unique vessel has a wave-adaptive modular hull design that improves seakeeping with specially designed pontoons that independently adjust to conform to the water's surface. They had been using gas outboards in the WAM series but decided to go with electric power for the new 16-ft. model due to a customer request. We designed a propulsion system consisting of two Torqeedo Cruise 2.0 outboard with

high-torque propellers, powered by multiple Power 24-volt lithium-ion batteries. Each motor provides equivalent propulsive power to a 5 hp gas outboard and the boat can hold up to six batteries, depending on the required operating range and endurance on station.

How long can it run on batteries?

Experience has shown that with six batteries it can do a full day's work of 8-12 hours. It can be recharged overnight and do the same thing day after day.

How about hybrids with batteries and a backup diesel generator?

Take, for example, the new Endurance 7.0 (above) introduced by SeaRobotics last year. The powertrain for this 7-meter aluminum boat consists of an inboard Torqeedo DeepBlue 80i electric motor and BMWi3 lithium propulsion battery, a water-cooled DC0DC converter and a 24 VDC lithium battery for the DC-DC back-up, plus a small 25 kW diesel generator, which serves as a range extender. It's designed to provide up to six days on station at survey speeds and up to 10 hours between automatic battery recharges from the onboard generator. The recharging cycles are fully automatic under computer control.

The fully integrated control system

on the SeaRobotic boat allows for operation under remote control or semi-autonomously to implement a mission plan. All on-board systems are monitored with data connections to the remote base station. The operator can control all interfaces, view video feeds or put the ASV into automatic waypoint navigation mode, in which throttle and steering are under full computer control. The helm station can be optionally manned for operation in congested waterways and ramp operations.

So what do you see on the horizon for electric ASVs?

We see a definite upward trend, which we expect to continue. Increasingly, electric power is becoming the propulsion-system-of choice for designers, builders and operators of modern ASVs. Electric power is often specified in customer requirements for newbuilds, and depending on the configuration it can be relatively easy to retrofit electric outboards in place of gas outboards. In many cases we have found that the batteries have about the same space requirements as the fuel tanks needed for gas outboards, but the batteries can be installed in places denied to gas tanks because of the necessity for running fuel lines and other considerations.

Maritime Autonomy

Special report on the policies, technologies, challenges and the players

Put to the Test

Robosys gets a Waterway Workout

As advances in autonomy proceed full steam in maritime, this month we visit with Aditya Nawab, CEO, Robosys Automation Ltd., for insights on his company's budding business and recent field trials.

Robosys was incorporated in 2012 to serve the niche market of maritime autonomy. During the same year, Robosys licensed its technology to a U.S.-based USV company 5G International. Together they decided to pursue an opportunity in the UAE to build Unmanned Surface Vessels for a local ship builder to serve the local market. The technology is used in various demonstrators and production vessels. To support the ongoing work in the UAE, Robosys UAE

was established in 2017. Having built a wider international reputation in Artificial Intelligence, robotics and marine autonomy, the team saw an opportunity to expand into broader commercial and global market.

“Robosys has now developed the Voyager product to a level where it is ready to break into the global maritime market,” said Nawab. “The 5G International relationship with Al Seer ended in early 2019, and a big break came when the

Dutch authorities invited Robosys to provide the navigation software for a major study into autonomous shipping – the 2017 Joint Industry Project. This platform gave Robosys an opportunity to showcase the Voyager technology.”

Building on Robosys' core autonomous navigation and billed as a virtual ‘Junior Officer of the Watch’ able to operate 24/7 at a predictable, predetermined level of performance, the Voyager 100 series was developed specifically to support Bridge Watchkeepers. It comes in two versions: SmartCaptain is an advisory system offering a basic ‘Decision Aid’ for navigation and collision avoidance, useful in busy waters.

▼ Put to the test. (R): Aditya Nawab, CEO, Robosys



Photo: Robosys

“Voyager 100 Smart Pilot has all the features of Smart Captain with the addition that it is linked to the ship’s autopilot and propulsion system to provide an ‘Intelligent Autopilot,’ able to maneuver the vessel automatically on a safe course without human intervention, if desired,” said Nawab.

From the regulatory viewpoint, Voyager 100 is not designed to replace the crew on the bridge of a ship. It is designed to augment and assist, freeing up highly qualified, heavily loaded ships officers to focus on other aspects of the voyage. “Think of Voyager 100 as a junior ‘officer of the Watch’ – competent and safe, but supervised,” said Nawab. Voyager 300 is Robosys’ flagship product which is designed for remotely piloted unmanned vessels. “Robosys’ unique selling point is the ability of the Voyager 300 series software to operate autonomously – without any external

communications,” said Nawab. It has a refined Obstacle Avoidance module which allows it to navigate safely and comply with the COLREGS, enabling the vessel to carry on with the mission even in the event of a complete loss of communications with the remote operator. This makes it suitable for a wider range of surveying tasks too.

Differentiating the Solution

In the commercial sector, autonomous does not mean ‘unmanned’ and it will be many years before fully unmanned vessels will be regularly plying the sea lanes. “The commercial sector does however urgently require new solutions to prevent collisions,” said Nawab. ‘Avoiding collisions in a multi-vessel scenario using the COLREGS framework is particularly challenging. We believe we have solved the problem of collision avoidance for multiple vessels

with full COLREGS compliance. The Voyager 100 series is aimed at seamless integration with bridge systems aboard existing conventional vessels.”

Robosys has a new Human Machine Interface in the works, recently trialed at MARIN. “The HMI is designed to provide a dedicated interface between the software and the officer on the bridge,” said Nawab. “It’s quite different from the HMI for a remote piloting task. It aims to assist the officer of the watch by identifying and prioritizing contacts of interest, and then offering a navigation solution that avoids hazards and complies with the COLREGS.” In SmartCaptain, it offers this prioritized ‘action list’ for the crew to carry out; in SmartPilot it will operate the autopilot and propulsion control system on behalf of the bridge team, whilst keeping them informed of its intentions. The bridge team can override it at any time.

Kongsberg tests

Autonomy on the Inland Waterways

Kongsberg will install and test autonomous ship technologies on two vessels in Europe’s inland waterways and short sea coastal shipping routes.

Dubbed AUTOSHIP, the four-year \$22m project will aim to test and further develop key technology linked to fully autonomous navigation systems, intelligent machinery systems, self-diagnostics, prognostics and operation scheduling, as well as communication technology.

One of the two vessels that will be equipped for remote-operated and autonomous maritime transport, Eidsvaag Pioneer is owned by the Eidsvaag shipping company and operates along the Norwegian coast and in fjord areas where it carries fish feed to fish-farms. The other vessel to be equipped with autonomous technology is a Belgian

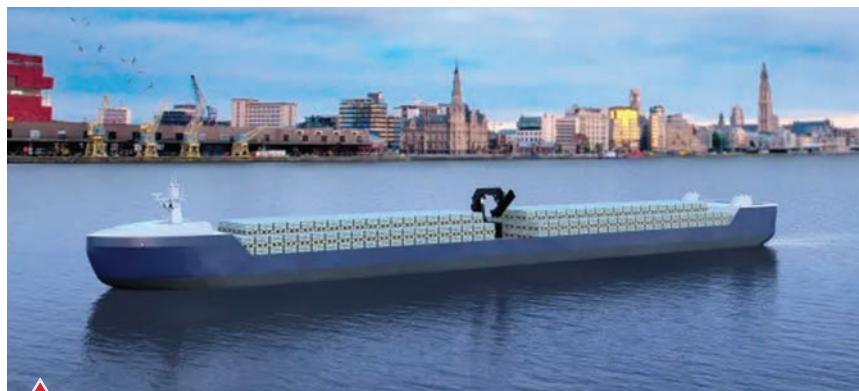


Photo: Kongsberg

▲ Blue Line Logistics’ pallet shuttle barge.

pallet shuttle barge owned by Blue Line Logistics NV that operates on canals in Europe.

The markets for both short sea coastal shipping and transport on inland waterways are expected to dramatically expand in the next few years, both in Norway, Europe, and worldwide.

Kongsberg is also involved in other autonomous shipping projects, including the development of fully electric and autonomous containership Yara Birke-land as well as several autonomous ferries. It also teamed up with Wilhelmssen to form autonomous shipping company Massterly.

Tech Talk

Scrubber Installation

Scrubber Installation on the Rise

Over the 12 months leading up to the IMO 2020 implementation date, Pacific Green Technologies (PGT) saw demand for scrubber installations steadily increase, particularly in December 2019. Last year, lots of vessels were ‘testing the market’ but now the enquiries are for bigger vessels, said Scott Poulter, CEO, Pacific Green Technologies. “Our installations last year were split 50/50 between tankers and bulk carriers with a few container ships. Now we are seeing many more bulkers – panamax, capesize, handymax – and there are more installations on order for VLCs, suezmaxes, aframaxes and medium range tankers.” He said the number of newbuild installations has increased too. “Looking ahead, we expect the market to be dominated by retrofits for the next few years and then the balance will switch to focus more on newbuilds for at least another five to 10 years.”

ROI

Many shipowners left the decision of whether to install a scrubber or not as late as possible. It represents a significant investment but the price difference and availability between high sulfur fuel oil (HSFO) and low sulfur fuel oil (LSFO) means that the cost of investment can be quickly recouped.

Industry analysis from Clarksons report that capesize vessels fitted with scrubbers are earning \$8,000 more a day than those without, VLCCs with scrubbers are saving \$15,000 a day, while supertankers fitted with scrubbers are expected to enjoy savings of more than \$7,000,000 per annum.

PGT estimates that the fuel savings would offset a scrubber investment within a year, and with the current bunker price spread – that investment may be offset in just months. While the bunker price spread may not continue at this level, some analysts expect the price difference to persist for several years as the industry adjusts. It’s not just the cost savings which are compelling though. Supply is an issue, the HSFO supply chain is well established, but there have been delays for ship owners requiring LSFO.

The Environment

Scrubbers have been accepted as an approved method of compliance by the IMO, European Union and U.S. Environmental Protection Agency, following considerable scientific analysis and scrutiny. Designed to remove the pollutants that contribute most to a wide range of serious health problems, scrubbers don’t just remove the greater part of sul-

phur oxides from the exhaust gases of ships’ engines and boilers, they also take out up to 94% of the Particulate Matter, up to 60% of the Black Carbon, and a significant amount of the Polycyclic Aromatic Hydrocarbons.

Last year, independent research organization SINTEF declared that measuring from well to wake, the energy required in the global production of LSFO produces far more GHG than in the production of high sulfur fuel oil (HSFO) and so scrubbers, which eliminate black carbon and particulate matter, offer shipowners the best long-term solution against carbon-focused legislation.

A 2019 report by Japan’s Ministry of Land, Infrastructure, Transport and Tourism (MLIT) described the operation of open loop scrubbers with high sulfur fuel oil as not only safe, but actually preferable to burning low sulfur fuel alone because scrubbers remove far more of the particulate matter found in ships’ exhaust fumes, than can be achieved by simply switching to low sulfur fuel.

Looking ahead, PGT believes that scrubbers are only going to get more effective at making air more breathable, removing much finer matter and becoming an effective long-term tool in the fight against climate change.

But the scrubbing industry needs to do more to educate the public and politicians about the environmental benefits. Many assume that scrubbers, particularly the open-loop ones are bad, because discharging sulphurous washwater into the sea sounds dangerous.

The world’s oceans already have a naturally high sulphur content, which means the additional sulphur from scrubbing washwater represents a tiny fraction of change. Apart from a small

Nantong Scrubber Production Line.



Photo: Pacific Green Technologies

number of shallow or uniquely sensitive marine ecosystems, the environmental impact of open loop scrubbing is actually negligible.

Scrubbers in Action

Pacific Green Technologies' ENVI-Marine hybrid system uses 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.

The TurboHead creates an 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 sulfur 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 sulfur 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 stored for disposal ashore.

Installation time

PGT has addressed potentially long retrofit times in two ways. First, PGT entered into a joint venture with the state-owned utility company PowerChina, a partnership that provides greater market reach and dramatically increased PGT's engineering capacity.

Second, using the same technology as the ENVI-marine, PGT has developed

a super-efficient naked scrubber in response to shipowners asking for lower CAPEX and OPEX levels. The new naked scrubber is very efficient using less power, offering considerable cost savings. It offers a 15% reduction in weight allowing the vessel to carry more cargo and retrofit time has been reduced by at least 15% cutting dry docking costs.

The Author

Poulter

Scott Poulter is the founder and CEO of the Pacific Green Technologies Group.

Since 2016 he has served as Chief Executive of Fresh Air Capital Ltd., a company engaged in the evaluation and financing of environmentally focused startup companies.



Installing a scrubber

As in any industrial setting, planning is key to success.

- 1** **The first step** is to assess the vessel's general arrangement to get a sense of the superstructure, funnel and spaces around them. The vessel layout will determine whether the scrubber can be located on the center line aft of the funnel, or whether space needs to be developed to the side.
- 2** **The next step** is to conduct a full 3D scan of the areas impacted by installation. The installation of a strainer and valves ahead of the seawater pumps, may require some creativity, and possibly take up space occupied by other equipment. The scan will be used to route sea water piping to the scrubber and discharge water from the scrubber to an overboard discharge. The electrical distribution cabinets, variable frequency drive (VFD) and programmable logic controller (PLC) cabinets are smaller and can be fitted in proximity to or around existing infrastructure. Routing for power and instrument wiring can be completed with the placement of the cabinets in a preliminary design.
- 3** **Once a feasibility study outlining the installation solution is complete**, the design team meets with the company technical and operations teams to review the solution and system specification. A team takes the feasibility study to the ship and walks the routing for the pipe and duct work to ensure that the solution will fit the vessel.
- 4** **Once approved, the working drawings are created** for the installation of the scrubber and members of the technical and operations teams attend the shipyard throughout installation. Finally, comprehensive training for the ships' crew in the operation and maintenance of the scrubber.

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Historic Tech Files

The Sixtieth Anniversary of the World's Deepest Manned Submersible Dive

Trieste Turns 60

Don Walsh shares with *Maritime Reporter & Engineering News* the experience of being a pioneer of the ocean's deepest depths.

By Regina Ciardiello

Growing up in the San Francisco Bay Area, Capt. Don Walsh decided to join the U.S. Navy at Naval Air Station Oakland in 1948, where he became an aircrewman in torpedo bombers. Two years later, he entered the U.S. Naval Academy, and in 1956, he enrolled in submarine school. Little did he know that four years later — in 1960 — he'd be the first person (along with colleague Jacques Piccard) to ever travel to the deepest ocean depths onboard the submersible known as the Bathyscaph Trieste (Trieste), which in 2020 celebrates its 60th anniversary.

During his tenure as Officer-in-Charge of Trieste, Capt. Walsh was designated **USN Deep Submersible Pilot #1**. In January 1960, he and Piccard dove Trieste to the deepest known spot in the ocean: 35,840 feet down. For this achievement, Lieutenant Walsh received a medal from then-President Eisenhower at the White House. In the years following the Trieste expedition, Commander Walsh served from 1970-1975 on duty in Washington DC as Special Assistant (Submarines) to the Assistant Secretary of the Navy for Research and Development (ASNR&D) and later as Deputy Director of Navy Laboratories. He retired from military life in 1975 with the rank of Captain. His accomplishments brought attention of Oceanology International Exhibition event organizers; Capt. Walsh has attended the event, in various locales, as a speaker, attendee, and consultant.

(MR sister publication MTR is pub-

lishing in March 2020 a special edition commemorating the 50th anniversary of Oceanology International). “My first time (attending Oi) was 1970 or 1971 when the show was held at Brighton,” he says. “Since that time, I have traveled many times to the U.K. show as well as those in the U.S., Singapore and China.” Capt. Walsh, a true subsea pioneer, holds the exhibition in high regard. “Having been a part of its early evolution, I was convinced that the Oi series were the ‘gold standard’ of ocean-related exhibitions and their associated conferences,” he says. “Today, I believe this is not an assertion or opinion — it is a fact. The

real benefit to me has been the serious networking that takes place between the ocean science and technology community members from many nations. There is no second place to the three Oi events now being offered, and the value they provide — the whole event is an opportunity-rich environment.”

Still actively involved with the industry, the 88-year-old Walsh serves as president of International Maritime, a consulting company he established in 1976. The company, which focuses on deep ocean engineering, has since completed more than 100 projects in 20 countries.

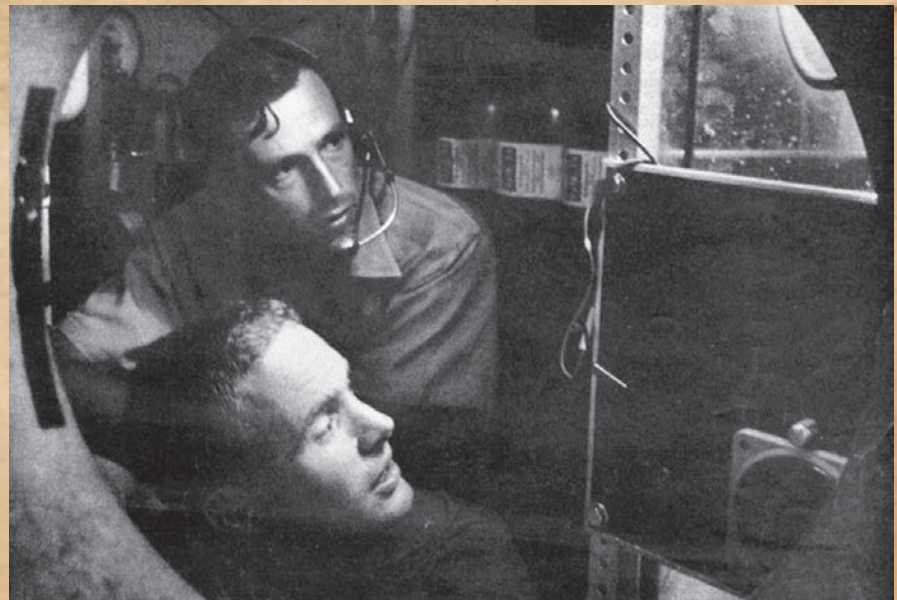




Trieste
as it appeared
in 1960 on the
cover of *Popular
Mechanics
Magazine.*

Image: From original artwork owned by, and courtesy of Don Walsh

Capt. Don Walsh (left, pictured in 1960) was designated **USN Deep Submersible Pilot #1**. (Below, in 2015) **At 88, Capt. Walsh still runs the day-to-day operations of International Maritime.** (Below, right) **Walsh and pioneer partner Jacques Piccard inside Trieste's cabin, 1959.**



All Photos courtesy Don Walsh

Tech Files

Innovative products, technologies and concepts



Joint IOT System Installed

KVH and Kongsberg Digital completed the installation of its first joint maritime IoT system on an active working vessel. The team installed a KVH Watch VSAT antenna for IoT connectivity and the Kognifai Vessel Insight platform on Simrad Echo, a Norwegian research vessel owned and operated by Kongsberg, which will continue normal operations during the pilot maritime IoT project. Simrad Echo will rely on Kognifai Vessel Insight to monitor main and auxiliary systems on the vessel and help ensure 100% availability. The Kongsberg Mapping Cloud application will move high-resolution echo sounding data from vessel to shore in real time so that shore-based personnel can provide analysis to optimize vessel ops. The data flow from Simrad Echo will be facilitated by KVH Watch IoT Connectivity as a Service.

KVH Watch features two modes: Watch Flow, for 24/7, machine-to-machine data delivery compatible with major IoT ecosystems such as Kognifai; and Watch Intervention, for on-demand high-speed sessions for face-to-face support, remote equipment access, and very large data transfers.

Telemar Launches BridgeLink

Telemar, the Marlink Group company, launched its BridgeLink solution. BridgeLink Smart Maintenance Application will be used to provide proactive support to reduce potential down-time and increase efficiency of Bridge Electronics hardware as well as associated software maintenance and repair.

The new Smart Maintenance App creates a benefit for shipowners by streamlining troubleshooting wherever they operate, Telemar can use the data collected to optimize asset life-cycles and deliver further efficiencies. The BridgeLink Smart Maintenance App will also be used for performance analysis and to collect data for site surveys, helping to further reduce the engineering time required for firmware/software installations and upgrades.



Dometic Cooling & Heating

Dometic's VARCX/X30 Variable Capacity Chiller and Diesel Fired Heating System provides energy-efficient climate control under many conditions. It's a 31,000 BTU system that can vary to 15,000 BTUs.



Fluid Monitor for Lube Oil

The MAN Fluid Monitor for lube oil enables owners to monitor the degradation and contamination of lube oil and protect their industrial assets. The fluid monitor immediately detects even the tiniest anomalies.



SHIPSWEB: Engine Control

Yanmar Engineering deployed SHIPSWEB, a tool for management of auxiliary engines on ocean-going vessels. incorporates elements of AI and advanced information and communications technology (ICT).



KVH Link

KVH Link, a new digital content service, has been launched to provide news and entertainment content geared for crew well being and operations data to optimize vessel performance.



Eidesvik Offshore

Ammonia-Fuel PSV

Equinor signed a deal with Eidesvik Offshore to test the use of carbon-free ammonia as a fuel aboard the Viking Energy platform supply vessel. Equinor awarded Eidesvik Offshore a five-year contract with effect from April 2020, when the current contract for the vessel expires.

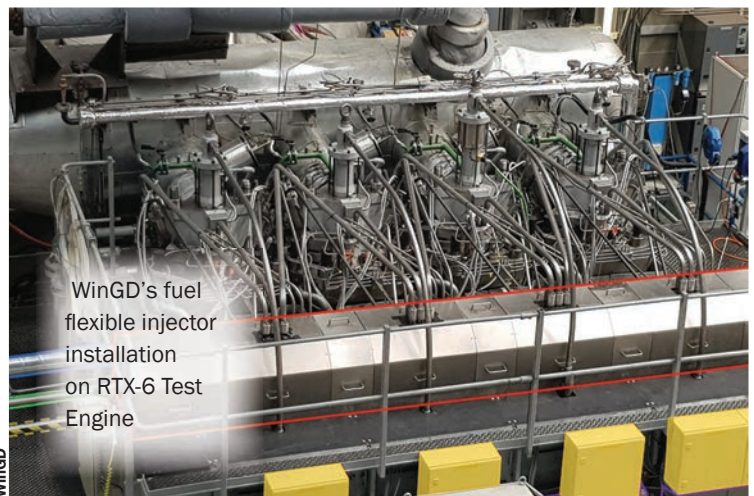
The vessel will transport supplies to installations on the Norwegian continental shelf (NCS). The project will test whether the technology can deliver 100 percent carbon-free power over long distances. The technology will be tested on the vessel from 2024.

According to the project plans ammonia will meet 60 to 70 percent of the power requirement on board for a test period of one year. Viking Energy will still be able to use LNG as fuel, and the remaining power requirement will be met by battery. Equinor is part of the European innovation project ShipFC, a consortium of 14 European companies and institutions coordinated by NCE Maritime Cleantech. The main partners of the five-year research project are NCE Maritime Cleantech, Eidesvik Offshore, Wärtsilä, Prototech, and Equinor.

WinGD Flexible Injector Concept

WinGD has invested in fuel research with the development of a flexible injection system. In a whitepaper '*Flexible Injector to Advance Alternative Fuels Research*', the engine designers describe how the concept will play a crucial role in its investigations into low-carbon liquid fuels and engine injection concepts to harness them.

The system features an adjustable needle to allow for the injection of lower density liquid fuels, including promising alcohol fuels like methanol and ethanol, as well as conventional fuels including heavy fuel oil and marine diesel oil. At present there is great uncertainty around the fuels that shipping will use to reduce GHG emissions. Several candidates are unconventional liquid fuels including alcohols and synthetic diesel. These will require different injection strategies to LNG, for example, which is already used in WinGD's X-DF engines. WinGD installed the fuel flexible injector on its RTX-6 engines in order to test ethanol combustion. Among other findings - detailed in the whitepaper - the company confirmed that ethanol fuel (with a small amount of diesel injected as a pilot fuel) reduces the formation of NOx and smoke emissions.



WinGD



Bertolini 10,000 PSI pump

Australian Pump debuts Bertolini's CAX Series heavy duty triplex pumps, with pressures to 750 bar, flows up to 25 liters a minute at 1000 rpm. The pump head is stainless steel (316).



Corvus Batteries

Corvus Energy was selected by CCC Shanghai Equipment Engineering (CCCSEE) and ZPMC to supply Energy Storage Systems (ESS) for 25 new battery-hybrid Rubber Tyre Gantry (RTG) cranes.



Industrial Grade Lubricant

L.S. Starrett offers M1 Industrial Quality All-Purpose Lubricant for a wide range of applications. It protects metal against rust and corrosion damage by providing a molecular shield that locks to the metal.



HTL Bespoke Hydraulic Cutter

HTL offers custom solutions. An example: It worked with a dredging and marine services company to design and manufacture a special purpose hydraulic cutter for umbilical cables to use on ship decks.

In the Yard

New Ship & Boat designs, contracts & deliveries

New Contracts



SGTM Orders Catamaran

SGTM awarded Austal Limited a \$10.7m contract to build a 41-meter, high-speed catamaran. The new vessel is based on Austal Australia designed vessel, with customer defined design modifications to be undertaken in Vietnam before construction commences there by March, 2020 with delivery approximately one year later. The 41.2 x 10.9 x 2 m ferry will sport 4x MTU 12V2000 M72 engines and 4x Kamewa 56A3 waterjets.

Sølvtrans Signs Contract



Myklebust in Gursken signed its fourth wellboat contract with Sølvtrans Rederi in Ålesund. The vessel is based on Kongsberg NVC 389, the design being used for one vessel already under construction at Myklebust for Sølvtrans. The new hull will also be built at Hat-San. Delivery from Myklebust is set for October 2021.

Hybrid Self-discharging Bulk carriers for Aasen

A pair of 9,300 DWT self-discharging bulk carriers being built for Norway's Aasen Shipping at the Royal Bodewes shipyard in the Netherlands will be the first of their kind to be fitted with a hybrid propulsion solution. Wärtsilä secured an order in December 2019 to provide the complete system design and full equipment scope for two newbuilds.

ESG Delivers C.D. White

Eastern Shipbuilding Group delivered the first of two 80-ft. 5,100 HP Z-Drive Tugs, the M/V C.D. White. The vessel built for Bisso Offshore on January 8, 2020 has completed its bollard pull testing witnessed by the American Bureau of Shipping (ABS) and received its USCG Sub-M Certificate of Inspection (COI).

The M/V C.D. WHITE is a RAL Report 2400 Z-Drive Ship-handling Tug design provided by Robert Allan Ltd located

in Vancouver, Canada. The sister vessel, the M/V A. Thomas Higgins is currently under construction at Eastern's Allanton Facility.

These two new Robert Allan RApport 2400 design tugs have been customized by the designer, the builder, and owner to provide specific operational features including a high bollard pull forward and aft, enhanced maneuverability and escort performance, better fuel economy, crew



Photo: ESG

New OSV Design from Damen

Damen developed a new concept vessel, the Offshore Support Vessel (OSV) 9020, featuring a stable platform with lots of accommodation, good station-keeping capability, low carbon emissions and flexibility to add mission-specific tools. OSV 9020 provides living space for up to 120. Interior is designed to ensure those on board will feel at home, with many personalization options.

A helicopter deck is integrated in the design, increasing the vessel flexibility. The

vessel is primarily designed to operate on DP. The hull features equally good ahead and astern performance.

The vessel profile ensures low wind catch. The four identical azimuthing thrusters are arranged symmetrically: two on the stern and two on the bow. This ensures maximum station-keeping performance while avoiding high noise levels in the accommodation.

Although the main benefits of the design are seen during station-keeping, the transit

comfort, safety under the new USCG Sub-M requirements and reduced emissions meeting the new EPA Tier 4 emissions regulations.

The tug is named after Cornelius Dee “Jack” White, Jr. Jack White was an owner of E.N. Bisso and was married to the company’s then President, Beverly Bisso White. It is the second boat to be named for Jack White in recognition of his place in the company’s history.

Main Particulars

Length	80 ft.
Breadth	38 ft.
Depth	13.2 ft.
Fuel Oil:	28,000 USG
DEF/Urea:	(2) x 850 USG
Potable Water:	8,750 USG
Total Horsepower:	(2) x 2,549 HP @ 1,800 RPM
Stern Pull:	67.6 Short Tons
Bow Pull:	65.2 Short Tons
Main Engines:	(2) LA CAT, Caterpillar 3512E Tier 4 EPA/IMO III marine propulsion diesel engines
Propulsion:	(2) Kongsberg/Rolls Royce US205 P20 Z-Drives
Generators:	(2) Kennedy Engines Co.
Firefighting:	(1) Counterfire
Tow Hook:	(1) Washington Chain
Flag:	United States of America



Photo: Mitsubishi Heavy Industries

MHI Launches RoPax for Hankyu Ferry

Mitsubishi Shipbuilding Co., Ltd. held a christening and launch ceremony for the second of two passenger/cargo ferries currently under construction for Hankyu Ferry Co., Ltd.

The new vessel, named Yamato, is being built at the Shimonoseki Shipyard & Machinery Works yard in Japan’s Yamaguchi Prefecture and is scheduled to be delivered in June 2020 after rigging work is completed.

Together with Settsu, which was christened and launched last August, Yamato will serve on the operator’s Shinmoji-Kobe route.

Yamato, like Settsu, is 195 x 29.6 meters, 20.6 meters deep with a draft

of 6.7 meters and gross tonnage of approximately 16,300 tons. The ferry has a holding capacity of 663 passengers, approximately 277 trucks (max. length: 8.5 meters) and roughly 188 passenger cars. Cargo handling facilities consist of two side ramp/doors and another ramp/door at the stern.

According to the builder, several factors, including a newly optimized hull type, deliver approximately 6% better energy efficiency. The vessel is outfitted with an exhaust gas cleaning system (scrubber) that controls airborne emissions of sulfur oxides (SOx), to satisfy the new IMO 2020 emissions regulations that took effect starting this year.

performance of the vessel is also very efficient. Speed and fuel consumption are hardly sacrificed by the layout.

The diesel generators are supported by a battery pack. The electric system is designed to operate with closed bus-ties. This makes it safely possible to have less engines running, resulting in reduction of fuel oil consumption and emissions with up to 20% and less maintenance.

The vessel is fitted with a hybrid power generation system, resulting in low emissions. The vessel can optionally be delivered to operate on green methanol, produced from biological waste streams.

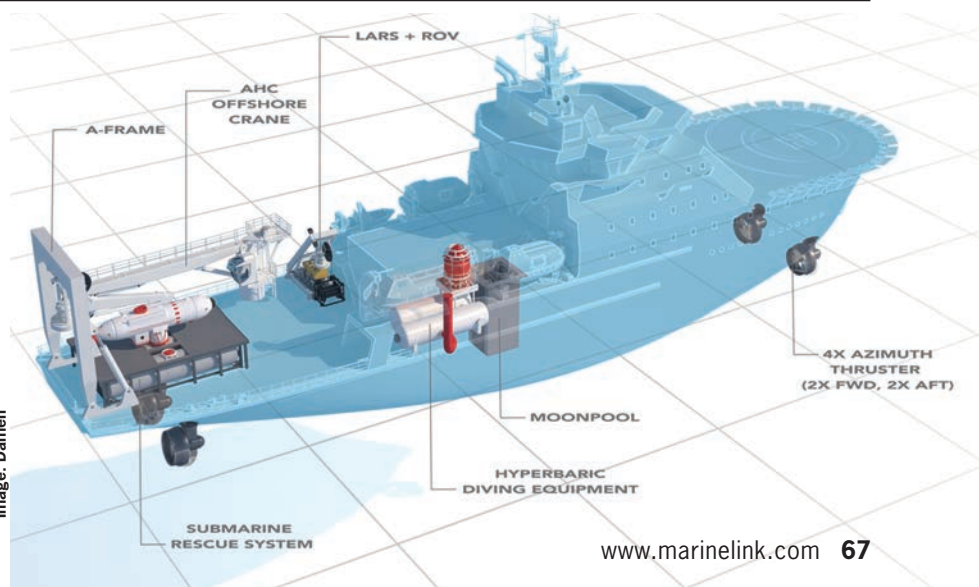


Image: Damen

People & Companies

Kelleher Takes Chembulk Helm

Chembulk Tankers



Kelleher Takes Chembulk Helm

David Ellis resigned as the CEO of Chembulk Tankers LLC and **Bart B. Kelleher** assumed the role of CEO effective immediately. Kelleher has held senior executive roles within Chembulk since joining the company in early 2016, initially as Chief Strategy Officer and then Chief Financial Officer in early 2019. **Solomon Tan**, SVP of Finance, will replace Kelleher as CFO. Additionally, **Arthur L. Regan** has been designated as Executive Chairman by the Board of Directors. Finally, Chief Commercial Officer **Steve Laino** is leaving the company to pursue other opportunities.

New COO in Maersk Supply Service

Mark Andrew Handin will join Maersk Supply Service as Chief Operating Officer (COO) on March 1, 2020, heading the Vessel Management function. Handin currently holds the position of VP of Operations at Tidewater. Handin replaces **Claus Bachmann**, who has taken a position within the Maersk Drilling organization, as SVP, Head of North Sea Division.

Hamburg Süd's CCO Smet to Retire

Frank Smet, Chief Commercial Officer (CCO) of Hamburg Süd, will be going into retirement at the end of March after nearly 27 years with the company.

Mund Joins Ship Architects

Ship Architects, Inc. announced the hiring of **Andrew Mund**, P.E., in the role of VP Engineering & Business Development.

Nestlehutt tapped to lead SCI

The Seamen's Church Institute of New York & New Jersey (SCI) selected Rev. Mark S. Nestlehutt as its new President & Executive Director. Mark will succeed the Rev. David Rider, SCI's current Executive Director, and begins his work on Tuesday, February 18.

Maersk Supply Service



Handin, COO, Maersk Supply Service

Hamburg Süd



Hamburg Süd's CCO Smet to Retire

Hamburg Süd



Nestlehutt tapped to lead SCI

Wallem Group



Chin Joins Hong Kong ACCI

Chin Joins Hong Kong ACCI

Wallem Group Managing Director for Ship Agency Services, Dickson Chin, has joined Hong Kong's Advisory Committee on Cruise Industry (ACCI).

Smith Named Director of Columbia-class Sub Program

Huntington Ingalls Industries (HII) announced **Brandi Smith** as the program director of the Newport News Columbia-class submarine program. Smith will be responsible for leading construction activities for the U.S. Navy's new class of ballistic-missile submarines, as well as maintaining strong relationships with General Dynamics Electric Boat and Navy customers. She will report to **Jason Ward**, Newport News vice president for Columbia-class submarine construction.

Nor-Shipping Appoints Norvik

Nor-Shipping appointed Sidsel Norvik to the new role of Commercial Director. Norvik joins following a stint as CEO of Energy Show Norway, two decades as Commercial Director for Upstream, and 10 years with Recharge, a news platform for renewable energy.

SAL Hires Matthies, Bibow

SAL Heavy Lift and owners Harren & Partner have appointed Claas Matthies, Managing Director, as the new group Chief Information Officer (CIO). In addition, Soeren Bibow was named Group Chief Financial Officer (CFO).

ONE SEA Appoints Lehtovaara

ONE SEA appointed Capt Eero Lehtovaara as its new Chairman. Lehtovaara, a Master Mariner and Associate Fellow of the Nautical Institute, is Head of Regulatory & Public Affairs at ABB Marine & Ports.

BIMCO Names Loosley CEO

BIMCO appointed **David Loosley** as its new Secretary General & CEO with effect from June 2020. Angus Frew,

BIMCO's current Secretary General & CEO, had previously announced that he will be stepping down in the summer of 2020.

Britannia P&I sets up Shop in NY

Britannia P&I has established a new exclusive correspondent, B Americas P&I, to be based in New York. B Americas P&I will be headed by **Michael Unger**, a maritime lawyer with extensive litigation and arbitration experience.

AAM Wins Deal with Birdon America

All American Marine, Inc. (AAM) has been named the West Coast shipyard by Birdon America, Inc., for Phase I of a contract to perform a Service Life Extension Program (SLEP) on a number of USCG fleet of Motor Life Boats (MLB). Birdon America was awarded the prime contract to perform Service Life Extension work on all MLBs in the U.S. Coast Guard's fleet.

Liebherr Celebrates "50" in the USA

This year Liebherr in the U.S. is celebrating 50 years as a manufacturer in North America. To keep pace with its growth, a new \$60m state of the art expansion will be completed in spring 2020 in Newport News, which will be home to Liebherr USA, Co.



Smith New Director of Sub Program.

HII



Nor-Shipping Appoints Norvik

Nor-Shipping



BIMCO

2020 Calendar of Events

FPSO Europe

Feb. 19-20
London, UK
www.fpsonetwork.com/events-fpsoeuro-pecongress

Green Ship Technology Conference

Mar. 1-3
Copenhagen, Denmark
maritime.knect365.com/green-ship-technology/

Underwater Defense & Security

Mar. 3-5
Southampton, UK
defenceleaders.com/home/events-page/underwater-defence-security/

Sea Japan

Mar. 11-13
Tokyo, Japan
www.seajapan.ne.jp/en/

NACE Corrosion

Mar. 15-19
Houston, TX
<http://nacecorrosion.org/>

Intermodal Asia 2020

Mar. 17-19
Shanghai, China
www.intermodal-asia.com

Ferry Safety & Technology

Mar. 18-20
New York, NY
ferrysafetyconference.squarespace.com/

Asia Pacific Maritime

Mar. 18-20
Singapore
www.apmaritime.com/

OTC Asia

Mar. 24-27
Kuala Lumpur, Malaysia
<http://2020.otcasia.org/>

Envirotech for Shipping Forum

Mar. 24-25
Rotterdam
www.envirotechforum.com

CMA Shipping

Mar. 31. - Apr. 2
Stamford, CT
maritime.knect365.com/cma-shipping/

Sea-Air-Space

Apr. 6-8
Baltimore, MD
<http://www.seaairspace.org/>

Clean Waterways

Apr. 7-19
Indianapolis, IN
2020.cleanwaterwaysevent.org/

AWO Spring Meeting

Apr. 21-23
Washington, DC
www.americanwaterways.com

Seatrade Cruise Global

Apr. 21-23
Miami, FL
www.seatradecruiseglobal.com

TOC Asia

Apr. 21-22, Singapore
www.tocevents-asia.com/en/Home.html

AUVSI XPONENTIAL

May 4-7
Boston, MA
www.auvsi.org/events

OTC

May 4-7
Houston, TX
<http://2020.otcnet.org/>

UDT

May 12-14
Rotterdam
www.udt-global.com/join-us-in-2020

Breakbulk Asia

May 18-19
Shanghai, China
www.asia.breakbulk.com/Home

Inland Marine Expo

May 18-20
St. Louis, MO
<http://inlandmarineexpo.com/>

MegaRust

May 19-21
San Diego, CA
<http://www.navalengineers.org/Symposia/MegaRust-2020>

Maritime Week Americas

May 23-27
www.petrospot.com/events/mwa2019-fl

Breakbulk Europe

May 26-28
Bremen, Germany
www.europe.breakbulk.com/Home

Posidonia

Jun 1-5
Athens, Greece
<http://posidonia-events.com>

TOC Europe

June 9-11
Rotterdam
www.tocevents-europe.com/en/Home.html

SeaWork

June 9-11
Southampton, UK
www.seawork.com/

Marine Money Week

June 15-17
New York, NY
www.marinemoney.com/forum/MMWeek20

Cruise Ship Interiors Expo

June 16-17
Miami, FL
www.cruiseshipinteriors-expo.com/

ASNE TSS

June 18-20
Washington, DC
www.navalengineers.org/Symposia/TSS2020

Electric & Hybrid Marine World Expo

June 24-26
Amsterdam
www.electricandhybridmarineworldexpo.com/en/



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Maritime & Marijuana: What Next?

I should commence by stating that I have never used marijuana and do not intend to use it while it remains illegal under applicable law.

Recreational use of marijuana has been legalized in 11 states. Use of medically prescribed marijuana has been legalized in most states. But any possession or use of marijuana is a violation of federal law. As a result, use of marijuana by persons in federally regulated professions is prohibited and may result in dismissal of such persons from their jobs. Thus, mariners and persons in other transportation sectors, among others, may not use marijuana. Persons who use marijuana are disincentivized from joining such professions. There is a growing shortage of mariners and the ban on marijuana use is exacerbating the situation.

Public support for legalizing recreational use of marijuana is strong and growing. Illinois recently became the first state in which recreational use was legalized by means of a popular referendum, rather than by the courts or the legislature. Still, Congress refuses to take up the issue.

Federal intransigence hinges largely on two arguments: First, that marijuana is a gateway to use of more dangerous drugs; and Second, that more research is necessary to determine the hazards and benefits of marijuana use. Both arguments are disingenuous.

What limited evidence there is seems to indicate that use of prescription drugs is more likely to lead to use of dangerous illegal drugs than is use of marijuana. Yet no one advocates the banning of prescription drugs.

More research into the effects of marijuana may be helpful, but it is virtually impossible while possession and use of marijuana remains federally prohibited. No one advocated for continuance of the federal ban on possession and use of alcohol in the 1930s so that more research could be conducted into its effects. While marijuana has somewhat different impacts on the body than does alcohol, the level of harm seems to be about the same. We know that drinking alcohol can be harmful if consumed in excess, but its use is not banned, merely regulated. Mariners and persons in other transportation sectors may utilize alcohol within limits.

Alcohol is not medically recommended, although some argue that it relieves tension and improves digestion. Marijuana and one of its constituents, THC, are medically recommended for certain conditions. The federal Food and Drug Administration (FDA) has approved the use of THC to treat nausea and to improve digestion. Many states allow medical professionals to prescribe marijuana for a variety of conditions, including Alzheimer's disease; ALS; muscle spasms

caused by multiple sclerosis; nausea caused by cancer or chemotherapy; glaucoma; poor appetite and weight loss caused by chronic illness, such as HIV, or nerve pain; seizure disorders; or Crohn's disease. Unfortunately, even the use of medically-prescribed marijuana is prohibited by federal law.

Marijuana use is not risk-free. While a blood-alcohol level of a certain level will result in a corresponding level of impairment, the same cannot be said for marijuana. In addition, there is no proven test for determining the level of marijuana (or THC) in the body or how much impairment might result. The long-term impact of alcohol is also well known – cirrhosis of the liver, stroke, and early-onset dementia, among other conditions. The long-term impact of marijuana use is poorly understood, in large part because of the federal prohibition of its possession or use.

I am not advocating the use of marijuana, but I also don't promote the use of alcohol. I do, though, think that the federal effort to ban the possession and use of marijuana is futile and counter-productive. Futile because, like the effort in the 1920s and 1930s to prohibit the possession and use of alcohol, it hasn't worked. More than 50% of people in the US consume marijuana on at least a casual basis. Counter-productive because those laws end up turning users, including casual users, into criminals. The marijuana laws are seldom enforced, but the threat of enforcement can have bad results. It forces people to purchase bootleg marijuana of unknown potency and with unknown additives. For persons in occupations such as the maritime sector, it induces fear of job loss. It also discourages persons from seeking employment in professions such as the merchant marine that regularly test for drug use.

The time has come to treat recreational use of marijuana in the same manner as society treats the recreational use of alcohol. Don't encourage it, but don't criminalize it across the board. Instead, regulate its possession and use and tax its production and sale. The end product will be safer and the marijuana black market will be hobbled.

The Author

Bryant

Dennis Bryant is with Bryant's Maritime Consulting, and a regular contributor to *Maritime Reporter & Engineering News*.



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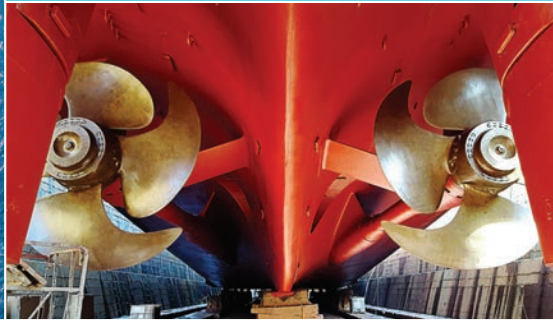
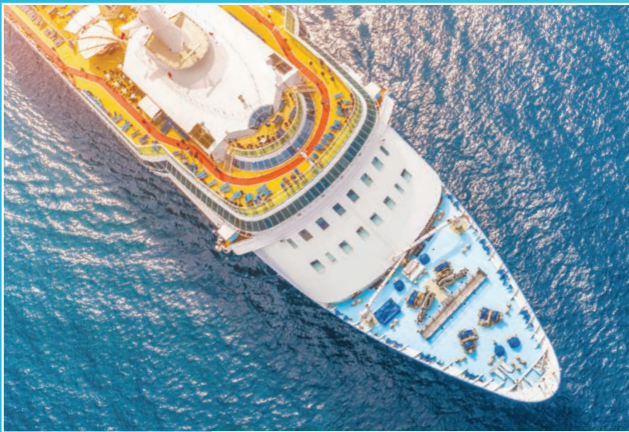
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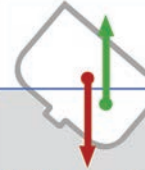


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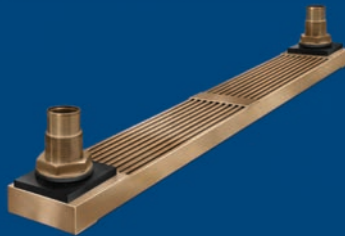
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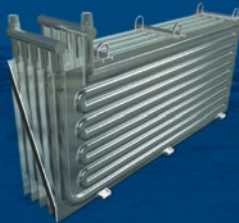
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