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MARITIME REPORTER AND ENGINEERING NEWS

SINCE 1939

January 2019

FIX THE FLEET

The Cost of 'Green'

Analyzing the Cost of New Regulation

IMO 2020

Tech, Fuel and Lubes take Center Stage to Cut Emissions

VIDA & BWMS Reform

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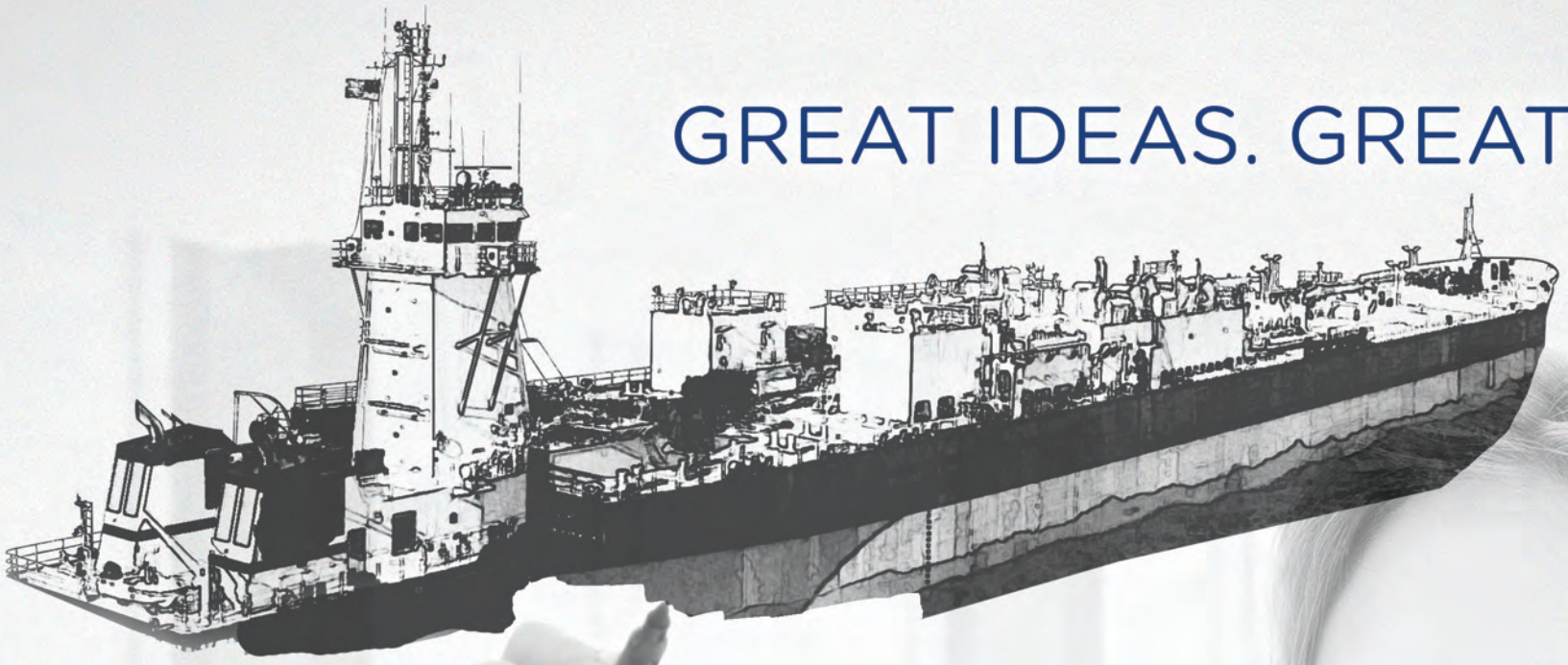

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MARITIME REPORTER AND ENGINEERING NEWS
MARINELINK.COM

ISSN-0025-3448
USPS-016-750
No. 1 Vol. 81

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

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

SUBSCRIPTION INFORMATION

In U.S.:
One full year (12 issues) $110.00;
two years (24 issues) $190.00

Rest of the World:
One full year (12 issues) $189.00;
two years $228.00 (24 issues)
including postage and handling.

Email: mrcirc@marinelink.com
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Editorial

Starting a new year always generates the requisite excitement and buzz. Even though the turning of the clock and calendar has no real impact on business fortunes, I don't know too many people in this industry that are sad to close the books on 2018. That given, this time of year is always an interesting time for reflection on trends to come, and from our seat, these are the trends that will drive the market further, faster, in 2019.

- **IMO 2010:** The mandated new fuel rules from the International Maritime Organization have been THE central theme of editorial coverage and conference discussions for the past two years, and in that time it is safe to say that to this date, no one really has the best answer for what to do. There has been a noticeable uptick in scrubber sales over the second half of 2018, but it is safe to say that the jury is still out on scrubbers as the ultimate technical solution. Uncertainty remains regarding the availability and quality of fuel, and ultimately on how these new fuel rules will affect the performance and lifespan of ship machinery. This month we offer several in-depth features focused on the topic, starting with Barry Parker's "The Cost of Green" starting on page 42. While much of our attention, rightfully so, has focused on the regulatory and the technical side, our readers, the ship owners, are keenly focused on the bottom line cost this new rule will impact their business. At a glance, it isn't pretty, or cheap. Following this Serge Dal Farra, global marketing manager at Total Lubmarine, weighs in with his opinion that IMO 2020 is not simply about the fuel. As everyone knows well, fuel is the central focus, but fuel choice invariably has an impact on lubricants and overall machinery health. His article starts on page 48.

- **Cruising Along:** The cruise shipping industry, while still a small part of the overall fleet numbers and value, continues its torrid pace in 2019 in all segments, from large oceangoing to specialty expedition to inland river cruises. Leading the trend in shipping overall, the green mandate is firmly entrenched in this sector, particularly the niche expedition business, as these ships generally traverse some of the most pristine places on the planet. To that end, they must arrive, visit and depart while leaving as little of a carbon footprint as possible. Tom Mulligan, our Science and Technology writer, recently went to Norway to meet with the top management of Hurtigruten and to discover how its newbuilds, and in fact its entire fleet of ships and crew of personnel, are aiming to be the cleanest in the business. Tom's story starts on page 38.

- **Ballast Water Technology:** While writing about this topic for nearly 14 years certainly has been interesting, I must admit that I look forward to the day when BWMS is removed from my daily editorial brain. The challenge to deliver and install technology that rightfully eradicates an environmental threat has been a long and arduous road. But with 15 systems now approved by the U.S. Coast Guard and BWMS refits picking up steam, it appears that the proverbial light is at the end of the tunnel. This month Dennis Bryant breaks down the new VIDA – Vessel Incidental Discharge Act of 2018 (VIDA) – a measure which largely cuts through a morass of conflicting and confusing requirements that have developed over a number of years relating to discharges into US waters. His story starts on page 10.

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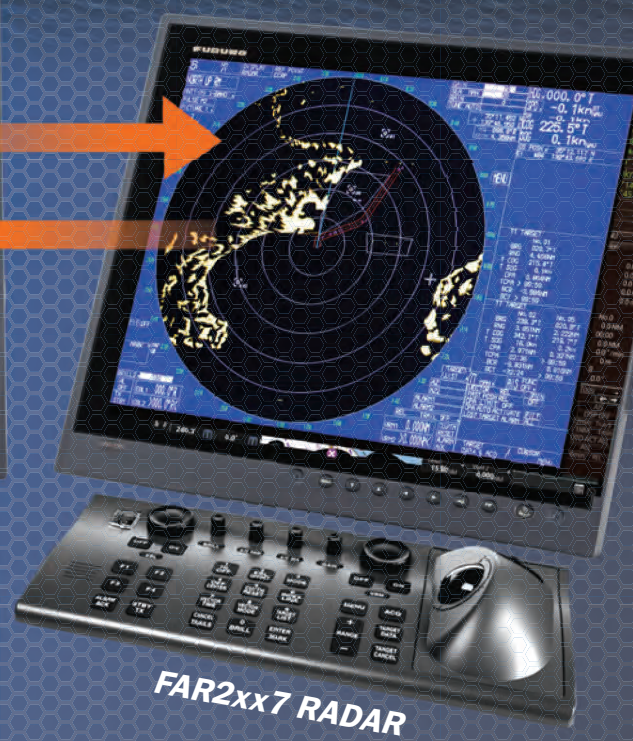

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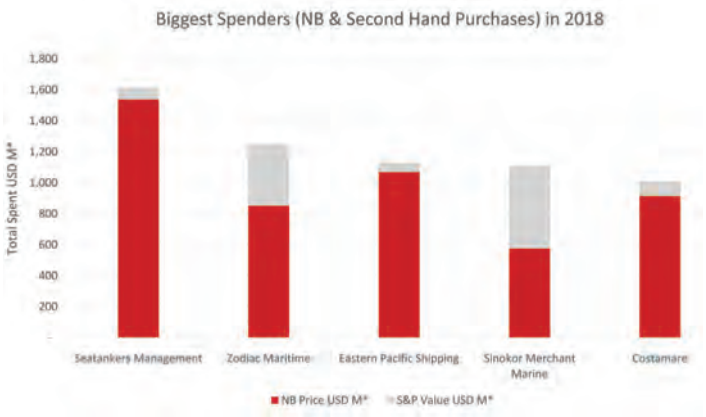
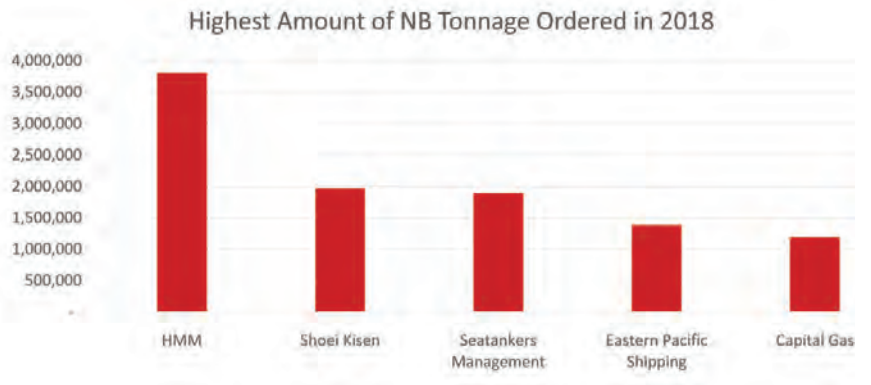
Biggest Spenders (NB & Second Hand Purchases) in 2018

Shipowner	NB Price USD M*	S&P Value USD M*	Newbuild # of Vessels	S&P #	Total #	Total USD M*
Seatankers Management	1,536	76	23	4	27	1,612
Zodiac Maritime	853	396	8	11	19	1,249
Eastern Pacific Shipping	1,069	64	11	2	13	1,133
Sinokor Merchant Marine	575	536	9	41	50	1,111
Costamare	914	94	10	6	16	1,008



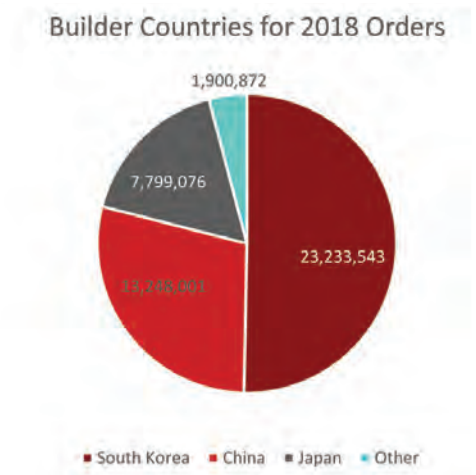
Top Newbuild Orders 2018

Buyer Country	Total GT	No Vessels
HMM	3,805,200	20
Shoei Kisen	1,969,749	18
Seatankers Management	1,890,917	23
Eastern Pacific Shipping	1,380,800	11
Capital Gas	1,188,000	10



Top Newbuild Countries 2018

Builder Country	Total GT	No Vessels
South Korea	23,233,543	242
China	13,248,001	331
Japan	7,799,076	189
Other	1,900,872	75



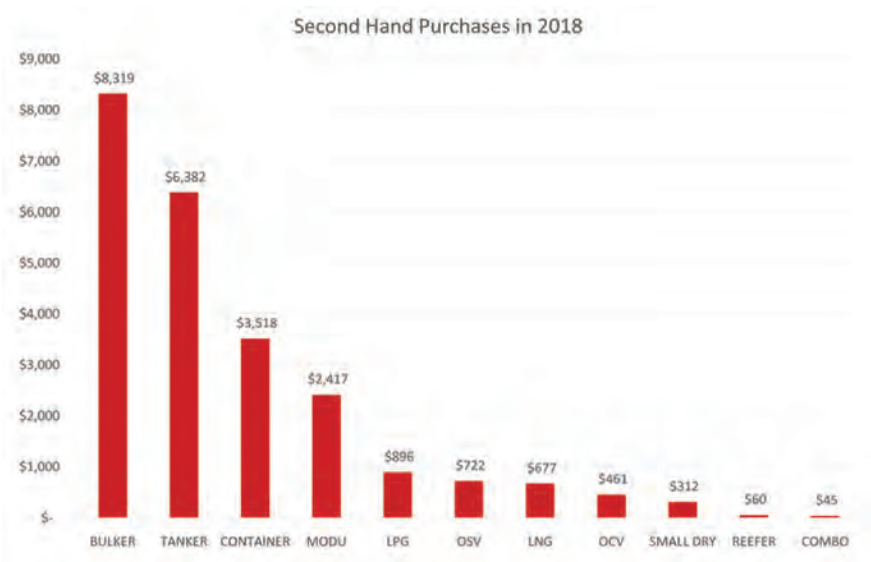
Buyers of Second Hand Vessels 2018 YTD

Buyer	No Vessels	Total Spent
Star Bulk Carriers	38	$938
Borr Drilling	5	$720
Ocean Yield ASA	17	$617
Bank of Communications	13	$603
Northern Drilling	2	$592

Ship Types Bought in 2018 YTD

Ship Type	Total Spent USD M*
BULKER	$8,319
TANKER	$6,382
CONTAINER	$3,518
MODU	$2,417
LPG	$896
OSV	$722
LNG	$677
OCV	$461
SMALL DRY	$312
REEFER	$60
COMBO	$45

Source: VesselsValue.com



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VIDA & *BWMS Reform*

The Vessel Incidental Discharge Act of 2018 (VIDA) cuts through a morass of conflicting and confusing requirements. Maritime Reporter's government insider Dennis Bryant explains.

De Nora is the latest to receive Type-Approval from the United States Coastguard for its BALPURE ballast water treatment system (BWTS).

On December 4, President Trump signed into law the Frank LoBiondo Coast Guard Authorization Act of 2018 (S. 140). Title IX of the legislation is the Vessel Incidental Discharge Act of 2018 (VIDA). VIDA will largely cut through a morass of conflicting and confusing requirements that have developed over a number of years relating to discharges into US waters.

This purpose of this new legislation is to: (1) provide for the establishment of uniform and environmentally sound standards and requirements for the management of discharges incidental to the normal operation of a vessel; (2) charge the Environmental Protection Agency (EPA) with primary responsibility for establishing standards relating to the discharge of pollutants from vessels; (3) charge the US Coast Guard with primary responsibility for prescribing, administering, and enforcing regulations, consistent with the EPA discharge standards for the design, construction, installation, and operation of the equipment and management practices required aboard vessels; and (4) preserve the flexibility of states, political subdivisions, and certain regions with respect to the administration and enforcement of standards relating to the discharge of pollutants from vessels engaged in maritime commerce and transportation.

SVGP and VGP programs

VIDA immediately repeals the Small Vessel General Permit (SVGP) program. The current Vessel General Permit (VGP) program, including state requirements developed thereunder, will remain in effect as they currently exist until final, effective, and enforceable VIDA requirements are in existence.

Uniform standards

The legislation adopts for commercial vessels a program similar to the Uniform National Discharge Standards for Vessels of the Armed Forces. Entitled 'Uniform National Standards for Discharges Incidental to Normal Operation of Vessels', it focuses largely but not exclusively on ballast water management. I should point out that I have publicly advocated such an approach from 1996 when the uniform standards were adopted for military vessels.

Removal from NPDES

When fully implemented, VIDA will remove the VGP program from the National Pollutant Discharge Elimination System (NPDES). As a result, states will no longer be authorized to establish and enforce their own higher standards for discharges, including ballast water management system discharges, incidental to the operation of covered vessels. Instead, states are allowed to comment on and object to proposed federal standards of performance for marine pollution control devices and water quality orders. The EPA is required to consider any state comments and objections and explain in writing the rationale for not accepting the state proposals. The EPA decision in this regard is not judicially reviewable.

Nonviable organisms allowed

Because VIDA adopts for purposes of ballast water management system (BWMS) review definitions of 'live' and 'living' to exclude an organism that has been rendered nonviable or preclude the consideration of any method of measuring the concentration of organisms in ballast water that are capable or reproduction, the new testing protocol will be more consistent with that utilized under the IMO ballast water testing procedures. The US, though, will continue to insist that testing be performed by independent laboratories. It is expected that an increased number of BWMSs that have been approved under the IMO standard will be able to meet the VIDA requirements. Within 180 days (i.e., by June 2, 2019), the Coast Guard is required to publish a draft policy letter describing type-approval testing methods and protocols for ballast water management systems, if any, that render nonviable the organisms in ballast water, taking into consideration testing methods that use organism grow-out and most probable number (MPN) statistical analysis to determine the concentration of organisms in ballast water that are capable of reproduction. A public comment period not to exceed 60 days must be allowed. A final policy letter must be published not later than December 4, 2019.

Regional differences

There will be some regional differ-

ences in ballast water discharge requirements. A more stringent standard will apply for vessels operating in the Great Lakes and connecting waterways. A somewhat different standard will apply to vessels engaged in operations in the Pacific Region. Passenger vessels operating in Alaska waters will continue to be subject to the current graywater requirements.

State inspections

States will be allowed to conduct their own inspection of covered vessels to ensure compliance with applicable federal standards. In addition, states will be allowed to charge a fee for such inspections. The Coast Guard, in consultation with the states, will develop, publish, and periodically update inspection, monitoring, data management, and enforcement procedures for the enforcement by states of federal standards and requirements. States will also be allowed to regulate sewage discharges from vessels. The Coast Guard will, upon request, provide access by states to Automated Identification System (AIS) arrival data for inbound vessels for specific ports or places of destination in that state.

Risk assessment

The EPA is required to develop a ballast water discharge risk assessment and response framework using ballast water discharge data and aquatic nuisance species monitoring data. This risk assessment will be used to identify and track populations of aquatic nuisance species; evaluate the risk of aquatic nuisance species establishing and spreading in US waters; and establish emergency best management practices that may be deployed rapidly, in a local or regional manner, to respond to emerging aquatic nuisance species threats. A similar program has been adopted in Australia.

Transition

With regard to incidental discharges other than ballast water, it is expected that the requirements of the current VGP program will be transferred over to the new VIDA system with minimal substantive changes. The major difference will be, as previously noted, that the state requirements will go away, except to the extent that a state can convince the EPA that a particular provision is justified.

Implementation

VIDA includes a number of aggressive target dates for promulgation of implementing regulations. If experience is any guide, it should be expected that most, if not all, of those target dates will not be met. Regardless, the framework has been established to bring increased sanity and uniformity to ballast water discharge management and the incidental discharge of other substances from vessels.

William Burroughs
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BWMS ... *& the Survey Says ...*

ABS has just completed its second comprehensive survey of the shipping industry's progress towards global compliance with ballast-water regulations, finding just over a third of installed management systems (BWMS) to be fully operational.

The survey's findings, which were supported by a series of workshops in New Orleans, Shanghai, Hong Kong and Singapore, included feedback from more than 60 shipowners and almost 500 ships, including bulk, gas, product, heavy-lift and vehicle carriers, as well as containerships.

Conducted to form an accurate picture of the operation and installation challenges of achieving compliance, the survey included seven main types of ballast water management systems supplied by approximately 30 different vendors.

Main BWMS technologies included (proportion of response):

- *Filtration + Side-stream EC + Neutralization (29%)*
- *Filtration + UV Treatment (20.7%)*
- *Ozone Treatment + Neutralization (19.9%)*
- *Filtration + Full Flow (In-line) EC + Neutralization (17.8%)*
- *Full Flow (In-line) EC (7.5%)*
- *Filtration + Chlorination via chemical addition (5%)*
- *Filtration + Deoxygenation (0.2%)*

With compliance deadlines on the horizon for many shipowners, the study revealed a critical need for owners to start their technology-selection process, and to resist buying BWM systems based on initial price alone.

Crews need to be trained as early and as thoroughly as possible to lessen dependence on the widely disparate levels of technical support being offered by the vendors. The findings should encourage shipowners to ensure that at least one company engineer is intimately involved in the systems installation process,

With compliance deadlines on the horizon for many shipowners, the study revealed a critical need for owners to start their technology-selection process, and to resist buying BWM systems based on initial price alone.

Photo: ABS

with each system operated as much as possible before the compliance deadline to build corporate and crew familiarity.

Results varied between BWM technologies, but the survey broadly revealed growing concerns among shipowners about: the operational reliability of the systems; operating expenses being as advertised; the availability of vendor support; quality of software; and adequate levels of crew training.

In general, across all available technologies, about one third of participants claimed to be 'happy' with the reliability of the systems they had installed. The inverse implication of that measure is that system reliability remains a major concern for most owners.

About 40% considered their system to be 'user friendly', which is a subjective evaluation; it is entirely possible that two owners could see the same treatment system from opposite sides of the spectrum. But the measure does speak to overall industry comfort with the systems offered. About two-thirds of respondents categorized their systems to be either 'inoperable' (6%) or 'operationally problematic' (59%).

It was difficult to identify with any certainty the dominant cause of the perceived unreliability; certainly, vendor support was found difficult to secure, specifically for owners operating outside the vendor's country of manufacture for the system they had purchased.

However, some of the under-performance ratings for what is essentially new technology may also be attributable to the skillsets of the crews being asked to operate the systems. Anecdotal evidence from the survey and workshop comments suggested that the highest levels of dissatisfaction came from owners whose personnel had received training on the fly during commissioning, while onboard acceptance testing was being conducted.

During the workshops, ABS facilitators emphasized that best practices would include ensuring more comprehensive training regimes than could be received ad-hoc at the commissioning stage. As discussed above, best practices could include nominating someone from the fleet's crew to attend the factory while the system is being built, returning an expert on the system that has been selected.

A potential risk of that strategy is that the person nominated, if not paid adequately, could be exposed to what is fast becoming a very competitive marketplace among vendors for technical and operational expertise on treatment systems.

Put into context, the world's land-based water-treatment industry has historically required intensive training regimes and operator licensing, given the challenge of operating the relatively complex equipment. With that practice now moving offshore, the present commitment to training will need to significantly improve. More mariners will need to be trained at the academy level.

Another area of concern identified by the survey was operational expenses (OPEX); just 22% of respondents said they were happy with the OPEX they were experiencing, suggesting it was above the estimates provided by the manufacturers. Expenses escalate if operational requirements or regulations require operators to reduce the treatment rates.

The software used for the various treatment systems is dictated by the vendors, making most packages proprietary. Feedback from the survey indicates it is currently a significant barrier to operational reliability.

As there is no standards body to currently offer guidance on design and quality, a lack of interoperability may remain a challenge beyond current deadlines for overall BWM industry compliance, which stretch into 2024.

ABS intends to make the full report available later this month.

USCG *enters the Final Frontier*

A pair of new U.S. Coast Guard satellites – "Cubesats" – aim to give navigating Arctic a greater margin of safety

Credit: Cal Poly Cubesat Lab and JPL

Photo courtesy SpaceX

Maura Casey
Maura Casey worked as an editor and opinion writer for four newspapers, including The Hartford Courant and The New York Times. She has won 45 national and regional awards for journalism. She has been a staff officer for the U.S. Coast Guard Auxiliary for 12 years, and owns a Connecticut communications firm, CaseyInk, LLC.

The U.S. Coast Guard's mission of keeping the seas safe will soon get an additional boost from space with two polar satellites. The two satellites, called "cube satellites" or "cubesats" for their small size of about 60 square centimeters, or a little under 2 feet, will be part of a payload on a SpaceX Falcon 9 rocket scheduled to launch from Vandenberg Air Force Base in California Nov. 28. Although the Coast Guard has used satellite technology for years, these two are the first to be entirely dedicated to a Coast Guard mission.

The initiative is part of the U.S. Homeland Security's Polar Scout program, which aims to increase technical resources in the Arctic to detect emergency position indicating radio beacons, or EPIRBs, sent from mariners in distress in that region. The project will also be a test to explore the effectiveness of using the cubesats, which are less expensive than other forms of technology, for these and other missions.

The service will also gain two ground stations to monitor and control the satellites as they orbit the planet over the poles every 100 minutes or so. One ground station has already been completed in Fairbanks, Alaska. Another is planned for construction before the end of the year atop Smith Hall at the U.S. Coast Guard Academy in New London, Conn.

The increasing sophistication of technology, along with the ever-shrinking size of electronics, has made it possible for cubesats to do the job that once was performed by much larger and much more expensive satellites, said U.S. Coast Guard LCRD Grant Wyman. He is the project manager for the initiative at the U.S. Coast Guard Research and Development Center in New London, Conn.

"It's really expensive to build, launch and maintain a satellite, but the technology advancements that have occurred in recent years have begun to reduce those costs," said Wyman. He explained that the two cubesats, named Yukon and Kodiak, would orbit in "low Earth orbit" of between 690 and 1000 kilometers, or about 428 to 621 miles.

The Arctic is a high-priority area for the Coast Guard, Wyman said, as commercial shipping and even cruise traffic increases in previously inaccessible areas as the ice melts with climate change. Yet the area is still an extreme environment even in the warmer months, with harsh weather, cold temperatures, and emergent areas of navigation.

The diminutive satellites will likely have some company as they are launched into orbit; the Spaceflight rocket that will launch the cubesats for the Coast Guard will have a payload of more than 70 other satellites for 35 different organizations. The mission has thus been dubbed the SmallSat Express for the variety and number of spacecraft involved, the most launched from any U.S. spaceship. This high-tech form of ridesharing has a positive upside: the more organizations and governments launching on the same rocket, the more the venture can potentially lower the cost of entry into space for all.

The reduced cost of the cubesats – and the construction of a ground station at the Coast Guard Academy – will also have an impact across the board on the education of Coast Guard cadets, for which the Academy has been preparing for the last five years, said Dr. Lorraine Allen, associate professor of physics at the Academy.

"We've rolled out a new curriculum for the marine and environmental sciences major. It fits in perfectly," she said. Data from the cubesats will also be used for independent study. "Our students can form ideas for projects, whether it is a mission gap or something they are curious about." For example, the Academy course on remote sensing, required for two majors, will use the satellite data as it detects mariners in distress. The physics and engineering students will be able to design proposed new cubesats; other cadets will help provide 24/7 coverage to read the data as it comes in.. "The students will use the information to ask 'What are the gaps? How can we supplement the data we need with what we have?," said Brooke S. Stutzman, physics section chief at the Academy.

The launch of the cubesats and building of a ground station at the coincides with the Academy's periodic review and revisions of courses to assure that the education next generation of Coast Guard officers stays on the cutting edge, said Stutzman.

Chad Fuhrmann
Fuhrmann graduated from the U.S. Merchant Marine Academy in 1998 and sailed internationally for 10 years as a licensed engineering officer. In 2008, he shifted focus shoreside consulting in dynamic positioning and marine operations, taking his current position with MAC as North American Operations Manager for Maritime Assurance & Consulting in 2014.

Reactivating *DP Assets*

As the offshore oil and gas market collectively (and slowly) comes back to life, vessel owners must be mindful of the successful re-starting of vessels and DP-related systems.

Operators reduced expenditures on offshore exploration and production activities obviously lowers demand for offshore assets, many of which are deactivated and laid-up. With oil prices rising throughout much of 2018, there is optimism that 2019 will continue a trend of slow, steady growth. Buoyed by this optimism, deepwater drilling is making a comeback and drilling rigs are coming out of lay-up. As a result, vessel operators are beginning to reactivate idle OSVs, too.

These assets and vessels are specialized, performing distinctive industrial missions with varying degrees of risk including drilling, manned diving, ROV and subsea construction operations. With few exceptions, these functions are performed by complex platforms incorporating dynamic positioning (DP) technology. When contracted for active service, these assets were subject to a high level of technical scrutiny that provided assurance to all stakeholders that they could execute their missions safely and reliably. When energy markets turned tough, thorough lay-up preparation and maintenance was generally not subject to a comparable level of guarantee. Nevertheless, the reactivation of assets safely, reliably, and efficiently remains critical, regardless of stacking procedures and maintenance activities that may (or may not) have taken place. Clients and other stakeholders demand a level of assurance that an asset will continue to operate as effectively and efficiently as it did before lay-up.

In anticipation of these demands, MAC and Bureau Veritas have been active in the development of guidance and recommended practices to verify that reactivation has been addressed properly. MAC has been directly involved with The Marine Technology Society in developing The DP Asset Reactivation Guidance and has supported Bureau Veritas in the development of Guidance Note NI 649 DT R00 E, Guidance for the Lay-Up and Reactivation of DP Vessels.

Both guidance documents are designed to support the efficient return of DP assets to service and to provide a clear path toward the safe and reliable reactivation of DP capable assets, emphasising the positive influence of adequate preparation on safety and operational reliability. With the understanding that proper planning and execution are critical to achieving the goal of the effective return of the asset to service, this guidance outlines a number of factors that should be considered as part of the overall strategy for asset reactivation.

The specific focus on DP related systems and equipment is reflective of its criticality for safe offshore operations. Dynamic positioning capability is not only instrumental in the execution of the respective industrial missions of each asset, but also critical for safeguarding against incidents.

While technology in general plays a crucial role in asset reactivation and DP operations, there are several additional important aspects that are addressed in these documents including environmental considerations, documentation and regulatory concerns. Importantly, in preparation for reactivation it is recommended to use the same personnel that were present for the lay-up activities, to ensure continuity of information and experience. Unfortunately, given the potential trajectory of the industry and its recovery, this may very well surpass reactivation of the physical systems and equipment as the biggest challenge an owner – and the industry at large – will face. As more vessels are brought back into service after lay-up, DP systems will need to be renewed, retested and recertified. Many operators will need DP refresher training, familiarization and, in some cases, recertification to ensure they are competent to operate these systems. As a consequence of the downturn, a significant proportion of personnel has moved on to other seemingly more stable sectors, taking their skills, knowledge and expertise with them. Attracting them back or encouraging others to join is going to be an industry-wide challenge.

For more information, visit
https://dynamic-positioning.com
http://www.bureauveritas.jp/news/pdf/649-NI_2018-02.pdf

Additionally, an often ignored aspect, the loss of onshore personnel must be taken into account to ensure adequate supporting resources are available across the varying disciplines, with a particular focus on operational and engineering experts needed for the reactivation plan and execution period.

The ultimate objective of a successful reactivation is that the DP capable asset is fully assessed and verified to be fit for purpose at the end of the reactivation process. Having a clear goal from the outset is essential with critical support provided by all immediate stakeholders and sustained by clear communication and cooperation between all parties.

The MTS and Bureau Veritas DP asset reactivation guidance documents are designed to support the return of DP assets to service safely, reliably, and efficiently regardless of the type of lay-up or level of preparation and maintenance. The documents highlight the critical issues considered when undertaking reactivation with the objective of providing better guidance to stakeholders and re-building confidence in systems critical to station-keeping following lay-up. The industry demands that safe, effective operations continue before and after reactivation and MAC and Bureau Veritas can facilitate those efforts.

The reactivation of assets safely, reliably, and efficiently remains critical, regardless of stacking procedures and maintenance activities that may (or may not) have taken place. Clients and other stakeholders demand a level of assurance that an asset will continue to operate as effectively and efficiently as it did before lay-up.

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Photo: Claudio Paschoa

Claudio Paschoa
Claudio Paschoa is a regular contributor to New Wave Media publications, print and electronic. He authors a weekly column on the new **OEDigital.com**, the online home to *Offshore Engineer* magazine.

Brazil *Offshore Year in Review*

As the year comes to a close it is interesting to examine some of the latest developments in the offshore and maritime markets in Brazil. Data from National Union of Marine and Offshore Construction and Repair Industry (SINAVAL) shows a number of significant developments that took place in the second semester of 2018.

The Program for the Renewal of the Offshore Support Vessel Fleet (Prorefam), was established in 2000. By extensive use of Merchant Marine Fund (FMM) resources, the project attained significant growth for the local offshore support vessel (OSV) industry, while consolidating the Brazilian flag fleet and securing significant foreign exchange savings. No less than 210 OSVs were built by Brazilian shipyards between 2002 and 2018 – 85 percent built with FMM resources.

However, not all is rosy, as the Prorefam project has recently had one-third of its orders canceled.

Petrobras has only 10 OSVs to receive through the program. Of the 121 vessels chartered in the Petrobras offshore support fleet renewal program, almost one-third (38) had a contract canceled. It has already been confirmed this year that Brasil Supply was unable to deliver vessels contracted by Petrobras due to financial difficulties. In addition to four platform supply vessels (PSV) for Brasil Supply, there are eight vessels in the Galaxia Marítima orderbook, six from Asgaard, six from Astromarítima, four from Safe Supply, three from Geonavigation, two from Bram Offshore, two from Oceanpact and three from Bravante – including oil spill response vessel (OSRV) Mar Limpo III, which has been delivered.

In all, 19 PSVs, 17 OSRVs and two anchor handling tug supply vessels (AHTS) were de-contracted, while 49 PSVs, 13 AHTSs and 11 OSRVs were delivered and are currently operating for Petrobras. Only 10 vessels – all chartered in the seventh round of Prorefam in 2014 – are under construction: eight Bram Offshore PSVs due in 2022, and two CBO AHTSs scheduled for delivery in September and November of this year. The information was obtained via the Law of Access to Information (LAI) and the press office of Petrobras.

Increased participation of foreign vessels to support platform anchoring operations fell from 73 percent to 27 percent in one year. The fleet of vessels supporting anchor handling operations in Brazil is increasingly flagged domestically. Between July 2017 and the same month of this year, 14 foreign-flagged units left the country, reducing their participation – as mentioned above, in the total fleet of type boats in Brazilian waters. Four of the foreign AHTSs that left for other markets in the period are from Maersk. The others include two vessels from Astromarítima, and one vessel each from Asso Marítima, Deep Sea, Farstad, Finarge, Galáxia, Maré Alta and OSM.

Today Norwegian firm DOF is responsible for the largest fleet of AHTSs in Brazil, with 11 units, one of which is an international flag vessel. Following are Bram / Alfanave with 10 vessels, CBO and Farstad with six vessels each, Bourbon, Finarge and Maersk with three vessels each, Farol with two and Asso Marítima and Marlin with one each. The "escape" of foreign ships follows the fall of the offshore support fleet in the country in recent years, since Brazilian vessels have a preference in hiring. In the analyzed period, the proportion of foreign vessels in Brazil decreased by 35 percent, falling from 69 to 45 units. Other classes of vessels that have experienced significant reductions in foreigners between 2017 and 2018 include remotely operated underwater vehicle (ROV) support vessels (RSV), OSRVs and pipe laying support vessels (PLSV).

An increase of 70 percent has been agreed for the shipbuilding budget in 2019. The Board of Directors of the Merchant Marine Fund (CDFMM) approved the fund's budget proposal for 2019. For shipbuilding, R$6.350 billion (around US$1.629 billion) will be allocated, up 70 percent over the budget approved for this year. The general total expected for 2019, including costing, contingency reserves and reimbursements, will be to the tune of R$6.988 billion (around US$1.792, billion), 61 percent more than the amount set for 2018. The CDFMM has awarded priorities of financial support to Bourbon Offshore, Bram Offshore, Marlin Navigation, Magallanes Navigation, Transpetro and Wilson Sons Offshore. In the list of prioritized companies is also the Brazil Basin Drydock Company (BBDC), which will be installed in the Northeast State of Paraíba, with a focus on repairing medium and large ships.

The Tanker Market

Outlook for 2019 & Beyond

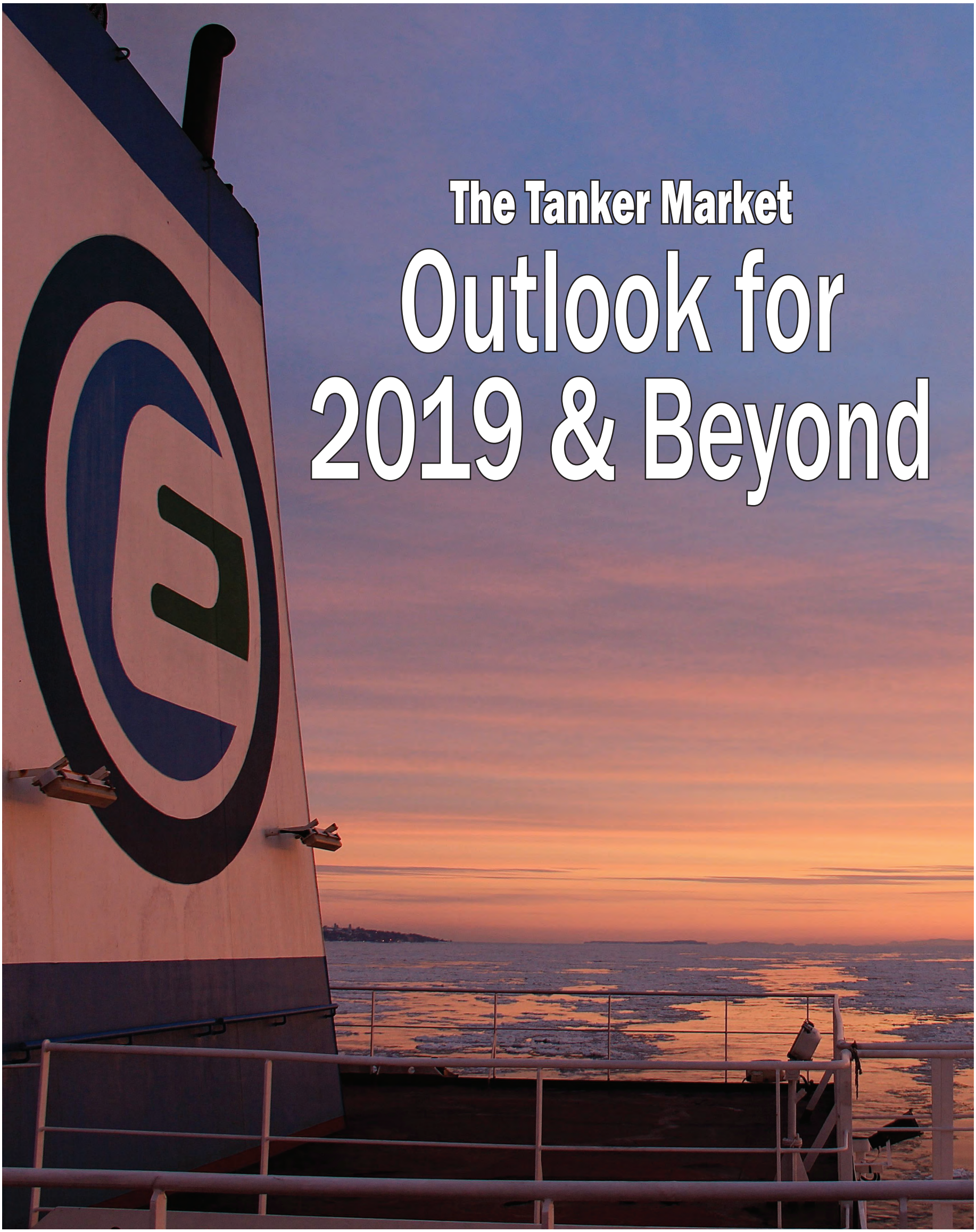


Photo: Courtesy Euronav

"DESPITE THE ADVERSE IMPACT OF THE OPEC CUTS AND A SLOWER ECONOMY, THE IMO 2020 COULD FURTHER BOOST CLEAN TANKER DEMAND THE NEXT TWO YEARS, ABSORBING OVER 10% OF THE FLEET."

FOTIS GIANNAKOULIS, EQUITY ANALYST, MORGAN STANLEY

Photo: Courtesy Euronav

By Barry Parker

Late 2018 saw the tanker market bubble upwards through late November, with daily vessel hires moving in the direction of, though not yet reaching levels not seen since late 2014-2015, when oil prices were in freefall and inventories building to the brim. A few pundits have suggested that we are seeing a "mini 2014" where lowered oil prices are coaxing another inventory build which would drive tanker capacity utilization, and per diem freight inflows, higher. The oil market has changed over four years; OPEC+ is seeking to pull back on production this time (as seen by its announcement in early December 2018 of a cutback), counteracted by U.S. shale oil production and a new wrinkle, U.S. oil exports. The big question now – which will play out in the coming months – is whether the recent uptick, brightening up a generally desultory 2018, is seasonal (winter cold typically drives demand) or an upward thrust along a longer-term cycle.

As 2018 was drawing to a close, profitability had returned to all sizes of vessels, in contrast to loss-making earnings on the first half of the year. Hires on the bellwether VLCC runs from the Arabian Gulf to the Far East were netting close to $70,000/day. Brokers CR Weber, in its weekly report at the end of November, pegged the voyage to Japan at Worldscale 97.5, working back to $68,132/day, with the voyage to Singapore bringing in slightly less. For Suezmax tankers, liftings from West Africa into northern European ports were worth more than $35,000/day (and moves into the U.S. Gulf worth more than $40,000/day). Tankers loading Russian oil, in the Black Sea, and the Baltic were seeing hefty earnings (around $55,000 daily in early December for Suezmaxes loading in the Black Sea, and for Aframaxes loading in the Baltic).

Christian Waldegrave, Head of Research at Teekay Tankers, one of the largest owners of crude carrying tankers, had enthused in his late November online market report, "What a difference a few weeks makes in the tanker market." He explained the market dynamics as follows: "Scrapping has been very high, and has offset deliveries; for the first 10 months of this year, fleet growth has been less than 1%."

Statistics from Clarksons, among others, bear this out. The strong markets of 2015 into 2016 led to additional ordering, with nearly 39 million deadweight (mdwt) of crude carrying tankers contracted in 2015. During 2016 and 2017, the net fleet, accounting for scrapping, grew by 20 mdwt, or 6% both years. In 2018, expected fleet growth will be 4 mdwt, or a little more than 1%, with vessel scrapping at 17 million dwt, more than twice the yearly average over the previous decade. In comparison, world oil production (a proxy for demand) has grown at slightly more than 1% during these years.

Analysts also note the ratio of the vessel orderbook (59 mdwt at end 2018) in the crude sector, to existing fleet size (380 mdwt by end 2018), or around 15.5%. This is a respectable percentage, particularly when you compare it to the end of 2008 when the orderbook (120 mdwt) was 46% of the existing fleet (260 mdwt).

Waldegrave from Teekay issued his report just prior to OPEC's early December announcement of a production curtailment. Buoying hires during Q3 and through November were production increases from OPEC of around 1 million bbl/day, and 0.4 million bbl/day from Russia- which the analyst cited as very beneficial for mid-sized tankers.

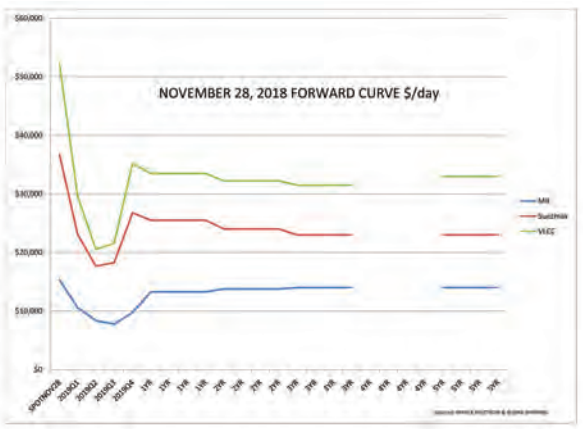
For smaller "MR" tankers (typically 50,000 dwt) in the refined products trades, a basket of "triangulation" routes in the Atlantic Basin could have earned owners around $26,000/day in early December, nearly triple the levels of only a month earlier, as computed by CR Weber. Equity analyst Fotis Giannakoulis at Morgan Stanley hinted at ongoing strength in this sector, telling clients in a mid-December report, "Despite the adverse impact of the OPEC cuts and a slower economy, the IMO 2020 could further boost clean tanker demand the next two years, absorbing over 10% of the fleet." Besides the prospects for more distillate (in the form of marine fuels) moving internationally as the shipping industry adjusts to lower sulfur rules, old fashioned supply and demand has also fueled the runup in this sector, with Mr. Giannakoulis noting the: "…minimal product tanker fleet growth (+1.7% YoY) and low orderbook (~8% of the global fleet)."

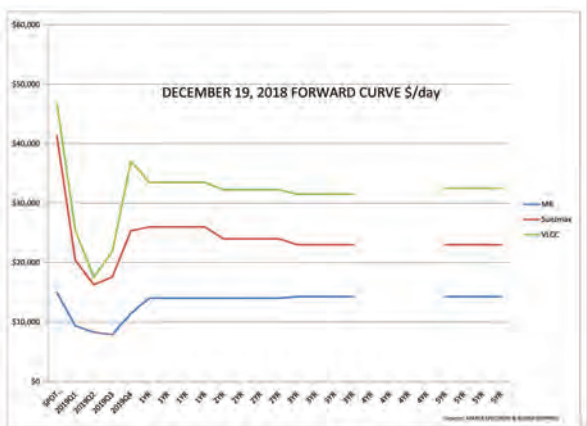
However, the tanker market responds to the broader currents driving the oil markets. The December softening in oil prices reflected, in part, nervousness about economic slowdowns (the same forces pushing stock markets down into "bear market" territory). Oil prices were dropping again, but, unlike 2014, fears of economic slowdown, rather than open spigots, were responsible for the 2018 price drops which saw Brent contracts drop from $86/barrel in early October to around $51/ barrel as Christmas was approaching. The U.S. analog, West Texas Intermediate, had dropped from $75 to below $43/ barrel.

Looking forward, the complexity of shipping markets has bedeviled forecast-

The Forward Curve

The graphs below show snapshots of tanker market forward curves, in end November 2018 and late December 2018. Spot market hires are plotted on the left side of each graph for VLCCs (in trades that differ slightly from those discussed by the brokers); the graphs show spot hires softening during December. It is also important that, for the larger VLCCs and Suezmaxes, the spot market hires exceed those of estimated multi-year time charters (middle and right side of the graphs) at both end November and in mid December, indicative of a near-term "spike" rather than a cyclical shift upward. The good news is that market participants (financial and shipping investors for the 2019 hires, and shipping operators and owners for the forward time charter hires) collectively expect daily hires going forward to exceed break evens, albeit only slightly. But caution is in order- multi-year hire estimates were little changed during the spot market's ups and downs in November / December, suggesting that nearby activity with its myriad short-term causations, plays less of a role as market participants peer out three to five years.





ers who look out more than a few months. Demand variations around an economic trend line include numerous wildcards. The actions of OPEC+ regarding exports mentioned by Teekay Tankers, and the impacts of the ongoing "Trade War" are examples. But cargoes can erupt out of nowhere as differences in regional products markets give rise to price spreads that give rise to "arbitrage"-driven movements: witness the huge spike in the MR product tanker per diems. Unlike other industrial markets, the supply side of the equation can flex in ways beyond simple deliveries and removals.

Another pitfall bedeviling forecasters is slow steaming (a fuel saving measure), which effectively decreases available capacity. Floating storage of oil (in response to an oil price curve with stronger oil prices further out in time) also removes available capacity, albeit temporarily. Compliance with upcoming regulatory initiatives has introduced new wildcards; removals (a/k/a scrapping) may increase in anticipation of potential capital outlays for requisite Ballast Water Treatment systems and for possible fuel price hikes in 2020 (when restrictions on sulfur in marine fuels kick in). Indeed, as noted already, 2018 saw levels of vessel scrapping at their highest levels in more than a decade.

One indicator of expectations is the Forward Freight Agreement (FFA) marketplace, where traders from the worlds of shipping and finance can agree on prices for tanker hires at future dates. The outlook can be described as cautiously optimistic but not ecstatic, based on market data provided by brokers Marex Spectron. For VLCC's, the daily fully costed breakeven (not including fuel and port costs) is somewhere between $20,000/day and $25,000/day. At end November, with the spot VLCC trade to Asia showing a timecharter equivalent of $57,334/ day, the "forward curve" of settle prices for 2019 worked back to a healthy $32,893.12/ day (Q1), $20,401.45/ day (Q2), $24,281.64/ day (Q3) and a seasonally strong $37,601.45/ day (Q4), according to Marex Spectron. By late December, with the spot equivalent now down to just under $46,000/day on this voyage, the forward curve had dropped lower, with both Q2 and Q3 below the daily breakevens.

Physical forward markets, in the form of period timecharters for VLCC's provided a similar view. For now, the market is healthy, but hardly getting set for boom times. Brokers CR Weber, at end November, were estimating a one year time charter on a modern VLCC to be worth around $37,000/day, definitely above daily cost breakevens, but below the spot levels at that time. For comparison, in the 2015 tanker boomlet, one year period timecharters were done at levels touching $55,000/day.

Companies to Watch

It is clear that the "consolidation" trend is alive and well in the tanker sector. In June 2018 Euronav (NYSE: EURN), grew into a behemoth owning more than 70 vessels, predominantly Suezmaxes and VLCCs, after the deal was done following its merger with Gener8 (which was weighted down with vessels bought at market highs, including those acquired through an earlier combination with General Maritime). The company's CEO, Paddy Rodgers, stresses a countercyclical approach; in EURN's Q3 conference call, he said: "…let's not forget that we just completed the merger of Gener8 which ships were valued at $75 million where they were bought in that ECO rush at $110 million. So let's seek value for shareholders, be cautious, be clear minded and not follow a herd."

Another company to watch is privately held Diamond S, which will soon be quoted on the NYSE, after it eases into the listing of an already stock-listed company, Capital Products Partners (CPLP). The new company, to be dubbed Diamond S Shipping Inc, will control 68 vessels, of which 52 are in the refined products trades, in a deal announced late in 2018 and expected to close during Q1 2019. The structure, sometimes known as "reverse merger", speaks to the difficulties that maritime companies have had in raising public money from investors. As explained in CPLP announcements, the new entity will have the ability to source investor funds, in subsequent share issues. If the positive outlook for the product tanker sector plays out, this entity's activities in 2019 may just reverse the tide of limited maritime equity raises.

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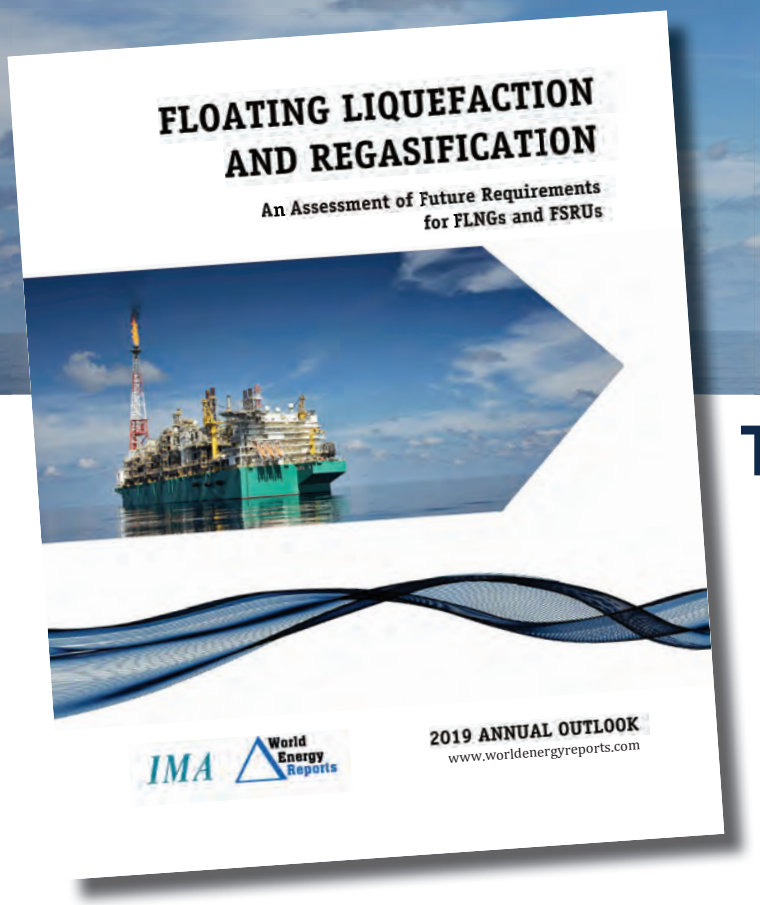

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MarTID 2019

Transformation in Maritime Industry Training

The 2019 Maritime Insights Database (MarTID) survey has been launched at **www.MarTID.org**. *This annual survey and the resulting annual reports are available freely, globally, providing critical data on maritime training practices and trends useful to every segment of the maritime industry.* **As such, it is important that every seafarer, maritime trainer and maritime administrator working at a vessel operator or training center complete the survey (also available at www.MarTID.org) and ask their colleagues to do the same.**

Now that the 2019 survey has been launched, it is useful to examine the most notable insights revealed by the inaugural 2018 report. It turns out that there is one message that, far and away, stands out most in the report: we are currently in the throws of a major training transformation in the maritime industry. It is a transformation that swept other industries over the last 10 – 15 years, and that we are now experiencing here in our industry. And although there was anecdotal evidence of this transformation in the past, the MarTID report presents clear data that must be understood by everyone in the maritime industry – especially those involved in training. That data reveals a clear transformation away from traditional training practices and toward modern learning technologies such as internet-based e-learning and simulation.

There are important messages here for all operators – both in terms of what is happening in the industry, and what it says about our acceptance of non-traditional practices in the industry. Understanding this trend, the evidence for it and the reasons for it allows vessel operators, training centers and even seafarers to both prepare for the transformation and take best advantage of it. It is a transformation that affects us all – so let's look at the data.

The Findings

The trend toward modern training tools and practices in the maritime industry did not begin yesterday. Over many years the industry has slowly become more and more aware and accepting of new tools and techniques. This, in itself, is an important message to take away – that despite our reputation, the industry is indeed accepting of new ideas when they are well supported by evidence.

The most obvious evidence of the trend toward the adoption of learning technologies such as simulation and eLearning is the degree to which these technologies have already been adopted. Given how recently they have become available, it is remarkable to note that they have already been adopted by roughly 90% of respondents. Compare this to the situation of the early 1990s when simulation and eLearning barely existed. This is clear evidence of a rapid transformation.

But even more important than the current level of use is the rate at which these technologies continue to be adopted and more deeply implemented. A whopping 70-80% of MarTID survey respondents plan to increase their usage of simulation and internet-based eLearning in the upcoming year. Of all training techniques surveyed, these two were the clear standouts in terms of plans for increased usage. It is similarly interesting to note that only 3% to 6% of respondents indicated that they planned to decrease their usage of those same technologies. No other training technology came close in terms of plans for increased use, and every other training technique is slated for a larger decrease amongst respondents. So not only have we experienced a significant transformation, but that transformation is, in fact, still in full swing.

What Does this Mean for Maritime?

First, it is reasonable to infer that respondents are highly satisfied with their use of these technologies. There is already a high degree of use, and those respondents plan to increase their usage. Additionally, only a very small number of respondents have plans to decrease usage next year.

Other inferences can be derived by comparing respondents' plans for learning technologies with those of more traditional models such as job shadowing and classroom-based training. These are two training models that respondents indicated would be expanded upon the least at 26% and 23% respectively. Equally interestingly, for classroom training, the same percentage of respondents (23%) indicated that they expected to do less next year. Thus according to this data, at this point the usage of classroom training is flat while every other model surveyed is on the increase. This is significant as it indicates a trend away from traditional models and toward modern technologies. This trend will cause changes and even disruption over the coming years. Currently, the most-used model of training is classroom-based training; 92% of respondents indicate they use it a medium to high amount and 43% indicate that it is their primary training method.

According to the data, this is going to change, and generally, the change will be for the better.

Knowledge training has been shown to be more efficient and effective using online models where the training inherently adapts to each individual learner and learning style. This is in opposition to face-to-face classes where the timing of the lecture and the experience the trainees have is uniform. This model does not account for individual differences in the trainees and therefore it is more likely that the outcomes will be poorer and vary more widely. Thus, the move toward online learning for knowledge acquisition portends a future of better trained seafarers.

Addressing Training Challenges

In addition to a future with potentially better training outcomes, a move to technology-enabled training will also, in part, address the top three training challenges listed by MarTID survey respondents. The most commonly cited challenge is the presence of financial constraints. Although implementing an eLearning program does not come for free, once developed it presents a much more efficient (and less expensive) training model. This is especially true in cases where it removes or reduces the need to transport trainees or instructors to training centers. The second and third most commonly cited training challenges are lack of training courses and lack of qualified training personnel. Fortunately, for knowledge-based courses there is a growing body of eLearning content creators and a growing library of good quality web-based learning materials. Additionally, we have seen some of our customers to collaborate on the creation of online training materials and share the costs. They do not see improved safety as a competitive advantage but rather a rising tide that lifts all ships. We have also seen, in other industries, large and mature open-source libraries of free online learning materials. This movement is especially advanced in higher education where multiple initiatives provide quality learning materials to be freely used by individuals and deployed by organizations. There is no reason this cannot happen in the maritime industry.

Of course, learning technologies will not solve all training and assessment problems. It is true that web-based eLearning can improve both the efficiency and effectiveness of knowledge training, and that simulators can greatly support the acquisition of skills. However, no training program can be successful without the presence of an expert trainer who is available to interact with the trainees, reinforce skills, share experiences, and mentor students. So, at no time in the foreseeable future will the need for expert, face-to-face instruction disappear. It will, however, change and be more effective.

Johan Dekker
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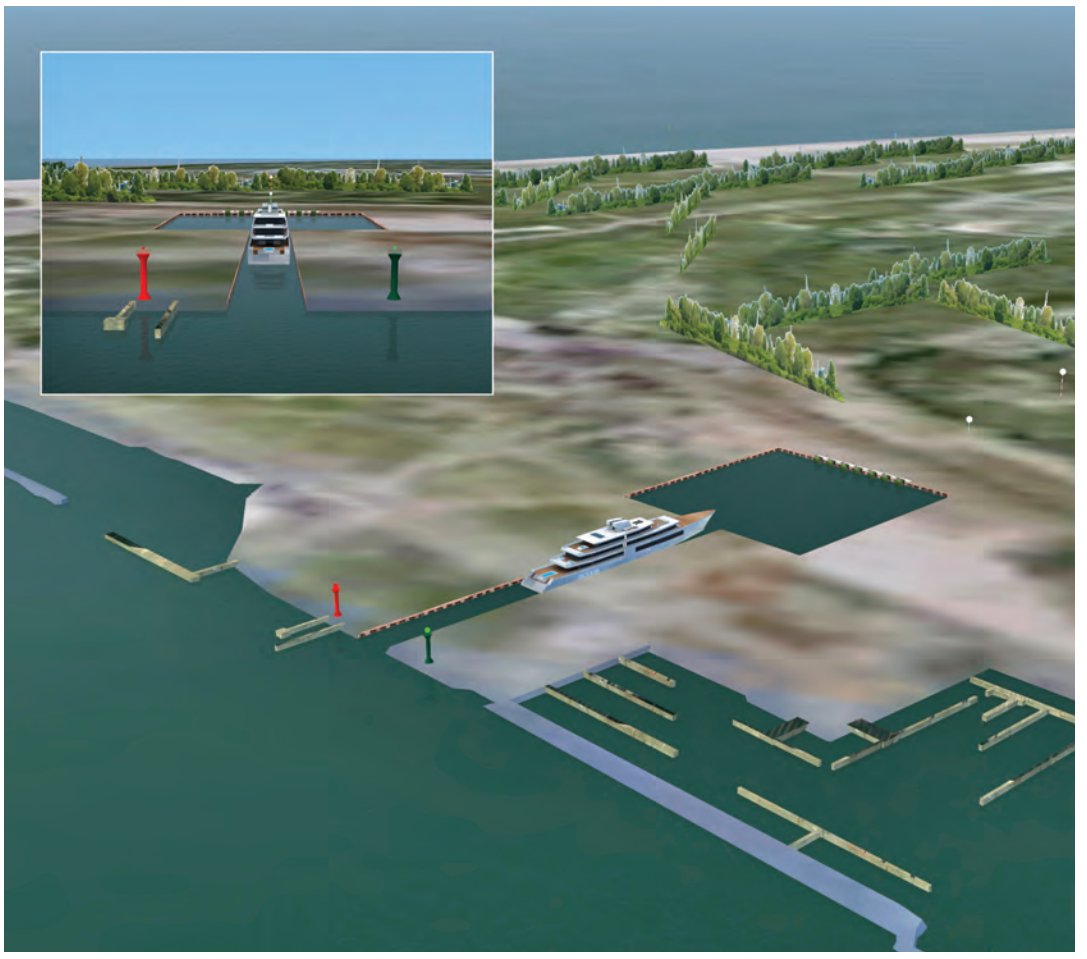
Real Time Simulation
to Test Propulsion Alternatives

MARIN helps yacht owners make vital decisions about the propulsion and thruster configurations best suited to their yacht by using virtual reality.



MARIN helps yacht owners make vital decisions about the propulsion and thruster configurations best suited to their yacht by using virtual reality. If a motor yacht of 112x16 m has to sail a 20 m channel and turn in a basin of 120x116 m, what maneuvering characteristics are required? This was the challenge a Dutch yard was facing for a new yacht, which was on the drawing board.

Several options were considered for the main propulsion, bow and stern thruster. For example, are fixed pitch propellers (FPP) or continuous pitch propellers (CPP) better for the main propulsion, and should these turn inward or outward? FPP and CPP were also the alternatives for the bow thruster, while three options with retractable azimuthing thrusters were considered for the stern thruster. To investigate the influence of the different alternatives on the ship handling characteristics, the yard and owner's representative decided to test the options in virtual reality using our full-mission bridge simulator, so that they could experience the difference first hand.

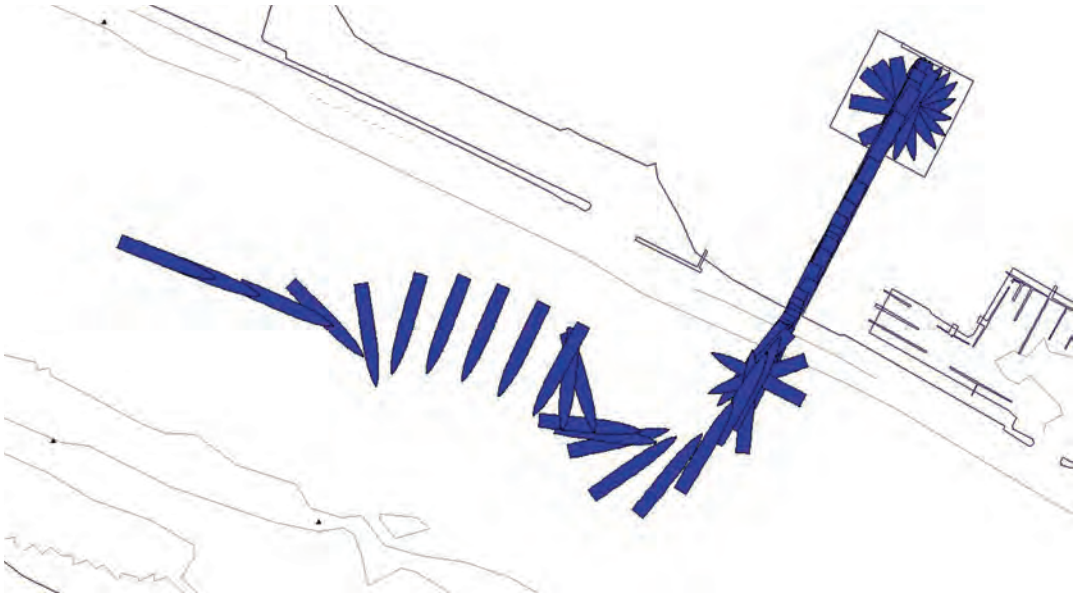
Nine models

Using the results of a series of powering, seakeeping and maneuvering tests that had already been carried out at MARIN, a mathematical maneuvering model was prepared using SURSIM. The options for the propulsion were made as accurate as possible, based on specific details such as the combinator curve for CPP main propulsion, the time-thrust diagram of the bow thrusters, the time to turn 180 degrees for the retractable stern thrusters, etc. In total nine ship models were prepared.

Simulations at the design stage

A harbor basin of the required dimensions was prepared in the database of the Port of Rotterdam, which is available at MARIN. During a 1-day simulator workshop on MARIN's Full-Mission Bridge 1, the owner's representative and the captain sailed the various yacht models in this database, witnessed and supported by representatives from the yard and one of MARIN's simulator instructors.

By carrying out these real-time simulations during the design stage, the participants were able to select the most suitable propulsion options for the yacht. Considering the extremely confined waters, it is probably not surprising that the bow thruster with the fastest build-up of thrust and the retractable stern thruster with the shortest time for 180 degrees azimuthing were selected as the preferred options.



Maritime Autonomy

Sea Machines gets a $10m investment injection

While there remains much debate as to what an autonomous future looks like in the maritime sector, one company, Sea Machines, is helping to pace the field with product development, partnerships and investment.

"THE LEVEL OF TRACTION THEY HAVE FROM THE GLOBAL MARITIME INDUSTRY IS A TELLTALE SIGN THAT ***THE INDUSTRY IS THE NEXT FRONTIER FOR AUTONOMY"***

VIC SINGH, FOUNDING GENERAL PARTNER, ENIAC VENTURES.

Sea Machines Robotics announced last month that it had closed a $10 million Series A investment led by Accomplice VC, with participation from several corporate titans including Toyota AI Ventures; Brunswick Corp., through investment partner TechNexus Venture Collaborative; Eniac Ventures, NextGen VP, and others.

"This investment enables us to double down on our commitment to building advanced command and control products that make the industry more capable, productive and profitable," said Michael Gordon Johnson, founder and CEO, Sea Machines. Sea Machines will first use the funds to develop additional features to its recently launched SM series (the company's first line of autonomous-command and remote-control products) and is now developing and testing the world's first A.I.-powered situational awareness system for container ships aboard a Maersk new-build Winter Class ship. In addition to supporting these initiatives, the funds will also help to grow our network that will help to distribute these products around the world and will provide the financial backing Sea Machines requires to hire the talent that will take the company's innovations to the next level, said Johnson.

"Eniac Ventures is excited to back Michael Johnson and the Sea Machines team – the leading maritime and robotics experts solving this industry's most critical issues, including labor, safety, efficiency and cost," said Vic Singh, founding general partner, Eniac Ventures. Eniac is an experienced investor in a handful of autonomous robotics companies across big GDP sectors agriculture, logistics, manufacturing, and transportation. Some examples in agriculture include Iron Ox, a fully integrated autonomous robotics farm for product, and Vence, autonomous cattle ranching through virtual fencing. In the logistics and manufacturing sector it is involved in Ready Robotics, programmable robotics platform for manufacturing. In the Transportation Eniac's thesis is around air, land, rail and sea, as in addition to today's Sea Machines investment this includes ISEE, autonomous trucking long haul and distribution center, and Xwing, autonomous aviation for eVTOLS, helicopters, small aircraft and ultimately general aviation.

"Sea Machines' autonomous technology and advanced perception systems can reduce costs, improve efficiency and enhance safety in the multi-billion dollar commercial shipping industry," said Jim Adler, founding managing director, Toyota AI Ventures. "This marks our first investment in the maritime industry, and we're excited to embark on this journey with Sea Machines."

From Brunswick Corp., a familiar name in commercial and consumer maritime sectors, David Foulkes, chief technology officer, Brunswick Corp. simply said: "To date, our participation and investments are helping us to better understand how we can make boating better and continue to evolve and differentiate our business."

Sea Machines on the Fast Track

While maritime remains behind other transport sectors in terms of autonomous adaptation, the gap is closing according to Eniac. "Maritime is ripe for autonomy given the spectrum of vessel types - recreational, work boats, survey boats, security boats, water taxis and cargo ships," said Singh. "Autonomy is new to all transport spaces and maritime has its own unique challenges and benefits of autonomy. The technology requirements for autonomous maritime are not as deep as ground transport and the industry is already starting to adopt. From a tech perspective, maritime is earlier than ground but from an industry perspective its right on par."

The investment marks one of the largest venture rounds for a marine- and maritime-focused technology company and brings the total capital Sea Machines has raised to $12.5M. According to Johnson, a cornerstone of the company's success to date is founded on using existing technology in a more intuitive way. "Sea Machines has done a great job leveraging existing technology to create new, robust commercial solutions," said Johnson. "From consumer off the shelf (COTS) hardware components to an industry standard autonomy framework, the engineering team has used tried-and-tested tools as a solid foundation on which to build a library of proprietary technology to form the core of all Sea Machines products. This approach has allowed the team to develop quickly and focus on delivering robust solutions to customers."

While there are a multitude of investment opportunities to move autonomy forward in the maritime space, Singh was succinct in the attraction to Sea Machines. "We looked at autonomy in air, land and sea. We decided to invest in Sea Machines as our bet in autonomous maritime given the deep domain expertise of the team in maritime as well as their deep operating sand technology expertise building and scaling full stack AI + data + software _ hardware companies," said Singh. "When investing in startups going after big GDP sectors, the technology itself won't be the only key to success but rather a deep understanding of the industry and customer base is what sets its apart and Sea Machines has all of that DNA. They are the leader in the space as evidenced by their traction."

MARITIME REPORTER AND ENGINEERING NEWS

2019 Editorial Calendar

JANUARY

AD CLOSE: DEC 21

Ship Repair & Conversion: The Shipyards

MARKET FEATURE: **Tankers and Bulkers**

TECHNICAL FEATURE: **Hybrid Drives**

PRODUCT FEATURE: **Ballast Water Treatment Systems**

THOUGHT LEADERSHIP: **Fuels & Lubricants**

EVENT DISTRIBUTION
PVA Maritrends: Jan 17-20, New Orleans, LA
Surface Navy Association: Jan 15-17, Crystal City, VA

FEBRUARY

AD CLOSE: JAN 24

Ferry Builders

MARKET FEATURE: **Inland Push Boats & Barges**

TECHNICAL FEATURE: **Loading and Unloading: Cranes, Conveyors, Davits & Hoists**

PRODUCT FEATURE: **Passenger and Crew Safety Equipment**

THOUGHT LEADERSHIP: **TOP 10 Ferry & Riverboat Owners**

EVENT DISTRIBUTION
Ferry Safety & Technology: Feb 20-22, Bangkok, Thailand
Inland Waterways Conference: Cincinnati, OH

MARCH

AD CLOSE: FEB 21

Cruise Shipping

MARKET FEATURE: **Satellite Communications**

TECHNICAL FEATURE: **Maritime Simulation**

PRODUCT FEATURE: **Clean Water Technologies**

THOUGHT LEADERSHIP: **Coatings & Corrosion Control**

EVENT DISTRIBUTION
Seatrade Cruise Global: Apr 8-11, Miami Beach, FL
CMA Shipping 2019: Apr 2-4, Stamford, CT
NACE Corrosion: Mar 24-28, Nashville,TN
INMEX Vietnam: Mar 27- 29 Saigon, Vietnam

APRIL

AD CLOSE: MAR 21

Navies of the World

MARKET FEATURE: **Offshore Support Vessels**

TECHNICAL FEATURE: **RIB & Patrol Boat Report**

PRODUCT FEATURE: **Deck Machinery**

THOUGHT LEADERSHIP: **Autonomous Ship Technology**

EVENT DISTRIBUTION
Sea-Air-Space: May 6-8, National Harbor, MD
MACC 2019
OTC: May 6-9, Houston, TX
Ballast Water Mgmt
Intermodal Asia 2019: May 22-24, Shanghai, China

MAY

AD CLOSE: APR 21

Propulsion Annual - Green Marine Tech

MARKET FEATURE: **Tug and Tow Boats**

TECHNICAL FEATURE: **Ballast Water Management**

PRODUCT FEATURE: **Emission Scrubbers**

THOUGHT LEADERSHIP: **2019 Engine Guide**

EVENT DISTRIBUTION
Norshipping: Jun 4-7, Oslo, Norway
MegaRust 2019: May 14-16, Norfolk, VA
Inland Marine Expo: May 20-22 St. Louis, MO
Tugnology: May14-15, Liverpool, UK
Bari Ship 2019: May 23-25, Imbari, Japan

JUNE

AD CLOSE: MAY 24

80th Anniversary World Yearbook

MARKET FEATURE: **Cyber Security**

TECHNICAL FEATURE: **Offshore Renewable Energy: Wind Wave, Tidal**

PRODUCT FEATURE: **Navigation: Marine Electronics, Radar & ECDIS**

THOUGHT LEADERSHIP: **Top 10 Shipowners**

EVENT DISTRIBUTION
Electric & Hybrid Marine World Expo: Jun 25-27, Amsterdam
MAST Asia: Jun 17-19, Tokyo, Japan
CIMAC Congress 2019: Jun 10-14, Vancouver, Canada
Marine Money Week: Jun 17-19, New York, NY

MARITIME REPORTER AND ENGINEERING NEWS

2019 Editorial Calendar

JULY

AD CLOSE: JUN 23

Cruise Vessel Design & Outfit

MARKET FEATURE: **Expedition Cruise Vessel Construction**

TECHNICAL FEATURE: **Training and Simulation**

PRODUCT FEATURE: **Autonomy, Robotics & Drones**

THOUGHT LEADERSHIP: **Maritime Software Solutions**

AUGUST

AD CLOSE: JUL 25

The Shipyard Edition

MARKET FEATURE: **Heavy Lifting: Cranes, Winches, Windlasses & Capstan**

TECHNICAL FEATURE: **Icebreakers**

PRODUCT FEATURE: **Welding & Cutting Equipment**

THOUGHT LEADERSHIP: **Energy Efficiency Systems**

EVENT DISTRIBUTION

Offshore Europe: Sep 3-6, Aberdeen, Scotland
Seatrade Europe: Sep 11-13, Hamburg
NEVA 2019, Sep 17-19, St. Petersburg
Seatrade Offshore Marine & Workboats: Sep 23-25, Abu Dhabi, UAE

SEPTEMBER

AD CLOSE: AUG 24

Satellite Communications

MARKET FEATURE: **Containership Technology**

TECHNICAL FEATURE: **Marine Firefighting, Safety & Salvage**

PRODUCT FEATURE: **Controls & Bridge Automation**

THOUGHT LEADERSHIP: **Maritime Port & Ship Security**

EVENT DISTRIBUTION

Shipping Insight: Stamford, CT
Clean Gulf: Houston, TX
Interferry 2019: Oct 5-9, London, UK
KORMARINE: Oct 22-25, Busan, Korea

OCTOBER

AD CLOSE: SEP 22

Marine Design Annual

MARKET FEATURE: **Alternative Marine Fuels**

TECHNICAL FEATURE: **Coatings: Deck, Hull and Tank**

PRODUCT FEATURE: **Software Solutions: CAD/CAM**

THOUGHT LEADERSHIP: **Ship Classification Societies**

EVENT DISTRIBUTION

SNAME: October 29 - Nov 2, Tacoma, WA
Europort: Nov 5-8, Rotterdam
Blue Tech Week: Nov 4-8, San Diego, CA

NOVEMBER

AD CLOSE: OCT 25

Workboat Edition

MARKET FEATURE: **Propulsion, Thrusters & Gears**

TECHNICAL FEATURE: **Multi Mission Boats; Patrol, Escort, Fire and Search & Rescue**

PRODUCT FEATURE: **Deck Machinery Product Guide**

THOUGHT LEADERSHIP: **Offshore Wind Power**

EVENT DISTRIBUTION

Workboat Show: Dec 4-6, New Orleans, LA
Marintec China: Dec 3-6, Shanghai China
INMEX China: Dec 12-14, Guangzhou, China

DECEMBER

AD CLOSE: NOV 22

Great Ships of 2019

MARKET FEATURE: **Top 10 Shipbuilders**

TECHNICAL FEATURE: **Digitalization in Ship Design & Construction**

PRODUCT FEATURE: **Bridge Electronics and Communications**

THOUGHT LEADERSHIP: **Maritime Emission Reduction**

EVENT DISTRIBUTION

SNA 2020 - Crystal City, VA

Information may be subject to change

Fixing the Fleet

BAE System's San Diego yard is a critical player in keeping U.S. Navy

David M. Thomas, Jr. standing atop the wingwall of one of two drydocks in service at BAE System's San Diego shipyard.

Photo: BAE Systems/Maria McGregor

y ships operating

*Walk with **David M. Thomas, Jr.**, VP & GM, San Diego Ship Repair, BAE Systems, and a few things become immediately clear: Dave Thomas is passionate about cleanliness and order, as the San Diego yard is compact and bustling with work, yet impeccably clean. Dave Thomas is passionate about safety, and he takes the health and welfare of every employee, colleague, client and guest personally. Most of all, Dave Thomas is passionate about everything U.S. Navy. Following a distinguished U.S. Navy career, his second act is ensuring that this big, meticulous client and the ships that it operates are ready and able for any mission that might fall to them, anywhere in the world.*

By Greg Trauthwein

"I walk to work every day and I am inspired every time I walk around this yard," said Thomas. "I always wanted to be in the Navy, it's all I ever wanted to do since I was a little kid. My dad was in the Navy and I couldn't wait to join, which I did the day after I turned 18."

That passion for the U.S. Navy born with the man still burns today. "It's an honor for me to be able to continue to serve my country. To the sailors and the marines who will take those ships far away. It's a privilege. I love what I do."

But the job of maintaining Navy ships takes more than passion, and Thomas understands the business courtesy of his Navy career. "Having been the customer, I understand the requirement for compliance with the specs, the Navy's appropriately high standards," said Thomas during our recent visit to the San Diego yard. "Our commitment to that quality and the timely delivery of those vessels is our number one priority. It's not a challenge, it's a commitment."

The "Pivot West"

San Diego has always been a navy town, but as the U.S. Navy works toward the stated goal of a 355-ship navy combined with its 'pivot west,' there is obvious growth in and around this major southern California city. In fact Thomas is seemingly part of the 'pivot west', as us until a year ago he held the same position at BAE Systems' Jacksonville, FL, yard before accepting the San Diego assignment. "The opportunity to continue to repair and modernize navy ships attracted me to the position in San Diego, but really it's the same customer, different coast," said Thomas.

But in San Diego the size and diversity of the Navy presence is evident, as there is everything from aircraft carriers, to the large deck amphib class ships, the LPD17s, the cruisers, destroyers and minesweepers, as well as the addition of the new DDG1000, and LCS populations.

"We've worked on ships with 30 years' of time in service to brand new ships and everything in between," said Thomas. "We've worked on ships with wooden hulls and we've worked on ships with aluminum superstructures to steel ships."

When *Maritime Reporter & Engineering News* visited in November 2018, the diversity in the ships under repair was evident with the following in for repair:

- USS Omaha (LCS 12), Littoral Combat Ship (LCS);
- USS Howard (DDG 83), Guided Missile Destroyer (DDG);
- USS Pearl Harbor (LSD 52), Dock Landing Ship (LSD);
- USS San Diego (LPD 22), Amphibious Transport Dock (LPD);
- USS Cape St. George (CG 71), Guided Missile Cruiser (CG); and
- USS Sterett (DDG 104), Guided Missile Destroyer (DDG).

While a shipyard's facilities, particularly docks and lift capability, are an obvious part of its success, Thomas maintains that without a qualified employee base and competent subcontractor network, the best facilities are of little use. "People are most important, without question," said Thomas. "The facilities are incredible too, but without the right team, without the right leadership, the facilities don't matter as much." To this end, the company is investigating an apprentice program for long-term workforce developmet.

Like any shipyard, the BAE systems facility in San Diego requires continuous investment and upgrade, the biggest and most evident one being a second drydock delivered just over one year ago. "We've invested in a brand new drydock to accommodate all of the ships in the fleet here in San Diego, up to the large deck amphibs and the conventional surface fleet."

Keeping Clean

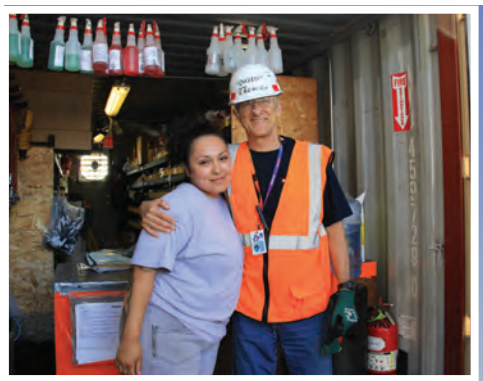
While San Diego is a long-tenured navy town, it is somewhat unique in that there is a large population base – an estimated 1.5 million – situated in close quarter with a string of shipyards, all residing in California and its demanding environmental laws. Being a good environmental steward is the mandate, not the expectation. "I read 'Silent Spring' as a kid; I watched Jacques Cousteau, and I literally sailed around the world, so I know what it looks like when the environ-

LCS12 in drydock (above).

San Diego is a Navy town (right), but with several shipyards in close proximity to the city center, being a 'good neighbor' and environmental steardship go hand-in-hand.

David M. Thomas, Jr. (below) is a stickler for detail, running a clean, efficient yard to service its primary customer: the U.S. Navy.

Photos: BAE Systems/Maria McGregor



ment is well maintained and preserved, and unfortunately I've seen what it looks like when it is not," said Thomas. "Our company, me personally, and our team are all committed to be good stewards to the environment. We continually look for ways to improve, whether that be the addition of new electric vehicles in the yard; it's about being a good business, it's about being a good neighbor."

Safety Culture 1, 2, 3

When David M. Thomas, Jr., VP & GM, San Diego Ship Repair, BAE Systems talks shipyard safety, he doesn't just say it, he means it. "It starts with being confident that everyone who works in our shipyard is aware of the reality of the hazards, but the fundamental core value of safety and the uncompromising commitment to safety in everything that we do. There are 3 things that I tell every new employee, and that I repeat at every morning muster or other gatherings:

1. Safety is an uncompromising core value in our shipyard;
2. Every employee has the right and the responsibility to stop work if they see an unsafe situation; and
3. It's not my shipyard, it's our shipyard. If you see a way to improve it, speak up.

Dry Docks:

Pride of California:

Length, o.a.	*950 ft.*
Length, Over Pontoons	*852 ft.*
Clear Width Between Fenders	*162 ft.*
Maximum Design Draft	*65 ft.*
Rated Lift Capacity	*55,000 Long Tons*
Two 50 Ton Electric Wing Wall Cranes	

Pride of San Diego:

Length, o.a.	567 ft.
Length Over Pontoons	528 ft.
Clear Width Between Fenders	106 ft.
Maximum Design Draft	38 ft.
Rated Lift Capacity	23,000 Long Tons

Berths:

Length ft.	Depth ft.	MLLW*
#1 South:	871	≥35
#3 North:	722	≥45
#3 South:	842	≥35
#4 North:	561	≥35
#4 South:	561	≥35

*Mean Lower Low Water

Cranes:

#1 Pier served from POCA & POSD*
#3 Pier: 80 ton rail crane
#4 Pier: 22 ton – 60 ton electric rail crane
150 ton floating crane to service any berth/dock
5 additional mobile cranes any pier
One 27 Ton Crane

The Shipyards

Review of recent repair jobs, new construction & shipyard investment

Despite a general market downturn, shipyards globally remain active with routine fleet maintenance work while eying a potential boom in activity premised on a long list of environmental regulation mandate.

Photo: Damen

Photos: Top to Bottom

Oceanic Sirius and **Oceanic Vega** have completed a round-the-clock, 10-day maintenance programme at Damen Shiprepair Amsterdam (DSAm).
Photo: Damen

Costa Fortuna sailed away from Sembcorp Marine Admiralty Yard on December 16, 2018 after repairs at the yard.
Photo: Sembcorp Marine

ALMACO Group delivered 36 new luxurious Seabreeze Penthouses and two new spacious Seabreeze Penthouse Suites to Crystal Cruises' **Crystal Serenity**.
Photo: ALMACO

Damen: Tandem Seismic Vessel Repairs

Late last year Damen Shiprepair Amsterdam (DSAm) completed a 10-day, round-the-clock maintenance on sister-ships Oceanic Sirius and Oceanic Vega, a job where for eight of those days the two 106-m vessels were in the yard's 250-m drydock No. 4 together. The twin SX120 type seismic RVs are owned by CGG Eidesvik Ship Management AS, a joint venture between Eidesvik Offshore and CGG, originally built by Ulstein Verft in Norway.

Repairs and upgrades included maintenance on the propeller nozzles of both vessels and paint work. "When riding a tandem, one is steering and one is working the pedals," said Tjeerd Schulting, MD, DSAm. "Only excellent teamwork will bring you quickly and safely over the finishing line."

Sembcorp Marine: 10 Cruiseships in '18

Sembcorp Marine completed 10 cruise ships in 2018, finishing the year with the redelivery of Costa Fortuna, a 1,358-cabin vessel operated by Costa Crociere. The yard's cruise business for the year included six ships from established customers in Carnival Cruises, Princess Cruises and Royal Caribbean Cruise Line, and one from new customer Norwegian Cruise Line. Looking to 2019, Sembcorp Marine sees strong cruise business ahead, to date booking 13 jobs. It will also manage the turnkey upgrade of the Pacific Jewel, Zen Cruises' first upmarket cruise liner in India. All these projects will take place at Sembcorp Marine's Tuas Boulevard and Admiralty yards, both equipped with large and deep-drafted dry docks ideal for mega-size cruise vessels.

"Given the continued strong growth of cruise tourism, especially in Asia, Sembcorp Marine is well positioned to capitalise on the boom with our proven capabilities and facilities," said Alvin Gan, Head of Repairs & Upgrades. Sembcorp Marine has delivered a total of 102 cruise ship refit and upgrade projects over the past decade, averaging about 10 vessels a year.

Photo: Sembcorp Marine

ALMACO: Suite Refurb on Crystal Serenity in Bremerhaven

ALMACO Group recently delivered 36 new luxurious Seabreeze Penthouses and two new spacious Seabreeze Penthouse Suites to Crystal Cruises' Crystal Serenity. This project was part of an extensive redesign of the ship, started during the drydock at Lloyd Werft shipyard in Bremehaven, Germany. The suites were delivered in Lisbon, Portugal, before the ship returned to Florida.

ALMACO's scope of work included demolishing the existing 58 standard staterooms on deck 10 and building in their place two new Seabreeze Penthouse Suites and 36 Seabreeze Penthouses, increasing significantly the space and decreasing the guest count to provide a more exclusive guest experience.

Photo: ALMACO

Photo: SMS Group

Photo: HII

Photo: U.S. Navy photo courtesy of Bath Iron Works

Photos: Left

UK-based ship repairer the **SMS Group**, which focuses on mechanical engineering, started 2019 focused on several major refit wins.

Photo: SMS Group

The future **USS Thomas Hudner (DDG 116)** returns after completing acceptance trials.

Photo: U.S. Navy photo courtesy of Bath Iron Works

Ingalls Shipbuilding's seventh U.S. Coast Guard National Security Cutter, **Kimball (WMSL 756)**, during sea trials in the Gulf of Mexico.

Photo: HII

Photos: Right Page

Virtu Ferries 110m ship launched at Incat.

Photo: Incat

MV Werften's new shipbuilding hall complex in Rostock.

Photo: MV Werften

This project was complex in construction with a tight installation schedule. "This was a successful project for ALMACO not only because we were able to work closely with Crystal's and Lloyd Werft's teams, but also because we were able to make our own project team more agile and lean, with thorough risk analysis and prevention plans," said Tommi Virta, ALMACO's Project Manager.

Viking Star Repowered

In 1978 Allied Shipyards of North Vancouver built a series of three big steel purse seiners that have become much-admired classics amongst the excellent fleets of British Columbia. In the years since the boats have changed owners and changed names. One, the Viking Star, has even shifted from being a dedicated purse seiner to a transport vessel for salmon farms for the Walcan Seafood plant on Quadra Island.

The success of the design, of which more than a dozen were eventually built, is often attributed to a drawing on a restaurant napkin by designer Ron Burchett and fisherman Alfred "Hutch" Hunt. Legendary builder Arthur McLaren of Allied Shipyard worked with naval architects at Cleaver and Walkinshaw to perfect the design.

Proof of design and construction is always in the performance. The Viking Star and her sisters have, in this instance, given ample evidence of excellence. For a forty-year-old vessel quality is also reflected in the maintenance, again the Viking Star and her owners demonstrate a high level of proficiency

In recognition of this quality the owners recently decided to give the boat a new engine. In keeping with the traditional excellence and contemporary innovation, a new in-line 6-cylinder, 4-cycle, Cummins KTA19 marine engine was chosen to replace the outdated and tired two-cycle 8V149 Jimmie. At 500 HP the new engine matched the original power of the GM engine but the renewed vigor earned a new Twin Disc 5170 marine gear. The new gear came in a 5.03 ratio compared to the old ratio of 4.04, so the original 3 blade prop was taken from 61.5D X 40P to 61.5 X 53 to get the torque curve into the right range for maximum performance and efficiency.

The job, complete at Arrow Shipyards by a team led by Gerry Harris from Infinity Marine Systems of Gibsons, BC involved creating an access to the engine room through a door cut in the hull at the waterline.

SMS Group: Several Refit Wins

UK-based ship repairer the SMS Group, which focuses on mechanical engineering, started 2019 focused on several major refit wins. Dave Chaffers, mechanical manager for SMS, said: "The big news is the three major mechanical refits that we've won. We've over 30 time-served marine mechanical engineers in the business now, which is pretty unique on the South Coast (of England)."

"We're currently, simultaneously, undertaking several 12,000 hour overhauls on Stork-Wartsila FHD 240s, 30,000 hour overhauls on Ruston RK270s, the 20-cylinder engines, and several overhauls on Scania D12 generators."

SMS Group offers national coverage from the business's seven primary sites in Lowestoft, Dover, Portsmouth, Southampton, Poole, Bristol and Plymouth. From the sites, the SMS Group will also be offering interior outfit in 2019. In addition, Dan Lockyer joined SMS after Christmas 2018 as outfit manager. "We've exemplary relationships with very many ferry operators, commercial ship operators, superyacht owners and defense contractors."

NAVY/COAST GUARD

Bath Iron Works: DDG 51 Contract

The U.S. Navy awarded General Dynamics Bath Iron Works a contract to build a fifth DDG 51 destroyer as part of the multi-year award announced in September. In the most recent multi-year competition, BIW was awarded four ships. The Navy held a separate competition for an option ship as part of its commitment to growing the fleet. There are currently five DDG 51 destroyers in production at Bath Iron Works: Daniel Inouye (DDG 118), Carl M. Levin (DDG 120), John Basilone (DDG 122), Harvey C. Barnum (DDG 124) and Patrick Gallagher (DDG 127). The shipyard's backlog includes Louis H. Wilson Jr. (DDG 126) and the five ships that are part of the multi-year contract awarded this fall. BIW also is building the third

Photo: Incat

Photo: MV Werften

Zumwalt-class destroyer, Lyndon B. Johnson (DDG-1002).

HII: Two More USCG NS Cutters

At the end of 2018 Huntington Ingalls Industries' Ingalls Shipbuilding division won nearly $1B in contracts from the U.S. Coast Guard to build two additional National Security Cutters. The contract values for the a 10th and 11th ships in the program are $468.75 million for NSC 10 and $462.13 million for NSC 11.

NSCs are 418 x 54 ft. and displace 4,500 tons with a full load. They have a top speed of 28 knots, a range of 12,000 miles, an endurance of 60 days and a crew of 120. To date Ingalls has delivered seven NSCs, the flagships of the Coast Guard's cutter fleet, designed to replace the 12 Hamilton-class high-endurance cutters that entered service in the 1960s. The seventh ship, Kimball (WMSL 756), will be commissioned in Hawaii on Jan. 19. Both the eighth ship, Midgett (WMSL 757), and the ninth, Stone (WMSL 758), are currently under construction at Ingalls. Midgett is scheduled for its first set of sea trials in the first quarter of 2019. Stone is scheduled to launch in 2019.

COMMERCIAL NEWBUILD

110m Cat Named Saint John Paul II

Shipbuilder Incat launched the 110m vehicle/passenger ferry from the shipyard at Derwent Park in Hobart Tasmania. The ship was scheduled to commence sea trials in mid-January prior to delivery to her new owner Virtu Ferries for service between Malta and Sicily.

Dubbed Saint John Paul II, the ferry was named in honor of the Pope who served from 1978 to 2005. It is the second Incat ship named in honor of a Pope; in 2013 Buquebus named their Incat 99 metre ship Francisco in honor of Argentina-born Pope Francis.

This new 110m wave piercing catamaran will be the 15th fast ferry Virtu has acquired, it will be the largest high-speed catamaran in the Mediterranean and with a service speed up to 38 knots it will complete the crossing from Malta to Sicily, berth to berth, in around 90 minutes.

"Virtu Ferries is amongst the oldest, most respected and most discerning fast ferry operators in the world, operating a variety of high speed ship services throughout the Mediterranean and Adriatic," said Robert Clifford, Chairman of Australian shipbuilder Incat Tasmania.

For Virtu Ferries this new vessel provides a significant increase in capacity, the 490 truck lane meters offering 43% more truck capacity, with 15% more passenger capacity and 7% more car capacity than their previous craft. It is fitted with a total of 1120 seats. The design was modelled by Revolution Design and Seaspeed Consulting and then extensively tank tested and optimised at QinetiQ.

The ferry has been built under the DNV-GL rules and comply with IMO High Speed Craft HSC 2000, the Malta Flag statutory requirements and Italian Port State requirements, and will fly the Malta flag.

IN THE SHIPYARD

NASSCO Commissions New Panel Line

General Dynamics NASSCO held a ribbon-cutting ceremony recently to commission its new panel line, a panel line which enables distortion-free welding of plates as thin as five mm to produce lighter, more energy efficient ships. The new facility uses hybrid laser arc welding and numerically controlled robots to mill, seam and weld steel panels in a highly automated production line. These features improve capacity, quality, accuracy and cycle time, and are expected to double steel processing rates.

Four ships are currently under construction at the San Diego shipyard, including two containerships for Matson Inc., and the first TAO-205 -class oiler for the U.S. Navy, all of which will feature steel from the new panel line. An expeditionary sea base for the Navy is also under construction.

MV WERFTEN: New Shipbuilding Hall Complex

An advanced Pemamek welding plant was put into operation at the MV WERFTEN yard in Rostock. "The new plant enables us to make a significant increase in the capacity of our steel prefabrication for the global cruise ships in Rostock and take a further, important step towards Industry 4.0. It is one of the most innovative laser-hybrid panel lines in Europe and also unique, as it is specially tailored to our processes and the Global Class," said Peter Fetten, CEO of MV WERFTEN.

The semi-automatic, highly efficient plant is the heart of the 400-m long hall area 11.1 and the entire steel prefabrication at the yard. Panels measuring up to 25 x 16 meters will be produced with it.

Its features include a one-sided butt welding station with laser-hybrid welding head and additional MAG tandem welding heads with integrated milling, automated profile assembling with two-sided fillet welding of profiles using the laser-hybrid process and programmable robot portals. The highly automated thin panel welding line optimally fits the digitalization and logistics concept of MV WERFTEN.

The German Federal State of Mecklenburg-Western Pomerania and the German Federal Government granted six million Euros in support of innovation for the technologically advanced production plant. The Fraunhofer Institute in Rostock carried out the feasibility study on optimized cycle times, while a Schwerin-based firm supplied the system control for coordinating the cranes and welding portals.

U.S. Shipyard Updates

With 2018 in the rearview mirror, Maritime Reporter & Engineering News takes stock of a challenging, but innovative year in and around U.S. shipyards, with a look ahead for what's to come in 2019.

By Lisa Overing

All-American Marine

All-American Marine delivered Enhydra, a 128-ft. passenger vessel for San Francisco. Launched in September 2018, it is a lithium ion hybrid electric powered monohull. The yard also built a high-speed whale watching boat, Saratoga, a 73-ft. hydrofoil assisted catamaran hull as well as Salish Explorer for Argosy Cruises in Seattle. "It was a very busy year," said Bronson Lamb. "We moved into a new 57,000 sq. ft. facility in Bellingham, Wash., last fall, and Saratoga was the first vessel fully built in the new facility."

In 2019, All-American will potentially launch three vessels. These include two for Kitsap Transit, one a 70-ft. hydroelectric passenger ferry, as well as another ultra low-weight passenger ferry stemming from the success for the Rich Passage, previously built for Kitsap.

Blount Boats

Blount Boats reports brisk business in 2018, too, according to Christopher Petit. The yard will deliver 132-ft. doubled ended vessel for N.Y. in September 2019, along with an 85-ft. Fire Island ferry, and a 102-ft. doubled ended vessel for October. "We have the NY Power Authority's vessel (a 56-ft. subchapter M icebreaking tug) in build for October 2019," said Petit, also noting that Blount "built the first U.S. flag wind farm vessel."

Bollinger Shipyards

Bollinger Shipyards is full of new construction for both commercial and government customers, with the construction of USCG fast response cutters remaining a staple for the yard. "We've delivered 31 of the 58," said Chris Remont. "The program is going very well, with vessels over-performing anticipated mission criteria."

The USCG multi-mission vessels perform search and rescue, drug interdiction and humanitarian relief. "Lockport is dedicated for USCG work," said Remont, noting that the oil and gas market is still tight. "We're looking at other government programs and participating in several design studies, so we are hopeful."

With multiple yards at its disposal, Bollinger focuses Amelia for new construction and commercial work, with repair work and refits in Fourchon and Morgan City. Other projects include ATBs for Bouchard and Crowley, a floodgate and a ferry for North Carolina.

Bollinger is also in the competition to build the next-gen Polar Security cutters for the U.S. Coast Guard, one of the highest-profile contracts expected in 2019.

Colonna Shipyard

Colonna Shipyard had a good year with a busy schedule. A new 11,500T dry dock went into service in 2017, M/V Charles J. Colonna has three active MSC contracts with a wide variety of tugs, barges and dredge equipment, with a good workload in fabrication with Steel America, bluewater tugs in coastal transportation and ship checks. "We are home to the Atlantic fleet of U.S. Navy," said Thomas Godfrey. "We have a three year upward trend in overall business volume. The trend for looks like an increase in business compared to 2017, and it looks like 2019 will be an increase over 2018."

Detyens Shipyards

Detyens Shipyards is busy today with a promising outlook in 2019, according to Loy Stewart, Jr., president and owner. "We were fortunate in 2018 with a fair amount of work," said Stewart. "In 2018 we saw a variety of vessels. We've worked on Military Sealift Command (MSC) & MARAD vessels, oilers/tankers, RoRo's, container ships, EPF's, a casino boat, Emerald Princess and a boutique cruise ship, Pearl Mist. Local dredge and tug vessels frequented the yard in 2018, a pair of container vessels from Hyde Shipping, a dozen or so foreign flagged vessels and a high-speed passenger ferry, Alakai operated by Bay Ferries for the Maine to Nova Scotia run.

Eastern Shipbuilding Group

Eastern Shipbuilding had an incredible year, with strong bid activity characterizing 2018 and continued, resilient operation as its employee base lives in ground zero from Hurricane Michael. The strongest storm ever recorded in this area, Michael slammed into Florida's Panhandle on October 10 as a Category 4 hurricane with maximum sustained winds of 155 mph, cutting a 50-mile swath of destruction.

Eastern established a GoFundMe account for its employees, distributing $177,200 in financial aid to over 440 impacted employees. As the yard and its worker fight return to normal, work will be consistent and demanding for its employees, as the yard adding to the backlog of vessel bids going into 2019.

"As long as our bid activity is strong, and we've been that way, we'll win additional contracts," said Stephen Berthold, adding "It's been a busy year with projects. We signed two tugs with EN Bisso Offshore in New Orleans, a repeat client who ordered four tugs in the past."

Eastern is also building four vessels for Florida Marine Transporters (FMT), 90-ft. inland push boats, for 2019 - 2020 delivery. Hull 200 represents the 70th vessel of a series built over a 12-year relationship for this repeat client, making it the largest post WWII, single owner, single shipbuilder new construction program with the same class towboat design in U.S. history according to the yard. The shipyard is also building a USCG Offshore Patrol Cutter (OPC). The Coast Guard awarded detail design for the Offshore Patrol Cutter to Eastern with delivery of the lead ship, USCGC Argus, planned for fiscal year 2021. NYCDOT Staten Island Ferry ordered three, 320-ft. double-ended passenger ferries for river service in New York Harbor.

In addition, Eastern launched its second escort/rescue Z-Drive Tug Ava M. McAllister on December 7, 2018, less than two months after Hurricane Michael devastated the Florida Panhandle.

Eastern Shipbuilding Group/Ava M McAllister

Photo courtesy of Eastern Shipbuilding

Detyens Shipyards/Pearl Mist

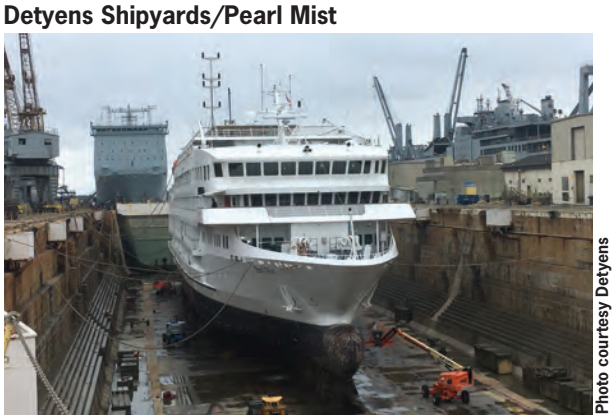


Photo courtesy Detyens

St. John's Shipbuilding/100 ft. Tug

Photo courtesy St John's

Fincantieri Bay Shipbuilding

"2018 was a reasonably good year for Fincantieri Bay," said Todd Thayse. 'We were a bit down for 2015, 2016 and 2017. We continue working our backlog down and delivered a set of ATBs in 2018." The yard signed contract for a 740-ft. self-unloading bulk barge. "2019 looks as though will be a reasonably average year," he said.

Fraser Shipyards

Steel-builder Fraser Shipyards and its sister company, aluminum-fabricator Lake Assault Boats both had good years, according to Dave Steininger, delivering 20 aluminum boats in 2018, with a car ferry in production. "Aluminum will be up quite a bit next year," said Steininger. "Nice backlog," he said. "In the repair business, last year was nice and this year is great. We're optimistic about next season, primarily ore and coal bulk carriers, 600-1,000T class vessels."

Malin International Ship Repair & Drydock

2018 was a slow year for Malin, but David Dudley is optimistic looking ahead. "It seems like industry is starting to pick up and 2019 looks promising," said Dudley. "A lot of bids out that we're waiting on. We are a one-stop-shop, with a repair facility, full fabrication shop, machine shop, joinery shop and sand blasting for barges, tugs, ferries, oil platforms and research vessels. We have 1,100-ft. of bulkhead with a 27-ft. draft. We will take any kind of boat."

Metal Shark

Rapid expansion as a diversified shipbuilder continued in 2018, with Metal Shark building and delivering over 200 vessels, including two significant U.S. Navy contracts, in addition to six, 45-foot patrol boats for Vietnam Coast Guard and four units for a 12-boat, 38-foot patrol boat order for the Dutch Caribbean Coast Guard. Metal Shark built more than 17 passenger ferries for New Orleans, New York, and Washington DC. For the pilot boat market, Metal Shark's new Defiant line delivered a new 45-ft. pilot boat to the Virgin Islands Port Authority and with a contract for a 64-ft. pilot boat for Brazos Pilots, a similar design to the 64 hydrographic survey vessel delivered to Army Corps of Engineers. In June, Metal Shark acquired Horizon Shipbuilding, significantly expanding the company's steel shipbuilding capabilities and capacity. In November, Metal Shark announced a multi-boat order of 120 x 35 four-decked steel towboats for Florida Marine Transporters. With the addition of Horizon's 35-acre yard and 660-ton Marine Travelift, Metal Shark expanded into the refit and conversion sector with several projects underway. Metal Shark debuted its first Sharktech autonomous vessel at MACC.

North River Boats

2018 was a good year for North River Boats, with growth on its recreational business. "About 60 - 65-percent of our business is recreational production," said Mike Blocher. "It's a very strong market. We're roughly about a year out and the majority of product line for 2019 is booked out already." North River is adding a new 750-sq. ft. building in 2019 to complement its Workskiff fabrication line. "A small portion is dedicated to fabrication training," said Blocher, adding "We are recruiting 35 employees. We're adding a fourth paint booth. We will have extra capacity for 2020 and are set up for a five-year growth pattern."

St. John's Shipbuilding

St. John's Shipbuilding has several vessels in production. "This was a very busy year in 2018," said Bobby Barfield. "2019 will be just as busy." Projects include four, 152-ft. aluminum car ferries, a 100-ft. aluminum hull passenger ferry, 150 x 54-ft. ABS deck barge for Mobro Marine, and a dozen 30 x 75 ft. barges for an amusement park in central Florida. "We are building two, 25-ft. truckable tugs and multiple sectional barges are here for dock repair," said Barfield. "We also had an ATB conversion and a 100-ft., 200-hp offshore tug."

VT Halter

2019 is going to be an active year for both government and commercial activities and VT Halter. "We were awarded APL Barrcks program (barge) for USN," said Robert Socha. "We have two vessels with options of $244 million." A highlight is the yard's commercial activity is building 4000 cu. m. LNG ATB bunkering unit. "This is America's first, offshore LNG Articulated Tug and Barge operated in the Jones Act trade. We also delivered commercial ATB tugs for Bouchard Transportation."

VT Halter/Q-LNG 4000

Photo courtesy Metal Shark

Colonna Shipyard/Caisson for USN graving Dock

Photo courtesy Colonna

All American Marine/Enhydra

Photo courtesy All American Marine

Fraser Shipyards/Marine 24

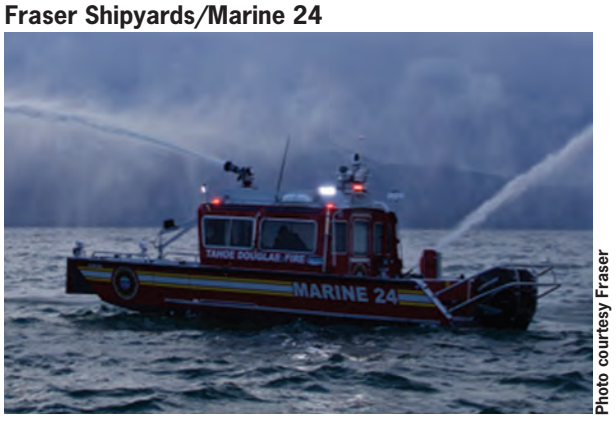


Photo courtesy Fraser

VT Halter/Q-LNG 4000

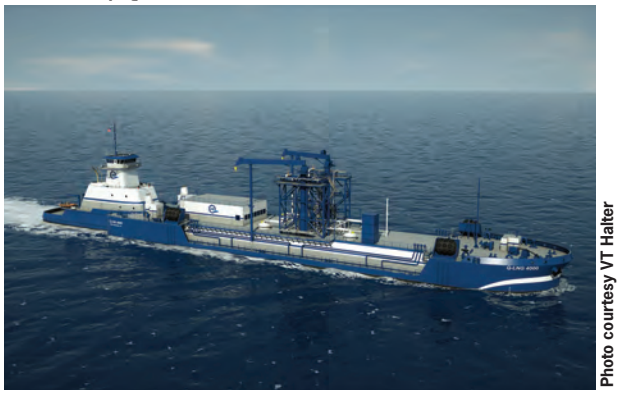


Photo courtesy VT Halter

Green Cruising

Hurtigruten orders third hybrid-powered expedition cruise ship

Hurtigruten has plans for cruises to a wide range of new destinations, including the Norway Fjords, Svalbard, Russia, South America and Antarctica.
Photo: Hurtigruten

Growth in the global cruise sector continues, as Hurtigruten, the world's largest expedition cruise operator, signed an MOU with shipbuilder Kleven Verft AS for the construction of a third hybrid-powered expedition cruise ship. ***Tom Mulligan****, Maritime Reporter's Science & Technology writer, reports from Norway.*

"We are thrilled to introduce yet another revolutionary hybrid-powered expedition ship," enthused Hurtigruten's CEO, Daniel Skjeldam. "This groundbreaking vessel will take our guests to some of the most spectacular areas of our planet, in a more sustainable and environmentally-friendly way than ever seen before," he stated.

The new ship's design, construction, engineering and advanced technology will be based on Hurtigruten's two next-generation ships, MS Roald Amundsen and MS Fridtjof Nansen, currently under construction at the Kleven Verft yard in Ulsteinvik, Norway.

The new expedition ship, accommodating 530 guests, will be custom-built for some of the most extreme conditions to be encountered, having a specially-designed, ice-strengthened hull and expected to be delivered in Q2 2021. Hurtigruten is introducing the MS Roald Amundsen and the MS Fridtjof Nansen, the world's first hybrid battery-powered cruise ships, in Q1 and Q3 2019, respectively, with the new third hybrid powered expedition vessel expected to be added to the company's fleet in 2021.

"These are greener, more advanced cruise ships than the world has ever seen – and ships that will raise standards for the whole industry to follow as we enter a new era of expedition cruising driven by sustainability," said Skjeldam. Among the innovative green features on the new ship are substantially larger battery packs to make expedition voyages even more sustainable.

Having celebrated its 125th anniversary last year (2018), Hurtigruten currently has a fleet of 17 custom-built expedition ships exploring a wide range of destinations that includes Antarctica, South America, Norway, Svalbard, Greenland, the North-West Passage and other Arctic destinations.

"We strongly believe that Hurtigruten, and our responsible and innovative approach to sustainable solutions, is the perfect fit for the modern-day explorer. Hurtigruten is experiencing substantial global growth. The expansion we have seen so far is just the beginning," said Skjeldam.

Fish power

As well as introducing its three new hybrid battery-powered cruise vessels, Hurtigruten is refitting its current fleet of ships to make them less polluting and is planning to use a by-product of rotten fish to help power their new, leaner engines. In a $826 million, three-year investment,

the whole of the company's fleet will be adapted for greener operations, with six of its older vessels being retrofitted to run on a combination of liquefied natural gas (LNG), batteries and liquefied biogas (LBG).

"We are talking about an energy source from organic waste, which would otherwise have gone up in the air. This is waste material from dead fish, from agriculture and from forestry. Our main aim is to reduce and cut out emissions," said Skjeldam.

The shipping sector is facing tougher international regulations, including cuts in carbon dioxide emissions by at least 50 percent by 2050 compared with 2008 levels, and a ban on fuels with sulfur content above 0.5 percent from 2020 against the current limit of 3.5 percent. Hurtigruten has said that it wants to be carbon-neutral by 2050: "We definitely have to be there in 2050 as a company and the cruise industry must definitely have to come a long way as well," said Skjeldam, adding that Hurtigruten's three new hybrid-powered ships, which will run on batteries with a diesel engine for back-up only, will help the company market itself as a green cruise company, and that this will be especially useful given that its ships sail through vulnerable eco-systems.

"The changes in the Arctic over the past 20-30 years are not caused by carbon dioxide emissions in the Arctic, but you can see the effects of the emissions elsewhere in the world first in the Arctic," he said. "Our crews have seen glaciers retreat and plastic waste on beaches where they land."

Plastic-free

Adding to the company's green credentials is Hurtigruten's ambition to become the world's first plastic-free shipping company. The company has already banned single-use plastic and items ranging from plastic straws, drink mixers, plastic cups, coffee lids and plastic bags have all been removed from its ships. "At Hurtigruten, we have focused on the problem of plastic pollution for years. There is a lot of talk about the impact plastic has on our oceans. But it's time to take action." said Skjeldam.

An estimated 15 metric tons of plastic ends up in the world's oceans every minute of the day. If this trend continues, this number will double in the next 10 years, meaning that, by weight, there will be more plastic than fish in the oceans by 2050: "Plastic pollution is the single biggest threat to our oceans" said Skjeldam.

"Hurtigruten operates in some of the most vulnerable areas in the world. This means that we carry a special responsibility to protect these areas for the local population and future generations of explorers."

Hurtigruten's single-use plastics ban will be effective across its entire fleet of custom-built expedition vessels and will also be imposed on the hotels, restaurants and other establishments that make up the company's land-based operations on Svalbard. These are operated by the company's fully-owned subsidiary, Hurtigruten Svalbard.

Challenge to suppliers

In addition to the its internal ban on single-use plastic, Hurtigruten is challenging all its suppliers to reduce and cut the use of plastic:

"No one can win the war on plastic alone without allies. This is why we implement high demands on our suppliers. Our goal is to become the world's first plastic-free shipping company and this is our first step," said Skjeldam. In addition to the introduction of its ban on single-use plastic, Hurtigruten is advocating a ban on HFO and stricter regulations to be applied to vessels that operate in 'pristine' destinations. In support of its position, the company is involved in environmental research, and funds both local and global projects through the Hurtigruten Foundation.

New guest experiences

Hurtigruten is expanding its greenest expedition cruise program with a number of new and unique destinations. From 2020, guests will be able to explore the Alaskan wilderness on board the MS Roald Amundsen, while the inaugural season of its sister eco-friendly ship, the MS Fridtjof Nansen, will explore the unspoiled beauty of Antarctica, Greenland, Iceland and the Norwegian coast. In addition, a complete makeover for one of the company's most popular cruise vessels, the MS Fram, will see it emerge as a brand-new expedition ship. However, the most notable development within the company's cruise program will be the addition of a series of expedition cruises to Alsaka, starting in the summer of 2020. This represents another first for the company and the expedition cruise market, with the MS Roald Amundsen having been chosen as the operative vessel for this new route, concluding its 2020 Alaska season by conducting an epic North-West Passage transit from Nome, Alaska via Greenland to Halifax, Nova Scotia. Hurtigruten also has plans for cruises to even more new destinations, including South America, Antarctica, Svalbard and Russia.

The new technology on board its newest expedition cruise vessels is designed to take the Hurtigruten expedition cruise guest experience to a new level, with the centerpiece being the tallest LED screen at sea, having a height of 17.5 meters and spanning seven decks. It will be located in the ship's atrium beside the main guest entrance and will show live broadcasts transmitted from outside the ship.

Facing the three all-glass elevators, the screen will reach up to and include Deck 10 of the eleven-deck vessel, the state-of-the-art LED technology, with a screen resolution beyond 4K Ultra-HD, providing a seamless and borderless display.

The guest experience will also be enhanced, according to Skjeldam, by the ship's modern Scandinavian design, with features ranging from the high-tech Amundsen Science Center, several observation decks, an infinity pool, a panoramic sauna, wellness center, three restaurants, a number of bars, the Explorer Lounge, and aft-facing suites with private outdoor hot tubs.

Hurtigruten has also announced that the world's first captain of a hybrid expedition ship will be Captain Kai Albrigtsen (54) who will be at the helm of the MS Roald Amundsen when the ship embarks on its maiden voyage in May 2019. Albrigtsen has held a number of different positions on board more than ten Hurtigruten vessels and completed his first expedition to Antarctica in 2003. He rose to the rank of captain in 2006.

The Kleven Verft AS shipbuilding yard (right) in Ulsteinvik, Norway is the construction site for Hurtigruten's next-generation ships.
Photo: Kleven Verft AS

The MS Roald Amundsen (below left) under construction at the Kleven Verft AS yard in Ulsteinvik, Norway.
Photo: Hurtigruten

The Hurtigruten ships (below) will feature several observation decks, an infinity pool and a panoramic sauna, plus an outdoor jacuzzi on the uppermost deck.
Photo: Hurtigruten

The Cost of Green

(Photo Credit: Crowey)

Low sulphur fuels, scrubbers, LNG or other alternative fuels; picking the tech is one matter, paying for it quite another

Crowley has been a leader in the adoption and integration of 'green' tech across its fleet of ships and boats.
Photo: Crowley Maritime

By Barry Parker

By any measure, the business of running vessels will not be the same after January 1, 2020, when the present 3.5% limit on sulfur content will ratchet downward to 0.5%. With the implementation date for the changes, enacted in late 2016 by the International Maritime Organization (IMO) and recently reiterated in the face of challenges by shipping organizations, less than one year from now, cost structures will certainly change.

Roughly, what will the increased costs be? Using a thick crayon on the back of an envelope, we could estimate that 50,000 deepsea ships burning an average of 30 + tons/day of residual fuels, operating 250 days/year in international trades, will need to pay an extra $250/ton (a reference number in line with recent price differentials) for fuel – a figure approaching a staggering $100 billion annually – with all else held constant. Maersk has said, "The additional cost for the global container shipping industry to comply could be up to $15 billion. Maersk expects its extra fuel costs could exceed $2 billion." Separately, Hapag Lloyd has estimated its extra cost at around $1 billion annually.

This starting point, however, and reflecting only the costs associated with lower sulfur content, is possibly at the low end of outcomes. That's because it does not consider a rise in oil prices as refiners push more crude oil (and limited amounts of residual) through their crackers and distillation towers.

A September 2018 article by consultants McKinsey noted "Demand for high-sulfur residual fuel oil for ship bunkers was 3.5 million barrels per day in 2018 – out of 7 million barrels per day of total residual demand – and the global refining system is not yet equipped to make this volume of residual fuel oil at 0.5 percent sulfur once the regulation goes into effect."

All that said; the precise magnitude, and even the directions of impacts on shipping company's bottom lines, is not known. The unknowns are dictated by normally unpredictable shipping market forces and by exogenous impacts of business decisions of oil refiners and downstream participants, all of which impact available supplies of compliant fuels.

The $250/ton number, and variability surrounding it, does not address strategic advantages may be gained (or lost) relative to competitors, who may adapt different business strategies than their peers. Outcomes are not static; they may move around in a dynamic marketplace.

Who Pays the Bill?

Indeed, the profit number emerging from the income statement starts with the top line, and leverages the uncertain proportion of cost increases that can be passed on to cargo interests paying the freight, or conversely, what degree of owners "savings" can be extracted by the cargo side. More "cost recovery" by shipowners (or less ability of the cargo side to capture "savings") is possible in strong freight markets, than in weak markets (where those paying the freight can drive it downwards).

Much of the conversation centers on scrubber economics and ROIs, with loud voices reverberating from a normally very quiet industry. The business case for scrubbers is defined simply: The capital cost can be paid for by savings in purchasing high sulfur fuel (IFO 380 and similar) relative to their competitors who burn low sulfur fuels (0.5% compliant). The greater the price differential (or 'spread'), the quicker that capital expenditure can be paid off.

But what if the owners wish to capture part of the "savings" in time charter deals where a vessel charterer pays for fuel and the charterer wishes for a scrubber to be

ALTERNATIVE FUELS

MAN Cryo developed a marine fuel-gas system for liquefied hydrogen.

Photo: MAN Cryo

SCRUBBERS

Yara Marine scrubber installation on a cruise ship being built in Germany.

Photo: Meyer Werft

WIND POWER

MV Fehn Pollux in operation with installed EcoFlettner rotor. .

Photo: ©Fehn Ship Management

installed? Industry association BIMCO is attempting to bring some commercial clarity. In describing a proposed charter party clause due to be published in Q1 2019, it says: "…The main issue that the scrubber clause is likely to address is possible cost sharing between owners and charterers of the installation of a scrubber. The clause could provide a cost sharing formula based on the expected life of the scrubber versus the duration or remaining duration of a time charter."

Savvy financial structuring may be able to put price differentials to real use in the bulk shipping realm. Nikos Petrakokos, Vice President, Head of Maritime Environmental Innovation, at Seabury Securities, said, "Through the structure of our Seabury Maritime specialized agreements, it is possible to monetize 'savings' that are likely to accrue to consumers of high sulfur fuels, and partially use streams of such savings or charter premiums to cover the costs of exhaust gas 'scrubbers' without draining cash reserves."

On the liner side, the challenges are different, as carriers have unveiled a new type of "black box" in arriving at fuel surcharges. Maersk, in the fate of its estimated $2 billion extra expenditure, announced in September, 2018, that it would preemptively implement Bunker Adjustment Factors, commencing in January 2019, according to a series of (hidden) formulae which consider bunker prices at selected ports (3.5% sulfur throughout 2019, then 0.5% sulfur), with fuel intensity of particular trade routes. In the first iteration, using a notional IFO 380 price of $400/ton the new bunker surcharge, for a 40' box, ranged from $90 (USWC to Far East) to $600 (ECSA to N Europe), with the mainline Far East to Northern Europe route pegged at $480 per box. Hapag Lloyd announced that it too would be developing a new fuel pricing formula.

The lack of transparency is a problem.

ROUGHLY, WHAT WILL THE INCREASED COSTS BE?

WE COULD ESTIMATE THAT 50,000 DEEPSEA SHIPS BURNING AN AVERAGE OF 30 + TONS/ DAY OF RESIDUAL FUELS, OPERATING 250 DAYS/YEAR IN INTERNATIONAL TRADES, WILL NEED TO PAY AN EXTRA $250/TON FOR FUEL – A FIGURE APPROACHING A STAGGERING $100 BILLION ANNUALLY – WITH ALL ELSE HELD CONSTANT.

An October 2018 article by Philip Damas, Head of London-based Drewry Supply Chain Advisors, offered, "Given the scale of the extra costs triggered by the new regulation and the carriers' expectations that their pricing and fuel charge mechanism with customers must be restructured, there is a need for carriers to address the transparency concerns expressed by their customers."

More Clarity on Prices: From where?

The back of the envelope calculation above starts with a 'spread' of $250/tonne being in effect at the outset of the new rules, in January 2020. That uncertain number reflects pricing of Jan 2020 delivery traded contracts on low sulfur gasoil, versus 3.5% fuel oil throughout 2016 and 2017. During the scrubber-mania phase of mid 2018, as oil prices were turning upward, the spread reached over $400/ton; by end 2018, it had backed down to $300/ ton. Uncertainty over fuel prices prevails, with experts, insiders and stakeholder all over the map.

One school of analysts sees residual fuel prices dropping dramatically (which would widen the spread), in early 2020, as refiners cannot process it into higher value outputs. Well known energy consultants Wood McKenzie wrote in September 2018, that: "Displaced HSFO can be processed within the global refining system's spare residue upgrading capacity, but its discount to crude needs to widen to make using this spare capacity economical." They added "We also believe that by 2020, the price differential between gas oil and HSFO will be roughly double the 2017 differential." Drewry agrees, suggesting in an October 2018 article, as energy prices neared their zenith) that "Based on independent 'futures' prices, low-sulphur marine fuel prices per tonne will be 55% higher than current high-sulphur fuels and Drewry considers that the probable 'worst case' scenario is that fuel costs (paid by carriers) and fuel surcharges (paid by shippers) in global container shipping will increase by 55-60% in January 2020." These numbers imply spreads – of IMO low sulfur compliant fuels above high sulfur marine fuels, on the order of $300 to $400/ ton, or more.

Another view, that of narrowing spreads (and, hence, a weaker business case for scrubbers) is borne out by shipping executive Paddy Rodgers, who heads up large tanker owner Euronav. He said, in an October Bloomberg interview that certain refiners have said: "The spread between the old [high sulfur] and the new [low sulfur] fuels will be half of that the analysts have suggested." He added, "We believe that a year out, that's going to come down even further as more oil becomes available and our costs are not materially affected." Laura Blewitt, Energy Fundamentals Analyst at RBN Energy, told MLPro, "With the spread narrowing nearly $100/ton in the past six months to the $300 range, I see trader's confidence in the availability of low-sulfur marine fuel supply is growing."

Ralph Grimmer, Senior Associate at transport fuels consultant Stillwater Associates, based in Irvine, California, noted

"Through the structure of our Seabury Maritime specialized agreements, **it is possible to monetize 'savings'** *that are likely to accrue to consumers of high sulfur fuels"*

Nikos Petrakokos, *VP, Head of Maritime Environmental Innovation, Seabury Securities*

the challenges bedeviling price forecasters. "All things being equal," he said, "lower crude prices should result in lower product prices, potentially minimizing the negative price impact of impact of IMO 2020 if Brent doesn't climb back to summer 2018 levels." Nevertheless, Grimmer cautions, "With all of the above factors changing IMO 2020 marketplace dynamics markedly over the past 6 months, forward prices and differentials are still a moving target. Many observers have thought that current futures prices through 2020 understated the likely impact of IMO 2020." More clarity on pricing for low sulfur marine fuels and relevant spreads is emerging, starting in December 2018. Two futures exchanges, the New York Mercantile Exchange and the Intercontinental Commodity Exchange (ICE) will initiate contracts specifically on 0.5% sulfur marine fuels. The CME contract (which will settle against prices posted by Platts), began trading December 10th on the electronic GLOBEX platform. The ICE contract was still awaiting regulatory approvals as MLPro went to press.

Matt Muenster, Senior Manager, Applied Knowledge for Breakthrough Fuels, also weighed in. "While it's true Monday, December 10th, was the first day of trading on NYMEX (CME) Globex, 0.5 percent futures, we have yet to see trade volume begin to move prices in the market. This is not particularly surprising for new products on an exchange. Of course, the interest on these futures will pick up as we move closer to the coming regulatory timelines and as clearer expectations for the price of oil in 2019-2020 take shape."

Ralph Grimmer stressed the role of futures in demystifying the post 2020 landscape, saying, "With the emergence of futures and transactional prices for IMO 2020-compliant marine fuel becoming visible in December and January, industry will finally have a more tangible basis for preparing to optimize operations beginning in late 2019. Shipowners, refiners, and bunker suppliers will all benefit from this increase in price visibility."

Matt Muenster offered a similar sentiment. "Most forecasts still peg 0.5 percent <sulfur> prices in a range of 75 to 90 percent of LS MGO 0.1 percent. Bearing these figures in mind and analyzing established futures markets for IFO 380 and LS MGO reveals it is presently reasonable to expect 0.5 percent sulfur fuels to have at least the premium LS MGO had over IFO 380 across geographies in the past year, or about $225-$250 per metric ton. Estimates with steeper discounts to high sulfur fuel oil due to excess supply have pushed this figure closer to $300 per metric ton."

Looking ahead, the only thing that is truly clear is that there are many variables – most of them difficult to predict – that will impact the cost of 'green' in the future for shipping. Less clear is how much green it will take to produce that greener footprint that the IMO aims to produce. Shipping is going to get cleaner and more expensive as the January 2020 deadline comes and goes. All that said; the former metric will be much easier to predict than the latter. That much we can count on.

Excerpted in part from the November/December 2018 edition of Maritime Logistics Professional.

Remote Reporting

Beyond the issue of sulfur emissions, the industry's Greenhouse Gas emissions (CO2) have been the subject of scrutiny in the broader context of climate change. With effect from 2013, new vessels have adhered to the IMO's Energy Efficiency Design Index (EEDI), which sets a minimum energy efficiency per ton mile for different vessel types and sizes, letting owners pick the best solution that meets the standards. The standards will continue to be tightened in subsequent phases, and the IMO's Marine Environmental Protection Committee (MEPC) will be publishing a revised strategy for lowering CO2 emissions, in 2023. As part of its efforts to evaluate its progress, and inform the new strategies for reducing the industry's carbon footprint, the European Union, for vessels calling at member nation's ports, has now begun to collect data on fuel consumption of vessels greater than 5,000 gt, beginning with 2018 data to be submitted in early 2019.This parallels the IMO's data collection efforts, for similarly sized vessels on international voyages calling at member nations' ports, where submissions of 2019 data will be made starting at the beginning of 2020 .

The Class societies, already at the forefront of industry digitalization, have developed software for reporting fuel consumption parameters to the European Commission, to the IMO and to Flag states. Their involvement complements their role as a verifier of the data. Over time, reporting may play into cost reduction; for example, the digital loop may include instructions back to the vessel on optimizing fuel burns by slowing down the vessels. All of this, of course, also comes at a cost to the global supply chain.

IMO 2020, IoT & the Enviro Agenda

While conservatism is a hallmark of maritime, research from Inmarsat finds that IoT may be helping turn the tech tide by delivering new solutions that ease rather than complicate compliance.

With environmental imperatives mounting, shipping's hesitation concerning new technology has been laid bare in an Inmarsat Research Program report that includes data on how far the industry sees IoT-based solutions as a gateway to sustainability. Directly out the porthole is the IMO 2020 fuel sulfur cap, but further along is 2050 the target to cut GHG ship emissions by 2050. In facing the fuel sulfur cap the industry is split between those seeing advantage in developing an environmental edge and those driven largely by compliance. As far as 2020 is concerned, compliance is becoming the imperative. Recently-published International Chamber of Shipping guidance, 'Compliance with the 2020 Global Sulphur Cap,' suggests that companies running ships without Exhaust Gas Recovery (scrubbers) will need to order compliant fuels (0.5% sulfur content) from mid-2019. ICS also strongly recommends developing ship-specific Implementation Plans as soon as possible. Shipping's opinion divide on the environment as technology driver is evident among 750 respondents to the Inmarsat research report 'Industrial IoT on land and at sea' (2018), which also drew on agriculture, energy, mining, transport and logistics and fishing industry professionals. The data behind the study has been revisited to isolate prevailing attitudes towards the role of the IoT in achieving environmental goals.

Environmental Monitoring is seen by 46% of shipping participants as one of the most important drivers for deploying IoT-based solutions.

Image: Inmarsat

Among shipping respondents, the report shows that environmental monitoring is seen by 46% of shipping participants as one of the most important drivers for deploying IoT-based solutions. Around 34% of organizations across the supply chain already see improvements in sustainability through their use of IoT, and 43% expect to do so in future. At first sight, then, experience and outlook of shipping respondents is moderately behind the curve, with 30% characterizing their organizations as achieving sustainability benefits by deploying IoT-based solutions, and 42% expecting to do so.

However, dig a little deeper, and shipping's unremarkable level of recognition of the IoT as an enabler for sustainability overall is exposed as disguising its notorious divide between technology progressives and laggards. Progressives are already showing themselves attuned to using IoT-based solutions as strategic tools to improve efficiency and enhancing energy usage. However, the new research shows that the maritime industry – like no other constituency – includes 14% of respondents who say that sustainability is not even one of their organisation's aims for IoT deployment.

In the cost-conscious world of shipping, it is surely more than coincidence that 14% of maritime respondents also believe that, even five years out, there will be no savings at all resulting from the adoption of IoT-based solutions. By way of comparison, some 54% of peers in the mass transit and inland distribution industries identify improving resource efficiency as a primary driver for IoT adoption. In fact, left to their own devices, shipping respondents overall cite health and safety more often as an IoT deployment driver (in 54% of cases), and they do so in greater numbers than the wider transport group (50%) or respondents overall (46%). However, as one of the world's most heavily regulated industries and as outlined above, shipping is seldom if ever left to its own devices. Perhaps one of the most interesting findings in the new report, therefore, is that it shows environmental regulation working strongly in favor of IoT deployment. Where only 19% of respondents overall categorized meeting regulations as a main driver for IoT deployment, shipping respondents cited it as a main motivator in 39% of cases – the highest proportion given by any group.

The IoT at Land and Sea report establishes that, despite its foot draggers, 47% of shipping respondents are collecting data for the purpose of environmental monitoring: this compares to 40% of respondents across the supply chain, and the same figure (40%) among wider transport industry respondents.

With 69% of maritime respondents in the current survey counting themselves as reliant on satellite connectivity to support their IoT-based solutions, Inmarsat is a proactive partner in addressing fuel efficiency. Notably, the satellite group has been working with Rolls-Royce to make the latter's Energy Management system available via Fleet Xpress. Recently, the satellite group also introduced Fleet Data, whose connectivity via the ship's VDR will enable real-time data analysis and decision-making, addressing a key point of resistance to IoT-based solutions identified in the Inmarsat report. Nevertheless, shipping's distinctly average enthusiasm overall for sustainability as a driver for IoT deployment contrasts strongly with the regulatory impetus to monitor fuel consumption that sees 65% reporting that they already use IoT-based solutions. An additional 9% say they will do so within a year while, in an apparent commitment to meet regulatory obligations, deployment is projected as reaching 100% by 2023. The preparedness no doubt reflects the fact that shipping is already required to meet the EU MRV (Monitoring, Reporting and Verification) scheme, while Fuel Consumption Reporting within the IMO Ship Energy Efficiency Management Plan is not far behind. By April 2019, and by the same month in subsequent years, for example, verified annual emission reports must be submitted for every ship above 5,000 gt to the EC and the relevant flag state.

OSM: Scrubber Retrofits by the Numbers

As pressure mounts to comply with the fast-approaching IMO 2020 sulfur cap, ship management company OSM is offering its assistance in the exhaust gas scrubber retrofit process.

"The IMO 2020 compliance deadline is coming fast, but the industry is still quite indecisive on which measures to take," said Ilias Soultanias, chief project engineer.

"As more owners and operators opt for scrubbers, it becomes more challenging to investigate options and secure equipment, book dry-docking slots and plan for the overall project. OSM's wide cooperation network gives us access to system manufacturers and engineering resources, ensuring timely and high-quality delivery of projects."

The IMO sulfur requirement targets fuel composition, but compliant fuels are either not widely available yet or quite costly. Scrubbing technology offers an option to comply by post-processing exhaust emissions using seawater to neutralize the emissions and clean them of sulfuric acids.

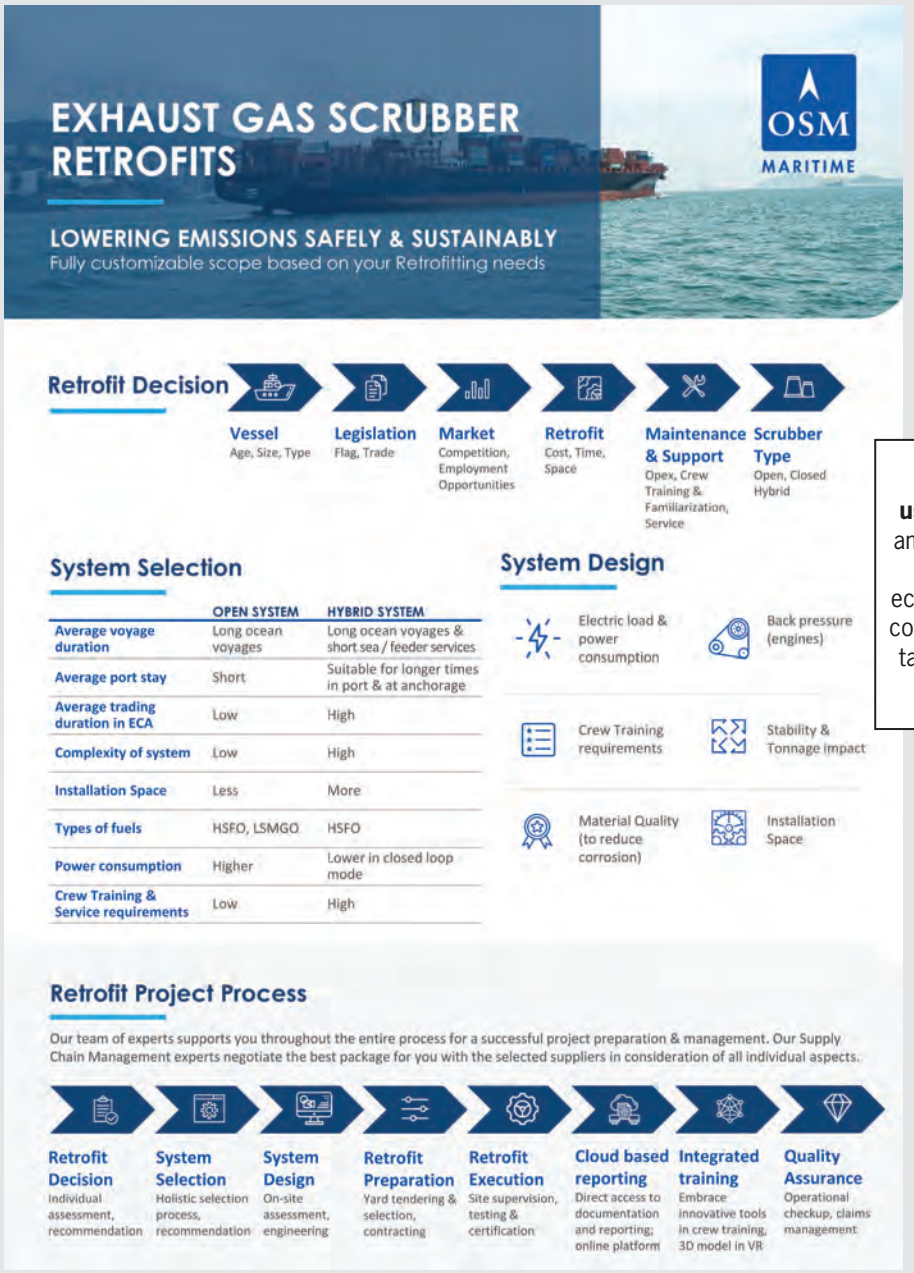
"The main advantage of using scrubbers as a compliance method is the continuous use of widely available and economical fuels instead of the compliant ones," said Soultanias.

All vessels are targeted in the new requirement, so means of compliance is a major decision that all owners have to make. Since fuel is often the responsibility of the charterer, it may also be in a charterer's interest to support an investment in scrubbers, especially for time charters. In any case, says Soultanias, OMS's team is ready to support any stakeholder requiring assistance and guidance through the solution selection and implementation.

"There are several stages in this complex process, from choosing the compliance method to verifying the installation with class.

Since there are many stakeholders involved and there is a time constraint, an owner may have already taken some decisions and require assistance only in certain parts of the process, and OSM can support them in any step as required," Soultanias said.

To strengthen their environmental service offering, OSM has recently recruited an Environmental Compliance Manager and a new Head of Risk Management & Quality Assurance. "We have strengthened our team to prepare for the coming wave of environmental regulations," Soultanias said. "There will be a rush on resources, and a lot of people asking a lot of questions. We want to be fully prepared to answer those questions, and to guide our clients and partners through the process of reducing their emissions, complying with international regulations, and helping to maintain sustainable growth and development in the industry."



"The main advantage of using scrubbers as a compliance method is the continuous use of widely available and economical fuels instead of the compliant ones," said Ilias Soultanias, chief project engineer.

Photo: OSM

Images: OSM

IMO 2020: More than Fuel Choice

Serge Dal Farra
has held the position of global marketing manager at Total Lubmarine since 2011, having worked in a variety of sales and marketing roles at the company, and an affiliate, since 1990. Before joining Total, Serge spent several years at sea as an engineer and deck officer. Serge is committed to industry-focused education initiatives, founding the Total Lubmarine Maritime Academy Support Program.

With a year to go before the implementation of the 2020 Sulfur Cap, few topics will be higher on the list of priorities for shipowners than complying with Annex VI of the IMO MARPOL Convention (2008). However, the reduction of sulfur content in marine fuel from 3.5% to 0.5% in time for the deadline means more than identifying a strategically suitable fuel choice. The importance of choosing the correct lubricant, coupled with incorporating the relevant supporting is also a vital consideration.

As both a global lubricant supplier and as a part of the wider Total Group, Total Lubmarine supports the implementation of the 2020 Sulfur Cap. We are committed to providing sustainable alternatives and we strongly believe that the new IMO regulations will be the driver for further technological evolution.

At the same time, we are committed to our customers and we are acutely aware of the operational challenges shipowners face. The lubrication of engines requires numerous and flexible solutions. We are committed to ensuring that there is industry understanding that developing lubricants, which are suitable post 2020, is more complex than simply tweaking existing products.

These challenges range from dealing with variable fuel quality and combustion to identifying optimum Base Number (BN) levels.

With a little under 12 months until the 2020 Sulfur Cap comes into force, we are beginning to see more shipowners making their choices, but there is still no clear consensus over the best strategy to comply with the upcoming regulation. For many newbuilding projects, scrub-

Case Study

Dole & Talusia Optima

Following the introduction of the 0.1% sulfur cap imposed within ECAs off the U.S. coast in 2015, Dole realized it had a problem. The engines of two of its vessels, 'Dole Chile' and 'Dole Columbia', which had been transporting fresh fruit from South to North America for the past 15 years, were suddenly suffering from rapid cylinder wear. This wear was so severe that liners and rings would need replacement within 100 hours of operation. The company was forced to fly in cylinder liners to keep the ships in service. Faced with problems meeting schedules and spiraling overheads, the situation was not good. It took over two years of experimentation with different lubricants and feed rates, timing adjustments and the installation of a completely new cylinder lubrication system before the situation returned to manageable levels. Despite this, liner wear rates and ring breakages were still much higher than normal. However, in the latter half of 2017, the company was informed by Total Lubmarine of its newly developed single-oil, BN 100, marine cylinder lubricant, Talusia Optima. The solution enables fuel switching when transiting both in and out of ECAs without the need to change lubricants, while also ensuring reduced wear rates and abrasive deposits.

This unique product, formulated using Ashfree Neutralizing Molecules (ANM) technology, provides fast and effective acid neutralization without the undesired mineral deposit build up. In addition, high-quality surfactants are used to provide detergency and cleanliness. Compared with other BN 100 products on the market, Talusia Optima has a better-proven resistance to wear, as well as better thermal resistance and piston coat wearing.

bers are being fitted or LNG or dual-fueled engines are a viable option. However, for much of the existing fleet, the Low Sulfur Fuel Oil (LSFO) option is a likely path.

As a result, we are currently developing a new solution to increase the versatility of our product range. It is our belief, that low ash chemistry will be the basis for the next generation of engine oils, particularly for dual-fuel engines or those diesel engines fitted with selective catalytic reduction systems. In addition to this, we are also developing new fuel lubricants designed to reduce CO2 emissions.

While we believe that there will be a convergence on LSFO, the reality is that a multi-fuel era is on the horizon. With this new era comes the possible issue of poor compliant fuel quality. To a lubricant supplier, questions around quality lead to concerns about poor combustion and ultimately engine condition and efficiency. Simply changing BN levels may not be enough to avoid engine-fouling, liner scuffing or ring breakdown, all problems that cost shipowners huge amounts of capital in engine replacement and downtime.

Choosing LSFO will subsequently lead to lower BN products, this introduces a dynamic issue in that when BN is reduced via conventional chemistry, there is a reduction in the ability of the lubricant to keep the engine clean. Providers must ensure that they deliver a product for shipowners choosing the LSFO route that delivers low BN aligned with effective detergency properties. To achieve this, providers must have experience with modern engines and fuels, be working closely with OEMs and proactively harnessing R&D capabilities to deliver a 2020 solution that will offer a smooth transition.

An increase in regulation on fuels as well as specific regional rules regarding bunkering has created, and will continue to create, real complexities in terms of lubricant supply. Suppliers have had an increased number of products to deal with, while still looking to deliver across their networks. Bear in mind that only a decade ago there were two products for two-stroke engines, where today we have six plus products for two-strokes. At Total Lubmarine, we are proud to have kept the same number of products in the same wide range of ports despite these regulatory challenges.

The introduction of Emission Control Areas (ECAs) in Europe and North America highlight the issues that the industry is already facing – acting as a precursor for the challenges of tomorrow. The 0.1% sulfur cap regulations have been extremely difficult from an engine lubrication point of view.

For example, when a vessel leaves an ECA and switches over from a low to high sulfur fuel, the potential for the worst engine damage occurs. The low base number lubricants designed for 0.1% sulfur fuel simply do not have the basicity to protect an engine from the high levels of acidity in the higher sulfur fuels. (See Dole Case Study).

Services Supporting Solutions

A real headache for marine engineers is the business of dealing with so many grades of lubricants on vessels that only have two lubricant tanks. We have mitigated these issues through our network of engineers who are always available to help achieve practical solutions.

When accounting for the additional complexity highlighted above, the value of continuous monitoring cannot be overstated. In the case of a two-stroke engine, achieving the right levels of cylinder lubrication is dependent on combining numerous different operating parameters managed by a lubricant expert. Modern engines are particularly sensitive to corrosive wear and both under and over lubrication can result in costly and long-lasting damage. Launched in 2017, the Total Lubmarine feed rate optimization program, Drain Oil Optimize, has been a significant step forward in tackling this issue, with customers reacting positively to this added-value service.

For shipowners, finding the right solution ahead of 2020 promises to be a challenging task. However, whatever the fuel choice, the importance of picking the correct lubricant cannot be undervalued. We believe that dynamic R&D supported by crew and onshore technical staff assistance is the best long-term strategy. New fuel and new engine technologies need new types of lubricants. With engine technology continually evolving, the need to remain agile and continue to understand and find solutions to the challenges shipowners face ahead of the upcoming IMO regulation is more important now than ever before.

M/Y Tis
Builder: Lürssen
Design: Winch Design
Length: 111m
Beam: 16.85m
Guest suites: 11
Helo pads: 2
Photo by Klaus Jordan

GREAT YACHTS 2018

By Lisa Overing

M/Y TIS: Size Matters

The age-old question of whether or not size matters is typically directed at men. However, since a ship is called she, Maritime Reporter's top spot for greatest yacht of 2018 is the class of 2018's largest launch, M/Y TIS, a 111-meter, six-deck superyacht by Lürssen with exterior styling and interior design by Winch Design.

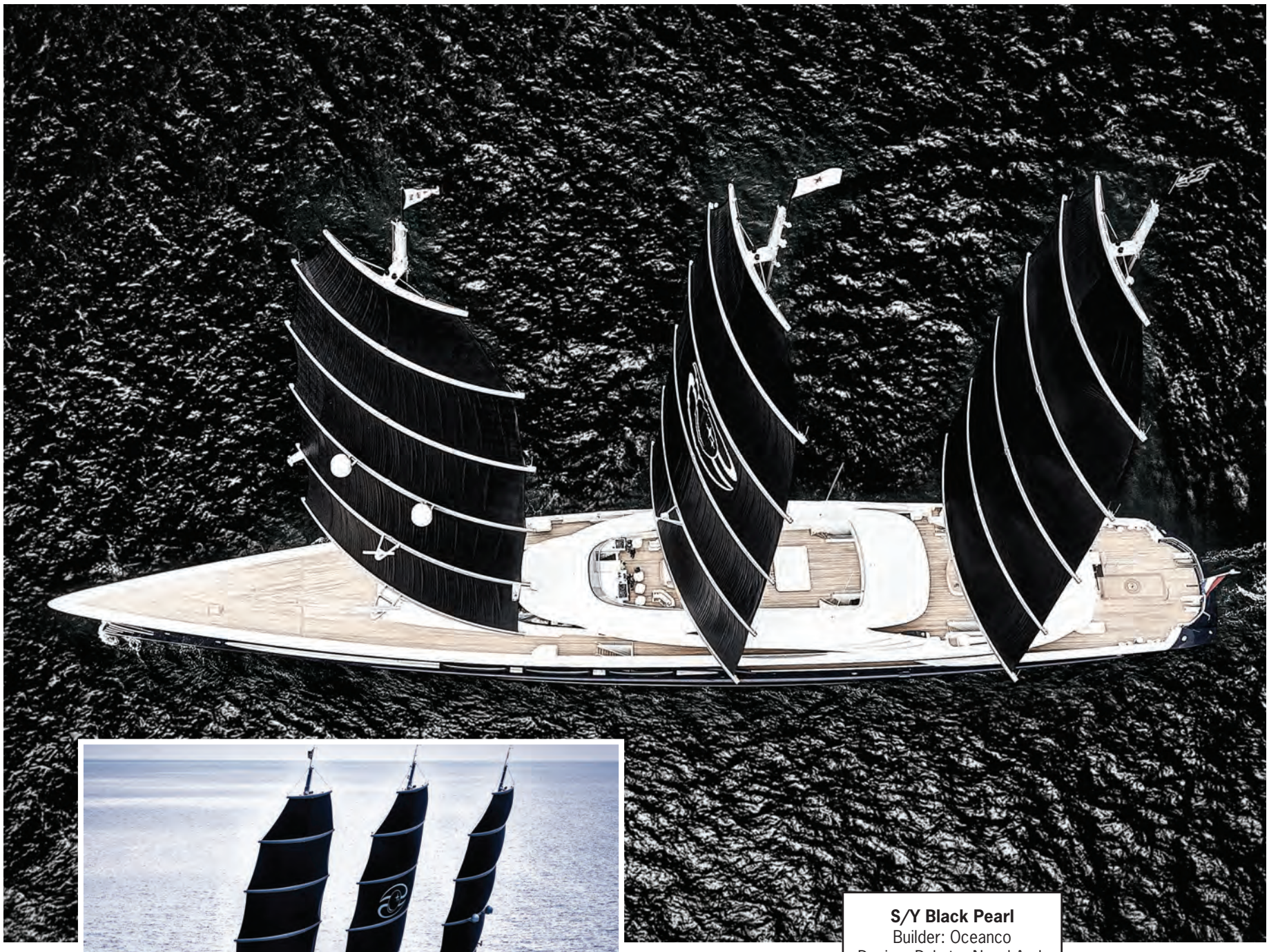
In spite of her massive size, steel-hulled TIS is sleek, graceful and well proportioned, a testament to her long and well-balanced sheer line. She boasts tremendous volume with her beam at 16.85 meters. Intriguing combinations of fluid, motion-oriented curvilinear architecture span her striking blue hull with a white boot stripe, achieving a dynamic but symmetrical profile with dozens of rectilinear windows and the straight deck lines.

With expansive interior and exterior areas onboard and generous ceiling height, TIS is ideal for entertaining in luxury. Featuring a massive, private owner's deck, she accommodates 22 guests in 11 luxurious staterooms.

Standout features include not one but two helicopter pads, a 12-meter swimming pool, a resort-inspired spa aft, and a magnificent, sweeping double staircase normally reserved for a palace at her transom, creating a grand entrance onboard. Her tender garage accommodates two 13-meter tenders and two 10-meter tenders, plus a submarine and a fleet of other water toys.

Dubbed Project Palo Alto during her build, Moran Yacht & Ship's new construction team wrote the technical specifications for this sophisticated superyacht, negotiated the build contract and managed the complete construction of the vessel in Germany from concept through her delivery at the end of this year. She was launched only 11 months after her keel-laying.

As a long-time charterer of the world's most illustrious megayachts, the family-oriented owner had extensive input in the design from guest accommodations



S/Y Black Pearl
Builder: Oceanco
Design: Dykstra Naval Arch
Length: 106.7m
Beam: 15m
Carbon masts: 3 x 70m
Sails: 2,900 sq. m.
Top Speed: 30 knots
Photo courtesy of Oceanco

to her propulsion package selection and the crew area, realizing exactly which features and amenities were paramount for his cruising lifestyle.

S/Y Black Pearl: 30 knots

This landmark sailing yacht by Oceanco is truly unique. Known as Project Solar during her build which was shrouded in secrecy, Black Pearl is the world's largest Dynarig sailing yacht at 106.7 meters and 15-meter beam.

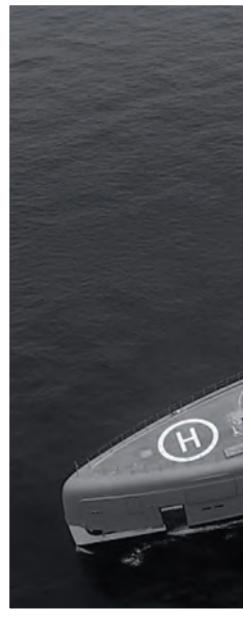
Designed by Dykstra Naval Architects with three 70-meter carbon masts and an air draft of 70 meters. Her sail area is subdivided into smaller, lesser loaded sails that can be set or furled with the press of a button, setting 2,900 square meters of sails in only seven minutes.

As the brainchild of a dream team of designers including Ken Freivokh Design, Nuvolari Lenard and Villate Design, Black Pearl exemplifies adventure on the seas and has a DNA all her own. BMT and Nigel Gee collaborated with Oceanco to create Black Pearl's hybrid propulsion system and waste heat recovery. In addition to wind power, she is powered by 2 x 1080kW MTU's / 2 x 400kW electrical propulsion motors. She has a single level engine room with regeneration mode under sail.

Her accommodations include a master suite, two VIP suites, two double guest cabins and a full beam beach club that converts into a cinema. A multi-level central atrium includes an all-glass lift rising alongside the central mast, contributing a feeling of vertical integration between the decks.

Her seven-meter draft includes approximately four meters of keel, 80-percent of which is filled with lead and the top part with fuel tanks, keeping her weight low. Her massive masts are actually in proportion to the length of the vessel overall. About 50 bolts around the outside of the rig transfer the torque rotation unit into the mast to rotate the mast as required to set the angle of the yards for the wind.

M/Y Dar
Builder: Oceanco
Exterior: Luiz DeBasto
Interior: Nuvolari Lenard
Length: 90m
Beam: xm
Guests/Crew: 14/31
Photo by Francisco Martinez



M/Y Spectre
Builder: Benetti
Length: 69m
Hull: Steel
Superstructure: Aluminum
Range: 6,500 nm @ 12 kt
Guests: 12
Price: $73.9M
Photo courtesy of Benetti

With the right wind and the right seas, Black Pearl could reach 30 knots. With regeneration under sail, she is predicted to make a transatlantic crossing with no fuel use. Black Pearl is a real gem of a vessel with exceptional performance, possibly the single, most revolutionary yacht of 2018.

M/Y DAR: Long & Lean

Competing with 40 other new superyacht launches, 90-meter DAR won 2018 Monaco Yacht Show Best Exterior Design and Finest New Superyacht Award.

With modern exterior styling by Luiz DeBasto, her profile is long, sporty and lean. DAR reflects the latest advances in glass technology with her superstructure completely finished in reflective glass. The upper deck salon yields panoramic floor-to-ceiling views port and starboard.

The sophisticated interior by Nuvolari Lenard accommodates 14 guests and 31 crew.

A dedicated to owners deck was designed with privacy in mind. The owners' private balconies offer a cozy indoor/outdoor living feature as well as incredible views. The owner's deck also includes a private, forward-facing Jacuzzi.

During the build period, DAR was dubbed Project Shark because the aerial view of her wing stations resembles a hammerhead shark. The mast in profile is shaped like a fin, contrasting with the flowing rhythm of the hull.

"The profile has a unique sense of contrast and homogeneity between the dark glass and the white balconies, providing a constant exchange in shape and lines between the two elements," said Luiz DeBasto.

The prevailing theme on DAR is nature, with blossom cascades, feathers, fish and waves expressed by tasteful combination of details and finishes.

The interior woods include different shades of sycamore fiddleback, small details in tinted Brazilian carballo wood and maple bleached gray. Other accents include bas-reliefs; metallic surfaces and 3D-cut leather panels.

She is the first yacht built in the Netherlands to achieve the official Lloyd's Register Integrated Bridge System (IBS) notation and designation

M/Y Illusion Plus: Lucky 88

The number 88 symbolizes fortune and good luck in Chinese culture, which bodes well for Asia's largest launch ever, M/Y Illusion Plus, an 88.5 meter luxury motoryacht launched by Pride Yachts in China. She was bestowed best interior design at this year's Monaco Yacht Show Awards and was also nominated for finest new superyacht award and best exterior.

Illusion Plus is a real stunner with four interior lounges. The main saloon is a duplex with a grand, offset rectilinear staircase punctuated with hidden lighting and mirrors, giving the already high 5.5 meter ceiling the illusion of extra height. Her amenities include two Jacuzzis and a beauty salon, accommodating 12 guests in 8 cabins.

M/Y Illusion Plus
Builder: Pride Yachts
Length: 88.5m
Beam: 15.4m
Power: Rolls-Royce Azipull
Guests: 12
Price: $145M
Photo courtesy of Pride Yachts

With a beam of 15.4 meters and a draft of 4 meters, Illusion Plus has a unique plumb bow, steel hull and aluminum superstructure with a six deck arrangement. With an intended build time of 3.5 years, she was conceived in 2007 on the precipice of the recession by Timothy Saunders and his team, then partner of Rainsford Saunders Design.

The interior design was ultimately completed by Sinot Exclusive Yacht Design.

Saunders' industrial and automotive design background is evident in her exterior styling and propulsion, fitted with a powerful, cutting edge Diesel Electric Rolls Royce power plant and Azipull Pod Drives.

"This hybrid vessel is capable of great speed, efficiency and accurate maneuvering - not to mention a DP0 Dynamic Positioning System - all of which may be precisely controlled at the touch of a joystick" said Saunders.

Some 11 years after developing her original lines, Saunders is pleased to see his creation launched as an iconic, timeless megayacht. Illusion Plus is listed for sale, asking $145 million.

M/Y Spectre: Ode to 007

Consummate yacht owners John and Jeannette Staluppi named their latest superyacht Spectre after yet another James Bond spy film, just as their 18 other superyachts were monikered, including Benetti's Quantum of Solace and Diamonds Are Forever. M/Y Spectre exudes sportiness as a 69-meter superyacht with a steel hull and aluminum superstructure arranged on five decks.

Benetti's interior design is reminiscent of a French, art deco theme. The sole in the main saloon resembles Liberty-style flooring in a Paris resort, with symmetrical forms and clean-cut geometrical patterns enriched with Armani fabrics and modern touches. Dark woodwork, sideboards and closets, with glass mirrors, white marble and white leather matching the deckheads for a strikingly, elegant contrast.

Featuring a swimming pool and a touch and go helipad, Spectre accommodates 12 guests in unparalleled comfort. The layout features two owner's cabins - one with a private terrace, a sun lounging area and hydromassage tub. The epitome of ultimate luxury, Spectre features a swimming pool, touch and go helipad, elevator to all decks, beach club, spa and gym. Giorgio M. Cassetta designed the flowing, contemporary exterior contours with a long bow and extended superstructure. The lines of the Hi Speed Cruising Hull by Mulder Design deliver maximum navigational efficiency, with a range of 6,500 nautical miles at 12 knots and a top speed of 21.2 knots, 30-percent more than a traditional displacement hull with an anticipated 30-percent lower fuel burn on crossings.

Mulder fitted Spectre with the new Ride Control technology by Naiad Dynamics, significantly increasing stability during navigation and comfort on board with the help of four stabilizing fins and three vertically-adjustable blades. Spectre is listed for sale at $73.9m.

One Word: **Hybrid**

By Joseph Keefe

The iconic 1967 film, The Graduate, has a lot of famous scenes, some of which weren't necessarily intended for family viewing. That said; one particular quote resonates strongly, especially when I think about the myriad discussions and interviews that I participated in, last week, in the 'Big Easy.'

Perhaps the most memorable scene in the film begins with Mr. McGuire telling our young graduate, Ben Braddock, played by Dustin Hoffman, "I just want to say one word to you. Just one word: plastics." Mr. McGuire then goes on to say that there's a great future in plastics. He adds, "Think about it. Will you think about it?" Young Braddock promises that he will. On the other hand, and by midday on Thursday at last week's annual trade event, one word seemingly kept coming up, no matter who I talked to. Here's a hint: it wasn't 'plastics.'

Tier 4, Tier Beaters and … hybrid

As a matter of full disclosure, I'd be the first person to tell you that when it comes to propulsion stories and engine editorial in general, I generally need adult supervision as I'm grinding away on the keyboard. Beyond that admission, I also admit to not really understanding the logic behind so-called tier beater arrangements presumably intended to sidestep the now required EPA Tier 4 mandates. Until last week, that is.

It was a while back that I asked my good friend (and favorite propulsion writer, Massachusetts Maritime Academy graduate and engineering SME) Bob Kunkel what was up with the whole 'tier beater' trend ongoing in the world of marine propulsion. Probably well aware he was speaking to a deckie and not an engineer, he replied simply, "It's just good design." Now, if Bob says it, I believe it. And, that settles it. But, that didn't mean I really understood it.

I talked to a great number of people during the show, many from engine OEM's, shipyards, designers and, of course, equipment integrators. That dialogue has convinced me that, like nothing else happening on the collective waterfront today, the move towards hybrid propulsion arrangements – of one type or another – has gathered enough momentum that it simply can't be stopped. There are a lot of reasons for that reality, and there were a lot of smart people at the trade event to show me how, why, and when (now) it is coming.

For example, a visit with Ed Schwarz at the ABB booth on Thursday brought the hybrid concept into full focus – at least for this deckie – like never before. As we sat down for our scheduled appointment, I asked him the same (annoying) question I usually ask of other propulsion SME's: "What's the point of having the EPA Tier 4 rules if everyone seems to obviate it by installing smaller engines so as to escape the lower limit horsepower requirements that the rule entails?" And, as Schwarz (patiently) went through the explanation, point by point, the 'light' finally went on in my head.

It turns out that when it comes to the so-called 'hybrid wave,' there are a lot of options out there. And he said, "Hybrid means different things to different people." Beyond the obvious attraction of installing ever smaller equipment, the price of these system integrations continues to come down. These systems might take the form of an all electric passenger vessel, a diesel electric workboat, or a half dozen other iterations. And, leaving aside the environmental aspects of the hybrid choice, the impact of going 'hybrid' can reduce your fuel bills by as much as 30%. But, that's only the beginning.

As operators increasingly turn to the hybrid option as they contemplate repowers or newbuildings, they do so for many reasons. For example, it turns out that running those higher horsepower tier 4 engines at slower speeds than what the OEM originally intended isn't necessarily a good idea. Nor is it good for the engines. Just looking beyond the workboat sector to blue water shipping where those large post-Panamax boxships have been lurching their way across the ocean on those 'slow-steaming' voyages is evidence enough to reinforce that point.

In contrast, a hybrid propelled boat, employing three smaller engines as opposed to two larger Tier 4 models, can efficiently loiter or proceed in transit using just one engine at its ideal speed settings, using less fuel, emitting less emissions and at the same time, effectively lengthening the time between the dreaded maintenance intervals. And, these workboats can employ any one of those three (or more) engines in planned sequence, effectively reducing operating hours on all of them by as much as 50 percent. Of course, when that 'hour of power' arrives, the properly designed hybrid workboat can also use all three for that quick towing assignment or ship assist shift.

In the end analysis, it's about total lifecycle costs, lower fuel consumption, increased (longer) maintenance intervals, reduced operating hours on installed engines and a markedly smarter way to op-

erate your fleet. In many cases, I'm told, the environmental signature of these hybrid solutions is greener than their Tier 4 cousins. No, I don't have those numbers in front of me, but if true, isn't that what we're all aiming for in the first place?

Hybrid: today and tomorrow

Not everyone is sold on the hybrid concept. And that doesn't necessarily mean, for their particular operation, that they are wrong. But, I was told by more than one engine OEM and/or system integrator that the possibility of hybrid propulsion systems, when it comes up with potential buyers, no longer is met with that now familiar skepticism and reluctance to try new technologies that the collective waterfront has become famous for. Instead, operators are seeking out the technology to see if it can be the panacea for the emerging environmental regulations, clean air mandates, and the rising cost of low sulphur fuels. Indeed, 2019, when it comes to marine propulsion – especially for workboats – looks to be the year of 'hybrid.'

As a disclaimer, I won't attribute any of the foregoing gems of wisdom to any of the subject matter experts that I spoke to at the show. It wouldn't be fair to blame them for my mistakes. And, I'm guessing I probably got at least one small thing wrong within my narrative. I told you; I'm a deckie. And, I foolishly wrote this missive without adult supervision. That's the problem with technology, calculus, differential equations, and, of course, hybrid propulsion: one little mistake gets you into a lot of hot water.

Nevertheless, and circling back to where we began, I am of the firm belief that every trade event has its own unique buzz word, trend or theme. Looking back to September's SMM Trade show in Hamburg, for example, the buzz most certainly circulated around the advent of some amazing technology. Similarly, this year's Workboat Show seemed to revolve around the arrival of a raft of different hybrid marine propulsion options, and what each promises for tomorrow.

In that infamous exchange from The Graduate, Dustin Hoffman's character promises to at least think about the possibility of plastics. But, you get the impression that he has no such intention. What about you? Today, far away from the make-believe world of Hollywood movies, there's just one word: hybrid. Will you think about it?

BAE SYSTEMS & THE RED & WHITE FLEET

There is much more than fuel being saved with BAE System's ecologically friendly power and propulsion systems. Its electric drive propulsion systems are powering more than 10,000 vehicles and several vessels including the Enhydra, a 600-passenger vessel in service for Red and White Fleet of San Francisco. With an array of proven solutions, such as, hybrid electric, battery electric, hydrogen fuel cell electric propulsion, and auxiliary power systems BAE Systems is helping fleets meet their emissions and operations goals.

Photo: BAE Systems

HYBRID ELECTRIC FOR STERN TRAWLER

Ocean Choice Intl. ordered a new 74 x 16-m freezer trawler to be built at the Tersan Shipyard in Turkey, designed by Skipsteknisk. In addition to a 6,528-hp MAN main engine the naval architects designed in a Cummins QSK 60-powered generator with an output of 2155KVA/ 1724KWe, 3x440VAC, 3 phase, 60hz. An additional Cummins QSK19-powered generator has an output of 700 KVA / 560KWe, 3x440VAC, 3 phase, 60 Hz. These will meet electrical needs of the vessel's 39-crew accommodation block, navigation suite, processing factory and large freezer capacity.


Photo: Cummins

NORDEN TESTS BIOFUEL

Norden finalized a test voyage with a 37,000 dwt, 182m handysize product tanker vessel NORD Highlander powered by CO2 neutral biofuel, a test which reportedly documented that second generation CO2 neutral biofuel is technically and economically suitable. According to the company, engine performance is not affected; the full performance envelope can be delivered without restrictions.


Photo: Norden

ETC TECH STUDIED

A consortium created a new, marine-capable system designed to increase engine efficiency and reduce emissions, a demo which reportedly proved the potential to achieve fuel savings of up to 7.8% while reducing CO2 emissions. The $1.9m project was partly funded by Innovate UK, with Rolls-Royce Power Systems, Lloyds Register and University College London. Bowman put forward the electric turbo compounding (ETC) tech as the basis for development, while Rolls-Royce provided key information and sim results for its MTU Series 4000 M93 engine.

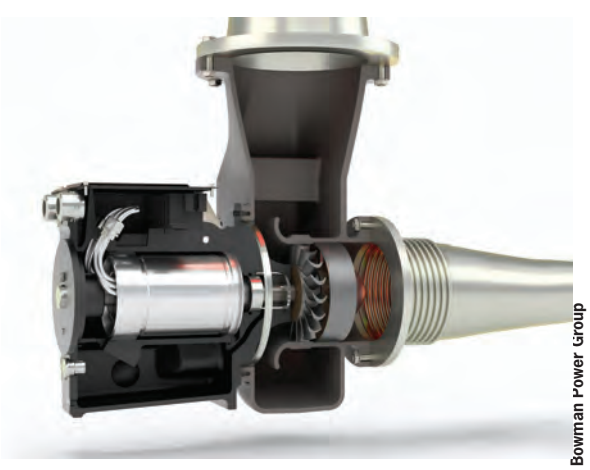


Photo: Bowman Power Group

Arctic Foxtail: Oil Cleanup Tech

A new oil spill response device designed to be capable of cleaning up spills in arctic conditions has been launched in an effort to bolster Norway's spill preparedness.

The new device, dubbed Arctic FoxTail, is a winterized version of H. Henriksen's standard Foxtail vertical adhesion band (VAB) skimmer, which filters out oil spills from the seawater using its sorbent mops. The system is capable of salvaging large quantities of oil after a spill, without much unnecessary water.

Tonsberg-based H. Henriksen began to develop the arctic ready system through the Norwegian Clean Seas Association for Operating Companies (NOFO) and Norwegian Coastal Administration (NCA) Oil Spill Response 2015 program, which invited vendors to develop new commercially avilable technologies to handle oil spill recovery in arctic conditions.

H. Henriksen's Arctic FoxTail proposal was accepted, and protype development started in 2016.

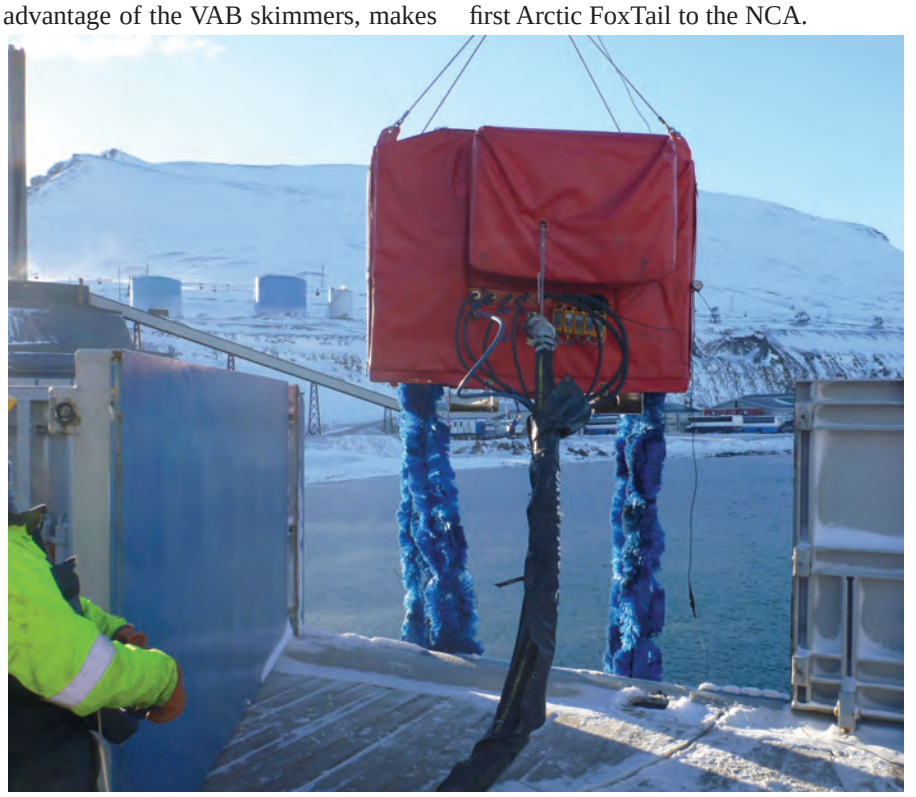
The scope of the project was to widen the weather widow in which oil can be taken from the water with skimmers. According to H. Henriksen, the old skimmers are very redundant to the sea state and weather, but their efficiency is reduced in cold weather when ice starts growing on the machines (mainly from sea-spray).

The newly launched winterized version features an integrated transfer pump, insulated cover and hydraulic heating system, representing a major redesign of the standard model. "Implementing heat and insulation to the machine and moving the transfer pump to the skimmer allows for stable and continuous operations at considerably lower temperatures compared to the standard Foxtail," explained Trygve Egenes, Managing Director of H. Henriksen. "Also, the weather window for the use of the vertical adhesive band skimmers has significantly increased.

"This modification, together with the advantage of the VAB skimmers, makes the Artic FoxTail a useful oil spill response device in arctic conditions."

The standard FoxTail operates in -6°C, compared to the new Arctic Foxtail which can operate -21°C under the same sea temperature and wind conditions, the developer said. H. Henriksen said the Arctic FoxTail proved capable of stable and continuous operation in sub-zero arctic conditions during recent testing on board MS Polarsyssel in Longyearbyen, Svalbard.

The company is now delivering the first Arctic FoxTail to the NCA.



Arctic FoxTail was recently tested on board MS Polarsyssel in Longyearbyen, Svalbard.

(Photos: H. Henriksen)

DAMEN GREEN SOLUTIONS: INVASAVE

The world's only land-based ballast water management system that is IMO-certified

In late December 2018, an InvaSave 300 Mobile Ballast Water Treatment System was transported from Damen Green Solution's premises in the Netherlands to Las Palmas de Gran Canaria to be used for a demonstration program as part of the "Atlantic Blue Port Services" project, made possible by the INTERREG Atlantic Area Program, funded by the European Regional Development Fund (ERDF). Once on scene, the unit was to be connected to a vessel's ballast water manifold to take on ballast water and treat it to the D2-standard as prescribed by the IMO's Ballast Water Management Convention. InvaSave is the world's only land-based ballast water management system that is IMO-certified to carry out such a job in a single treatment step, without any holding times or use of chemicals.

FPT, Fincantieri Partner

FPT Industrial announced a partnership with Fincantieri, as FPT was chosen by Fincantieri as a preferred partner to supply tailor-made powertrain solutions for its customers. The partnership includes FPT Industrial marine engines and auxiliaries, as well as ground power generators, and is dedicated to the worldwide market of commercial, patrolling and special applications, covering power ranges up to 1,000 hp.

FPT Industrial participated in the recent New Orleans exhibition where, at the Fincantieri booth, the C9 650 engine from the Cursor marine lineup was displayed. The C9 650 is capable of delivering maximum power of 650 hp at 2,530 rpm and maximum torque of 2,150 Nm at 1,700 rpm.

C9 650 E Specifications

Architecture	6-cylinder in line
Injection System	Common Rail
Valves per Cylinder	4
Displacement	8.7 L
Bore x Stroke	4.6 x 5.3 in
Light rated power	550 hp @ 2,530 rpm
Max Torque	2,150 Nm @ 1,700 rpm
Dry Weight	2,072 lbs (940 kg)
Dimensions (L,W,H)	50.7 x 32.4 x 37.8 in

K-Max Control Valve

Leslie Controls, a CIRCOR International brand, features its K-Max Eccentric Plug Rotary Control Valve. The K-Max incorporates the cam-action, low-friction plug operation that provides tight shutoff over a long service life in a variety of flow control applications, including high and low-pressure steam systems; clean, dirty, and corrosive liquids and gasses; and erosive and abrasive slurries. Featuring bi-directional flow capability, the K-Max is versatile and can handle mediums that are normally flowed to open and flowed to close. The K-Max's eccentric rotary plug action allows the plug to break free of the seat ring upon initial rotation of the shaft, resulting in a longer seat ring service life and improved shutoff integrity. The valve features a rangeability of 100:1, allowing precise throttling over a wide range of flows, and also has a self-aligning orbital seat.

A5 New Waterjet for Workboats

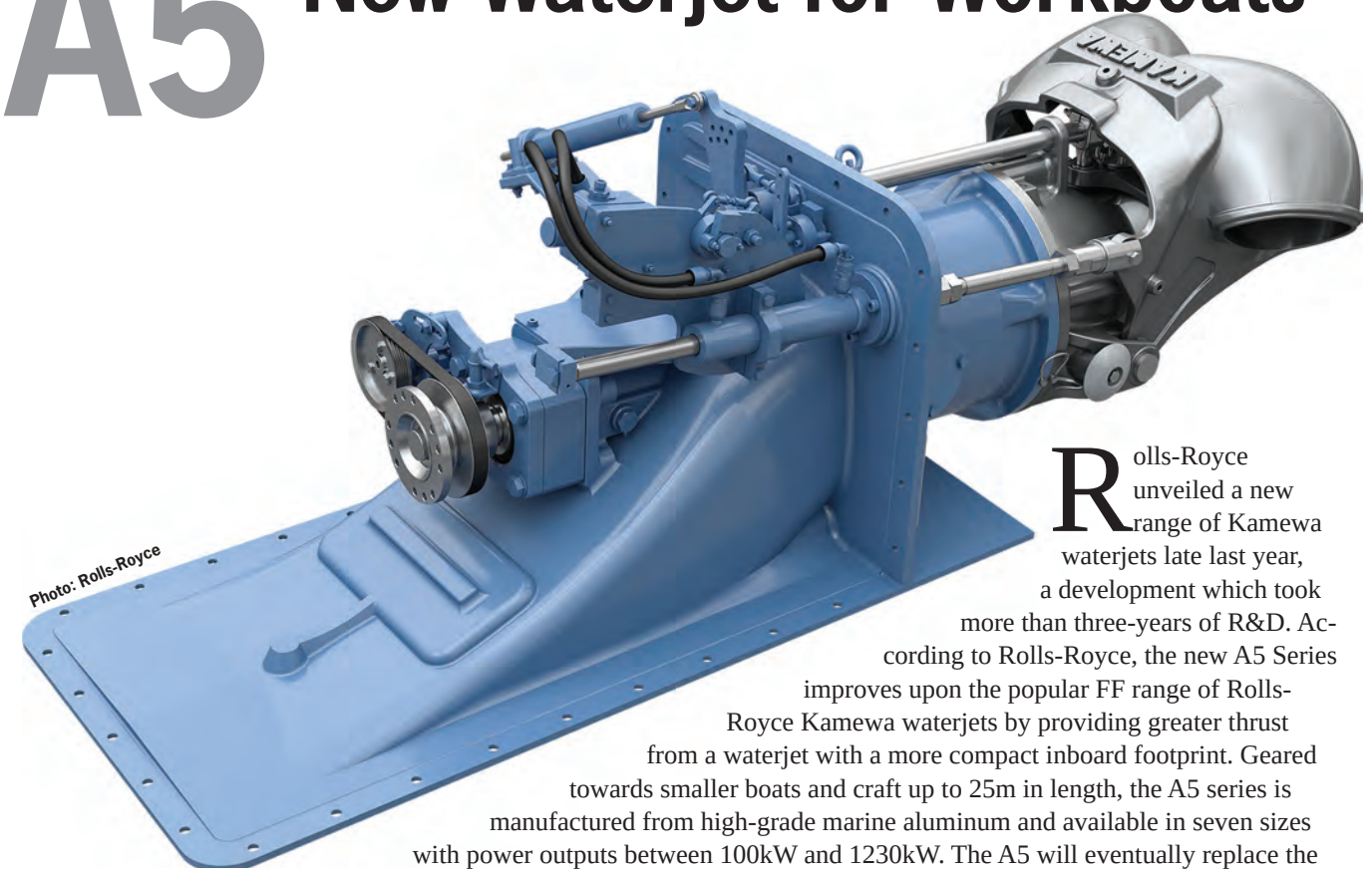


Photo: Rolls-Royce

Rolls-Royce unveiled a new range of Kamewa waterjets late last year, a development which took more than three-years of R&D. According to Rolls-Royce, the new A5 Series improves upon the popular FF range of Rolls-Royce Kamewa waterjets by providing greater thrust from a waterjet with a more compact inboard footprint. Geared towards smaller boats and craft up to 25m in length, the A5 series is manufactured from high-grade marine aluminum and available in seven sizes with power outputs between 100kW and 1230kW. The A5 will eventually replace the FF range and size 29 will be first to hit the market. Extensive Computational Fluid Dynamics (CFD) analysis and model scale testing at the company's hydrodynamic research facility in Kristinehamn, Sweden, was involved in the A5's development. Additionally, by incorporating elements from the proven S4 and S3/CA steel series of waterjets, Rolls-Royce has reportedly improved the axial-flow type waterjet to produce a smaller waterjet without the need for a comparative reduction in the power requirement. **www.rolls-royce.com**

WATCH it on MR TV
www.marinelink.com/videos/video/rollsroyce-debuts-new-waterjet-a5-100304A

180 FRP SERIES FILTER: SEA WATER FILTRATION

The 180 Fiberglass Reinforced Plastic (FRP) Series filters are designed as an ideal solution for corrosion resistance in brackish, brine and seawater filtration applications. All wetted components of the FRP Series self-cleaning filters are constructed from seawater-resistant plastic or other high alloy materials.

Photo: Forsta

Forsta's FRP Series self-cleaning water filters are available with an on-line, or in-line flange configuration to accommodate simple installation, and easily integrate with any pipeline in a seawater filtration process. A two-stage screening distinguishes the FRP Series filters. A coarse screen is responsible for straining out large debris from the water source, and the fine screen purifies water to the designated micron rating.

180-FRP Characteristics:

- Flow Rate: 15 – 4,500 gpm
- Flush cycle duration: 6 – 20 seconds
- Flush valve size: single 1″ or a single 2″
- Screen opening: 5µ – 4000µ
- Temperature: 150°F
- Flush Volume: 15 – 110 gallons per backwash
- Working pressure: 35 – 150 psi

Alfa Laval: PureBallast 3

Advantage Tankers & Advantage signs on for 33 systems

Advantage Tankers & Advantage Products selected Alfa Laval PureBallast 3 for ballast water treatment throughout its combined fleet. The agreement covers a range of PureBallast 3 system types, as well as deckhouses and a service agreement. Advantage Tankers & Advantage Products have a fleet comprising 16 tankers today, and a total of 33 PureBallast systems, including skid-mounted PureBallast 3 Compact systems and PureBallast 3 Ex systems for up to 3000 cu. m./hr., will be retrofitted across the fleet. Deliveries for this order will stretch over two years from March 2019 to March 2021. For the first year after commissioning, Alfa Laval will also provide a PureBallast Compliance Service Package, which includes testing, calibration, system optimization and crew guidance.

Optimarin: RCCL Win

Royal Caribbean International selected Optimarin to provide its Optimarin Ballast System (OBS) for three flagship vessels. Optimarin has now retrofitted its technology on Independence of the Seas and Mariner of the Seas, with installation on Grandeur of the Seas set for Q1 2019. Optimarin's systems are modular in construction, allowing them to be retrofitted in almost any vessel, regardless of space restrictions – a crucial factor for any ship, particularly cruise ships that work to maximize and monetize every inch on these feature packed cruise ships.

Grandeur of the Seas, Independence of the Seas, and Mariner of the Seas are key members of Royal Caribbean's 25-strong fleet.

Optimarin installed the world's very first commercial treatment onboard the Regal Princess in 2000. Optimarin has now sold approximately 700 OBS units, with more than 500 installed and operational, of which approximately 250 are retrofits.

Alongside full IMO and USCG compliance, OBS has certification from a comprehensive range of classification organizations, including ABS, BV, DNV-GL, LR & MLIT Japan. Current customers include Fednav, GulfMark, Hapag Lloyd, Matson Navigation, McDermott, MOL, Ardmore, Seatruck, Technip, and the Royal Netherlands Navy, amongst others.

USCG Type-Approval for De Nora BALPURE BWTS

De Nora has received Type-Approval from the United States Coast Guard (USCG) for its BALPURE ballast water treatment system (BWTS).

The BALPURE system has been approved for both safe area and hazardous zone installations for internationally trading vessels including U.S.-Flagged vessels. It is the 15th system to be certified by the USCG since inception.

De Nora is a patent holder of electrochlorination disinfection of ballast water through the slipstream method. According to De Nora's proprietary system design, only a 0.5% to 1% of the seawater flow entering the ballast line needs to be channeled into the electrochemical unit.

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