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MARITIME REPORTER AND ENGINEERING NEWS

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March 2017

President Trump & the path toward a 350-ship U.S. Navy

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Trump & the U.S Navy
President Donald J. Trump speaks with Sailors in the hangar bay aboard Pre-Commissioning Unit Gerald R. Ford (CVN 78). Trump visited to meet with Sailors and shipbuilders of the Navy's first-in-class aircraft carrier during an all-hands call inside the ship's hangar bay.

(U.S. Navy photo by Mass Communication 1st Class Joshua Sheppard/Released)

Features

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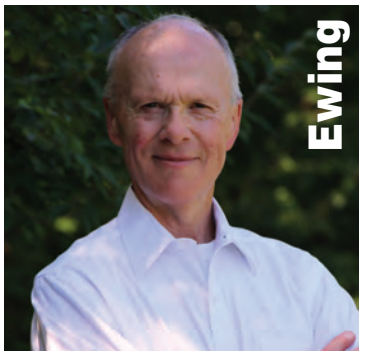

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GREG TRAUTHWEIN, EDITOR & ASSOCIATE PUBLISHER

As this is *Maritime Reporter & Engineering News'* 'Green Marine' annual, one might be surprised to see a recent photo of President Trump gracing our cover. Regardless of your personal feeling or political view, the story of President Trump and his new administration is arguably *the* maritime story of the year, as it touches on nearly every sector, from defense and national security to international commerce and infrastructure.

For the purposes of this edition the focus is squarely on the Navy, the kick-off to our 2017 Navy Quarterly coverage. As we were going to press the president announced, among other things, the plan to inject an additional $54 billion into defense spending, with the intent to rebuild the U.S. Navy high on the list. Regardless of administration, the shape and direction of the U.S. Navy is always fertile editorial fodder, both from its size and physical make up, as well as the technology that it develops and brings to the fore. When I sat in this seat for the first time in 1992, the U.S. Navy ... in terms of fleet size ... was already in decline with the end of the Cold War, the degradation of Russia as a military power and threat, and the change in course from President Reagan's "600 ship navy." Today the U.S. Navy force level is 274 ships, and while the numbers surrounding the 'new' navy continue to fluctuate, the number "355" has gained some traction. Starting on page 20, Edward Lundquist aims to add some shape, form and perspective toward the march to a larger navy, including some crucial questions as to the funding.

Looking toward the Green Marine topic, the days of using "Green" as just a marketing slogan are long gone. The push to make marine operations – already the most efficient and environmentally benign means to move cargo from Point A to Point B – even cleaner is rapidly underway. Earlier this year our Tom Mulligan initiated a series of articles centered on the new fuel rules from the IMO which effectively reduces sulfur content in marine fuel to 0.5% by 2020. The series continues this month with an insightful look at marine scrubber technology. It wasn't long ago that scrubbers were seen as 'too big' or 'too expensive,' but the technology has been gaining strong favor as a preferred method to meet new regulations. Mulligan's report starts on page 38, and is followed on page 44 with Eric Haun's interview of Mark Barker at The Interlake Steamship Company, a U.S.-flag leader in the adoption of scrubber technology.

Finally, the matter of subdued oil pricing and a cloudy at best future for the development of offshore oil and gas assets – particularly in the more costly deep waters – continues to dampen a certain sector of the market. With that, you may be surprised to know that William Stoicheviski's profile of the maritime business in Singapore is slightly upbeat. Stoichevski is our contributor situated in Oslo, Norway, a country with its fate and fortune closely tied to offshore energy production. Here, and half a world away in Singapore, Stoichevski finds hope and prosperity, as shipyards that were dedicated to offshore oil have invested and essentially reinvented themselves to serve new and emerging markets.

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... In case you missed it, highlights from marinelink.com ...

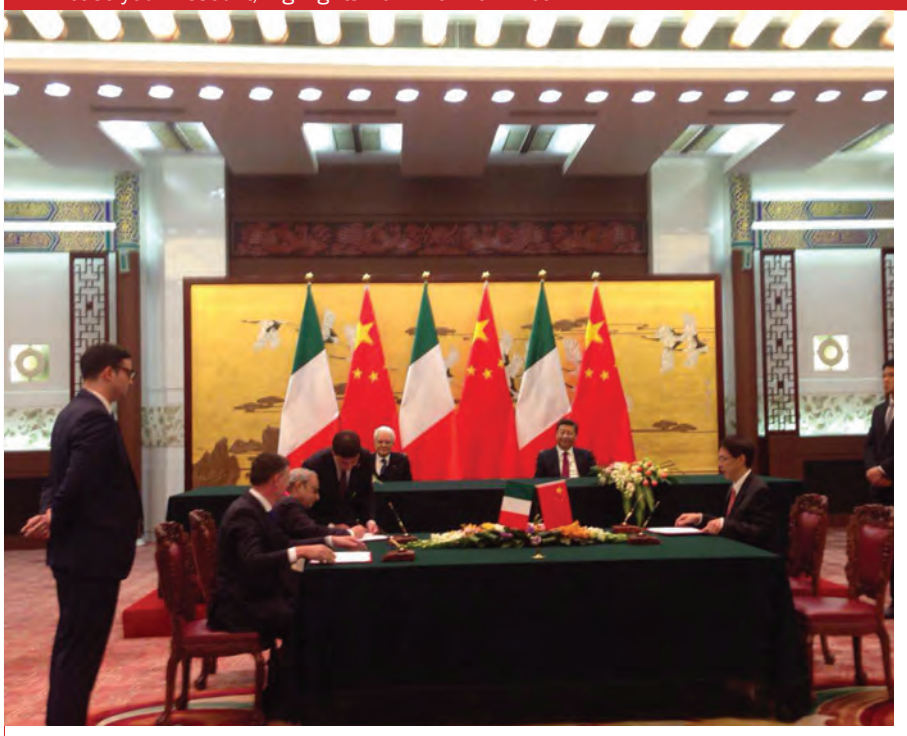

Photo: Fincantieri

Cruising China

Fincantieri, China State Shipbuilding Corporation (CSSC) and Carnival Corporation & plc signed a binding Memorandum of Agreement (MoA) for the construction of two cruise ships, with an option for additional four, the first units of the kind ever built in China for the Chinese market.
The deal to build the first China-built cruise ships was inked in the Great Hall of the People in Beijing, on the occasion of the fourth Italy-China Business Forum, attended by Italian President Sergio Mattarella and Chinese President Xi Jinping.
The new ships will be built at the SWS yard, a facility of CSSC Group.
http://www.marinelink.com/news/carnival-orders-cruise422382

Arctic HFO Ban

Expedition cruise ship operator Hurtigruten has joined international environmental organizations in efforts aiming to spearhead the protection of Arctic communities and ecosystems from risks posed by the use of marine heavy fuel oil (HFO) to power ships.
At the Arctic Frontiers conference in Tromsø, Norway, Hurtigruten CEO Daniel Skjeldam signed the Arctic Commitment along with Dr. Sian Prior of the Clean Arctic Alliance, lead advisor to the Clean Arctic Alliance, an international coalition of environmental organizations campaigning for a ban on heavy fuel oil use in the Arctic.
http://www.marinelink.com/news/hurtigruten-arctic-signs421238

Photo: Ester Kokmeijer / Hurtigruten

Photo: Washington State Department of Transportation

Cherished Ferry Gets a New Lease on Life

A 50-year-old retired Washington State passenger ferry will get a refit, and with it another life as a floating entertainment space. Washington State Ferries (WSF) sold its smallest retired ferry, Hiyu, for $150,000 to Menagerie Inc., which plans to repurpose the vessel as a floating entertainment venue.

"We make every effort to keep our retired ferries operational, instead of being sold for scrap," said WSF Chief of Staff Elizabeth Kosa. At 162-ft.-long, the ferry is considered to be the among "cutest and most cherished" in WSF history, but with only a 34-vehicle capacity, lack of ADA accommodations and high maintenance costs, Hiyu outlived her usefulness, making her final sailing on July 23, 2015.
http://www.marinelink.com/news/washington-oldest-sells422698

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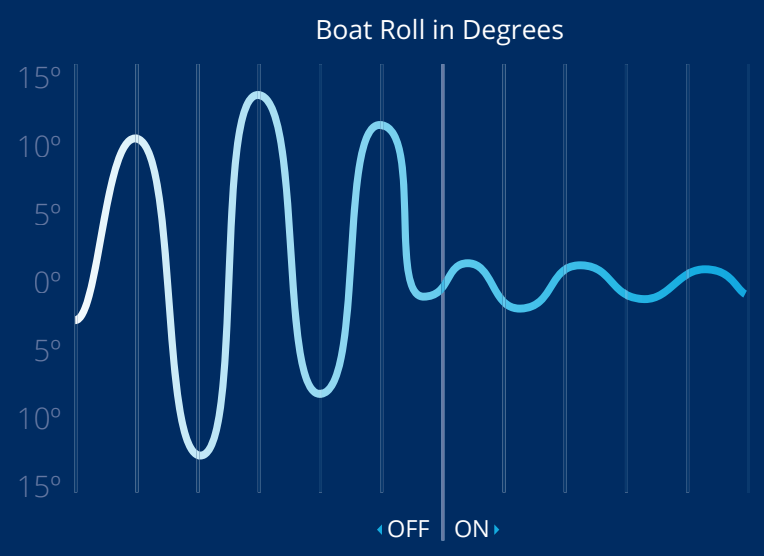

Courtesy USMMA

Kings Point at a Crossroads

As the United States Merchant Marine Academy recently announced the resumption of its commercial sea year training program, many unanswered questions remain and more importantly, myriad problems unsolved.

Roughly concurrent with news that the academy's accreditation body had flagged the school with failing marks in five of 14 categories, the school, in June of last year suspended the traditional commercial sea year training program, largely under the guise of 'solving' massive sexual harassment and assault issues that were allegedly (and largely) taking place on board commercial, U.S. flag vessels.

The suspension of the sea year program enraged alumni, midshipmen, parents and the shipping companies themselves (who were painted with the broad brush of vague accusations of misconduct on board their fleets). The issue dominated the news emanating from the nation's only federal maritime academy, partially obscuring (some say intentionally) the larger problem represented by internal curriculum and leadership failures that landed the school on probation in the first place.

Mind the Gap

On March 1, the academy will supposedly report to the accreditation body its progress on the latter issue(s) – assuming that any has taken place in the many months since the school received its black eye from the Middle States Commission on Higher Education (MSCHE) Accreditation Report. That document painted an unflattering portrait of what is transpiring at the academy – but not necessarily what might be occurring at sea.

In a separate report (SAGR), it had been shown that sexual assaults have over time decreased in all of the federal service academies except Kings Point, in particular during the period 2012-2014. The MSCHE accreditation reports also makes note of this issue, while also pointing out that the academy was (and still is) failing in at least 5 of 14 'standards' by which the accreditation body judges all schools. The MSCHE report also points to serious leadership failures at the academy. The academy's response to all of this was to discontinue the traditional training which the school has become known for, without even first devising a plan to replace that critical aspect of the curriculum with a viable substitute. That probably added (at least) one more failing grade to the aforementioned five.

The timing of the most recent change

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Many stakeholders and alumni felt that the sexual harassment and assault allegations had been, from the very beginning, a smokescreen for the deeper issue of whether the school could survive at all.

in policy at the academy is curious, coinciding roughly with the change in the guard at both Marad and at its DOT parent headquarters. And, in a prepared statement issued in response to the school's latest announcement, the USMMA Alumni Association and Capt. James Tobin, President of the Alumni Foundation, said, "This announcement is a very significant step toward the full restoration of Sea Year on commercial ships, and we are most grateful to Secretary Chao for recognizing the continuing need for this mission-critical training."

Many stakeholders and alumni felt that the sexual harassment and assault allegations had been, from the very beginning, a smokescreen for the deeper issue of whether the school could survive at all, especially given the shortcomings highlighted by the MSCHE report. Hence, the next few weeks and months will be critical for the academy as it tries to dig itself out from a largely self-inflicted mess. But the issues and failures in leadership brought out by the MSCHE didn't manifest overnight or because somebody said or did something inappropriate on a merchant ship 1,000 miles out to sea. From the outside looking in, there were – and still are – many signs of what was happening then, and still likely to come at Kings Point.

Abject, Benign Neglect

It wasn't too long ago – last spring actually; and roughly coinciding with the turmoil which rocked the Kings Point campus – that my own son was getting ready to graduate from High School. In the main atrium of his school, they have one of those ubiquitous "Oh, the Places They Will Go!" posters inside a display case. As Senior Year progresses and kids get admitted and make college decisions, they one by one tack up their choice in its approximate location on a huge map of the United States. It can be an impressive and equally interesting thing to watch develop.

At the point my son had made his decision, he naturally stopped by to visit the display and noticed that, lo and behold, someone he knew had been admitted to the U.S. Merchant Marine Academy. When we sat down for dinner that night, he told me about it. "Hey, Dad! Someone I know got into the Merchant Marine Academy. That's where you went, right?" Now, at this point, I carefully finished chewing my last bite, swallowed, washed it down with a [healthy] slug of chardonnay, and then replied evenly through gritted teeth, "Actually, No. But, hey, thanks for (sort of) paying attention to dear old Dad's career path." We moved on to a different topic and I forgot all about it until a week or two later.

Awards Night at his high school is something that always takes place apart from (and before) graduation day simply due to the daunting logistics of moving some 550 kids through the ceremony in roughly 90 minutes at a large local arena, just in time to shove us all out the door into the parking lot so that the next graduation throng can make its way in. My wife's knee was acting up at the time and she was on crutches. The school system found her a wheelchair, INSISTED that she get in it and they provided an attendant to get her from point A to point B. I was practically running to keep up on the way out. There just isn't much time for anything beyond the valedictorian's speech. As it is, these kids are jogging across the stage to get the diplomas.

In any event, this was my first 'senior awards' ceremony and this was my first kid to graduate from High School. Hence, I had little idea of what to expect. As it turned out, the event traditionally kicks off in the auditorium at the school by first honoring the students who have been admitted to and would be attending one of the federal academies. First up was our Naval Academy kid, introduced and applauded by a U.S. Navy Captain in full dress whites, sporting enough service medals and ribbons to give him a decidedly port list. It was a very nice ceremony.

Next up was the kid heading off to West Point. He was similarly honored by an Army Officer, also decked out in full dress uniform. This one I had to laugh at (as did everyone else) because our future cadet, also an enormous blue chip football star, had flowing blond hair down to his shoulders. The Army officer's last comment (issued rather dryly) was, "I dare you – I DARE YOU – to show up on the first day with that hair. I want to be there, when and if you do." That predictably broke the ice on the evening. Everyone cracked up.

I then settled back and looked around, craning my neck with great interest to see who our future Kings Point midshipman might be, but the event leader abruptly changed gears and went directly into handing out academic awards. Not a word about Kings Point or the academy. No one there to shake his hand. I had no dog in that fight but I was nevertheless privately embarrassed for him and whispered to my wife, "This is wrong on so many levels." The next day, I telephoned a Kings Point alumni friend of mine (yeah, I have a couple) and asked bluntly, "How could this happen?"

Well, it turns out that the collective identities of the kids being admitted to Kings Point is some sort of closely held state secret. My friend tells me that it is an annual event, akin to pulling teeth, to find out who these students are in order to properly recognize them at an appropriate moment. Many, like my son's classmate, don't get recognized at all. The academy is of little to no help, so I am told. That's a seemingly small thing, but is an apt indicator of deeper problems. And for starters, it seems to me that for a school which bills itself as one which seeks and only admits 'the best and the brightest,' well, this is one heckuva way to treat them.

Look Both Ways … before Crossing

The latest USMMA press release that heralds the "maritime industry's efforts to combat sexual assault, sexual harassment and other coercive behaviors … [and then names] the first companies to meet MARAD's Sea Year requirements," is insulting to the mariners who crew those vessels and the people responsible for keeping them on the water.

About the Author

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As if these firms in 2017 didn't already have stringent rules concerning moral turpitude in the first place.

All water under the keel at this point, right? Well, maybe not. With the smokescreen represented by the sexual harassment allegations levied at U.S. credentialed mariners now in the smoky, U.S. EPA Tier Zero wake of the Academy, it is finally time to address the real issues on campus. Looking straight in the face of five failing grades out of a total of 14 accreditation categories, academy administration and staff will (at long last) have to address their considerable shortcomings and what they have done to correct them.

Finally, I suspect that the new DOT Chief, Elaine Chao, will have little patience for the status quo and head games that have long permeated the Kings Point campus. A proven, experienced no-nonsense administrator, she wasn't brought back to Washington to play golf with the President. No, I think that there is a new Sheriff in town. At the same time, the U.S. Merchant Marine Academy at Kings Point is most certainly at an important crossroads. So far, I like how the new Sheriff is directing traffic. What about you?

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Cabotage Rules Changes Proposed

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On January 18, 2017, the US Customs and Border Protection (CBP) proposed in its Customs Bulletin & Decisions newsletter a significant change to the U.S. cabotage rules. For many years, use of non-coastwise-qualified vessels in the transportation of pipeline repair material; anodes; pipeline connectors; wellhead equipment, valves, and valve guards; damaged pipeline; platform repair material; and similar items from a U.S. point to another point within U.S. waters and/or those on the outer continental shelf has been ruled by CBP (and its predecessor US Customs Service) as consistent with U.S. cabotage laws (i.e., the Jones Act) where the transporting vessel was directly involved in the repair or maintenance activity. The January 18 proposal would revoke or greatly modify a whole series of prior ruling letters and make such activity illegal. The period within which to submit comments on this proposal was originally due to end on February 17, but has since been extended to 18 April. We probably will not know for months after that what the final decision of CBP is with regard to this proposal.

I do not have a dog in this fight, but I am concerned with the approach being taken by CBP to drastically modify or revoke more than 40 years of settled precedent in such a hurried and cavalier manner. There is nothing to evidence that CBP has conducted a cost-benefit analysis to determine the economic impact (both long and short term) of this proposal. A significant policy change, as proposed here, deserves such an analysis. A similar proposal was made by CBP in 2009 without a cost-benefit analysis, but eventually abandoned.

The Customs Bulletin & Decisions newsletter is not widely read. In fact, many have never heard of it. While the publication serves as a useful means of highlighting general agency views and recent developments, it is not generally considered an official expression of significant policy changes, particularly those with important legal and economic consequences.

The proper means of communicating significant policy changes by a federal agency is through the Federal Register. The US Coast Guard does this regularly, notifying stakeholders and indeed the world of proposed new or revised Navigation and Vessel Inspection Circulars (NVICs) and policy letters and providing the public with an opportunity to submit comments. Other federal agencies take a similar approach, as does Customs and Border Protection on occasion.

The Federal Register is the only statutorily-approved means for federal agencies to communicate with the general public. Communication by other means, such as has been done in this situation, is fraught with danger. The proposal may not reach its intended audience – entities and individuals impacted by the planned change, positively or negatively. As a result, the agency may end up adopting a flawed policy, one that could have been improved during the planning stage.

Other agencies that adopted major policy changes without utilizing the Federal Register have had those changes nullified by federal courts. The basic test for determining whether publication in the Federal Register with an opportunity for notice and comment is whether the agency could take enforcement action in the absence of the policy change. If the answer is no, then the policy change must be published in the Federal Register. Since this proposed policy change by CBP appears to be intended as the basis for future enforcement action, publication in the Federal Register, in my opinion, is required.

As illustrated by the US Coast Guard actions as well of those of other agencies, use of the Federal Register does not always necessitate official rulemaking, although it may be appropriate in this situation. An agency, though, is required to publish notice of its intended action in the Federal Register and to provide the public with a reasonable period (generally 60 days or more) to submit comments that are available for others to consider. Most reading the notice do not comment. Some commenters oppose the change. Some commenters support the change. Some of the comments identify flaws or inconsistencies that the proposing agency may have overlooked. All of this provides the agency an opportunity to refine its proposal so as to avoid unintended consequences. Further, the notice and comment process achieves buy-in from the impacted community, knowing that they were afforded a meaningful opportunity to weigh in and be heard, something that is lacking in a notice published in an agency newsletter.

I have no stake in the outcome of this proposed rule change, as I indicated above. I do, though, believe that federal agencies have obligations to the public and to the regulated community to keep them properly informed of proposed changes in long-settled agency policy and to fully and openly evaluate their proposals and options before moving forward. Among other benefits of such public notice is the reduction in unintended breaches and the highlighting of new opportunities and options that may not have occurred to the agency. Bureaucrats are referred to as public servants for a reason.

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SO LITTLE TIME

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Chantier Davie Shipyard

Competitive Value of Integrated Shipbuilding Tech

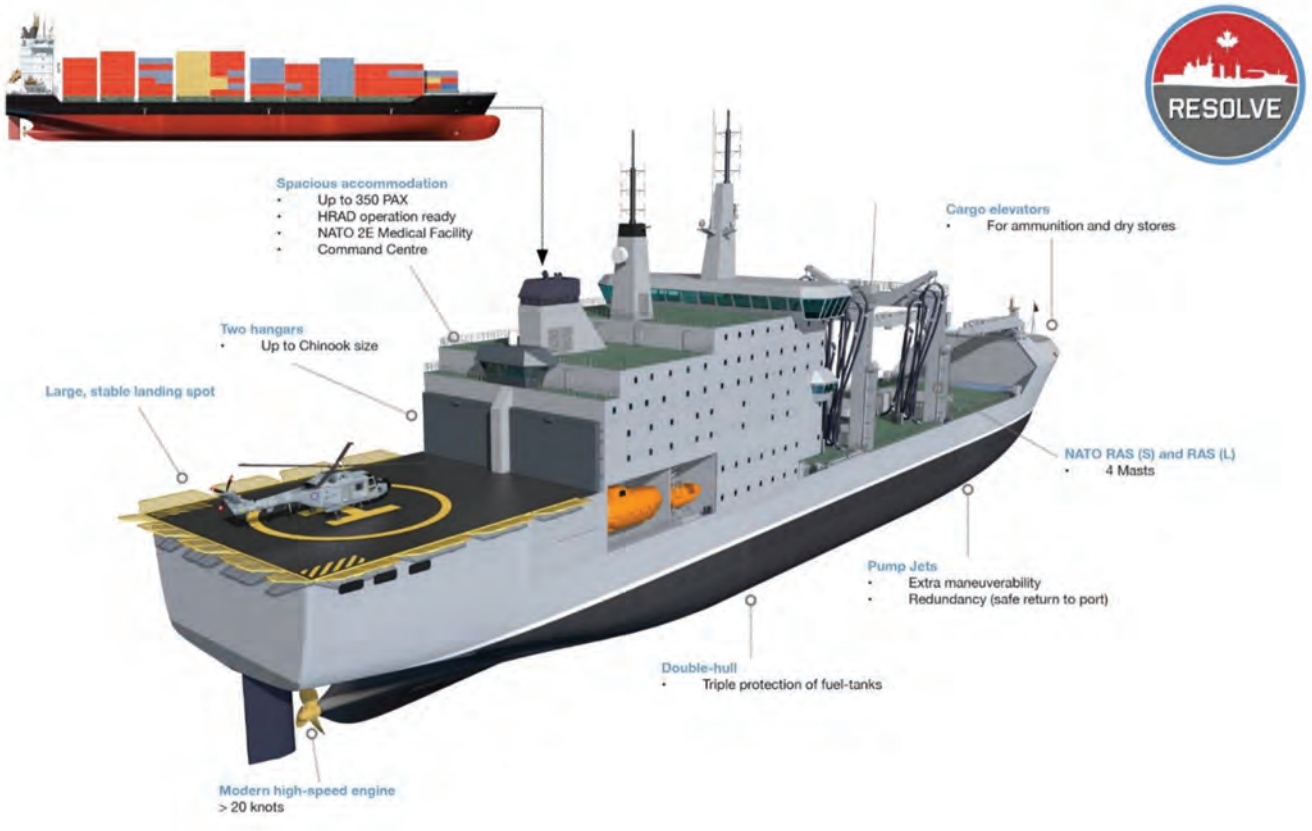
Established in 1825, Chantier Davie Shipyard is Canada's oldest, and still today one of its most innovative, shipyards. Situated in Quebec, the yard has been expanding in both working and production capacity, and its 1300 workers now have the capability to handle 1200 t / month of steel production at its 570,000 square meter facilities. Chantier Davie (Davie) is a diversified shipbuilder, building various types of ships for both naval and commercial clients. Its latest undertaking is the "Resolve" project, a conversion of a 182.5 m container ship into an Auxiliary Oil Replenishment Vessel for the Canadian Navy, in only 24 months, including design and delivery. To make the deadline for the complex rebuild, Davie has been forced to evaluate existing tools and processes, which has helped to identify ways to maximize efficiency across design, planning, supply chain and production. The transformation process was initially kicked off with the introduction of AVEVA ERM, AVEVA Marine and AVEVA Global, a tool which allows teams from multiple locations to work on the same 3D model. This allowed Davie to leverage its concurrent design processes together with multiple European design agencies. "Such investments are vital for survival in the global shipbuilding industry, where competition is becoming ever fiercer," said Lindsey Kettel, VP of Business Processes at Davie. "We invested in the AVEVA Systems back in 2013. We were the first North American shipyard to implement AVEVA ERM. This meant that we were taking quite a risk, being one of the frontrunners for the AVEVA toolset. However, we felt that this was a necessary step towards modernizing the IT infrastructure to allow us more efficiency, so we could focus more on the innovation required. The decision to select AVEVA Marine and AVEVA ERM was straightforward, as the applications are developed specifically to support the shipbuilding processes. Furthermore, AVEVA ERM is developed by people with decades of shipbuilding know-how."

Challenges Overcome

Prior to engaging with AVEVA ERM, Davie was facing several challenges in regards to the planning and supply chain domain. The challenges revolved around missing visibility of materials for planning, and missing visibility of planning for supply chain. Most of the systems used for managing supply chain and

"In AVEVA ERM and AVEVA Marine we have a dedicated and integrated IT environment which, combined with the skills of our employees, has helped us to become a modern and competitive shipyard."

Jared Newcombe, CEO, Davie



"We invested in the AVEVA Systems back in 2013. We were the first North American shipyard to implement AVEVA ERM."

Lindsey Kettel, VP, Business Processes at Davie

planning were homegrown and supplemented with various excel sheets and access databases. Davie started their transition by purchasing SAP for financials and shortly thereafter AVEVA ERM for material management and planning.

"The ERM implementation process gave us a really good start on our continuous improvement journey," said Lindsey. "There has been quite a steep learning curve as we transitioned between systems. We have not been used to adapting to new business processes in such a rapid and overarching fashion. We are still not using the AVEVA ERM to its full capability, but the integrated planning and materials management functions with AVEVA ERM are helping us to identify and solve problems that no individual would be able to manage on their own with a project moving at this pace."

One of the challenges which have been overcome is missing materials on the shop floor. As a result of using AVEVA ERM's integrated planning and materials management capabilities, Davie now has complete status/availability of materials prior to releasing jobs for production with their production teams. This has minimized the requirement for suspending jobs due to missing materials, and because of this, the efficiency of production teams has increased. As a side effect, warehousing also has better visibility of priorities when critical items are received into inventory.

"The traffic light system of both the material status and in the planning module is helping us effectively manage the entire material stream, right from identifying early requirements to purchasing actual materials, then getting those materials on-site and out to Production teams to do their jobs on-time and following the Project schedule, while minimizing material wastage and over or under-buying," said Lindsey.

Continuous Improvement

Now that Davie has embarked on this journey, they have realized improvements in terms of the visibility of status on jobs and materials. However, Davie recognizes its improvement journey is continuous and attention shall now be placed on other areas of the business. An example is the management of in-house steel and outfit fabrication, a process which so far has been managed and statused in various spreadsheets and databases. Davie handles most of the fabrications in-house, which makes planning and managing this a large task for supply chain, planning and production. The expectation is that by adapting more of the AVEVA ERM functionality, and making internal fabrication status more easily visible downstream, production efficiency will increase significantly.

Facing Future Challenges

AVEVA ERM and AVEVA Marine are also seen as important from a business management point of view. Jared Newcombe, CEO at Davie, agrees that, with these solutions, the shipyard is well placed to face the many challenges which may lie ahead in the shipbuilding industry. "In AVEVA ERM and AVEVA Marine we have a dedicated and integrated IT environment which, combined with the skills of our employees, has helped us to become a modern and competitive shipyard by reducing project cycles and so bringing down our total costs," Newcombe said.

Also, the excellent collaboration with AVEVA shows us that we are in safe hands, thanks to their expertise and their approach to shipbuilding."

Naval Design

Assessing the human role in the early design phase

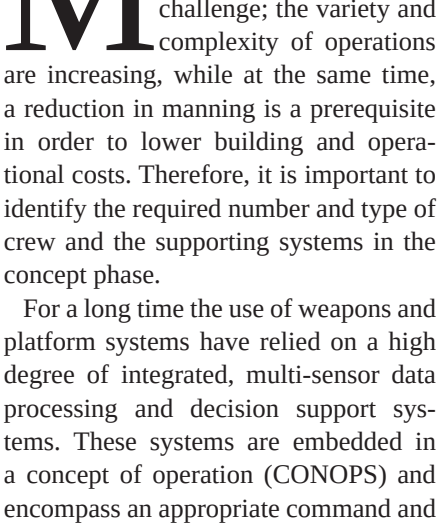
Photos: MARIN

Many navy new building projects face a double challenge; the variety and complexity of operations are increasing, while at the same time, a reduction in manning is a prerequisite in order to lower building and operational costs. Therefore, it is important to identify the required number and type of crew and the supporting systems in the concept phase.

For a long time the use of weapons and platform systems have relied on a high degree of integrated, multi-sensor data processing and decision support systems. These systems are embedded in a concept of operation (CONOPS) and encompass an appropriate command and control structure, effective communication capabilities & protocols and suitable man-machine interfaces.

Nowadays, the main function of a navy vessel is to offer a stable ship platform to facilitate a myriad of operations for both weapon and small platform(s) deployment. Given the increasing relevance of this latter type of operations, a CONOPS approach is useful. This includes matching functionalities with different levels of automation and manning in the concept phase. To this end simulation and full-mission simulators are used. The first assesses the known physical criteria (for instance motion and signature characteristics) and the latter defines the human aspects and mental requirements during interactive simulations. Many man-machine interactions are defined in this simulator phase.

Simulations require the accurate modeling of the motion and response characteristics of all platforms involved and potential interactions with other platforms (incl. air). Additionally, the prediction of vessel performance requires online measurement and fast assessment of the environment. Typical examples of platform related concept of operations using full-mission simulations are lifting (launch & recovery), docking, helicopter landing, evasive actions (torpedo threat), replenishment at sea (or other sea basing) and emergency responses (fire, flooding, NBC attacks). Concerning the manning requirements and their competences, an early use of simulators identifies the level of automation, as well as the need for advisory systems, team interaction protocols and education. In summary, during the concept design of advanced vessels, full mission simulators are essential to analyze the operational tasks and team interactions, to identify the required level of automation and decision support, and finally to establish the necessary training programs.



About the Author

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U.S. Navy: Force of the Future

Nimitz-class aircraft carrier USS Ronald Reagan (CVN 76) works with Military Sealift Command (MSC) ammunition ship USNS Flint (T-AE 32) as the aircraft carrier unloads all of her weapons signaling the beginning of the end of the carriers surge deployment. Ronald Reagan Carrier Strike Group is underway in support of operations in the South China Sea.

U.S. Navy photo by Chief Mass Communication Specialist Spike Call

Naval Power

It's still too early to know for certain what the new administration will do about building up the U.S. Navy, as the numbers are a moving target. But with President Trump's recent pledge to add $54 billion to defense spending, it's a safe bet to make that the fleet will grow.

BY EDWARD LUNDQUIST

U.S. Navy: Force of the Future

So let's start with the numbers. There are different ways to count the fleet size, including whether or not you count auxiliaries, but let's use this number as the baseline: There are 274 ships in the U.S. Navy now. The current objective is to increase the fleet size to 308, according to the approved 30-year shipbuilding plan and the FYDP, or Five Year Defense Plan.

Every navy wishes it had more ships, people, and stuff. Strategic priorities can change, technologies can alter the warfighting landscape, and there will always be a competition for resources among the services. That said, the Navy's most recent force structure review revealed a new number. 355.

President Donald Trump's Jan. 27 executive order calling for a "great rebuilding of the Armed Forces," a point reiterated in his February 28 speech to Congress.

"I'm signing an executive action to begin a great rebuilding of the armed services of the United States, developing a plan for new planes, new ships new resources, and new tools for our men and women in uniform," Trump said at a Pentagon ceremony.

During the campaign Trump called for a 350-ship Navy, which tracks with the Navy's own force structure review that concluded that 355 ships were needed to meet combatant commander demands.

Trump has directed Secretary of Defense James Mattis to conduct a 30-day "readiness review" to determine "readiness conditions, including training, equipment maintenance, munitions, modernization, and infrastructure."

The Navy conducted its own force structure assessment, and commissioned two other studies to examine what kind of force the Navy needs going forward.

Another study by MITRE said the Navy needs 414 ships, including three more nuclear aircraft carriers, nearly double the number of cruisers and destroyers requested in the Navy's 355-ship plan

The Danish navy frigate HDMS Peter Willemoes (F362), seen here operating as a part of the USS George H.W. Bush Carrier Strike Group, is an example of a capable and flexible frigate design that could be built in the U.S.

(U.S. Navy photo by Mass Communication Specialist 3rd Class Christopher Gaines)

355 Ships

The number of U.S. Navy ships called for in the Navy's most recent force structure review

(from 84 to 160), and an increase of 20 more attack submarines. MITRE's analysis would cancel the littoral combat ship (LCS), but would create some new classes of ships, such as conventionally powered light carriers and diesel submarines, for example.

The Center for Strategic and Budgetary Assessment (CSBA) concluded that 340 ships are required, plus an emphasis on unmanned vessels—such as smaller combat craft and sub hunting drones--to augment ships and manned aircraft to conduct a variety of operations.

U.S. Navy: Force of the Future

The CSBA study points to small combatants, like the Swedish Visby missile corvette, as a way to achieve numbers while maintaining lethality. Sen. John McCain's recent white paper also proposes small patrol ships. And while there have been criticisms of the fighting capability of LCS, the Visby is an example of significant combat power on a small platform.

The 640-ton Visby has a BAE Bofors 57 mm gun, the same as LCS and the Coast Guard's National Security Cutter and Offshore Patrol Cutter, which can use very capable 3P ammunition; RBS15 anti-ship missile; anti-submarine torpedoes and can lay mines. There's space and weight margin for 32 surface-to-air missiles. It has a hull mounted sonar, variable depth sonar and towed array; Saab 9LV combat management system; Saab Sea Giraffe AMB 3D surveillance radar, and Saab Ceros 200 stealth fire control radar system. And the combat system aboard Visby would easily fit on an LCS-sized ship. It takes many years to bring a new class of warships from the drawing board to the sea buoys. There are existing proven designs at sea today with the attributes the U.S. would need. One example, the Danish Iver Huitfeldt class of frigate visited Baltimore during a recent Flexible Ships Forum co-sponsored by the American Society of Naval Engineers (ASNE) and the Society of marine Architects and Marine Engineers (SNAME).

Counting Ships

In all of these ship counts, the total depends of what you count as a ship. This varies, so the numerical comparisons are not always apples to apples.

When counting ships, some ships operated for the Navy by the Military Sealift Command are not combatants, but can have a direct role in supporting combat operations, such as replenishment ships, the expeditionary transfer dock (ESD) and expeditionary mobile base (ESB). MSC's expeditionary fast transports are essentially high-speed commercial roll on-roll off ferries, and can be adapted for a number of theater security cooperation missions.

Ron O'Rourke, an analyst with the Congressional Research Service, said paying for a bigger fleet comes with a big price tag. "CRS estimates that procuring the 57 to 67 ships that might need to be added the 30 - year shipbuilding plan to achieve and maintain a 355 - ship fleet—a total that equates an average of about 1.9 to 2.2 additional ships per year over the 30 - year period—could cost an average of roughly $4.6 billion to $5.1 billion per year in additional shipbuilding funds over the 30 - year period, using today's shipbuilding costs. These additional shipbuilding funds are only a fraction of the total additional cost that would be needed to achieve and maintain a 355 - ship fleet instead of

(U.S. Navy photo by Mass Communication Specialist 2nd Class Amy M. Ressler/Released)

Top Left
Sailors aboard the Arleigh Burke-class guided-missile destroyer USS Michael Murphy. (U.S. Navy photo by Mass Communication Specialist 3rd Class Danny Kelley)

Top Right
Sailors conduct flight operations on the flight deck aboard USS Carl Vinson (CVN 70). (U.S. Navy photo by Mass Communication Specialist 2nd Class Sean M. Castellano)

Left
The littoral combat ship USS Coronado conducts routine operations in the Sulu Sea.

308 - ship fleet."

While O'Rourke said expanding the fleet will create jobs, he also said the Navy officials have also identified readiness as a priority, and that maintaining and sustaining the fleet is also important to maintaining force structure.

Congressional Support

According to Paul Pedisich, author of a new book from the Naval Institute Press: *Congress Buys a Navy: Politics, Economics, and the Rise of American Naval Power, 1881-1921*, the president and the secretary of the Navy both need Congress to fund the fleet.

"The Secretary of the Navy's budget must be vetted through the Joint Staff, and the Defense Secretary then reconciles the Army, Navy and Air Force submission to the President's Budget (PRESBUD). But even the president can't actually fund the Navy or the other services," says Pedisich. "That's the job of Congress, which authorizes and appropriates all federal spending."

"Obama had no money. Trump has no money," said Pedisich.

"For years it has been the budget that has driven the strategy. I think we ought to be looking at things the opposite way," said Rep. Rob Wittman (R-VA), chairman of the Seapower and Projection Forces Subcommittee, speaking at the Surface Navy Association's Annual Symposium in January in Crystal City, Va. "I think the strategy ought to be driving the budget. We ought to ask the fundamental questions 'what does it require for us to do the things that this nation needs to do in order to provide presence and power projection and defending this nation?' And then say, 'How do we make the budget decisions to make that happen, understanding that there's always going to be a gap?' But the only way we understand that gap, and the only way that Congress makes the priority decisions that it must make – that it is constitutionally required to make – is to have a discussion about what that strategy should be. And I think that that is what's just been laid out before us with the Navy. The Force Structure Assessment for 2016, I think, lays that out perfectly. If you look at the assumptions that that force structure assessment is based upon, it's based upon the demand signal from the combatant commands. What are the needs? What are the combatant commands see that they need in order to make sure that they are providing for this nation's presence, for power projection, and make sure we deter and respond to adversaries around the globe. Pretty simple and straightforward."

Wittman said the Navy's plan is spot-on.

"This year's Force Structure Assessment is a very accurate reflection because it takes the demand signal from the COCOMs (the operational combatant commanders), it looks at that in context of what's happening around the world, and what we can realistically do and achieve – and it says the Navy should be 355 ships. I think that that is exactly where we need to be and it's very close to what the incoming administration says the Navy needs to be sized at. So that's our target. That's where I believe Congress, the House Armed Services Committee, needs to look at and has to figure out 'how do we achieve that?' Now our job is to ask the questions about how we did we arrive at that number?"

Simple and straightforward, maybe, but it comes with a price tag.

"The Congress' job, obviously, is to say, 'Okay, how do we authorize that and then how do we fund that? How do we make those critical decisions?' And I am confident that, working hand-in-hand with the Navy, that we could meet that goal and we can get to that 355-ship navy. I think the capacity is there in our industrial base to do that," Wittman said. "I think that what they have now as far as hot production lines, mature designs, is there, I think the industrial base can provide all of the different support mechanisms, the systems are all in place for us to do that. It's our job to make sure that

U.S. Navy: Force of the Future

we address the situation of the resources. And then, also, it's not just capacity in the industrial base, but it's also capabilities. How do we make sure we have the sailors to go along with those great platforms to make sure we sustain it? And then the ultimate question that comes is 'How long does it take us to get there? How many years will it take to make that happen?'"

Rep. Byron Byrne (R-AL) said the Congress and the Navy will have to think differently to grow the expectation for the fleet from the current force of 274 ships, to the 308 that have been funded for, to 350-plus. "The hardest part of getting to a 350-ship Navy will be funding. We have to break the cycle of passing continuing resolutions in Congress. As many of you know, the continuing resolutions cripple our defense, they cripple our ability to build the ships that we need to build, and to make sure that we have sailors that are prepared and have the readiness they need in order to do the job we expect them to do."

"In order to do that, and in order to meet the funding we are going to have to have for a stronger, bigger Navy, we are going to have to reverse this whole concept of sequestration," Byrne said.

Byrne said that some members of Congress say that defense spending should be treated like at every other part of the budget. Byrne disagrees. "It's fundamentally different, and fundamentally more important, and if we do nothing else, we make sure that we provide that adequate resources that it's going to take to make sure we defend the American people."

"There is no greater priority for the federal government and the United States of America than provide for the safety and security of our citizens," Byrne said. "And that includes a strong, and fully capable Navy."

"Article I of our Constitution grants the Congress the power to raise an army when needed, but it directs the Congress to provide and maintain a navy," said Byrne. "Once again, that goes back to the very beginning of our Republic. Our ability to control the seas is challenged by new and evolving threats: China, Russia, and Iran. Growing threats and demands are best met with a strong and comprehensive maritime response. The value importance of our naval assets to security and stability here at home and around the world has never been greater."

(U.S. Navy photo by Mass Communication Specialist Seaman Cole Schroeder)

Growing the fleet is more than new ships. It's also maintaining readiness of the existing ship so they will be combat relevant for their full expected service lives. Here Rear Adm. John C. Kreitz, President, Board of Inspection and Survey (INSURV), addressess Sailors in the wardroom of the aircraft carrier USS Nimitz (CVN 68). The ship is undergoing INSURV in preparation for an upcoming deployment.

More people

At the height of the Regan build up, there were 594 ships in the Navy inventory, but with the end of the Cold War, the U.S. fleet began to decline in size, exchanged for the ephemeral "peace dividend." This included the number of ships, number of different classes of ships, personnel, and the engineering workforce behind them all.

The Navy and industry both need to address the aging workforce with a human recapitalization program at the same time it needs to significantly grow the number of engineers and technical experts to design, build and manage the fleet.

"In the FY 88, 90 and 91 budgets, we had 15, 21 and 31 ships in the appropriations for those three years in a row," recalled Vice Adm. Thomas Moore,

commander of Naval Sea Systems Command. "In the last 10 to 15 years we've been happy to get seven or eight ships in the budget."

"In 1990 we had in 1,092 people in the engineering directorate, NAVSEA 05. In all of NAVSEA, including the PEOs, we had about 4,500 people to manage these ships. And we had about 2,000 people in our Supervisors of Shipbuilding.

"By 2005 we had less than 290 ships. We cut the fleet in half in a 15 year period, which coincided with a rather precipitous drop in our headquarters personnel at NAVSEA and in particular NAVSEA 05, which went down to 251. Today we are at 568 and we continue to ramp back up," said Moore.

"We continue to focus on growing. We anticipate being about 750 by 2025 based on the current 30 ship shipbuilding plan. If we get bigger, if we want to get to 355 ship, we're clearly going to need more," Moore said. The thought of increasing fleet size would be welcomed by the combatant commanders as the demand signal exceeds the availability of ships. And industry would obviously like more work. However, according to Rear. Adm. Michael Jabely, a surge in production isn't a simple proposition, as his comments at the recent Surface Navy Association Symposium would indicate.

Photo Credit: John Whalen/Huntington Ingalls Industries

President Donald Trump visited Huntington Ingalls's Newport News Shipbuiding, speaking aboard the new aircraft carrier, Gerald R. Ford, regarding his proposed U.S. military build-up.

"We have the capacity to increase shipbuilding that would be necessary to get the 66 attack submarines, I would say we have the potential. We've obviously done it before: we delivered as many as six Los Angeles Class submarines in one year in the 1980s, at the same time that we were building the Ohio Class SSBN. So the potential is there. The question is at what point do you need to start building more facilities, hiring more people? We're already in the middle of a facilities expansion and a significant employee ramp-up at our ship builders, just to handle the increased demand signal brought by the Columbia SSBN. We have to figure out how to get the Navy the 66 attack submarines in the right amount of time, with the necessary increase in facilities and employees, without breaking the submarine construction enterprise. So we're doing that hard work right now to figure out what the recommended posture is to get us to 66."

Image: handout

Rig line at Keppel shipyard in 2014.

Singapore's Survivability

Singapore's shipyards are looking to recent investments in capacity, design and newly acquired technology to combat order declines after a decades-long offshore buildup. Sembcorp and peer Keppel are making the most of partnerships in FLNG and showing signs they'll be okay through the downturn, helped by their gas-hungry Australasian backyard and renewed ties with old charterer parties and suppliers.

LNG-Fuelled:
Singapore harbor's future dual-fuel tugs.

Image: handout

BY WILLIAM STOICHEVSKI

With drilling contractors unable to pay for the offshore rigs they've ordered, Singapore's heavyweight yards have had to defer deliveries and become defacto rig owners. Yet, despite eating through their orderbook — including two newly delivered floating production storage and offloading vessels, or FPSOs — Keppel's Offshore & Marine Division is staying profitable in the downturn, earning $20 million in 2016. "The painful but necessary measures to right-size our (Offshore & Marine) division must continue," Keppel Corp.'s chief exec, Chin Loh Hua, says for the record.

After delivering a rig for Seadrill, Sembcorp, too, is agreeing to delay a rig handover, and if its client doesn't find work for the finished semi-submersible and Sembcorp fails to sell it, then the two charter parties will do that by joint venture. "Their agreement to more or less jointly own the rig works pretty well," says Danske Bank Markets offshore analyst, Sondre Dale Stormyr. He adds that rig giant Seadrill's more public conflicts have mostly been with Korean and Chinese yards.

Troubled clients aside, the pace of work has been brisk for both yard groups. Keppel — which has just sold a client's jack-up rig at 80 percent of its build cost — in January 2017 finished the build and integration of topside modules on the P-66 FPSO for a Petrobras-led consortium. Work on FPSO, P-69 is progressing well and follows similar conversion work for Italian ENI and Yinson that was Keppel's 125th FPSO customization.

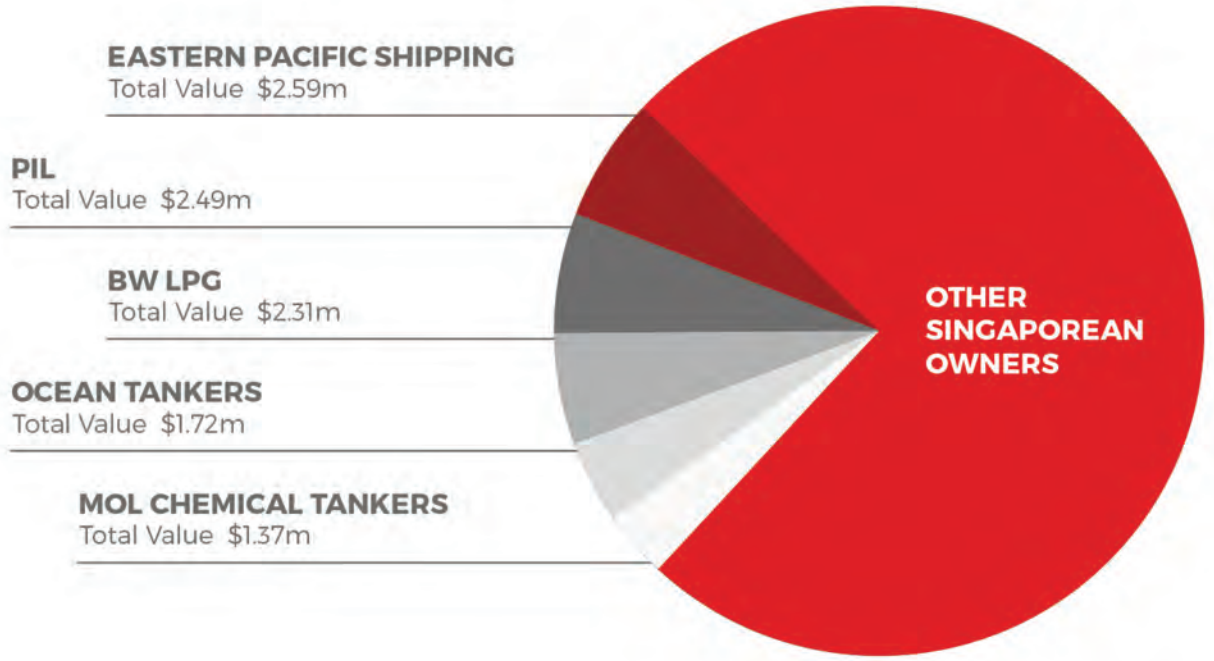
A fifth-generation offshore accommodation unit — Keppel's own design — was handed over to Floatel International for a Chevron work at the Wheatstone field off Western Australia. Another housing semi-sub is understood to be in the works at Keppel's Caspian yard.

Through Rig Glut

To be sure, rig orders have dried up. "You need a contract (with an oil company) and more" says Stormyr about financing anything for the yards these days. Not waiting for rig finance, Keppel FELS managing director Chris Ong is leading his build-and-repair network of 20 yards through the high-spec rig glut and into the new Keppel businesses. "There's a steady stream" of work for the repair segment, Ong is quoted in a regulatory filing as saying.

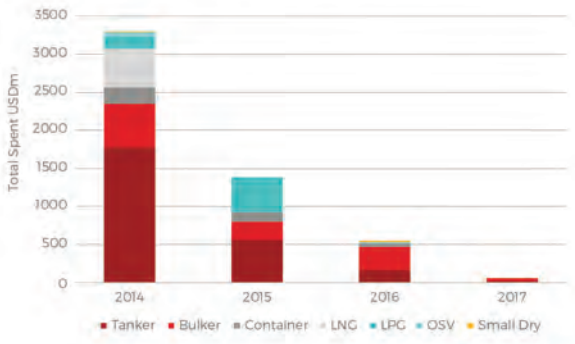
As with Sembcorp, there's a Keppel focus on the fledgling FLNG market, a belief in which is aided by Asia's dearth of gas pipelines. Keppel Offshore & Marine CEO, Chow Yew Yuen, can count on FLNG conversions (three and counting) to add to the "old" business of FPSO conversions and builds of topsides and turrets. A new lift-boat design for wind and platform maintenance and new, versatile, low-cost jack-ups for inspection, maintenance and repair, or IMR, intend to convert some "old business" into con-

TOP 5 SINGAPOREAN OWNERS
BY VALUE



Vessels Value

SINGAPOREAN SPENDING
ON SHIP TYPES PER YEAR



Vessels Value

SPENDING BY ASIAN COUNTRIES
IN 2016

Country	No. of Vessels	Average Age	Total Spent USDm
Greece	288	9	$3,746
China	185	11	$3,513
Norway	72	8	$1,867
Germany	65	8	$1,135
United Kingdom	45	10	$808
Denmark	57	6	$793
South Korea	57	10	$774
Singapore	50	9	$715
Japan	23	9	$579
USA	35	7	$490
Grand Total	877	9	$14,421

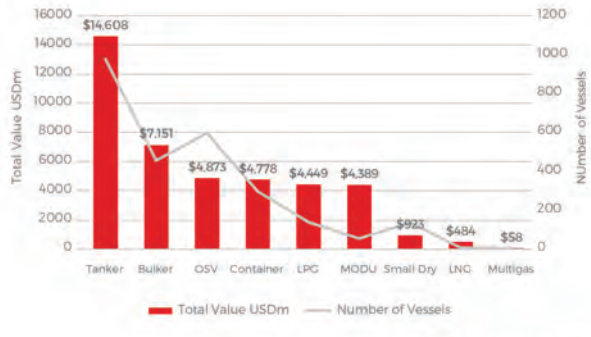
Vessels Value

TOP 10 NATIONS
RANKED BY VALUE

Country	No. of Vessels	Gross Tonnage (m)	Total Value USDbn
1. Greece	4,453	206.47	$88.0
2. Japan	4,317	150.26	$79.8
3. China	4,938	159.71	$71.7
4. USA	2,399	55.92	$46.5
5. Singapore	2,662	64.03	$41.7
6. Norway	1,668	39.68	$41.1
7. Germany	2,923	81.17	$30.3
8. UK	883	28.78	$24.3
9. Denmark	1,040	36.17	$23.4
10. South Korea	1,484	49.88	$20.1
Grand Total	26,767	87.21	$466.9

Vessels Value

SHIP TYPE BREAKDOWN
OF THE SINGAPOREAN FLEET



Vessels Value

tracts for this cost-conscious era.

In 10 years, Keppel has built mostly semi-submersibles (40 percent) and floating producers (25 percent). But in financial statements, Yuen points to FLNG conversions and IMR jack-ups as the promising technology behind a group-wide LNG push which made Keppel part of a new "gas value chain". Sembcorp's drive includes offshore liquefaction and LNG carrier knowhow that bears the mark of Norwegian engineers from Aragon AS (formerly Kanfa Aragon) and their "nitrogen expander" Dual N2 technology. It seems the Norwegians with their 50 percent of Aragon might put it aboard FLNG newbuilds across Asia.

"The global FLNG market is expected to draw US$65 billion of investments from 2014 to 2020," Yuen said in 2015. In February 2017, after a successful USD100 million fundraiser, another company, FLEX LNG, told an Oslo audience that LNG carriers without contracts are increasingly rare, so there's room for newbuilds. FLEX will build theirs in Korea, where Baltic shipping and LNG interests are building a large LNG bunker carrier in 2018.

LNG Focus

Sembcorp's LNG buttress against offshore headwinds strengthens in 2017 with the arrival in March of new Group chief exec, Neil McGregor, former CEO of Singapore LNG Corp. In a note to shareholders, Sembcorp notes McGregor is "the architect behind the strategy and implementation of Singapore's first LNG Terminal".

While Golar FLNG kick-started Keppel's FLNG drive, Sembcorp's initial LNG growth drive has been acquisition-based so far, kicked into gear via marketing and then ownership stakes in rising FLNG stars. There's also a move into smaller scale LNG shipbuilding linked to a deal with Shell to build LNG-powered vessels of all types.

Sembcorp's new LNG business will be built on a slew of designs from recently acquired LMG Marine and Aragon. There's also a memorandum of understanding with ENGIE to develop GRavifloat, an LNG-to-power near-shore terminal solution. The Gravifloat agreement means Sembcorp aims to design and deliver re-deployable terminals for near-shore gas and power installations that compete with LNG and re-gassing tech on costs. The 50-percent stake in process design engineering assemblage, Aragon, could help here, too, while giving Sembcorp the ability to deliver offshore and nearshore FLNG. A deal for all the shares in international floating producer designers LMG Marin of Bergen Norway rounds out Sembcorp's interest in pushing FLNG. LMG has designed LNG carriers, LNG-powered ships and the Espasdon drillship design, a Sembcorp deliverable.

All-In

While FLNG looks promising, it isn't clear which business activity — rigs and floaters, repairs & upgrades, platforms, and shipbuilding — will best help Sembcorp and Keppel until the expected offshore upturn.

"The challenge for Singaporean yards is that they are mainly exposed to rigs and vessels and these two segments are the ones to recover the last in this (all too slow) upturn," says Rystad vice president for oilfield services research, Audun Martinsen. "The companies that would

The Maersk Highlander

Photo: Courtesy Maersk Drilling

perform the best are those exposed to repair and upgrades and are able to win the few new greenfield awards in 2017. Time will tell."

Sembcorp also builds and engineers riser and wellhead equipment, tension-leg platforms and floating SPAR constructions like those that bob up and down like corks in the Gulf of Mexico or, soon, in the Norwegian Sea. Singapore, Audun says, represents $5 billion in sales and exports for Norwegian suppliers like LMG and Aragon. But, opinions are mixed on whether FLNG can lift all boats. "The LNG market is currently oversupplied and we do not expect a lot of new activity for LNG developments to dam up (for the yards) the decline in oil developments," Martinsen says, adding, "There are some megaprojects planned, but volume-wise, it is not enough to offset the decline in demand from conventional (offshore) activity." He says go-aheads for new offshore projects will improve to $70 billion in 2017, up from $50 billion in 2016. He cautions, though, that the Top 10 projects in 2016 made up 70 percent of that spend. "Competition for these contract awards will be fierce. I would not expect revenues to increase for this year, but in 2018 and onwards the recovery of the offshore business should have started to help the Singaporean yards."

Turning a Profit

Sembcorp, meanwhile, is still bringing in high-margin "conventional" offshore business. Recent work includes the Maersk Highlander jack-up for the Culzean field development in the U.K. North Sea and the Ivar Aasen process, drilling and quarters (PDQ) platform topsides. The rig was a "little sister" to Maersk's other rigs and marks a trend toward lower-cost units. The billion-dollar topsides were the biggest award of its kind in Sembcorp's history. Yet, as we write, Sembcorp at its flagship Tuas Bolevar shipyard is laying out the world's largest crane vessel, a 220-meter-long giant, for Heerema. Tuas offers massive, highly automated steel fabrication that Weng Sun says made possible the bids for Culzean, newbuild floating producers and the Heerema semi-sub. Despite the new work, communiques from Sembcorp leadership is keen to point out when new work is "non-drilling", a nod to those extra rigs.

Renewed Life

Keppel, meanwhile, will grow its LNG business with dual-fuel LNG tugs and cooperation with Shell on new uses for LNG as fuel. There's a growing list of potential FLNG projects to bid on, including the recent "okay" announced by Eni at the Coral FLNG project offshore Mozambique. If Coral goes, Eni's long relationship with Singapore on FPSOs will be pitted against field partner Kogas's national links to the Big Three Korean yards.

Meanwhile, Keppel, like Sembcorp, will look to its other orders, including work of a new type: a multi-ship dredger order worth $73.6 million for Dutch Jan de Nul Offshore.

For Singapore's Keppel and Sembcorp, the downturn is about their own and others' long-term bets on FLNG and whatever shipbuilding, repair and conversion work turns up.

New Business

Keppel has begun building dredgers like the Cristobal Colon, seen hear outside Rio de Janeiro.

(Photo: courtesy Jan de Nul Offshore)

Credit: Clean Air Engineering - Maritime (CAEM)

IT'S ELECTRIC!

Transportation Electrification Arrives at the Waterfront

BY TOM EWING

Transportation electrification (TE) is starting to impact California like no other state, maybe unlike any other place in the world. Essentially, and eventually, TE depends on replacing gasoline and diesel engines with renewably generated electric power. This could include just about every car, truck, fork lift, drayage vehicle, train and ship in California.

For the freight industry, including the maritime sector, TE presents complex challenges. In recent months, CA has started wrestling with "heavy-duty" freight transportation electrification. The maritime industry is included in this heavy-duty focus, starting with container, passenger and refrigerated cargo vessels. TE presents new demands across the board for ships, terminals and port operations.

The 7,500-acre Port of Los Angeles is center stage for zero-emission and low-emission technologies and strategies. Environmentally, the Port wants to be a better neighbor, decreasing the air pollutants that impact nearby communities. Additionally, the Port needs further controls to help Southern California meet Clean Air Act requirements for ozone, or smog, and fine particulates. The Port and its commercial operations need to decrease CO2 and greenhouse gas (GHG) emissions. By 2030, California wants state-wide GHG emissions to be 40 percent below 1990 levels. Freight sector reductions are critical for hitting that target.

A Work in Progress

Figuring out how to do this remains a work in progress. But a demonstration project is starting at LA's Port, in partnership with Pasha Stevedoring and Terminals L.P., The Green Omni Terminal Demonstration Project is a year-long, public-private effort to show full-scale, real-time zero and near-zero emission technologies at a working marine terminal.

At full build out, Pasha will be the world's first marine terminal able to generate all of its energy needs from renewable sources. For example, Pasha will integrate a fleet of new and retrofitted zero-emission electric vehicles and cargo-handling equipment into terminal operations, including four electric yard tractors and two 21-ton electric forklifts. Partially funded by a $14.5 million grant from the California Air Resources Board (CARB), the total cost is $26.6 million. Pasha committed $11.4 million in cash and in-kind participation, as well as serving as the project site.

For mariners, there are two critical components within this maritime/transportation electrification effort. One is likely familiar: using shore based power while at berth so that auxiliary engines – and emissions – are cut. The Port calls this Alternative Marine Power (AMP); more generically it's called 'cold ironing.' The LA Port has 270 berths, 24 are AMP equipped. This has been around for quite a while, actually.

The second component is perhaps less familiar. It consists of a dockside vessel emissions capture and treatment system – called ShoreKat, developed by Clean Air Engineering – Maritime (CAEM), in partnership with Tri-Mer Corporation. ShoreKat is next-generation technology, based on an older CAEM system, a barge-mounted unit called Marine Exhaust Treatment System-1, approved for use by CARB in June 2015. ShoreKat will work in tandem with on-shore power. It will be required to control stack emissions – under certain circumstances – for ships which, for one reason or another, cannot use shoreside power and need to keep auxiliary engines running.

Prior to entering Port, a captain will need to have made his decisions about at-berth power. He can cold-iron the vessel, assuming compatibility with the terminal, and that the ship is retrofitted for shore-side power. Or, he can remain powered-up. But in that case the vessel needs to be connected to an emissions capture system.

Capture, Treat - & Sell?

CAEM reports that the newer ShoreKat controls are more expansive than METS-1, capturing and treating more than 90 percent of PM, NOx, SOx and related diesel pollutants. ShoreKat can eliminate upwards of a ton of NOx emissions per vessel per 24-hour period.

ShoreKat offers two additional advantages over METS-1. Land based, ShoreKat is placed on a trailer, able to move along a pier, facilitating best posi-

tion for subsequent loading and unloading. A crane lifts a "bonnet" to attach to the vessel's exhaust stack. Treatment can commence without vessel retrofit. Importantly, ShoreKat has lower capital and operating costs compared to METS-1. ShoreKat's second advantage pertains to reducing energy-related emissions, particularly CO2, a top goal, obviously, for transportation electrification. CO2 reductions will be part of the demonstration work at Pasha, the first time that CO2 destruction technologies will be applied at a seaport terminal.

Matt Wartian is a Regional Global Practice Manager the engineering firm Burns & McDonnell and the project manager for Pasha/Green Omni. The CO2 control research has two parts; determining best ways to maximize CO2 reductions and

At full build out, **Pasha will be the world's first marine terminal able to generate all of its energy needs from renewable sources.** For example, Pasha will integrate a fleet of new and retrofitted zero-emission electric vehicles and cargo-handling equipment into terminal operations, including four electric yard tractors and two 21-ton electric forklifts.

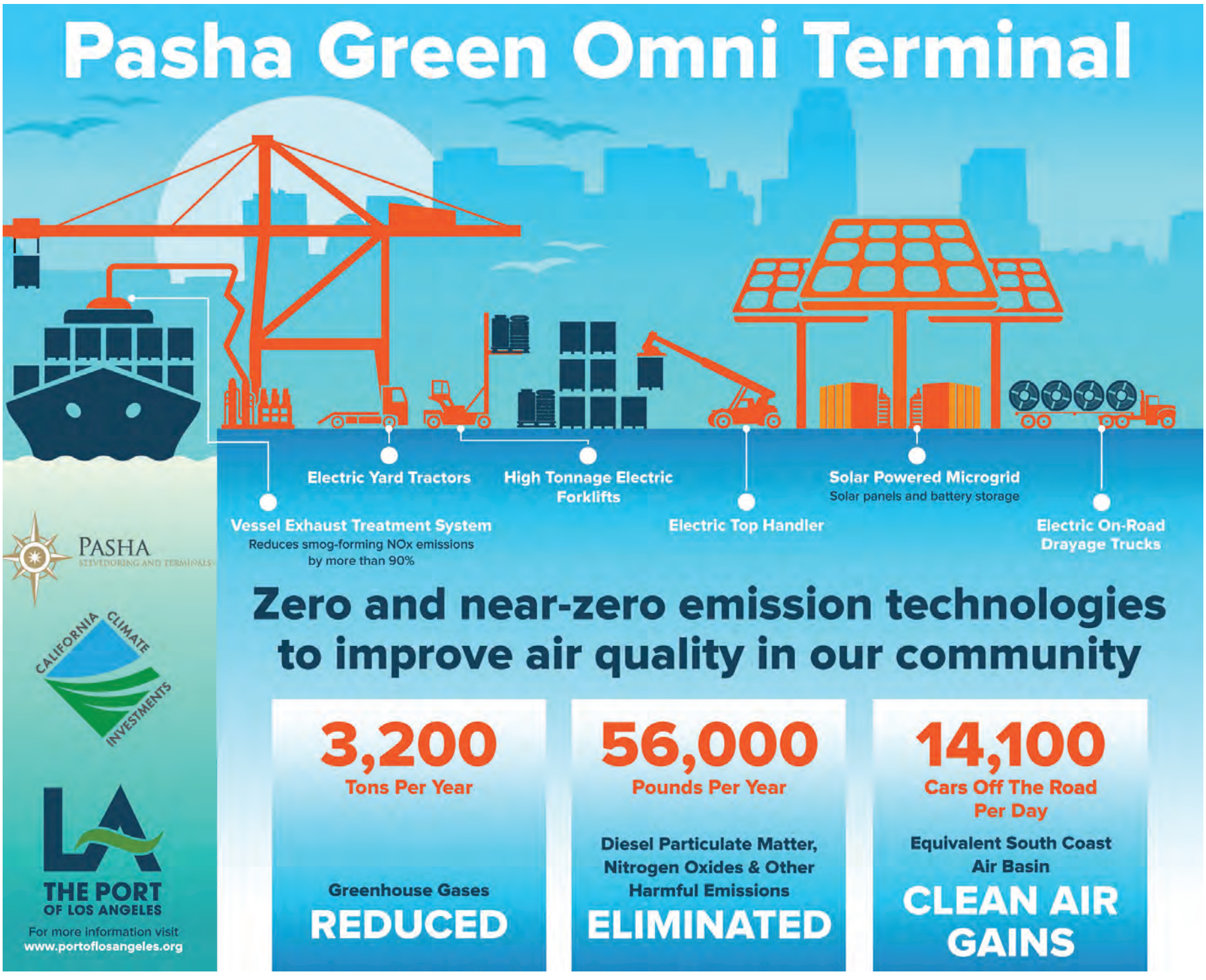
in a later phase, planning for CO2 capture, for disposal or, perhaps, sale to a downstream user for research.

Wartian expects ShoreKat to be ready by February 2017. Although vessels will not be charged during the demonstration, planners still need to decide how ShoreKat costs will be covered after start-up. For example, today's 'cold-ironed' vessels must pay for shore-side power.

California: out in front again

This is not just a marginal, academic research project. For example, two new CARB documents exemplify how regulations will push TE compliance using shore-side power and/or control technologies.

One document is a "Vessel Fleet Plan"



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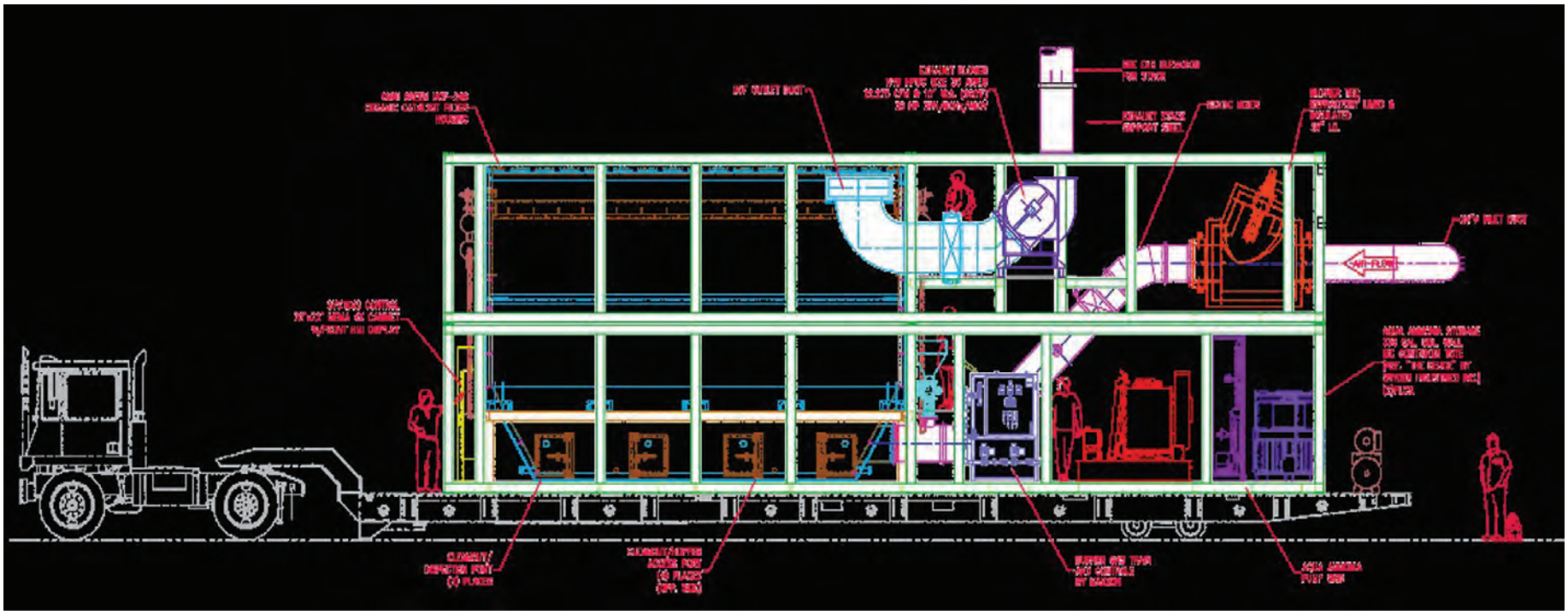


Credit: Clean Air Engineering - Maritime (CAEM)

that requires operators to detail how their fleet will comply with at-berth emission requirements. The Port's initial focus is on container and refrigerator fleets, and then only those which "cumulatively make 25 or more visits annually to a California port." For passenger ships, the minimum is 5 or more visits. And, while LA is today's target, the expanding regulations will eventually apply to of state's larger ports.

These Plans were due to CARB by October 1, 2016. As a counterpart to the vessel plan, terminal operators must also explain how they will fulfill their obligations under the environmental initiative. A second, newer policy is an Advisory posted in November. The Advisory informs affected vessel fleets and terminal operators as to how the Air Resources Board (ARB) will proceed with enforcement of the regulations, beginning in January 2017.

The Advisory sets forth six possible scenarios in which a vessel might be granted some leeway regarding at-berth emissions. These could include unavailability of terminal power, unresolved hardware problems, or when vessels keep power, but use an alternative control technology. Whatever the reason, operators are required, annually, to report specific vessel and event-related information to CARB. Operators are liable for infractions, fines and penalties could follow. In 2017, 70% of a fleet's visits must comply with the Advisory's requirements. That increases to 80% by January 1, 2020.

Looking Ahead

Matt Wartian was asked about scale-up, at least at LA. After all, the Port of LA is the 19th largest in the world, the 9th largest when combined with the Port of Long Beach. LA was visited by 1,951 vessels in 2015. Unanswered questions include how much AMP infrastructure is needed, how many ShoreKats that might involve and who will pay for it all. Wartian himself doesn't know. That said; there will only be one ShoreKat at the Pasha project. The Pasha terminal is a break-bulk facility and usually unloads just one ship at a time; so operationally, that works. As the emission reduction program expands, though, to other terminals, and other Ports, the "right number" of units – AMP and ShoreKats – still needs to be determined.

The Port of LA has no plans to expand AMP beyond the current 24 berths, which cost the Port about $180 million. As a comparison, the ShoreKat used in the Pasha project cost $3.7 million. Demand – and future investments – will likely become clearer for vessel and terminal operators, and the Ports themselves, when compliance plans can be reviewed.

In many ways, transportation electrification is hardly about transport. In California, TE is about using electric power primarily to replace individual engines and power plants. TE is not being advanced because it offers better, more efficient or safer transport. Furthermore, because TE results from command, not demand, it sweeps in new regulations and enforcement to ensure participation, compliance, equity and, eventually, the data that will document improved air quality and reduced climate impacts.

Hopefully, these non-transport goals will still allow safe, efficient and cost-effective maritime shipping.

A Wärtsilä V-SOx Scrubber
being installed on board the MV Tarago.

Photo: Wärtsilä

New Fuel Regs Drive Scrubber Business

BY TOM MULLIGAN

The Exhaust Gas Cleaning Systems Association and its members are preparing to meet higher demand for gas scrubbing systems to bring SOx emissions in line with the targets set by the IMO's 2020 fuel sulfur content proposals. As previously reported by this correspondent in Maritime Reporter and Engineering News (December 2016 issue, page 24; January 2017 issue, page 28), the IMO has come in for some severe criticism over its proposals to introduce a global marine fuels sulfur content cap of 0.5% (mass/mass) by the year 2020. However, the organization can take some encouragement for its ideas from the reactions of the Exhaust Gas Cleaning Systems Association (EGCSA) and major marine scrubbers manufacturers, most of which have expressed their satisfaction with and support for the proposed regulations.

"In October, IMO made the only correct and sensible decision. No delays – from 2020 the global limit on marine fuel sulfur outside of ECAs will be 0.5%," enthused Don Gregory, Director of the EGCSA, while Roger Holm, President of Wärtsilä Marine Solutions, observed that "the introduction of dual-fuel engines and the increasing use of LNG as a fuel will provide a viable means of complying with the sulfur cap requirements."

Gregory went on to say that it was not only for EGCSA members that the proposals bring certainty, but also the whole marine industry and its supplier base. He called it a "definite" decision that was beneficial to human health and the environment, and one that opens the door for businesses to take action.

Start Planning Now

"So, is that job done?" he asked. "Action plans must be put in place now. IMO's Marine Environment Protection Committee has also tasked its next subcommittee meeting with developing a work plan to ensure a smooth implementation, and the EGCSA and its members are ready and able to take full part in these preparations.

"EGCSA strongly believes that communication, transparency and co-operation between all stakeholders will ease the changeover process. After some 350 ship installations, scrubbing is now well-established and can no longer be considered a new technology. Needless to say, technology and regulatory development is ongoing – in reality it does not stop and there is always a need to build on experience."

With this in mind, the EGCSA recently hosted a second workshop, in which members, associate members and a number of guests viewed presentations from marine industry stakeholders outside of the Association to provide a platform for discussion on shipowners' perspectives of scrubbing, scrubbers and the environment, and of the refinery and fuel suppliers' view of the 2020 proposals.

Future Fuel Prices: The reality

"With significant overcapacity, low freight rates and poor vessel values, many sectors of the shipping industry have faced a very tough time of late. It is therefore unsurprising that financial uncertainty was one of the themes of discussion," Gregory stated. "EGCSA's view is that the future price realities of low-sulfur fuel should not be underestimated and that it is vital that ship operators carefully evaluate all the various payback scenarios when considering how to comply. Although using low-sulfur fuel may seem the obvious choice, it could easily render a vessel uncompetitive at the price differentials expected in 2020 and the easy option may well not be the best."

Washwater Discharge Quality

Working with Euroshore, the association of European port reception facility providers, the EGCSA has been taking a science-based approach to the quality of scrubber washwater discharges. A new washwater sampling program is currently underway for the European Sus-

Photo: EGCSA

Photo: Wärtsilä

Left:
Don Gregory, Director, EGCSA: "In October, IMO made the only correct and sensible decision. No delays."

Right:
Roger Holm, President, Wärtsilä Marine Solutions: The introduction of dual-fuel engines and the increasing use of LNG as a fuel will provide a viable means of complying with the sulfur cap requirements.

tainable Shipping Forum to address the type, source and concentration of material discharged overboard and the results of laboratory analysis are available for both the European Commission and the IMO to view. The EGCSA has said that it was reassuring that if the washwater discharge criteria were to be revised there would be a waiver in the Exhaust Gas Cleaning System Guidelines for those early adopters that have taken part. Within the research program to date, no samples have exceeded the IMO's limits on polycyclic aromatic hydrocarbons (PAH) – these chemical compounds are an indicator of oil content and analyses have shown that the concentrations of these substances can be up to 30 times less than in water discharges from oil and gas production platforms.

"Knowledge, Not Rhetoric"

The aim of the EGCSA/Euroshore sampling programs is to enable a clear and even application of scrubber discharge rules across Europe and in locations where open and closed loop scrubbers can be used: "Residual fuel and scrubbers can be the most cost-effective and environmentally sustainable method of SOx compliance and EGCSA will use knowledge and data rather than rhetoric to answer questions and explain the benefits," stated Gregory.

"Scrubbers offer the only alternative to compliance by fuel, not only controlling

SOx but also particulate emissions," he added. "EGCSA members have the capacity and resources to meet demand, market conditions are favorable and we have had the green light from IMO for 2020. It is now investment decision time: this is an opportunity for shipowners."

Manufacturers Poised for Action

Meanwhile, Wärtsilä Marine Solutions President Roger Holm has said that the company's proactive development of exhaust gas cleaning systems and broad offering in gas and dual-fuel engine technologies means that the company is in a strong position to help ship owners implement plans for compliance with the new regulations: With its technology certified to IMO gas cleaning systems standards and with the recent approval of its exhaust gas cleaning systems by the Singaporean flag state authorities (an approval recognized across all Asian flag states), Holm said that the introduction of dual-fuel engines and the increasing use of LNG as a fuel will provide a viable means of complying with the sulfur cap requirements.

DuPont has also been quick off the mark in promoting its marine scrubber technology as a viable solution to meet the global sulfur cap:

"Abatement technology such as a DuPont Marine Scrubber is the only way to continue shipping operations as usual with heavy fuel oil of up to 3.5% sulfur content while remaining in compliance come 2020," the company said. "A DuPont Marine Scrubber enables any vessel to meet sulfur emission limits without switching to expensive low-sulfur fuel when entering an ECA.

This economic and highly reliable compliance option allows for 'business as usual' bunkering. With a scrubber, there is no need for fuel-switching," it asserted. "The DuPont Marine Scrubber has 'run-dry' capability and no by-pass, allowing vessels that travel in and out of ECAs to comply with regulations: a single scrubber can meet 0.1% and 0.5% sulfur requirements."

Compliance and Retrofit: Key Concerns for Shipowners

Technology solutions provider Goltens had this to say on the subject: "The looming deadlines and pending approvals for a variety of environmental emission regulations are making compliance and retrofit a key concern of most shipowners around the globe. In a proactive response to this, Goltens has expanded its competency beyond the ballast water space and made further investments to help shipowners navigate this complex and costly compliance process. Compliance with IMO ECA regulations is becoming a large concern for owners, and, with additional deadlines approaching, for the existing fleet this means retrofit and the consideration of possible compliance solutions ranging from exhaust scrubbers to fuel conversion and boiler retrofit options. Goltens Green Technologies (GGT) is using its proven process to consult and retrofit these technologies with a strong focus on limiting the cost and operational impact on owners."

One option is to modify vessels to run on emissions-compliant fuel types like LNG or low-sulfur marine gas oil (LSMGO). Goltens said that outside of the LNG fleet, conversion to LNG is rarely cost-effective in a retrofit situation but that conversions to accommodate the use of LSMGO can generally be made with only minor modifications and significantly less capital investment. These options include LSMGO cooler installation and LSMGO fuel conversion for LNG main boilers.

Case Study:

18-day Exhaust Gas Scrubber Installation

Goltens was contracted by a large cruise vessel owner to undertake the installation of two exhaust gas scrubbers on one of its ships to comply with sulfur emissions regulations. The vessel is powered by four GMT/Sulzer 16ZA-V40S and two GMT/Sulzer 12ZAV40S diesel electric generating sets.

The project involved the evaluation, planning, design and installation of two 10+ meter long exhaust gas scrubber towers on Diesel Generators #1 and #2 with a deadline to complete the operation before the end of the vessel's dry dock period in a U.S. port.

Planning and Preparation

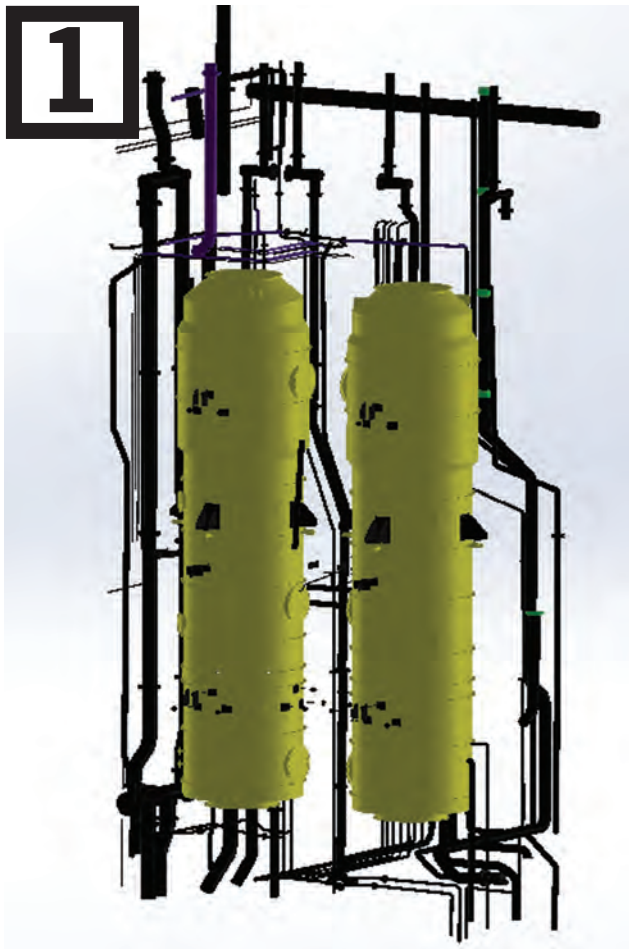
First, technical specialists inspected the ship to evaluate the project, determine space requirements and record any logistical obstacles. In addition, 3D laser scanning of the spaces for the scrubbers was undertaken to facilitate system modelling. This enabled Goltens to complete the detailed design of the exhaust gas cleaning systems and map out a definitive process, including plans for manning the project and determining timelines for the removal of the existing exhaust silencers and installation of the new exhaust gas scrubbers within deadline. Goltens was also able to prefabricate foundation structures in its workshop and ship the prefabricated material to the vessel in anticipation of its arrival in dry dock.

Phased Approach

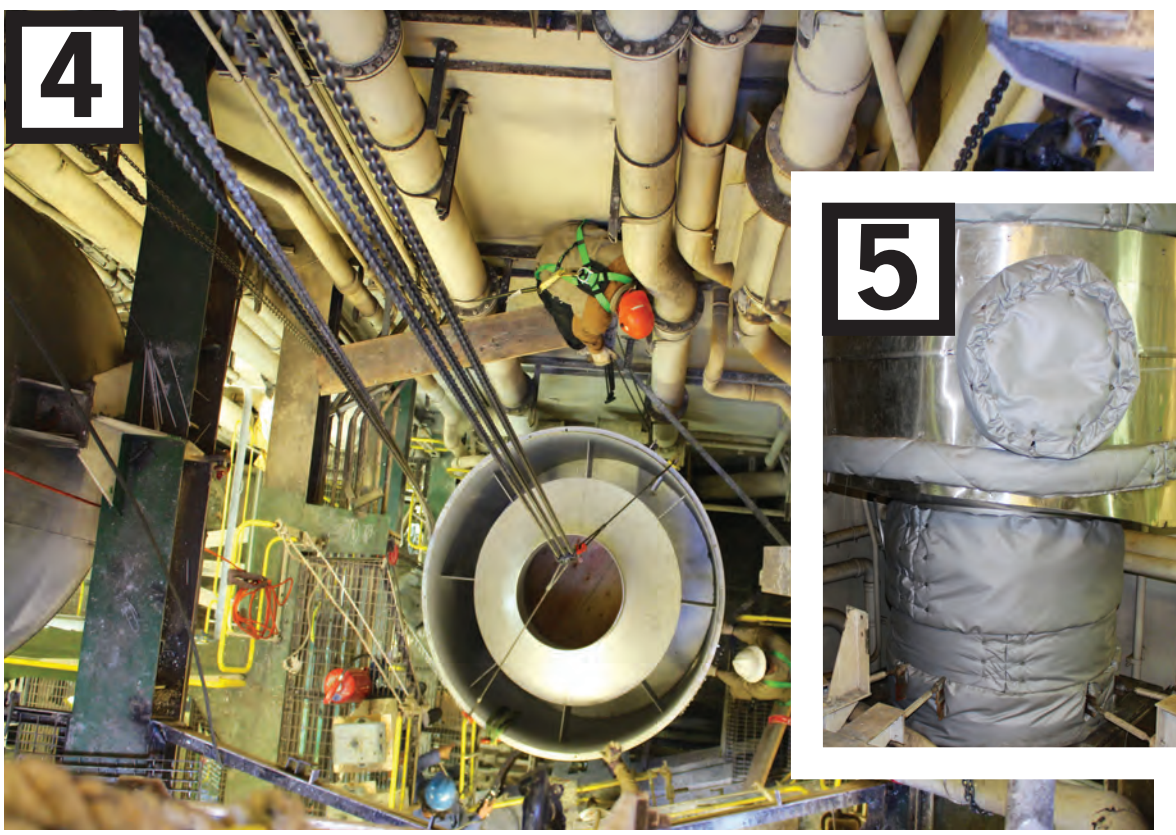
A ten-man crew performed the demolition work and prepared the engine casings for the rigging and installation operations, with all preparatory work being completed during a nine-day underway period prior to docking. Once in dry dock, a team of more than 40 technicians and technical managers was mobilized to complete the project within the ten-day dry-docking period. The team removed all eight exhaust silencers and installed all scrubber tower sections within 22 hours. Goltens ran two shifts with a minimum of two supervisors per shift to ensure that quality controls and safety standards were adhered to throughout the project.

On-time Completion

Goltens worked closely with the vessel's technical project management to overcome any schedule delays caused by weather and any technical obstacles encountered. As a result, the project was completed a day ahead of schedule and the vessel was able to leave dry dock as planned. As a result, the company was awarded and completed a similar contract on a sister vessel a few months later.



All images courtesy Goltens



[1] A 3D model of the scrubber with system connections.

[2] Removal of the existing exhaust gas silencer sections.

[3] Rigging the scrubber section into the ship.

[4] Lowering the scrubber section into place.

[5] The fully insulated and cladded scrubber section in position on board ship.

Panama Certifies Japanese Scrubber

Photo: K Line

Ambassador Diaz of Panama presents the certificate.

For almost a year Kawasaki Kisen Kaisha, Ltd., Mitsubishi Heavy Industries, Ltd. and Mitsubishi Kakoki Kaisha, Ltd. have been performing tests aboard an operational ship of a newly-developed "Hybrid SOx Scrubber System" for removing sulfur oxides (SOx) from the exhaust gas emitted by marine diesel engines. The testing results have now verified that the system's effectiveness in curbing emissions of air pollutants complies with international regulations, and the system has been officially approved by the Republic of Panama, the country where the test ship is registered.

The test unit of the Hybrid SOx Scrubber System is the first installation of a system jointly developed by MHI and MKK specifically for marine applications. It is installed on "K" Line's Drive Green Highway, the large-scale car carrier with capacity for 7,500 -units.

The Hybrid SOx Scrubber System is the first commercialized system in Japan to comply with the more stringent SOx emission regulations that took effect, starting with ECAs, in 2015. The system has two modes: an "open-loop" mode in which seawater intake is sprayed directly on the exhaust gas; and a "closed-loop" mode in which fresh water is used as the cleaning water, and after the exhaust gas is cleaned, it is then neutralized using sodium hydroxide (NaOH), after which water is then sprayed on the exhaust gas again. This hybrid system enables stable cleaning unaffected by the properties of the seawater in the area of navigation.

Whereas equipment auxiliary to engines is normally installed within a ship, **the core components of the Hybrid SOx Scrubber System can be contained in an ISO shipping container.** This modular packaging means that the major system components can be installed on an open deck, for example, thereby not only allowing the space within the ship to be used efficiently but also helping to reduce installation time. Also, as the container package is relatively easy to remove and transfer to a different vessel, installation on aging ships is facilitated.

Photos courtesy of The Interlake Steamship Company




Clean Shipping on the Great Lakes

BY ERIC HAUN

Maritime Reporter & Engineering News recently spoke with Mark Barker, president of The Interlake Steamship Company, who has sent its fourth vessel — its second 1,000-footer — to be outfitted with exhaust gas scrubbers. After seriously pursuing the possibility of converting its ships to run on liquefied natural gas (LNG) several years ago, U.S. based Great Lakes shipper The Interlake Steamship Company found that the region's LNG infrastructure was simply not present to support such conversions.

"We had some tentative agreements to do LNG, we were talking to the Coast Guard about the design, we had our ships designed for LNG tanks," said Mark Barker, president of The Interlake Steamship Company. "But the supply chain for LNG was just difficult and became too expensive, so we switched to scrubbers."

Interlake became the first U.S.-flag shipper to test freshwater scrubbers on the Great Lakes when the system became operational on the 806-foot bulk carrier MV Hon. James L. Oberstar in April 2015.

Following the successful implementation on Oberstar, which saw better-than-expected results, Interlake decided to continue the installs and is now on its fourth of five planned scrubber retrofits, having most recently sent its 1977-built self-unloading bulker MV Mesabi Miner into Fincantieri Bay Shipbuilding in Sturgeon Bay, Wis. in December 2016 to be retrofitted with closed-loop scrubbers that will effectively "scrub" the majority of the sulfur from the ship's stack emissions. In addition to Oberstar, Interlake vessels MV James R. Barker and MV Lee A. Tregurtha were outfitted with scrubbers in 2016, and the systems will be installed on the MV Paul R. Tregurtha in 2017 after the Mesabi Miner. Each of the five ships will be retrofitted with the same in-line, closed-loop DuPont Marine Scrubbers from BELCO.

"It is important for us to have continuity of equipment and operating systems for our crew. So we're standardized on that system," Barker said.

The scrubber units designed and supplied by DuPont company Belco Technologies Corporation (BELCO) enable ships to meet the limits set under U.S. Coast Guard, U.S. EPA and IMO exhaust gas and wastewater emissions regulations without switching to low-sulfur fuel. Each scrubber unit is attached to the exhaust system of each of the ships' main engines so that exhaust gas is sent through a series of absorption sprays that wash and remove impurities, specifically sulfur and particulate matter (PM) emissions. The "scrubbed" gas then travels through a droplet separator before a clean plume of white steam is discharged.

Barker said, "the scrubbers are not inexpensive," but for Interlake, they offer a greater benefit for long-term operating cost. "We felt that choosing this option and utilizing the lower cost fuel but having the cost of cleaning that exhaust was a better option than just switching to ultra low sulfur diesel."

"Scrubbers are — from a maritime perspective — still fairly new," Barker noted; and as is often the case when implementing any new technology, challenges are likely to arise.

So far the scrubbers themselves have not been overly complicated to operate, Barker said, but he added the company has seen challenges in the "logistics chain" of operating scrubbers. "It's a lot of little stuff, but it adds up."

"We're operating closed-loop scrubbers, so we're using caustic soda. There was no marine caustic soda distribution network in the Great Lakes," Barker said.

Sodium hydroxide, also known as caustic soda, is used to neutralize and remove sulfur from exhaust gas and must be delivered to each ship about twice per month. As the region's first scrubber user, Interlake was therefore tasked with developing its own supply-and-delivery infrastructure for securing and maintaining a supply of caustic soda.

Barker said this lead to many questions that needed to be addressed at various stages: "How do we bunker? How do we ensure safety and train our crew around caustic soda? How do we treat it? How do we deal with the wastewater and ensure we are complying with all laws and regulations?"

Interlake worked with partners Hawkins Inc., PVS Chemicals Inc., Garrow Oil & Propane and OSI to establish waterfront supply capability at Sturgeon Bay, Wis.; Detroit, Mich.; Duluth, Minn.; East Chicago, Ill. and Burns Harbor, Ind., and said it is continuing to work with other dock and facility owners to further develop sodium hydroxide supply on the Great Lakes.

In addition, the act of retrofitting scrubbers presents its own set of challenges. "We're trying to fit them into existing ship structure, so it's not like we're building new ships and can design around the scrubber," Barker said. "Where do we put the tanks? How do we heat them? How do we fit the scrubber units into the stack area without too much modification? Our team has done an amazing job figuring that out, but it has definitely had its challenges."

When asked about the cost of the project, Barker declined to offer a dollar figure, but said the expense has become greater than initially estimated. "The actual manufacturing of the scrubber units are within where we expected," Barker said. "We've realized that the installation has been a lot more complicated and time consuming than we initially estimated, so that piece has grown."

"We've learned from that," Barker said. Now on its fourth install, Interlake has ironed out many of the wrinkles and has adapted to minimize potential impacts. BELCO has even modified the units over time and altered various components to help improve performance.

"It's a big job and more complicated than we thought, but at the end of the day it's working well," Barker said.

MV Mesabi Miner

Mesabi Miner, named in honor of the men and women of Minnesota's Mesabi Iron Range, was built by American Ship Building Company in Lorain, Ohio and joined the Interlake fleet in 1977. Its self-unloading system includes three cargo hold belts and a 265-foot boom.

Year Built:	1977
Official Number:	581479
Overall length:	1,004 feet
Carrying capacity:	63,300 gt
Hull depth:	50 feet
Beam:	105 feet
Engine horsepower:	16,000

Courtesy of The Interlake Steamship Company

Earl W. Redd: The First Tier 4 Tractor Tug in the U.S.

Late last month Harley Marine Services accepted delivery of its newest tractor tug, Earl W. Redd, a technically significant vessel in that it is the first of its kind: the first Tier 4 tractor tug in the United States.

Earl W. Redd is equipped with Caterpillar's Tier 4 emissions technology and enters the fleet as one of the most efficient and environmentally conscious vessels in the world, exceeding the toughest marine EPA standards.

Built at Diversified Marine of Portland, Oregon, the Earl W. Redd measures 120 x 35 ft., with a loaded draft of 19.25 ft.. The tug features twin Cat 3516 Tier 4 Final main engines that will each produce 2,675 hp at 1,600 rpm. Each of the engines is paired with a selective catalytic reduction (SCR) after treatment system. SCR uses a urea-based solution to reduce NOx contained in diesel exhaust down to nitrogen and water vapor. The main engines will be paired with Rolls Royce US 255-P30-FP azimuth thrusters delivering an expected bollard pull capability of 75 tons.

The Earl W. Redd has a fuel capacity of 127,000 gallons and can carry 6,534 gallons of water, 1,137 gallons of lube oil, 1,263 gallons of hydraulic oil and 8,200 gallons of diesel exhaust urea. The vessel also features tow and bow winches by Markey and fendering by Schuyler. The bow winch is specially designed for ship handling and escort services. Auxiliary power comes from John Deere 125kW generators.

Harley Marine namef the vessel after Earl W. Redd, father of Diversified Marine's owner, Kurt Redd, was widely known and respected. Earl was a 32nd Mason and an athlete, playing baseball, football, basketball, skiing, and golfing. He even cleared the pool table, given the opportunity, but the water and fishing were his true passion.

Earl worked for Hyster and U.S. Steel, but found his niche when he landed firmly and found his fit at Harder Mechanic al Contractors where he retired at 70. After retirement, Earl became part of the Diversified team and a strong presence for the remaining 25 years of his life.

Designed by Jensen

The Jensen Maritime-designed Earl W. Redd, the first tractor tugboat in America to enter service in compliance with the U.S. Environmental Protection Agency (EPA)'s Tier IV environmental standards by use of a Selective Catalytic Reduction (SCR) system. A SCR system scrubs emissions by converting nitrogen oxide (NOx) into ammonia, which is then absorbed by ceramic bricks built into the engines. The technology reduces the amount of NOx, particulate matter and hydrocarbons released into the environment, and makes the 120-ft. vessel one of the cleanest-running tugboats in terms of marine emissions.

This is the first of seven such tugs in development by Jensen. "With six more Tier IV tugboat designs slated for release soon, Jensen is leading the industry in the production of environmentally friendly designs balanced with high-quality performance," said Johan Sperling, Vice President, Jensen. "The completion of this tug is a continuation of our commitment to meet the industry's demands for strong, yet nimble, vessels with quality design."

A large pilot house provides all-around visibility, and the deckhouse has an open feel with a large mess and lounge area along with accommodations for a 10-person crew.

Plenty of Pull

The tug is equipped with a Markey Machinery two-winch suite of equipment consisting of a Markey TESD-34B-100HP double drum electric towing winch, and a DEPC-48-50HP electric bow hawser winch with Render/Recover. The TESD-34B-100 hp towing winch is arranged to hold 2,500 ft. of 2.25-in. diameter wire rope on the starboard drum, and 1,500 ft. on the port drum. Barrel layer performance is rated at 193,000 lbs (87,500 kgs) at stall; 129,000 lbs (58500 kgs) at 22 FPM (6.7 MPM); and 55,000 lbs (24900 kgs) at 43 FPM (13 MPM). The brake has a maximum holding capacity of 645,000 lbs. (292500 kgs). P

owered by a 100 HP TENV inverter-duty electric motor controlled by a variable frequency drive, the winch can provide full torque at continuous stall. The winch also includes a hydraulically powered emergency "come home" drive motor in the event of electrical failure.

The DEPC-48-50 hp bow hawser winch will hold 500+ feet of nine inch Synthetic HMPE line in 8 layers. The mid-drum (5th layer) performance rating is 22400 lbs (10100 kgs) at 100 FPM (30 MPM). Light-line (high speed) ranges from 107 to 291 FPM (32 to 88 MPM). Brake capacity exceeds 612,000 lbs (277000 kgs). The winch uses Markey's proven Render/Recover technology to allow tug positioning while automatically maintaining an adjustable inhaul/payout constant-tension on the line. It also includes a "Free-wheel" feature allowing for fast line payout or emergency escape.

Earl W. Redd is a 120-ft. tractor tug equipped with Caterpillar's Tier 4 emissions technology. The main engines will be paired with Rolls Royce US 255-P30-FP azimuth thrusters delivering an expected bollard pull capability of 75 tons.

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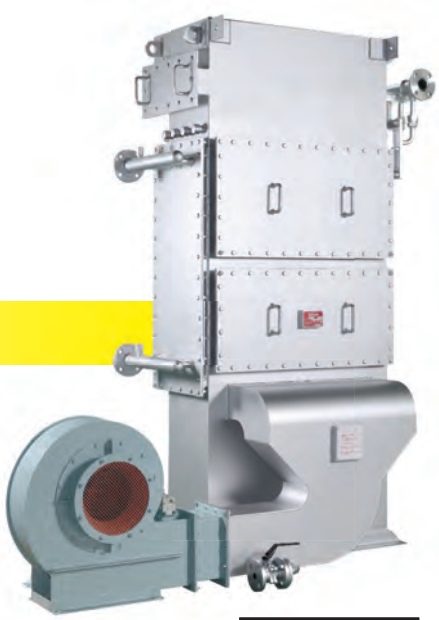

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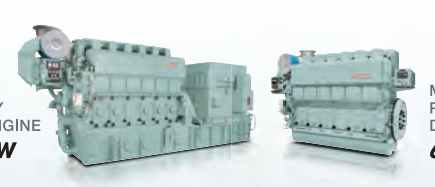

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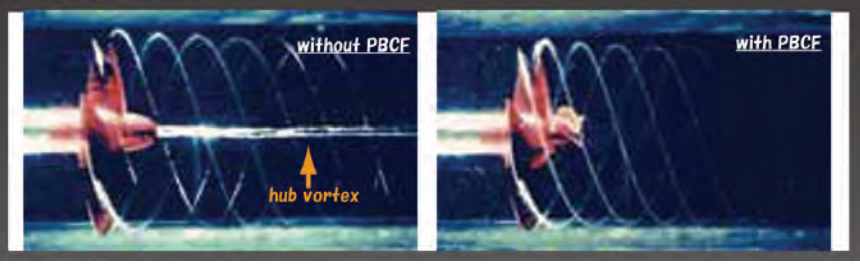

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All Photos: MARIN

SHIP SIMULATOR

By Pepijn de Jong

Bouncing over the waves at a speed of 43 knots, the director of the Defense Materiel Organization (DMO) Vice Admiral Arie Jan de Waard, and MARIN's director Bas Buchner, made the first test voyage on the moving 'Fast Small Ship Simulator.' This FSSS is built by MARIN and SME partners, Cruden and TreeC, as part of a CODEMO project to stimulate the development of a prototype. Vice Admiral De Waard felt the test was very realistic and said: "You feel as if you are involved in a complex operation at sea. Virtual reality like this is going to play a large role in education and training."

Detailed Replica RHIB Console

A unique knowledge combination led to the FSSS, which is made up of a motion base, typically used for racing car simulations (Cruden), real-time simulation of ship dynamics (MARIN) and an advanced visualization environment (TreeC). The main goal of the FSSS project is to provide a safe but accurate environment for training drivers and navigators of Rigid Hull Inflatable Boats (RHIBs). The motion platform has been outfitted with a near exact representation of the control console of the actual RHIBs used by the Royal Netherlands Navy. This includes engine controls, VHF radio and a GPS system. Even the seats of the driver and navigator are exact copies of the actual seats.

To facilitate simulation of fast RHIBs, MARIN extended its simulation framework (XMF) with a new approach to simulate complex phenomena such as slamming, capsizing, surf riding and broaching. The main challenge was to develop a method capable of simulating such complex motion dynamics while at the same time providing predictions in real-time, including the effect of control inputs by the operator. A balance had to be struck between 'accurate enough' and fast computation times. The method also had to be robust to cope with a wide variety of possible conditions and inputs, and also provide realistic motion predictions at all times.

XMF

Based on recent experience a computational model was built up from the ground within XMF consisting of a number of key building blocks. A module was developed based on added mass planing theory (or 'momentum theory') as was pioneered in the 1930s by Von Karman and Wagner. Experience from recent research in the DROPSIM tool development program into modeling the impact of free falling lifeboats into the water surface also contributed. In this approach the ship is split into a number of 2D transverse sections and the impact force of each of the sections is determined based on the impact velocity and wetted shape of each section at each time instant. The method is based on first principles and proves to be very adequate in dealing with both planing in calm water and impact forces on fast vessels in waves. Another building block deals with the hydrostatics and wave forces, computed on the actual submerged geometry. The resistance was also modeled as a function of ship speed and actual submerged wetted surface. A detailed engine model is included to simulate the dual Z-drive setup, including the effect of trimming the Z-drives. A coefficient-based maneuvering model to cope with the horizontal plane motions and additional damping coefficients complete the model.

Navy Input

An important step in real-time simulation is the tuning of the various components and coefficients in the underlying computational building blocks. For the FSSS project, MARIN made use of the know-how that it has been building up over the past years about small, fast craft and RHIBs. This includes various model tests with fully remote controlled models of high-speed small craft in the Seakeeping and Maneuvering Basin and the development of advanced computational methods such as PANSHIP.

In the development phase of this project, RHIB instructors from the Royal Netherlands Navy were invited to give their feedback on the behavior of the computational model in combination with the motion system. During various workshops, the instructors have been testing every aspect of the simulator, including steady trim in calm water, steering and throttle response, turning circle diameters, the roll angle during turning and the motion behavior in waves from every direction. Even aspects like the forming of spray on the visualization, friction between the RHIB and vessels during boarding operations and the engine sound were discussed and improved. This approach makes this project truly unique, resulting in a valuable simulation and training tool for operators of RHIBs and other fast small craft.

Real-time visualization and simulation technology

All Photos: Delgado Maritime Industrial Training

DELGADO MARITIME & INDUSTRIAL TRAINING CENTER

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Tel: (504) 671-6620
Email: fireschool@dcc.edu
Web: www.dcc.edu/academics/workforce/maritime-fire

Rick Schwab,

Senior Director of Delgado's marine, fire, radar and industrial training facilities

Overview

Delgado's Simulator Suite is comprised of 3 interactive Full Mission Bridge simulators. Simulators are used for Wheelhouse Proficiency Management classes to provide scenarios on navigating waterways on different types of vessels. Simulators can be programmed to run three vessels at the same time, so that students in all three wheel houses can communicate and interact with each other. Both conventional and Z-Drive controls can be used in the training.

In the past 12 months, the Delgado Maritime & Industrial Training Center has trained a total of 4,952 students in a variety of Fire Fighting, Safety, and Radar Navigational courses. With regard to Simulation classes specifically, it ran 71 total classes. Courses included all levels of Wheelhouse Proficiency Management, Z-Drive Training, and Towing Assessment Programs. The main thrust of its business is Domestic Inland Waterways and Offshore Oil & Gas.

Investment in the Future

Within the past 12 months, Delgado has built this new state-of-the-art facility which includes a Radar lab Suite that consists of three Full Mission Bridge Simulators, a Rose Point Lab, two complete labs for conducting classes in ECDIS, Radar Navigation, GMDSS and ARPA. These labs are completely furnished with the finest leather chairs, and tables which contribute to a total adult learning experience. This new state- of-the-art building also has WiFi installed throughout to allow for video streaming exercises in Virtual Reality Incident Command training. In the next 12 months, Delgado plans to build new courses, new simulation routes, and new vessels, to meet the ever-changing needs of the industry and unique needs of each company.

This new center was engineered with a complete package for future growth. All servers were designed to accommodate software upgrades for the next 5-10 years. All classrooms have state-of-the-art presentation ENO boards for utilizing modern software applications. The building has a full Emergency Center that allows all functions to operate without a delay of power created by outages. This building and its equipment was designed with the future in mind.

The Evolution of Maritime Simulation Training

Delgado has been using a simulator in some form since 2001. It has used it over the years as a simple learning tool to help mariners become familiar with new navigational areas and equipment. In today's environment, the simulation has become an essential component of analyzing skill levels of pilots, ascertaining competency levels on defined sections of the river, and proper utilization of new equipment and drives on the various vessels.

Where do you see opportunities for growth?

In an ever-changing industry, growth will always come with the ability to diversify. As long as we remain aware and on point with industry standards, changes and competencies, and develop or adjust programs to meet these needs at every turn, there is never-ending room for growth. Specifically, we will continue to develop scenarios and simulation software for specific routes of the Mississippi River, we will continue to expand program offerings to cater to a more expansive population of mariners at all levels, and we will continue to update our fire field and obtain new training props and equipment to keep us at a state-of-the-art level.

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Director: Captain Chris Hearn

**All images: The Centre for Marine Simulation*

Overview

CMS operates a range of marine simulation equipment that covers a broad range of marine and offshore activities. Much of the equipment is highly specialized and unique including fully motion capable simulators. The center also provides technical management and support of simulation equipment that is used by other parts of the Marine Institute.

Recent Developments

CMS simulation activities can be divided into three main areas; Training, Industrial Response, and Applied Research. To support these activities the Centre continues grow its technical capacity and as such is able to provide solutions for many of its clients including the development of ship models, geographic and area databases and the provision of software development. Reflecting its location in Newfoundland and Labrador, the centre has focused its ability on representing operations in harsh environments and ice covered waters.

With training, CMS is involved in offshore oil and gas and commercial shipping. While Dynamic Positioning and Mobile Offshore Drilling Unit (MODU) Stability and Ballast Control training has felt the effects of the down turn in the oil industry globally, CMS has seen an increase in training related to support and supply vessels using the new Offshore Operations simulator. This includes Anchor Handling level 1, Anchor Handling Stability, Ship Manoeuvering with Azimuth, etc.

In Commercial shipping, with focused courses like Ice Navigation, Leadership and Management training, and Bridge Resource Management remain steady in demand.

With industrial response, CMS utilizes its equipment and development capacity to provide services for the offshore oil and gas and commercial shipping industry as well as port design to examine planned operations, rehearse procedures, and evaluate risk. A significant project that CMS has been involved in over the past year is the tow to field simulation for the Hebron Platform. The Hebron Platform is a gravity based structure (GBS) that will be used in offshore oil production on the Grand Banks of Newfoundland for Exxon Mobil and its partners. This project will see the 700,000 ton structure floated and towed by six vessel some 300 nautical miles to its offshore site. CMS has conducted this type of work before, notably with the Hibernia GBS, but it nonetheless is a highly challenging technical project.

With research, CMS has been leading a large multi year project to develop proof of concept Dynamic Positioning capacity for hydrocarbon exploration/ production operations in ice covered waters. This Joint Industry project involves tanks testing of hull models with DP systems to study the ability of the technology to identify and counteract managed ice conditions. For its part CMS is developing a specialized visualization system that will make use of ice data coming from the ice modelling tanks to simulate realistic ice-hull interaction. Much of this work will serve to improve the level of ice modelling at the centre and assist industry to carry out operations assessment with modified DP technology.

Investment in the Future

CMS opened its new Offshore Operations Simulator in late 2015, but officially started to conduct training using the new technology in 2016. The OOS simulates the bridge and operating systems of a typical platform supply vessel or anchor handling vessel. In keeping with the theme of realistic ship motion, the bridge is mounted on a six degree of freedom motion base to give users the full effect of carrying out operations varying sea states. The Kongsberg Ksim Offshore simulation engine is the heart of this new equipment and provides highly realistic functionality for the types of activities involved in offshore oil and gas operations. The total investment exceed $6 million CAD. Additionally CMS invested in its other equipment including upgrading the projection system for its Full Motion Bridge, addition of new control technology for its part task tug simulator, visual and audio recording equipment for its bridges to facilitate debriefing sessions, upgrades to software and hardware for MODU Ballast control, cargo control, and the engine room simulator. CMS is also investing in its technical staff by obtaining specialized training for the hardware and software personnel

Looking ahead, CMS will look to obtaining additional hardware to back up the motion server controls for its motion bases as part of its ongoing preventative maintenance and upgrade planning. CMS will also look to the addition of specialized ice routing software that can be used in the ice navigation work. In particular the Enfotec Ice Navigation suite that can be utilized by groups dur-

ing training session to incorporate new technology in their training. The center is looking ahead to improving its current program delivering DP shuttle tanker with the addition of new DP equipment

The Evolution of Simulation Training

There is a thriving ocean technology cluster in St. John's involved in the development of technology for use in marine activities and this includes research on the use of simulation in areas such as studying fatigue impact and similar human factors. CMS is an important part of this activity and often is able to improve or enhance its systems as part of these research activities.

There are some fundamental aspects of maritime simulation training that will remain the same, specifically its use in providing a forum for people to demonstrate their understanding of navigational and watch keeping practices in situations they might encounter at sea. However, as simulation technology has improved, and specifically the fidelity of the physics engine and visual displays, the ability to use simulators in more specific industry applications that go beyond just training and certification is happening. The shipping and offshore industry has started to accept simulators as a valuable tool for use in analyzing situations and for being able to assist in validating a decision to undertake an operation. This can be for large port development projects analyzing the specific configuration of a quay or dock, to determining the minimum number of tugs a ship may need to get alongside. The cost of using a simulator in these situations is small in comparison to the total capital cost and it allows a means for companies to explore and demonstrate concepts. Many maritime colleges used their simulators as part of formal training; RADAR plotting, collision avoidance, passage planning and navigation, radio communications, engine control room etc. But as younger instructors have started to replace older personnel in colleges they are demanding more capacity from simulation providers in order to use simulators in other applications in maritime education that better reflect their experience in today's industry. Simulators can be used as part of looking at how people interact with each other in complex or demanding situations that impact situational awareness or highlight the need for communications.

Where do you see opportunity for growth?

CMS has a history in simulation for both training and industrial projects for operations in ice. The Center recently led the International Maritime Organization (IMO) working group tasked to develop the new basic and advanced ice navigation model training courses for use as required by the Polar Code. In addition to ice navigation for commercial shipping, CMS is also looking at developing more specialized training for the offshore industry in area of ice management such as ice berg towing to protect offshore drilling units. Keeping in the area of ice, CMS recently delivered a successful training for a cruise ship operating in the Arctic. While we haven't considered the cruise industry before, statistics indicate very little decline in that sector which may open some opportunity for the type of special simulation services we provide. From a perspective of actual maritime simulation technology, the impact of the gaming industry on the maritime simulation is not hard to miss, with the drive to increase the graphic level of visual detail. While gaming exists as a form of entertainment and isn't governed by representing reality there are certainly areas where maritime simulation can benefit. Some gaming companies have seen market opportunity and actually developed approved marine simulation equipment that is on the market at less costs, providing increased competition. With the amount of information generated in today's simulator systems, the possibility of big data analytics may also prove to be something that becomes part of future development. Simulators may be able to provide deeper analysis and prediction of performance which can assist the instructor in refining their teaching methods or focus more on experiential learning on an individual basis with students.

All Photos: MPT

MARITIME PROFESSIONAL TRAINING

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Web: www.mptusa.com
COO: Captain Ted Morley

In South Florida sits MPT, one of the most prolific and progressive maritime training facilities. Already fully stocked, MPT added significant weight to its offering in 2016 with investment in 25,000 sq. ft. of new training space and technology.

Overview

MPT handles more than 12,000 students a year from all segments of the maritime industry and from more than a dozen countries. With that range MPT has students from ship operators, tug companies, passenger vessels, offshore and energy exploration companies, inland operators, port operators, pilot groups, large yachts, ferry operators, as well as government and military personnel.

MPT simulators include (3) FMSHS bridge simulators- (2) DP2 classed 240° HFOV and (1) 325° HFOV; (4) all weather simulators with Sperry ARPA and Transas ECDIS; (6) DP simulators integrated with ECDIS, single visual channels, ARPA, MT DP hardware panels, and manual controls; (8) Transas GMDSS student stations; (1) Class A LCHS for petro, chemical, and LNG; (1) Class A ERS for diesel, steam turbine, and gas turbine; and (6) Tec-Sim student stations for peripheral system training.

Recent Developments

MPT's new facility expansion added 25,000 sq. ft. with more than 15,000 sq. ft. dedicated to simulation, with additional classrooms and student areas making up the remaining. An additional 9,000 of existing space was remodeled with new classrooms, meeting areas, and a conference center. All four of our Broward County campuses received significant technology upgrades allowing for live streaming and cloud-based data sharing between them. Our campus is now 61,000 sf and able to host 350 students a week in our classrooms, not including the conference center or meeting halls. MPT's investment in this upgrade was entirely self-funded and exceeded $6m USD.

Investment in the Future

MPT will continue to invest in all facets of our facilities, improving simulator interactions for Total Crew Training, VTS Operations, and again expanding the Engineering Simulation Department.

It is also looking at several other opportunities to expand simulation courses. "If you're not moving forward, you're moving backwards," is the philosophy, and MPT strives to maintain a high level of technology via a constant evaluation and upgrade process. It is looking at its databases, courses, and assessments constantly. Software and hardware upgrades occur at least twice a year.

The Evolution of Simulation Training

Simulation has changed dramatically in the past 5 years and operators are able to utilize simulators for much more than simple regulatory training. Being able to conduct realistic vessel familiarization, port building projects, dredging impact studies, and realistic tug/ship interactions are vital as our ports get more congested and the ships get larger. Simulation is a major component of port safety, from the ship and tug operators up to the VTS controllers.

The Market Today

MPT cuts a wide wake in the industry focusing on five primary areas: Passenger Vessels, Commercial Deep-Draft Vessels, Energy Exploration & Support Vessels, Tug & Barge Vessels, Mega-Yachts, and Inland Vessels. The offshore energy sector has suffered with the precipitous drop in oil prices but many of those mariners are looking at ways to improve their skill set to either compete for the remaining jobs, or move into other segments of the marine industry.

There are growth opportunities, as international regulations are not going away, nor is the efficiency of maritime commerce being challenged any time soon. Shipping remains the most environmentally friendly, budget-friendly, and low impact method of transporting goods around the world. It also remains one of the most sought after methods of exploring the world. With that, training opportunities exist with port development, man power creation in developing countries, streamlining of corporate training, and creating more efficient mariners. These areas are all key to future growth as the ships may be getting larger, but crew size is getting smaller. More efficiency, more technological ability, and a higher level of competence are vital for future growth.

All Photos: CSMART

Hans Hederström,
Managing Director of CSMART

CSMART, CENTER OF SIMULATOR MARITIME TRAINING THE ARISON MARITIME CENTER

Zeeduinweg 9
1361 BG Almere, The Netherlands
Web: www.csmartalmere.com

While much of the maritime world slumps, the cruise sector is enjoying its most vibrant growth in a generation. Carnival Corporation, in particular, is doing very well as its financial performance is stronger than ever, with 2016 delivering the best year of earnings in company history. The company's adjusted earnings for 2016 of $2.6 billion is the best annual financial performance in its 44-year history. With that, Hans Hederstrom, Managing Director give overview of CSMART, one of the newest and richly appointed simulation centers on the planet.

Overview

Carnival Corporation's CSMART Academy has implemented a training environment concept in collaboration with the Transas Integrated Full Mission Simulation solution.

The simulators provide a wide array of programming and simulated exercises for various maritime scenarios. Working with the CSMART Academy team, Transas developed 12 cruise ship models and delivered 60 sailing areas and ports around the world, including Los Angeles, New York, Miami, Copenhagen, Stockholm, Singapore and Glacier Bay, Alaska that are specific for Carnival Corporation's vessel operations.

Nautical simulator environment:

• 4 full mission bridges with a 220 degrees horizontal field of view and with two additional sets of bridge wings with dome projections, each with a 180 degree field of view. The simulator bridges replicate the bridges of the latest cruise ships built for the Carnival Corporation fleet. There is also a safety center behind each bridge replicating the onboard version.

• 6 part-task bridges with 120 degrees horizontal field of view and two part-task bridges of 180 degrees horizontal field of view provide for specific operations training and assessment. Each bridge includes an interface with the onboard bridge system used on Carnival Corporation vessels.

• 7 Instructor control stations are used for monitoring and control.

• 4 de-briefing rooms one for each full mission simulator. The CSMART Academy also uses modeling station with the Transas Model Wizard and Virtual Shipyard software to edit and create our own sailing areas and ship models while leveraging the full value of Transas simulation R&D capabilities.

Technical simulator (TechSim) environment:

- ***4 full mission engine room simulators***
- ***12 sets of virtual machinery space stations***
- ***2 high voltage training systems***
- ***2 engine room simulator classrooms (12 stations each)***
- ***4 debriefing stations and rooms.***

In collaboration with the CSMART Academy team, Transas developed three cruise ship engine models with different propulsion systems, including a virtual replica of ship automation systems.

The TechSim model uses the high tech 'gamification' with 3D engine compartments walk-through and usage

of avatars controlled via large touchscreens or gaming controller to ensure realistic situational training for engine room and machinery functions. A unique replication of the Safety Management System is based on the real ships application.

The applied closed circuit TV (CCTV), recording and archiving system is similar to the CCTV used at the ESA Space Centre, with 90 full HD cameras observing and recording everything on the bridges and in the engine room to allow full picture team training. AV control, recording and archiving system with full synchronization of all workstations, cameras and audio. This was essentially required by the Carnival Corporation and the CSMART team in order to optimize the level of training experience.

Recent Developments

Building on the CSMART Academy's legacy of safety training excellence, in July 2016 Carnival Corporation expanded its training operations with the opening of the Arison Maritime Center, featuring the CSMART Academy and a 176-room CSMART-Hotel. At nearly 110,000 sq. ft., the new CSMART Academy will more than double the capacity of the original center, enabling Carnival Corporation to train more of their cruise ship officers more often, spend more time training on simulators and provide more real-time feedback to officers. In 2017 CSMART will welcome 7,000 participants to one of 20 courses offered, Nautical as well as Engineering.

Investment in the Future

With the new facility that opened in July 2016 new simulators were developed, built and implemented with the latest technology from Transas. The simulators underwent more than 15 months of intensive development to ensure the visuals and operational characteristics closely model today's technologically advanced cruise ships, providing an authentic shipboard experience for participants to build skills in navigating complex control and automation systems. This technology is part of the overall investment of an estimated $79m for building Carnival Corporation's state-of-the-art Arison Maritime Center and Hotel, home of the CSMART Academy. The CSMART Academy's mission is to provide the deck and technical officers from Carnival Corporation's 10 global cruise line brands with the most technically advanced maritime training and professional development in the cruise industry. We have a relentless focus on world-class training and continuous improvement, underscoring that the safety of our guests and crew is the corporation's number one priority. This results in a continuous investment by Carnival Corporation to the CSMART Academy's training programs and equipment.

The Evolution of Simulation Training

Starting in 2012, the CSMART Academy expanded to begin training bridge and engineering officers from all of Carnival Corporation's global brands – providing a world-class standard for safety and excellence in maritime operations. Referred to as role-based bridge and engine room management, the approach is based on roles rather than ranks, with the officers operating as a coordinated team.

The system builds on the airline industry model by using navigator and co-navigator roles. The navigator, who is "conning" the ship, is required to verbally communicate intentions to the co-navigator, whose tasks include monitoring, cross-checking and supporting the navigator. As needed, they are supported by the operations director, who must be a senior officer -- either the captain or staff captain. He or she maintains an overview and provides guidance as required. There is also an administrator to manage disturbances (alarms, internal communications) for the bridge team. A helmsman and a lookout complete the team.

As part of the team-based approach, CSMART Academy introduced new ways of communicating. In a departure from past protocol, this includes encouraging team members of all ranks and seniority to speak up to challenge or question a decision.

These fundamental changes were introduced in several stages, starting with the development of new bridge procedures for normal, abnormal and emergency operations. Current training also includes insight on human performance and its limitations. This transformation has resulted in a higher level of safety and operational excellence, with officers making effective use of the new structure and constantly evolving technology.

Choosing your BWM supplier

After 13 years, the International Ballast Water Management (BWM) Convention will enter into force on 8 September 2017, marking a landmark step towards halting the spread of invasive aquatic species worldwide. As a result of this ratification, ballast water enquires and interest for retrofits have dramatically increased. Besides having an efficient system installed, ship owners and operators must choose a supplier who can provide not just a system but a full suite of services and aftersales care worldwide.

Ship owners and operators need to consider the support their supplier can provide throughout the whole process of BWM installation and maintenance. Will my supplier support me throughout the process? What is my suppliers service reach globally? Can I receive service in key major ports worldwide? Which system is best suited for my vessel? (According to vessel type, size, operation & design). Furthermore, a key consideration for making a purchase decision needs to be based on the full ballast water management package the supplier provides. This package addresses the pre engineering, retrofit engineering, design and installation of a system. To be able to receive a whole package from a singular supplier is seen as a huge weight off of ship owner's shoulders.

In response to this, Evoqua have aligned themselves with a number of renowned global organizations, Venteville & Damen who are engaging in the design, engineering, installations and service of technical equipment. Drew Marine provides servicing and presence in 900 ports. Locally, Krosys in South Korea, Matsui in Japan & Hai Cheung Trading in China provide systems, engineering, installation and support to the market.

Recognizing compliance is more than just superior equipment, competent global service providers, effective project life-cycle management, ensuring all the critical knowledge and expertise is applied at the right time, at the right place and by the best team. The suppliers ongoing commitment to the industry must be established to ensure support for the lifetime of their vessel. Additional potential compliance requirements may come into force in the future and it will be suppliers who will need to adapt offerings to provide compliant systems.

SeaCURE® Ballast Water Treatment System (Compact Design)

Matt Granitto
Ballast Water Manager,
Evoqua Water Technologies

It's crucial that any BWMS issues are resolved as quickly as possible to avoid non-compliance. Additionally, it is essential to provide service support on a 24-hour basis, to ensure these issues are dealt with. Matt Granitto, business manager for Evoqua's ballast water business, states: "Installing a BWMS on board an existing vessel is a complex process which requires both extensive planning and expertise. Evoqua's combined full service offering will enable us to offer a complete ballast water solution to the shipping industry across the globe, to ease the headache of compliance. This joint offering is fully customer oriented, with the client able to pick and choose the elements of service they require".

These strategic agreements with respected global providers allows for effective project life-cycle management, ensuring all the critical knowledge and expertise is applied at the right time, at the right place and by the best team. This service offers ship owners peace of mind that they will be well-equipped to meet the technical challenges associated with compliance to ballast water regulations.

Low Power BWTS will help Shipowners Comply with New Sulfur Emissions Cap

By Tom Perlich,
Founder and President Ecochlor

At IMO MEPC 70 the 2020 implementation deadline was approved for a global sulfur emissions cap reduction from 3.5% to 0.5%. This will ensure the reduction of sulfur emissions for an estimated 70,000 ships worldwide. Clearly, installing a power-hungry ballast water treatment system (BWTS) would be counter to this objective.

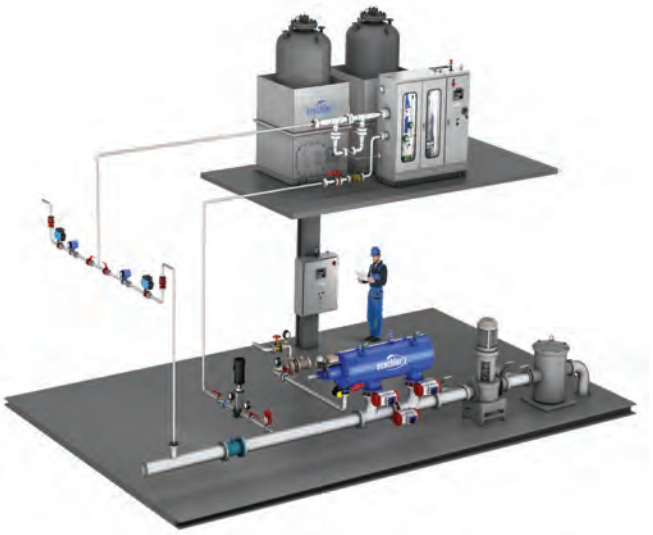
The sulfur emission requirements can be met in one of two ways: through using a low-sulfur compliant fuel or an approved equivalent method of lowering emissions. Investment costs for fuel conversion or installing a scrubber can be significant and must be a consideration in the decision-making process. In light of ballast water treatment regulatory obligations on the horizon, limiting the additional power usage of a BWTS will be of great importance. The power required for a BWTS during ballasting, and in some cases, during de-ballasting, can be considerable. The ship's existing generators typically supply this power; however, some treatment systems require so much power that an additional, or an upgraded generator must be installed to power the system. These added power requirements are not only a burden to the existing power available on the ship, but add to fuel consumption costs and increase sulfur emissions. Selecting a BWTS with lower power requirements will ease this problem.

For a BWTS that uses UV technology, power consumption is directly related to the intensity of the UV lamps. The effectiveness of UV treatment is influenced by exposure time, intensity of the UV light, and water quality. As water clarity decreases, additional power will be required to ensure the same effectiveness by either increasing exposure time, increasing the intensity of the UV light, or additional filtration to improve water clarity. Additionally, to meet stringent USCG discharge criteria in all water conditions, a considerable amount of power may be required. Other considerations when evaluating UV treatment systems are that UV BWTS require treatment during both ballasting and discharge, effectively doubling the power requirements, and multiple UV systems may be required in order to treat the full ballast capacity on vessels with higher flow rates.

For BWTS using Electrochlorination (EC) technology, the electricity required to power the electrolytic cell will be directly related to the ballast flow rate, significantly increasing power requirements for higher flow rates. In addition, EC systems have temperature and water salinity limitations. At lower temperatures (less than 10°C) or low salinity levels (less than 18 PSU), the efficiency of the electrolytic cell drops off drastically, requiring more power to treat to the same standard in these conditions. Options to correct this include using a heater to increase the temperature of the incoming water for slipstream systems or augmenting the salinity of the incoming water. Either of these options will require associated pumps, electronics, and programming, which result in additional power.

The Ecochlor BWTS, uses unique, two-step process that includes filtration and ClO2. This process requires very low power, possibly the lowest in the industry. For the Ecochlor system, as flow rates increase there is minimal scale-up in power usage. See the 'Ecochlor Power Requirements' chart for specific flow rates and power requirements – a typical power requirements assumes six filter cleaning cycles per hour, maximum (high water turbidity) is the filter running continuously for 60 minutes.

Keeping up-to-date with all the global environmental legislation with be challenging for shipowners. To minimize risk, shipowners should thoroughly research manufacturers power consumption data and put together a strategy for compliance. Low power consumption and hence, lower emissions, are the reality of the future.



ECOCHLOR BWTS POWER REQUIREMENTS

Flow Rate	Filter	Typical Power	Maximum Power
400 m3/hr	1	4.8 kWh	7.0 kWh
800 m3/hr	1	5.5 kWh	9.1 kWh
1,200 m3/hr	1	6.6 kWh	10.2 kWh
2,400 m3/hr	2	7 kWh	14.2 kWh
3,300 m3/hr	2	9.6 kWh	24 kWh
4,500 m3/hr	2	10.4 kWh	31.8 kWh
6,600 m3/hr	2	12.6 kWh	40.8 kWh
8,000 m3/hr	4	12 kWh	34.8 kWh*
10,000 m3/hr	4	12.8 kWh	42.2 kWh
12,000 m3/hr	4	19.8 kWh	62.6 kWh

Power requirements include filter(s), filter suction cleaning pump, generator, control panel and motive water booster pump.
*Suction pumps switch from 2 large to 4 smaller pumps requiring loss power.

OceanSaver Ballast Water Treatment System Receives USCG Approval

No restriction approval means OceanSaver is now able to offer peace of mind to ship owners by offering a BWTS in full compliance with both US Coast Guard and IMO standards. Ideal for uninterrupted Trade or Cargo Ops.

Drammen, Norway

As the first electrochlorination ballast water treatment system to obtain final USCG type approval certificate in December 2016, OceanSaver is able to offer peace of mind to ship owners by offering a BWTS in full compliance with both US Coast Guard and IMO standards.

OceanSaver has obtained USCG type approval with no restriction regarding holding time, temperature, flow-rate and water quality. **The operation of the system will not affect and interrupt the vessel trade or cargo operation.** Power consumption still remains the same as the IMO type approved system.

As part of R & D, the USCG type approved system has further introduced new features in order to eliminate any potential risks for operators. Homogenous mixing of oxidant and neutralization, compact layout of injection and sampling points to reduce installation cost and increased robustness are a few of the new features.

The benefits of OceanSaver patended membrane cell technology continuous to provide unique benefits in terms of safety, low TRO level, self-adjusted oxidant generation, and compliance. In addition, lowest operational costs and consumables are, amongst others, the key benefits of the system.

The operational flexibility of the fully automated MKII BWTS system ensures uninterrupted ballast/ de-ballast operations. Provisions of gravity de-ballasting, sea-to-sea ballasting, filter recovery function, redundancy in disinfectant cell and rectifiers, optimized power consumption and automatic control of processes are some of the added-value functions that are intended for operational flexibilities to ship crew.

With IMO convention ratification as well as USCG strict policy on further extensions, there is an increased demand in enquiries for BWTS retrofitting. OceanSaver is prepared to assist owners with turn-key solution including interface equipment, design & engineering package, class approval package as well as financing of retrofit projects through Norwegian Government financing institutions at very attractive interest rate options.

OceanSaver

www.oceansaver.com

- Design and engineering for retrofits (incl. 3D scanning, class approval, riding crew etc.) can be offered.
- Financing possibility of up to 85%.
- 40 um screen filtration and side stream electrodialysis with paten-ted membrane cell.
- Low TRO level - short half life.
- Self adjusted dosage - optimization of power consumption - low opex cost.

Ballast Water Treatment System

USCG Type Approved

For more info contact us at: +47 45 26 83 89 or bpe@oceansaver.com

FORSTA FILTERS
Self Cleaning Water Filters

AUTOMATIC SELF-CLEANING SCREEN FILTERS

FOR BALLAST WATER FILTRATION

Forsta shipboard & ballast water filters effectively remove particles and seawater debris from ballast water and other shipboard water lines. The filtration system is fully automated and does not cause an interruption to flow during the short cleaning cycle. Forsta self-cleaning filters for ballast water will easily integrate into a complete ballast water management system (BWMS).

Forsta ballast water filters remove large, hazardous organisms as well as sediment (down to 40 micron) before water enters the main disinfection treatment. Particle removal efficiency above 40 micron is 98-100% with up to 50% additional particle reduction below 40 micron (due to the filter cake effect).

Forsta ballast water filter housings are available in high grade materials for maximum corrosion resistance, reducing the need for replacement parts and improving equipment lifespan.

Housings are constructed from Fiberglass Reinforced Plastic (FRP), with screens and all wetted components of Forsta's ballast water filters constructed from seawater- resistant plastic or other high alloy materials. Forsta ballast water filters are made to exceed PREN 40+ requirements for the harshest of environments.

Forsta takes a long-term and sustainable approach to the design of filters for corrosive environments. In shipboard applications such as Ballast Water Treatment, Forsta sees it as an imperative to minimize the maintenance requirements.

Where conditions allow (i.e. in colder temperatures, lower chlorides), material selection may be modified to include a variety of additional alloys. Surface finishes such as pickle passivation\ & electro-polishing can prolong the seawater life of stainless components, making 316L & 904 stainless viable options in certain scenarios.

On ships with existing infrastructure, the performance history of the materials onboard is often the most useful indicator of how to select materials moving forward. Forsta engineers analyze how materials have held up to their conditions as a way to best inform a retrofit.

This methodology has been effectively utilized in the design of equipment for saline lakebeds, shipboard reverse osmosis desalination, plant desalination, and produced water. Piping and other appurtenances provide an excellent road map from which to introduce new equipment. If pitting, rust, or holes have plagued a 316 element, for example, it provides evidence for the need of a material upgrade.

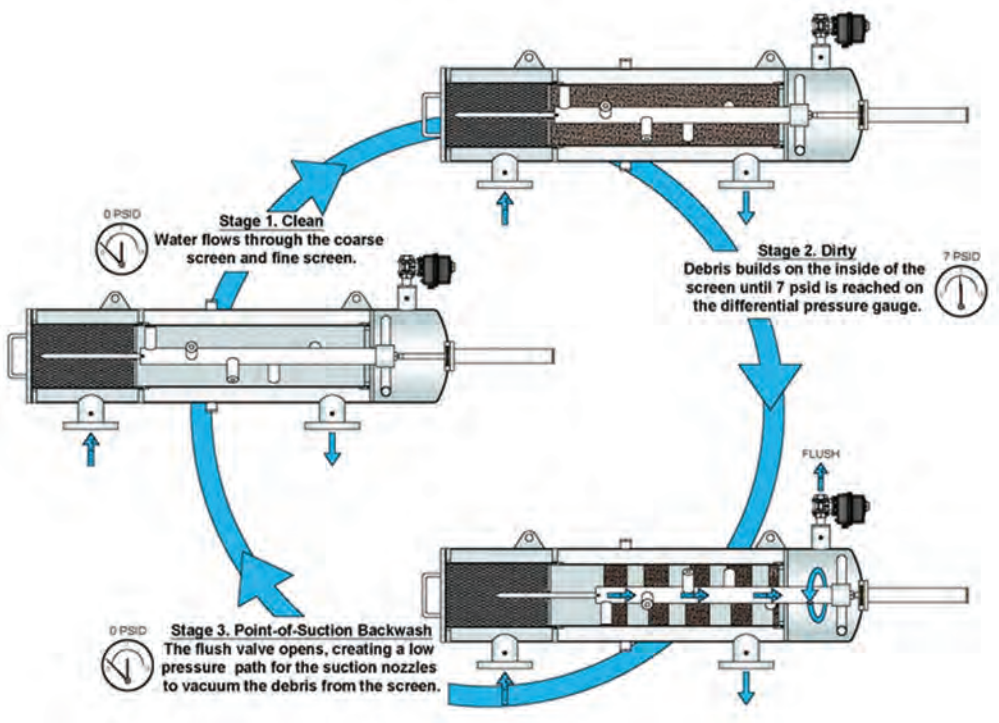
FILTER CHARACTERISTICS

- Flow Rate: 15 – 4,500 gpm
- Flush cycle duration: 6 – 20 seconds
- Flush valve size: single 1" or a single 2"
- Screen opening: 25µ – 4000µ
- Temperature: 150ºF
- Flush Volume: 15 – 110 gallons per backwash
- Working pressure: 20 – 150 psi

Contact Forsta Filters today to get a free quote
for your ballast water or shipboard filtration application.

www.forstafilters.com • info@forstafilters.com
Ph: 310-837-7177

THE NUTS AND BOLTS OF A FORSTA AUTOMATIC SELF-CLEANING SCREEN FILTER



How to Reduce Risk When Selecting a Ballast Water Management System

By
Gerard Lynch, Vice President of Engineering, Maritime Solutions, Inc.
&
Aaron Strupp, US Sales Manager, ABB Industrial Automation

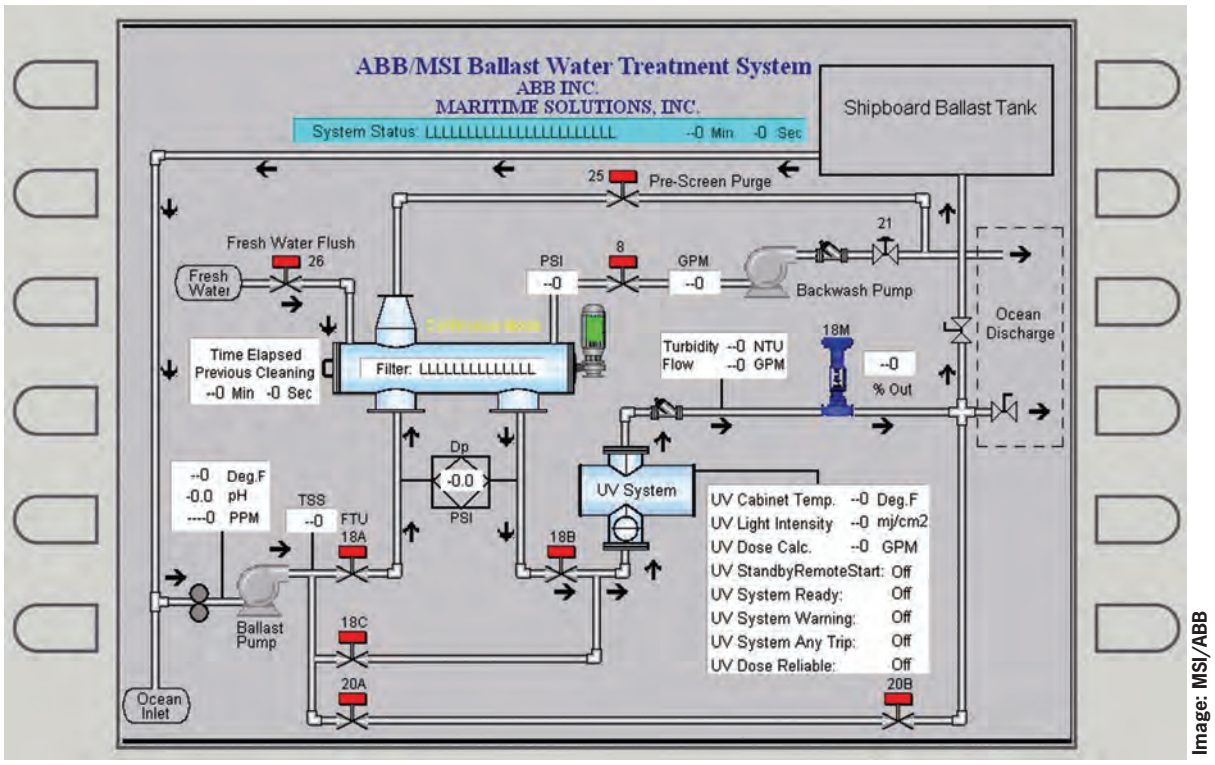


Image: MSI/ABB

It seems like a lifetime coming, but the IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) has been approved and will enter into force on September 8, 2017. Deemed as an environmental necessity, it creates an enormous operational challenge for the maritime industry.

As ship owners, system installers and BWM system manufacturers alike prepare for the many challenges associated with implementation, it would be wise to more closely evaluate the real (and sometimes hidden) risks to system operators and manufacturers.

To achieve the IMO and USCG standard, most BWM systems will use self-cleaning filters followed by UV treatment or some other biocidal device. Anyone with experience using filter and biocidal systems in natural waters knows that there will always be upset conditions due to seasonal water issues, silting, algae blooms, dredging spoils, dissolved minerals, etc. … So how do you reduce your risk of operations?

Experienced raw water filtration operators know that water quality monitoring and flow control are necessary tools to help reduce downtime and system failures due to high solids loading and dissolved minerals greater than the system can manage. We realize that to achieve real world operational freedom, every ship will rely on smart system automation and a special operational process to manage heavy silting periods. This might include a three valve bypass and large manually cleaned filters/strainers installed in parallel with the self-cleaning system, allowing the second stage biocidal treatment to do its job during the filter upset period. UV systems and biocidal treatment will also be challenged when the T10 UV transmission rate is too low to achieve the minimum dose required for proper treatment. This too will result in a "system down" warning alarm. Smart operators can better prepare for both these situations by using a more sophisticated control system designed specifically to monitor and manage these upset events.

There are two main approaches to ensure proper dosage and organism kill rate: 1. adjustment of biocidal intensity/concentration; 2. adjustment of biocidal contact time by regulating the ballast water flow rate. Smart systems do both. Smart systems will sense silt, sediment and organism build-up on the filter media and correlate that to a proprietary algorithm which controls flow based on the monitored, "real-time" filter cleaning cycle and effective UV or biocidal treatment dose. This "smart ballast" approach ensures the proper flow/kill rate at constant dosage control.

These challenges are not unique to the maritime industry. In fact, many power plants that use river water for turbine bearing cooling have utilized these design approaches for over 20 years. Municipal water treatment plants also monitor UV treatment effectiveness by calculating UV dose from digital input measuring flow rate, light transmittance, turbidity, and lamp life. Smart automation allows them both to use self-cleaning filters even when seasonal issues arise. Being prepared, they stay online using temporary alternate process modes.

During the 1970s and 1980s, ship owners worked through the implementation and enforcement of the Federal Water Pollution Control Act (FWPCA) which required the Coast Guard to, "establish procedures, methods, and equipment and other requirements for equipment to prevent discharge of oil from vessels...". Ship engineers forced to use under-developed systems were hauled off and arrested while ship owners were sued. Clearly, a user friendly system designed with less risk was needed.

Developing more operator friendly designs with the user in mind is the only way for today's BWM manufacturers and ship owners to approach the challenges and implementation of new smart BWM equipment.

The USCG recognized these risk issues as well and it is clearly stated in the 46 CFR Part Standards for Living Organisms in Ships' Ballast Water Discharged in U.S. Waters Specifically; §162.060–20 Design and construction requirements: … (b) Each BWMS must have control and monitoring equipment that— (1) Automatically monitors and adjusts necessary treatment dosages, intensities, or other aspects required for proper operation; (2) Incorporates a continuous self-monitoring function during the period in which the BWMS is in operation….

Having worked with natural water treatment systems for decades, we know what works and what does not.

A robust BWM system will:

•Use a back washable filter with a prescreen water chamber to collect large debris.

•Have a biocidal (UV or other) means to disable or kill unwanted marine organisms.

•Utilize a smart control system with a sensor to monitor light transmission through the ballast water with a control means for regulating not only the biocidal dose but also the system flow rate based on water quality. This light sensor will monitor water quality in real time and allow the ship to continue ballast water operations in heavy solids and/or turbid water at a reduced system flowrate. It will help keep the filter and biocidal system from overloading causing a system fault and automatic shutdown.

World Class BWM systems will use ballast water controls and software similar to the patented system produced by Maritime Solutions, Inc. (MSI), The MSI Smart Ballast System monitors and adjusts BWM system operation based on fluid intake and ballast water quality. This allows ship owners to go port to port without having to manually adjust the system operating parameters. The risk of human error can be reduced significantly. The MSI Smart Ballast System does not rely on manual crew testing of water conditions to adjust the system efficiency.

Operators need robust system controls to better manage natural water upset conditions, which are guaranteed to challenge any BWM System. The question for ship owners and manufacturers alike is: "How will you hedge the risk of non-compliant discharges, port state control penalties, vessel delays and unnecessary service calls"?

BWM Systems must be designed to help safeguard the health of the world's waterways. Smart, effective controls like those used in every MSI system, address these critical environmental issues with the goal of keeping ecosystems intact.

NOTE: Maritime Solutions, Inc. (MSI) and ABB have teamed up to serve the global Ballast Water Management market. Patented Control Systems developed by MSI will be manufactured by ABB.

U.S. Ballast Water Research Opened at Carderock

While the focus on Ballast Water Treatment to date has focused primarily on commercial ships, navy ships also travel the globe and trasport organisms in ballast water. To address and study this issue, Carderock commissioned a new Ballast Water Research Laboratory at the headquarters in West Bethesda, Md. Here engineers and scientists will study the best ways to treat ballast water for U.S. Navy ships. The new lab gives researchers the capability to replicate the salinity and sediment profile of any body of water in the world. Rachel Jacobs, a chemical engineer in the Wastewater Management Branch at Naval Surface Warfare Center, Carderock Division, is also looking forward to the addition of the nursery, which will give researchers the ability to grow and culture their own organisms.

Jacobs, a graduate of the University of Maryland with degrees in chemical engineering and marine biology and a master's degree in environmental engineering from Johns Hopkins University, is a member of the team which facilitated the designing of the Ballast Water Research Lab. She and Toby Cole, a chemical engineer who was a team member and is now the deputy division head of Carderock's Environment and Energy Division, were the principal investigators for the project lab.

The Ballast Water Research Lab's setup spans two levels. Water is pumped from the salt-control tank and the sediment-control tanks on the ground floor to the mix tank on the mezzanine level. Eventually, the nursery tanks will be housed on the mezzanine level where organisms can be added in the mix tank and then fed into systems under evaluation. Engineers and scientists can then test the status of the organisms and other parameters in a sample tank on the ground floor.

"We are working with [Carderock's] Naval Architecture and Engineering Department using virtual computational fluid dynamics to actually see how water flows within specific ballast tanks in specific ship classes," Jacobs said. "We will be able to take that and then turn that into physical scaled models and test those models in the lab."

Carderock Director of Research Dr. Jack Price committed the funds for the laboratory – which was four years in the making – after a proposal modeled from a concept Jacobs and the Wastewater Management team were able to come up with in just over 24 hours.

"There was a lot of research that was involved in doing the computational fluid dynamics calculations by our hydrodynamics people," Price said. "There's also all the parts that wastewater management folks were bringing to bear in the knowledge of the types of species you're going to want to deal with, what their densities are, sizes and weights, etc. So it's a complicated problem, and I think we built a unique lab to appropriately simulate that."

"With the fact the lab consists of lightweight nalgene, or plastic tanks, you can set the lab up in new configurations if you have to so you can simulate the different configurations you might encounter in different ship classes," added Price. "That makes it an easy module-type approach so that we can do good, accurate testing."

According to Rita Schuh, the Ballast Water Management Technical Area Leader and environmental engineer in the Wastewater Management Branch, the new Ballast Water Research Lab will provide tools necessary to continue to study and innovate ways of treating ballast water and meeting various regulations. "Unlike major commercial transport ships that have dedicated transit lanes, the U.S. Navy goes all over the ocean," Schuh said. "Navy vessels are not always going to be in the same kind of water in the same part of the world, and are not held to the same limitations. So we need to be able to ballast everywhere, in all conditions, all salinities, and all temperatures. It is important to find a really robust treatment of ballast water that doesn't limit our operations."

According to Jacobs and Schuh, different treatment options have been tested in the past, but the goal is to come up with a way to ensure no live organisms are being dumped into bodies of water to interfere with the ecosystem of native species. "Ultraviolet radiation (UV) is one set of treatment technology that has been tested, although there have been issues in terms of how effective it is at killing the organisms versus deactivating," Jacobs said. "The whole point of UV is to basically inactivate the DNA in the organism so it's unable to replicate. It's not an official kill as compared to an inactivation, but then we have to figure out how to test for that. There are other treatment technologies, in terms of chlorine dioxide and deoxygenation, and all sorts of different things that have the potentiality for use."

Excerpted from an article by Daniel Daglis on www.navy.mil

Ballast Water Tech Notes

"We expect 2017 to be even better."
Tore Andersen, CEO, Optimarin

Order Influx @ Optimarin

Optimarin signed an agreement with Fincantieri Bay Shipbuilding (FBS) for the delivery of two 500 cu. m./hr. capacity Optimarin Ballast Systems (OBS). The contract comes at a busy time for the Norwegian ballast water treatment (BWT) specialist, which has seen order enquiries go "through the roof" since securing U.S. Coast Guard type approval.

The agreement will see both systems installed on a 155,000-barrel capacity clean products barge, with delivery scheduled for August 2018. It is, according to Optimarin CEO Tore Andersen, an important sign of the trust his company's clients have in both his business and its UV technology.

"Repeat orders are one of the best endorsements any supplier can have," Andersen said. "And when they come from a company of Fincantieri's standing it really is a cause for celebration. They're one of the premier specialized shipbuilders in the industry, with huge experience and a reputation to match.

Optimarin has been exclusively focused on developing BWT technology since its formation in 1994, and it became the first supplier to receive full USCG approval in December 2016.

Optimarin has now received orders for around 500 OBS systems, with more than 300 installed worldwide. Over 100 of these have been retrofits, delivered in conjunction with global engineering partners Goltens and Zeppelin Power Systems.

Last year was the firm's most successful ever, as, fuelled by its success with the USCG, it won contracts for over 120 BWT units.

Alongside approval from IMO and USCG, Optimarin's technology is certified by a comprehensive range of classification organizations, including DNV GL, Lloyd's, Bureau Veritas, MLIT Japan, and American Bureau of Shipping.

www.optimarin.com

Alfa Laval PureBallast
USCG type approval triggers major order

"This order is directly tied to the USCG type approval of PureBallast."

Anders Lindmark,
Head of Alfa Laval PureBallast

As a direct consequence of its type approval by the U.S. Coast Guard (USCG), Alfa Laval PureBallast 3.1 has been selected for ballast water treatment on vessels owned by STAMCO Ship Management. Under the agreement, PureBallast 3.1 systems will be retrofitted on 11 RoRo vessels in the STAMCO Ship Management fleet. "This order is directly tied to the USCG type approval of PureBallast," said Anders Lindmark, Head of Alfa Laval PureBallast, Alfa Laval Marine Division. "Since the type approval was announced, Alfa Laval has seen a clear increase in the number of inquiries about the system." The USCG Type Approval Certificate for the PureBallast 3 family was issued on December 23, 2016, making Alfa Laval one of the first suppliers with a USCG-approved system.

3GA Marine, Alfa Laval Partner for BWTS Retrofits

Naval architecture and marine engineering company 3GA Marine Ltd has teamed up with Alfa Laval to provide engineered turnkey solutions to support ship owners in their response to ballast water management regulations. "The retrofitting of ballast water treatment systems in existing vessels is challenging because of their size and required capacity to maintain ballast operations. It can also prove to be complex in integrating the system with existing systems and congested machinery room spaces," explained David Stocks, president of British Columbia based 3GA Marine. "3GA utilize 3D laser scanning and modeling technology to gain accurate representation of as-built structures and surrounding systems which significantly reduces refit project risk."

www.alfalaval.com/pureballast3
www.3gamarine.com

OceanSaver BWTS

OceanSaver received final type approval certificate from USCG as the first ballast water treatment system (BWTS) supplier using electrochlorination, meaning a USCG type approved system is now available for medium and large vessels. OceanSaver, partly owned by the energy shipping company BW Group, is now able to offer ship owners a BWTS in full compliance with both U.S. Coast Guard and IMO standards.

"The OceanSaver system is a perfect match for medium to large vessels with a system capacity of 1,500 to 7,000 cu. m./hr., meaning that owners now have USCG certified systems available for small, medium and large vessels. It is also promising to hear that other makers are in the process of obtaining the USCG type approval," said said Alan Linderoth, OceanSaver Vice President Sales & Marketing. The USCG testing has been carried out with OceanSaver's existing MKII system (IMO type approved in 2011) without significant modifications, proving the efficiency and reliability of the design. Overall the MKII system has been through more than 60 tests over the past years as part of development of the system, class certification, IMO- and USCG approval processes.

www.oceansaver.com

Wärtsilä for Containerships

Four new 3300 TEU container vessels being built for the French shipping group, CMA CGM, will feature Wärtsilä Ballast Water Management Systems (BWMS). This is the third series of vessels for which the same owner has selected the Wärtsilä BWMS solution, making a total of ten ships in all. These latest vessels are being built at the Cosco Zhoushan shipyard in China, and the contract with Wärtsilä was signed in the fourth quarter of 2016.

The BWMS system chosen for these vessels is a 500m3 per hour capacity Wärtsilä Aquarius UV system. This uses a simple two-stage process involving filtration and ultra-violet (UV) irradiation. Delivery of the equipment to the yard is scheduled to begin in July of this year. "We have enjoyed a long and successful relationship with this major global operator and are pleased and proud to have again been selected as their BWMS provider. The Wärtsilä solution is extremely efficient and very well proven. Furthermore, we are the only company able to offer customers maintenance contract support for a BWMS installation," says Joe Thomas, Director, Ballast Water Management Systems, Wärtsilä Marine Solutions.

www.wartsila.com/ballastwater

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Maritime Reporter & Engineering News	63,864
World Energy News	51,176

All stats from 02/14/2017

Cranes

Much more than just critical equipment. At ZPMC, it means the supply chain itself.

BY JOSEPH KEEFE

In post-Panamax world – that is to say one which includes an expanded, deepened and improved Panama Canal – there are many layers to the logistics onion. These include reinforced and improved berths and bollards, deepened blue water harbors, improved intermodal connections ashore and a reshuffling of ever larger tonnage for ports that can handle those ships. All of that is important, of course, but it is the post-Panamax sized cranes which may be the hottest commodity on the water as the race for the cargo reaches full speed.

How those cranes are sourced and acquired may surprise you. It turns out that the global crane business is very much a 'turnkey' operation. The firms that embrace that idea today find themselves in a very good spot as today's market moves forward to realize what the Panama Canal promised when its operators announced that they would expand what is arguably the world's key global supply route. One such firm, Shanghai Zhenhua Heavy Industry Co., Ltd. (ZPMC), a global heavy-duty equipment manufacturer listed on the Shanghai Stock Exchange, has arguably perfected the art of the container crane supply chain.

Meet ZPMC

ZPMC is the world's largest heavy-duty equipment manufacturer and owns 22 heavylift ships ranging in capacity from 60,000 DWT to 100,000 DWT, delivering products all over the world. ZPMC North America is the operating company for North America, and ZPMC Crane Services is its North American service subsidiary. The firm boasts annual revenues of $5 billion and employs more than 30,000 personnel. With eight factories in the Shanghai area, the firm claims a 70% global market share of the STS Crane market. What is particularly noteworthy is that when ZPMC sells a crane, the sale typically (but not always) involves the manufacture of that crane, its transport from point A to point B, the dismantling and/or removal of the old crane and the in situ delivery of the new one. All that, and the logistics piece, as well.

According to Jeff Rosenberg, ZPMC Crane Service's Jeff Rosenberg, VP, Sales & Marketing, the firm delivered more than 200 STS cranes last year alone. Here, as is the case overseas, his firm has captured over 70% of the North American Market. And, says Rosenberg, it is very much a conscious decision to create a business model that in reality does it all when it comes to box cranes. "This service business is modeled after a very successful contracting company which did all this work, East Coast Cranes. ECC was purchased by Kalmar in 2006. This team is the same team."

The Supply Chain of Cranes

When Rosenberg says that his firm 'does it all,' he literally means 'everything.' One recent assignment involved the delivery of two new STS Cranes to the port of Charleston, SC followed by the loading of two older, smaller cranes at the same berth and then transporting the used units to St John, New Brunswick.

Rosenberg explains further, "I don't know of anyone else who handles it all. There are contractors that do the lifting, moving, etc., but none of the other OEM's has service companies with our capabilities."

For those contemplating the purchase of a new crane, Rosenberg says the

Recent N. American ZPMC Orders at a Glance

Port / Location	Type Crane	Number	Job Status
Gulfport, MS	Post-Panamax	3	Complete
Port Tampa, FL	Post-Panamax	2	Complete
Jaxport, FL	Post-Panamax	3	Complete
Charleston, SC	Post-Panamax	2	Complete
Houston, TX	STS Cranes	3	2017 Scheduled
Mobile, AL	STS Cranes	2	2017 Scheduled
Philadephia, PA	STS Cranes	2	2017 Scheduled
Charleston, SC	“Crane Raises”	5	2017 Scheduled
Elizabeth, NJ	STS Cranes	4	2017 Scheduled

Image: SC Ports

Image: ZPMC

"I don't know of anyone else who handles it all. There are contractors that do the lifting, moving, etc., but none of the other OEM's has service companies with our capabilities."

Jeff Rosenberg,
VP, Sales & Marketing, ZPMC Crane Services

typical turnaround time of a large post-Panamax crane order – from contract signing to delivery – can range from 12 to 18 months. And, the market has been booming. All during the construction of the Panama Canal, ports and terminals everywhere have been preparing to handle bigger ships. This means new cranes, raising existing cranes, dredging, and wharf improvements; all in the hope they will attract new business from the Panama Canal expansion.

No two assignments are exactly alike. A port might choose to have ZPMC demolish and remove an existing crane and then dispose of the scrap. Rosenberg adds, "The scrap value is factored into the demo price." Or, a port or terminal might get lucky and be able to sell its older, smaller crane(s) to another port, in which case, ZPMC might also be tasked with its safe removal and redelivery.

The cranes, for the most part, are quite robust and have long lifespans. But, says Rosenberg, it is usually a sale of opportunity. "There is not a great demand for used cranes, mostly because of the cost to transport them," he said, adding, "There are a lot of older cranes available for sale."

Real Jobs: real results

A fast-track project by ZPMC Crane Services helped North American operations for DP World this month at the port of Saint John, New Brunswick. ZPMC Crane Services was able to prioritize and complete an STS crane modification and relocation project with an extremely short deadline, with work days reduced even more by Hurricane Matthew. Indeed, and in this case, the agreement for the sale of the cranes between the South Carolina Ports Authority (SCSPA) and St John was not finalized until ZPMC was delivering the new cranes to Charleston.

"The idea to use our ship to move these cranes was presented, and a contract was negotiated and signed. Things moved very quickly as the ship was now waiting for the cranes which had about 3-4 weeks' worth of preparation before being ready to load on the ship. During this time Hurricane Matthew hit the east coast and shut down operations for over a week. Finally, with prep work completed, the cranes loaded, transported, and unloaded, we received and e-mail from DP World last week with a picture of both cranes working a ship for the first time." This assignment was truly the ultimate 'turnkey job,' attempted and completed under sometimes trying circumstances.

ZPMC's heavylift vessel Zhen Hua 14 stood by in Charleston for the preparation work to be completed as a 30-man ZPMC crew jacked up the cranes and performed the alterations. But on October 7, five weeks into the project, the vessel was ordered out to sea to take it out of the path of

Hurricane Matthew. The project was idled for 10 days until the ship could return. Eventually, the vessel made the six-day trip to New Brunswick, and offloaded the first crane on November 1. Notably, ZMPC offloaded the first crane on a rising tide in 35 minutes using the ship's specialized gear. The second crane was unloaded in just 28 minutes.

Before all of that could happen, however, the delivery of SCPA's two super post-Panamax cranes marked a significant milestone in the Port's big ship readiness. This is to be followed in the coming years by the completion of the Wando Welch wharf project and harbor deepening to 52 feet. The ZPMC-manufactured cranes now provide SCPA with 155 feet of lift height from the dock to enable SCPA to work larger container cargo ships. Last month the SCPA Board of Directors approved the purchase of two additional cranes of this size for delivery at the end of 2017, coinciding with the completion of the wharf project. The deal represents still more repeat business for ZPMC.

For his part, Jim Newsome, SCPA's President and CEO was effusive in his praise of the ZPMC team. "ZPMC is the world's largest manufacturer of ship-to-shore container cranes and a world class engineering company which has enabled the growth of containerization. We are proud to have them as our partner." And it wasn't too long after the cranes were delivered and began working that SCPA reported its strongest November container volumes on record. Fiscal year-to-date pier container volume at the port is up 4 percent, with 487,924 boxes moved at its North Charleston and Wando Welch container terminals.

The arrival of new cranes, especially post-Panamax units is typically a joyous event at most ports. SCPA was no different and in a concerted outreach to the local community designed, in part, to raise the port's exposure to the general public, two Charleston elementary students earned $500 from SCPA for their school, thanks to their winning entries in a Port contest to name cranes at the Wando Welch Terminal. A team of SCPA employees selected two entries, which have been painted onto the cranes. Cranebob Bluepants and Heavy Metal were the winning entries.

Elsewhere, the tallest port crane in North America was recently raised to that height by ZPMC, which raised the crane 33 feet (10.08 meters) to prepare for Ultra-Large Container Vessels calling at APM Terminal's Pier 400. In a landmark project that kicked off July 1, 2016, ZPMC is upgrading 10 cranes for APM Pier 400 Terminal. When complete, the cranes will

Image: ZPMC

Crane arrival day is always dramatic, as attested here by a recent shipment to the Port of Tampa Bay.

Image: SC Ports

Belle Hall Elementary School fifth-grade students Jacob Blackburn and Annabelle Horton receive their award for naming our two new cranes.

be able to service ships carrying up to 20,000 twenty-foot equivalent containers (TEUs). Prior to this crane raise, the largest vessels that could be serviced at the Port of Los Angeles were 13,000 TEUs. The scope of work also includes installing a new energy-efficient LED lighting system, forestay repairs, and repositioning of all 10 cranes.

Looking Ahead: New Toys, Better Service

As good as its performance has been over the course of the past 12 months, ZPMC is always looking to improve its service signature. That effort includes making sure its crews have the best equipment available to speed the jobs along even faster. To that end, ZPMC Crane Services recently acquired a second specially designed jacking system that offers a significant speed advantage during a crane raise. Because the jacking system is built on the dock rather than the crane's sill beam, it does not need to be disassembled between cranes. A completed crane can be moved out of the way leaving 90 percent of the structure intact. This approach can speed up the process by as much as a week for each crane. Beyond this, the firm also purchased 16 new Self-Propelled Modular Transporter (SPMT) trailers for current and future work.

It is these kinds of decisions – and other like them – that dominate the ZPMC business strategy. In turn it continues to dominate that markets that it serves. That's because STS cranes aren't just necessary equipment anymore. In fact, the process of acquiring or shedding one is a carefully planned event – in and of itself a supply chain; all its own.

The success or failure of that kind of operation can be the 'make or break' for any port or terminal in the fast moving world of bigger ships, demanding shipping alliances and deeper channels. No one wants to get left behind is the unbelievably competitive quest to get, keep and grow TEU market share. For its part, ZPMC makes sure that doesn't happen, all in one neatly packaged turnkey operation.

AIDA Cruises

Hurtigruten

LNG

Helios Class: World's First LNG Cruise Liner

Germany's Meyer Werft held a steel cutting ceremony on February 21 in Papenburg marking the ceremonial start of construction for a new cruise liner series – the Helios Class – for AIDA Cruises. The cruise ship class is significant as it will be the world's first capable of operating completely on liquefied natural gas (LNG). The first ship in this new class will be delivered at the end of 2018, and the second in spring 2021.

The ships will be powered by engines made by Caterpillar / MaK, and the entire planning and design activities gave priority to heat recovery, electric motors, LED lighting, ship automation geared to energy efficiency, optimized underwater paintwork to reduce resistance, weight-optimized material selection and many other topics.

The 183,900 gt ships will have space for 2,500 cabins

Hybrid Battery Tech

'World's Greenest Cruise Ship' Build Starts

Hurtigruten CEO Daniel Skjeldam pressed the button to officially kick off the construction of hybrid expedition cruise ship MS Roald Amundsen – "the greenest cruise ship the world has ever seen," according to the ship owner.

The new ship is the first of a new generation that will change expedition travel forever, Skjeldam said during the ceremony at Kleven Yards on the western coast of Norway.

When launched in 2018, MS Roald Amundsen will be the world's first expedition cruise ship powered by hybrid battery technology. The steel section marking the official start of the construction, will become one of the main engine compartments – housing the ship's hybrid engines.

Sustainability will be the core of every detail of the ship and the on board operation, the owner said. The hybrid engines will reduce fuel consumption substantially and allow for 15-30-minute periods of completely emission free sailing. With a number of other technical solutions throughout the ship, MS Roald Amundsen will be the most advanced and environmental friendly expedition ship ever built, according to Skjeldam. The vessel is being designed by Rolls-Royce and will have the latest automation and control systems, including the Rolls-Royce Unified Bridge, the first delivery of two azipull propellers using permanent magnet technology, two large tunnel thrusters, stabilizers, four Bergen B33:45 engines, winches and power electric systems.

More than half of the 265 all outside cabins feature private balconies, while a number of Expedition Suites features private outdoor Jacuzzis.

NASSCO

ECO Class

Liberty on Sea Trials

General Dynamics NASSCO sent the newly built Jones Act tanker Liberty to sea for testing and trials. The 610-ft.-long Liberty set sail for the first time on February 20 to undergo sea trials before delivery later this year. Liberty is the third and final tanker to be built as part of the ECO Class program for SEACOR. The three vessels are each 50,000 dwt LNG-conversion-ready product carriers with a 330,000 barrel cargo capacity.

The other two vessels in the series, Independence and Constitution, were delivered in 2016.

Designed by DSEC, a subsidiary of Daewoo Shipbuilding & Marine Engineering (DSME), the tankers are engineering for increased fuel efficiency and optimized performance and are among the world's most environmentally friendly product tankers.

Royal IHC

Tony Broussard - Berard Transportation Skipsteknisk

LNG

World's Largest Cutter Suction Dredger Ordered

Royal IHC won a contract for the design, construction and delivery of a 164m-long, 44,180kW self-propelled cutter suction dredger (CSD) for DEME in Belgium. The vessel, Spartacus, will be built in the Netherlands for summer 2019 delivery.

Spartacus will be the world's first CSD powered by liquefied natural gas (LNG), following on the order for the first LNG-powered trailing suction hopper dredgers (TSHDs) Minerva and Scheldt River, and the LNG-ready Bonny River, that are currently under construction at IHC's shipyards.

"We can state that this CSD [Spartacus] is the largest and most complex that IHC has ever built," said IHC's CEO Dave Vander Heyde. "The combination of power, size and innovations makes it a true challenge to build."

The concept and basic design for this mega cutter was produced via collaboration between IHC, DEME and Vuyk Engineering Rotterdam, a 100 percent subsidiary of IHC. The dredger's four main diesel engines can run on LNG, marine diesel oil (MDO) and heavy fuel oil (HFO), and the two auxiliary engines have dual-fuel technology.

According to DEME's Head of Construction and Conversion, Jan Gabriel, "This cutter suction dredger is going to be an important benchmark for the industry and a huge step toward limiting the environmental impact of our vessels." The environmentally-friendly CSD will also have a waste heat recovery system that converts heat from the exhaust gasses to electrical energy. Spartacus will have a Green Passport and Clean Design notation. DEME said that Spartacus' 44,180kW total installed capacity will qualify the CSD as the most powerful ever built. This power will enable the vessel to cut harder soils at speeds not possible previously, reducing reliance on the use of dynamite and blasting.

Metal Shark Puts First Two Citywide Ferries on the Water

Louisiana-based shipbuilder Metal Shark said it has put the first two passenger vessels for New York's new Citywide Ferry Service on the water, having splashed the new builds at its Franklin, La.

On February 24, operators from Berard Transportation began the process of moving the first of two 86 x 26-ft. catamaran-hulled aluminum passenger vessels from Metal Shark's final assembly building to the waiting cranes from H. Brown Crane Service, which hoisted the vessel and placed it into the adjacent Charenton Canal.

Meanwhile, two more Citywide Ferries were being prepared for paint, and two others were taking shape in the welding shop as Metal Shark is currently building six of the Incat Crowther-designed, 149-passenger, USCG Subchapter T passenger ferries for HNY Ferry Fleet LLC (a Hornblower company), operator of New York's Citywide Ferry Service. Metal Shark plans to deliver two of the New York ferries per month from March through May. In addition to Metal Shark's six ferries, Horizon Shipbuilding is also building 13 Citywide ferries at its shipyard in Bayou La Batre, Ala., with the first deliveries planned for spring 2017.

Recent Contracts

Vard Secures Trawler Build Contract

Vard Holdings Limited secured a $41.4m contract to build an 80-m long pelagic trawler for Research Fishing Company, based on Shetland. The vessel is designed by Skipsteknisk in Ålesund, Norway. It will also be built, equipped and completed in Norway. Delivery is scheduled from Vard Langsten in 3Q 2018. The trawler will be equipped with electrically powered winches to reduce oil spills and pollutions, and will have the world's first electrically operated fish pump onboard.

Skipsteknisk

Vigor to Build 2 More San Francisco Ferries

Vigor was awarded the contract to build two additional passenger ferries for WETA (the Water Emergency Transportation Authority) in San Francisco, Calif. Under the latest contract, the two new hulls will be constructed at Vigor Ballard (formerly Kvichak) and the superstructure at Vigor's Harbor Island shipyard. Designed by Incat Crowther, the 135 x 38 ft. all-aluminum catamarans will feature MTU 12V4000 M64 EPA Tier III engines rated 1875 BHP at 1,800 RPM coupled with ZF7600 reduction gears as the propulsion system.

Vigor

Baleària Orders Two Dual Fuel Ferries

Spanish shipping line Baleària said it has reached an agreement with the Italian shipyard Cantiere Navale Visentini to build two dual-fuel sister ferries, measuring 186.5 m in length and a capacity for 810 people, 2,180 linear meters of cargo and 150 cars. The total investment in these vessels is $215 million and they are expected to be operational by the end of 2018.

Baleària

Meet Asia's First

Hybrid Electric Ferry

The Taiwanese harbor city of Kaohsiung has launched a new hybrid electric ferry, which could revolutionize marine passenger transport across the region by curbing greenhouse and diesel emissions. Kaohsiung recently re-launched the popular Cijian Island passenger ferry, retrofitted with a Visedo electric propulsion system, replacing the original diesel engine. It heralds Asia's first hybrid electric ferry and, if successful, the Kaohsiung City Government plans to retrofit the rest of its diesel fleet to help reduce pollution levels around Taiwan's largest harbour.

Visedo OY, a leading Finnish manufacturer of electric drivetrains for marine vessels, commercial vehicles and heavy duty applications, worked alongside Taiwan's Ship and Ocean Industries R&D Center, also known as SOIC, to complete the retrofit.

"Given the geography, ferries are a vital mode of public transport across East and Southeast Asia but they are also the most energy intensive per kilometer travelled. Until now, diesel ferries have been a dirty but necessary part of life around harbors like Kaohsiung," said Kimmo Rauma, CEO, Visedo. "In Hong Kong for example, passenger ferries make up the majority of licensed vessels in Victoria Harbor, where it's estimated air pollution kills about 3,200 people every year.

"Visedo has developed a cost-effective and efficient alternative, so rather than waiting until a vessel's service life ends, harbor cities (get) silent electric powertrains that are more efficient, can halve fuel costs and emit no fumes or oil pollution."

Kaohsiung's new e-ferry, Ferry Happiness, will halve daily fuel consumption while transporting 15,000 passengers every day to Cijian Island, a popular tourist destination in Taiwan, at a top speed of nine knots.

Launching from berth every 15 minutes, the ferry will help share the eight million passengers who travel the 650m route every year. It's estimated the electric propulsion will save more than 25,000lt of fuel every year.

Visedo retrofitted the 100-ton, 23m-long vessel with an electric system to replace the original 300hp diesel engine. The powertrain was designed to ensure pure electric cruising for half the ferry's operation time and, with fast shore charging, this pure electric percentage can be higher.

"Taiwan's 'Harbor Capital' has long suffered from air pollution and only a few years ago the average person was consuming double the national Taiwan average of carbon dioxide," said Chih-Hung Lin, Head of SOIC's System Development. "In response the Kaoshiung City Government is committed to cleaning up its fleet and is currently considering the possibility of replacing all 11 of its vessels with this new type of e-ferry. This also includes embarking on a hybrid tug-boat project."

> "Harbor cities (get) silent electric powertrains that are more efficient, can halve fuel costs and emit no fumes or oil pollution."
>
> Kimmo Rauma,
> CEO, Visedo

Images: Visedo

The Switch's High-Tech Marine Offering

Magnetic Attraction

The Switch is targeting growth of 200% within the marine segment in the next five years, building on the momentum of a flurry of recent orders, its acquisition of Wärtsilä Drives and the financial muscle of its parent company, the $3.5 billion turnover Yaskawa Electric Corporation.

The Switch is a Finnish headquartered business, a specialist in the development and supply of advanced drive train solutions, believes its permanent magnet (PM) and frequency converter technology can have the same transformational effect on marine as it has had in wind. In wind, The Switch is a preferred industry supplier, providing permanent magnet generators and full-power converters to wind turbines worldwide.

In total, the firm boasts an installed capacity in excess of 13 GW. The largest low voltage (690 V) PM generators installed have a capacity of 8.6 MW. "We entered the marine market four years ago," said Mika Koli, Business Development Manager. "We saw a huge potential to transfer not just our unique competency, but also the benefits that our technology can deliver to a sector facing challenges on a number of fronts. Namely, with regard to operational costs, falling profit margins and increasing environmental regulations and concern."

"Our products address all these issues. With this in mind, we believe we can make a real difference in marine – championing both enhanced efficiency, the environment and our customers' businesses. We see this as the beginning of a new energy era."

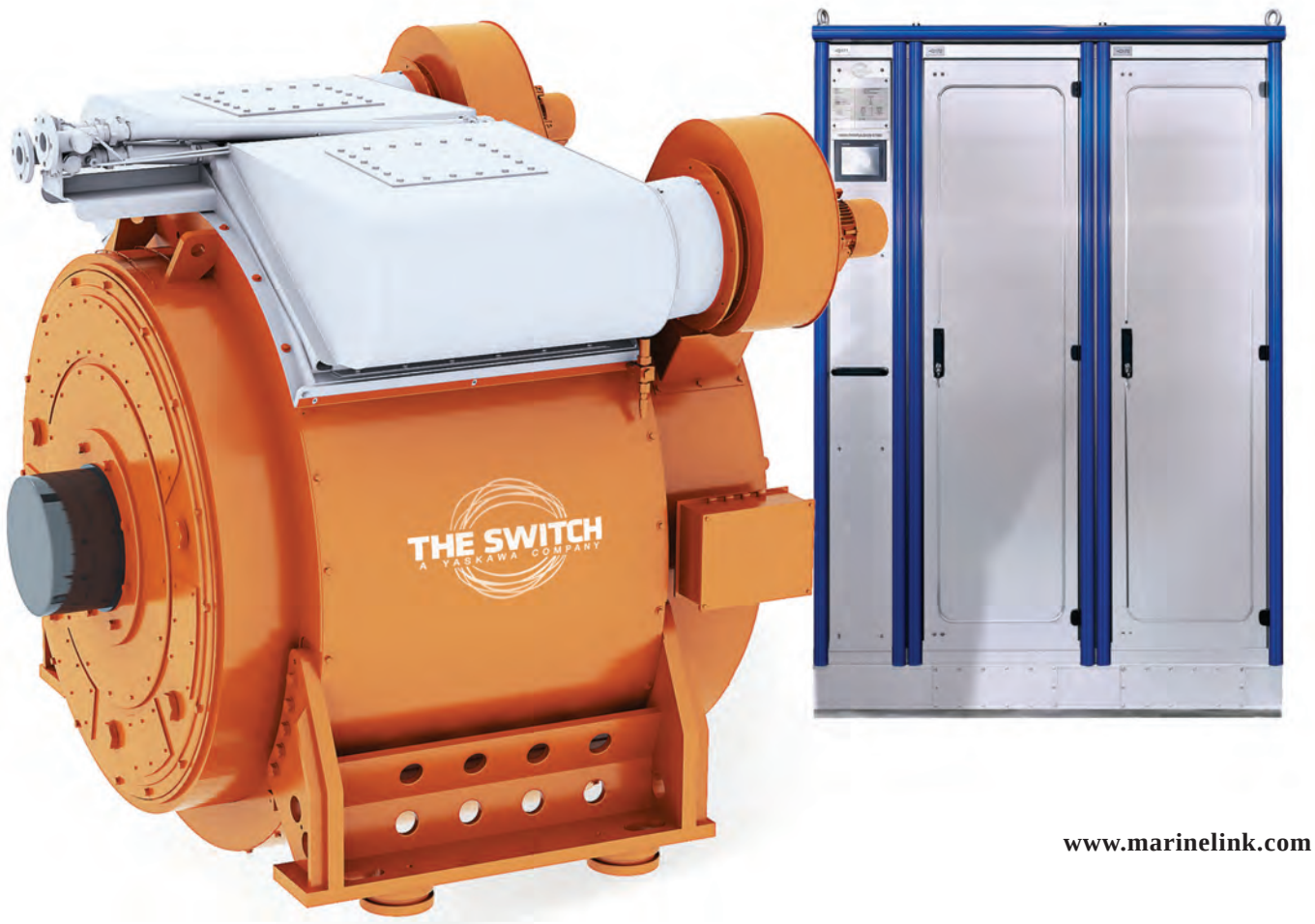
The Switch manufactures PM machines that, in conjunction with frequency converters, convert mechanical energy into electric power that can then be utilized for onboard systems and equipment. With modular, flexible and lightweight designs, the solutions drive a new wave of efficiency.

Its PM shaft generators can be used to create cost-effective electricity and save fuel – with large merchant vessels potentially consuming 50 percent less energy during slow steaming. Meanwhile, vessels utilizing electric propulsion can optimize fuel consumption and access predictable and flexible power with unmatched power density.

In addition, The Switch's frequency converters deliver reliable and accurate speed control. This makes them ideal for vessels operating in varying environments and speed ranges – such as ferries, cruise ships, ice breakers and tugs – and perfectly suited to the demands of dynamic positioning systems.

Despite only entering the segment in 2013, The Switch has received more than 20 orders for its permanent magnet shaft generator technology, with a growing number of enquiries. Its latest agreements, to be delivered by solutions provider WE Tech, cover PM shaft generators for two Toll Shipping 12,000 dwt RORO vessels and a series of four Stena RoRo ROPAX ferries. All vessels are being built in China, with Toll's constructed at Jinling Shipyard and Stena's at AVIC Weihai Shipyard Co. Deliveries span from late 2017 through to January 2018.

"After an initial phase where we've been establishing our name and technology in the sector, the business is really moving on to the next level," Koli stated. "The support and global network of our parent company provide an excellent platform to build on, while its financial strength paved way for the acquisition of Wärtsilä Drives in November 2016. That move was crucial. It gives us competency in specialized megawatt-class power drives, alongside a test center and manufacturing facilities in Stord, Norway. It means we are now a specialized provider of drive trains that are engineered specifically for the marine industry."



Images: Ulstein

The World's Largest

PLUG-IN

Hybrid Vessel

Ulstein won a contract to build Color Line's new hybrid vessel to service Sandefjord – Strømstad starting from the from summer 2019. The ship will be constructed at Ulstein Verft in Norway, and according to Ulstein it is the world's largest plug-in hybrid vessel.

The vessel takes into use new solutions to reduce noise and emissions. The ship will be a plug-in hybrid, in which the batteries are recharged via a power cable with green electricity from shore facilities or, as a secondary alternative, recharged on board by the ship's generators.

With shore power in Sandefjord all Norwegian ports on Color Line's network will have shore power facilities. The ship will have full battery power into and out of the fjord to Sandefjord inner harbor. It will therefore not give emissions of harmful greenhouse gases or nitrogen and sulfur compounds in this area.

The 160-meter vessel, with the working title Color Hybrid, can take on 2,000 passengers and 500 cars. It will have almost double capacity as M/S Bohus, which is scheduled to be phased out when the new ferry will be put into operation in summer 2019.

The ship will provide significantly increased capacity on the route between Norway and Sweden, and will represent expanded and improved services on board and thus a new and better travel experience.

The new vessel will be built according to Norwegian flag requirements and registered in the Norwegian Ordinary Ship Register (NOR). Color Line is currently the only company in the international passenger and freight traffic to and from Norway with ships registered in the Norwegian Ship Register and with Norwegian headquarters.

Schottel Propulsion for Briese

Briese Group contracted Groot Ship Design to deliver the design and basic engineering package for four multi-purpose vessels. Schottel performed enhanced CFD investigations to determine the optimal aftship configuration incorporating nozzle support and streamline body between rudder and hull. As a result, a streamlined CPP installation will enable a power reduction of 3.7 percent.

The vessels feature an open and closed top design for variable cargo purposes. Each will measure 89.99 x 14.8 m with a difference in draft between 5.30 m (open) and 6.65 m (closed, summer draft), and a carrying capacity of 3,400 t (open) and 5,000 t (closed).

Propulsion is provided by a Schottel controllable-pitch propeller with a power rating of 1,600 kW and a propeller diameter of 3,500 mm within the nozzle. The vessels meet the requirements of Finnish/Swedish ice class 1A.

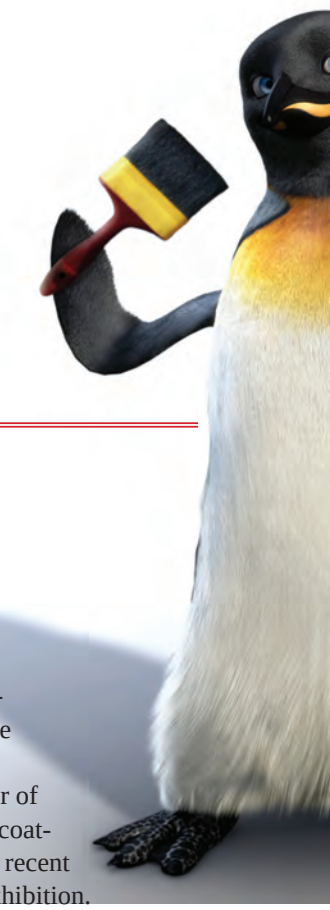
Several actions were taken to optimize sailing on ice.

Along with the operational experience of Briese and the new bow shape based on the Groot Cross-Bow by Groot Ship Design, Schottel carried out various CFD simulations to investigate the best performance of two variants in the aftship. Variations in headboxes without struts and with two additional struts were tested, aiming for the most efficient use of power under service conditions. In this process the position and shape of the struts were considered carefully. Prior model tests at the HSVA model basin as well as extensive calculations revealed features such as a non-separated flow around the struts and the small headbox, leading to a significant decrease in hull resistance.

The HSVA model testing included resistance/self-powering tests, ice power testing and seakeeping.

The result is a ship with very economical powering and a unique cargo flexibility setting a new standard in this range of MPP vessels.

Marine Coating Technology



The maritime environment is harsh, and protection of maritime assets starts with modern coating technology. Following are recent updates on coatings, from the hull to the cargo tanks, from major manufacturers.

In the four years since its coating with **Jotun's Hull Performance Solutions (HPS)** system, COSCO Europe reportedly has reached new heights of efficiency, cost control and environmental performance.

Figures released by Jotun show that the 2008-built, 10,062 TEU containership cut fuel costs by $4.5 million and reduced CO2 emissions by some 29,500 tons.

"As a company we are committed to delivering optimal value for all our stakeholders and the best environmental performance for our fleet, which forms a key link in the global supply chain," said Mr. Hou, Deputy General Manager of COSCO Shipping Lines. "HPS has proven that it helps us meet these demands, enabling market leading hull performance and unlocking significant fuel and emissions savings."

HPS combines Jotun's SeaQuantum X200 antifouling, enhanced technical service, performance analysis according to ISO 19030 and a high performance guarantee. The coating is designed to limit the growth of organisms on the hull, while the analysis and guarantee ensure measurability and accountability.

"HPS has now been applied to over 400 vessels worldwide since its launch in 2011," said Alfie Ong, VP Jotun Marine Coatings. "As we get more and more long-term data from the system, which is the first solution of its kind to measure performance in line with ISO 19030, we get the hard evidence to prove what we already knew – namely that HPS delivers the cleanest hulls, highest efficiency and best environmental performance on the market.

Ong notes that the ship, which received the HPS treatment at COSCO (Zhoushan) Shipyard in October 2012, has so far recorded a speed loss of just 0.76% (measured to ISO 19030). This compares to a market average of 5.9% for vessels treated with standard antifouling solutions.

Euronav had been using **Hempel silicone coatings** on its tankers since 2007, and the company was keen to try the new technology, but wanted to patch test it on a vessel in active service before making any full-ship applications.

"Maintaining a smooth and fouling free underwater hull surface during the entire service period is vital for the efficient operation of our vessels," said Theodore Mavraidis, Fleet Technical Manager, Euronav Ship Management.

"We tested Hempaguard using a (300 sq. m.) test patch on our VLCC crude carrier Famenne, which trades in fouling aggressive warm waters."

The Famenne mainly trades in Asia and the Middle East, but over the test period it traversed most of the globe, including stints in southern Europe and North America. In addition, Famenne experienced a number of relatively long idle periods during the test.

"One of the key benefits of Hempaguard is its ability to maintain its antifouling performance despite long idle periods," said Torben Rasmussen, Global Key Account Manager, Marine Marketing, Hempel. "Thanks to the combination of silicone and biocides, Hempaguard guarantees continued fouling prevention during idle periods of up to 120 days. This was clearly demonstrated during the Euronav test."

Following the positive results of the test and the expected fuel savings from Hempaguard, Euronav intends to switch a number of vessels to the coating.

To date, Hempaguard has been applied to more than 400 full-ship applications since its full launch in September 2013.

According to the manufacturer, some Hempaguard advantages include:

- Average fuel savings of 6% over the entire docking interval
- Excellent fouling resistance for idle periods of up to 120 days
- 95% less biocide than traditional antifoulings
- Vessels complying with a full Hempaguard X7 specification get a performance satisfaction guarantee

PPG showcased four of its premium marine coatings solutions at a recent global shipbuilding exhibition.

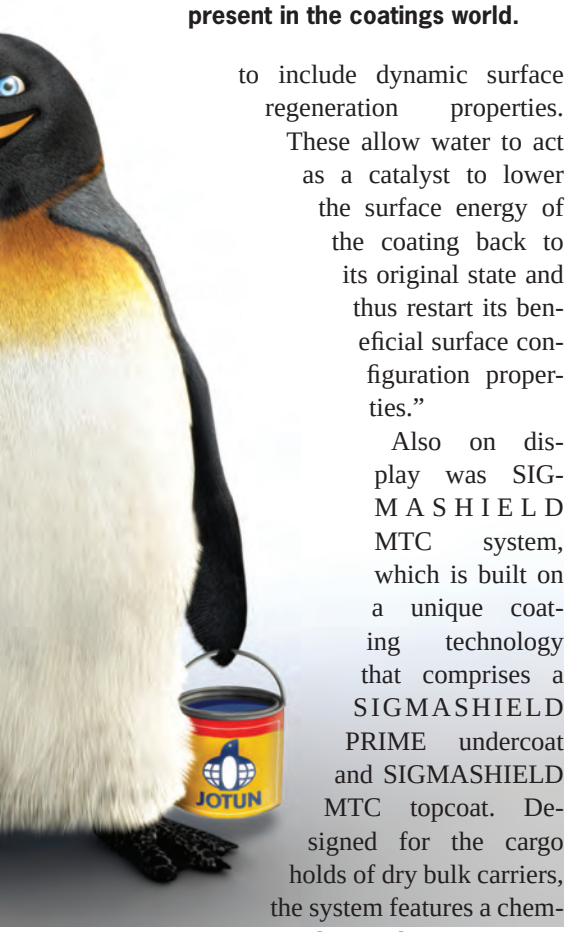
One product is SIGMAGLIDE 1290 fouling release coating, one of PPG's most recent product innovations. It is a 100% silicone binder fouling release system uses a dynamic surface regeneration technology to eliminate slime problems and increase fuel savings compared to existing fouling release products, said Sijmen Visser, PPG global marketing manager, marine. "One of the well-known drawbacks of fouling release technologies is that their effectiveness reduces over time. This is often seen at the waterline where the impact of sunlight, dirt and UV radiation has a negative effect and leads to the aggregation of slime," Visser said. "PPG SIGMAGLIDE 1290 has been engineered

Ternsund, the "Great Ships of 2016" cover subject, is protected with coatings from Advanced Polymer Coating's MarineLine 784.

On February 27 Hempel inaugurated its new North American Central Distribution Centre (CDC) in Northlake, Texas, a significant addition to Hempel's network. It covers 202,000 sq. ft. with 32 dock doors, and will be responsible for distributing Hempel's range of coatings to customers and stock points across North America.

AkzoNobel's Marine Coatings Business launched a new shipping industry engagement program to support the adoption of ISO 19030.

The Penguin is a unique symbol for Jotun, ever present in the coatings world. (Photo: Jotun)



to include dynamic surface regeneration properties. These allow water to act as a catalyst to lower the surface energy of the coating back to its original state and thus restart its beneficial surface configuration properties."

Also on display was SIGMASHIELD MTC system, which is built on a unique coating technology that comprises a SIGMASHIELD PRIME undercoat and SIGMASHIELD MTC topcoat. Designed for the cargo holds of dry bulk carriers, the system features a chemistry designed to maximize technical performance and offer a commercially sound solution for spot and full repairs as well as for application at newbuild.

SIGMA SAILADVANCE RX and GX coatings by PPG are based on advanced technologies developed and patented by PPG that generate low friction, linear polishing, improved idle time tolerance and fuel savings. The self-release binder technology is based on Controlled Surface Active Polymers (CSPs) that act on the coating/water interface as a lubricant, which supports laminar flow, thereby lowering the hull friction when the ship is sailing. In addition, these CSPs create a "slippery surface" that will increase the resistance to fouling when the ship is not sailing and, therefore, extend the possible idle days.

Suitable for application at newbuild and dry dockings, the products are designed for all vessel types and speeds, Visser added, and they are particularly effective for slow steaming because of the engineered oil binder composition.

MarineLine 784 from Advanced Polymer Coatings is a premier cargo tank coating system available for chemical and product carriers, and the only high performance lining that withstands all IMO approved chemical cargoes. The coating was featured on Ternsund, the cover subject of *Maritime Reporter & Engineering News'* December 2016 Great Ships of the Year feature. The coating is designed to provide the shipowner with maximum durability and flexability, allowing the greatest sequencing possibilities and the opportunity to carry the most profitable cargoes.

The MarineLine cargo tank coating has been applied to more than 700 maritime chemical and product tankers, covering more than 10 million square meters of surface.

The tanker and cargo range is truly a hallmark of the company, as ships coated with MarineLine 784 have carried thousands of different chemicals, including acids, caustics, solvents, inorganic chemicals and edible oils, with some tankers changing their chemical cargoes up to 85 voyages a year.

APC's MarineLine coating withstands the stresses of twisting and bending in rough seas while resisting temperature extremes of the cold Baltic winters to the hot Middle East summers.

AkzoNobel's Marine Coatings Business launched a new shipping industry engagement program to support the adoption of ISO 19030, standard for hull and propeller performance measurement. The new global ISO 19030 Ships and Marine Technology - Measurement of changes in hull and propeller performance was finalized in 2016 following three years of development by a wide range of industry stakeholders including coating and propeller manufacturers, academics, ship owners and data analysts. It enables ship owners and operators to compare hull and propeller solutions, and select the most efficient option for their vessels and fleets.

AkzoNobel's engagement program is designed to simplify the complexities of ISO 19030, explaining the principles and values of the standard, and clarifying the appetite for its take-up within the market. AkzoNobel played a role in the development of all parts of ISO 19030. In other company news, **Intersleek 1000** is a new biocide-free fouling control coating developed by AkzoNobel's Marine Coatings business. Offering fuel and CO2 savings of up to 6 %, the new product – part of the company's **International** range – is the first fouling control coating to be based on Lanion technology. The patented technology incorporates bio-renewable raw material that helps to deliver enhanced vessel performance, so that hulls coated with Intersleek 1000 maintain an ultra-smooth surface, reducing drag and lowering fuel consumption and emissions. The long-term fouling control performance of Intersleek 1000 is equivalent to a self-polishing copolymer (SPC) coating. In addition, when compared with SPC coatings, Intersleek 1000 delivers smoother films upon application, leading to lower hull roughness and improved vessel efficiency.

New & Notable

Fleet Cleaner Completes First Hull Cleaning

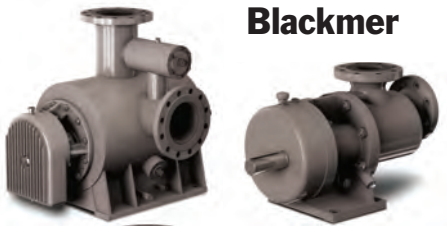
Fleet Cleaner has completed its first hull cleaning trial, removing fouling of the vessel by using a hull cleaning ROV. Both under- and above water cleaning was performed by the robot. The use of controllable high pressure waterjets prevents coating damage during the process.

Carboline Celebrates 70, Re-Opens Upgraded R&D Facility

Carboline's St.Louis-based R&D facility went through several upgrades. The reopening also kicks off a yearlong series of celebrations for their 70th Anniversary. Carboline produces high quality performance coatings, linings and fireproofing products in more than 20 manufacturing facilities around the world.

New Literature Details Stronghold Coatings

Stronghold Coatings' brochure details polymer and thermal spray solutions to repair, rebuild and improve the performance of mission critical components. The brochure introduces Dichtol capillary sealers, MM 1018 on-site repair technology, PlasticMetal polymer-bound metal repair materials and the RepaCoat family of repair products. **www.StrongholdOne.com**



Blackmer

FCI

Profile Cutting Systems

Viega

Blackmer S Series Screw Pumps

Blackmer announced that its S Series Twin Screw pumps deliver the operational capabilities necessary to meet the demanding needs of shipbuilders and shippers. Specifically, S Series pumps offer the reliability, flexibility, economy, performance and proven value to optimize the transfer of critical liquids from the vessel to distant tank farms. S Series Twin Screw models from Blackmer are ideal for loading and unloading tankers because they feature a compact design composed of two sets of opposed screws that engage during operation to form a sealed cavity with the surrounding pump casing. The pumped liquid is moved axially as the screw shafts turn, allowing the liquid to be steadily and constantly conveyed to the center of the pump where the discharge port is located. This method of operation guarantees that the liquids are transferred with high efficiency and nearly pulsation-free, which are crucial considerations when transferring highly viscous liquids over great distances.

www.blackmer.com

FCI's Compact Watermaker

FCI Watermakers' new Atlas+APC is compact, yet produces 1,400-3,600 gallons of potable water per day and is fully automatic in its operation. Suited for the large yacht or commercial vessel, the watermaker is engineered and built for extended run times.

The Atlas+APC is manufactured in the U.S. to commercial standards for reliability. Its robust stainless steel drive components are sized for extended run times and to quickly make ample amounts of water.

The Atlas+APC is simple to configure using its V4 controller. It bears type approval certifications from ABS, GL, Lloyd's Register EMEA, Det Norske Veritas and the Russian Maritime Register of Shipping. An intuitive menu on the 7" marine-grade, bridge certified touch screen makes it easy to program it to automatically start, make water, run diagnostics and perform a flush. Once set up, the watermaking process completely touch-free. The Atlas+APC's one piece powder-coated aluminum frame is open to provide access for maintenance and inspection, and is only 31.6" L x 20.5" W x 18.2" D.

www.fciwatermakers.com

Profile Cutting Systems

Profile Cutting Systems has completed the installation of two large Plasma & OxyFuel Cutting Machines for a U.S. Navy Shipyard. Each system features dual Lincoln 400-amp Plasma systems, infinite rotation triple Oxyfuel beveling torches and introduced revolutionary OxyFuel Cutting Torches. The oxygen and fuel mixtures for the Cutting Torch are totally CNC controlled, require no tools for tip changes, have internal automated height adjustment and automated spark ignition. A first on a cutting machine installed in the USA!

www.profilecuttingsystems.com

Klüber Lubrication

Klüber Lubrication introduced Klüberbio LG 39-700 N and Klüberbio LG 39-701 N, two high-performance greases with a base oil and additive package that combines eco-friendliness with high load-carrying capacity, good antiwear and anticorrosive effect and excellent adhesion to surfaces. Designed for open gear drives, jack-up lifting systems or other on-board equipment that may be in contact with sea water, Klüberbio LG 39-700/701 N complies with the requirements for classification as an Environmentally Acceptable Lubricant (EAL) in terms of biodegradability, toxicity and bioaccumulation, as defined by the 2013 Vessel General Permit.

www.klubersolutions.com

Viega ProPress

Viega introduced its line of Viega ProPress Zero Lead Ball Valve press x hose thread for copper fittings. The bronze ball valves are full port and designed for potable water applications. The ball valves are available in 1/2" and 3/4" press sizes and 3/4" hose sizes. Other features include a lockable metal handle, stainless steel ball and EPDM sealing element.

The Viega ProPress for copper system is available in more than 600 fitting configurations, in sizes ranging from 1/2" to 4". The patented Smart Connect feature, available only from Viega, provides installers with added confidence in their ability to ensure the integrity of connections.

www.viega.us

DuPont Clean Technologies

Tailored exhaust gas cleaning systems from DuPont Clean Technologies remove SOx and particulates. DuPont has over 300 scrubber installations globally both on land and at sea and provides customers worldwide with project management expertise. From in-line to multi-stream configurations, open- to closed-loop and hybrid configurations for container, tanker and passenger ships, DuPont has developed and installed a range of flexible solutions to suit the varying needs. Retrofitted to existing ships and installed in new builds, DuPont Marine Scrubbers are suit-

able for main and auxiliary engines as well as boilers.

www.dupont.com

EnScrub's Sea Trials Completed

EnSolve Biosystems has completed sea trials of its EnScrub SOx Scrubber Water Treatment System onboard a vessel operating in the Baltic Region. The EnScrub system was installed in April 2016 and the DNV certification testing that was conducted in August 2016 revealed that during closed-loop operation, the EnScrub system was successful in legally discharging 97 percent of the SOx scrubber water entering the system. The remaining 3 percent (sludge) was sent to a decanter for further dewatering.

EnSolve is currently in discussions with several scrubber companies for the possible inclusion of the EnScrub technology in their scrubber product lines. EnScrub models are now available for closed-loop, open-loop or hybrid applications.

www.ensolve.com

DuPont

EnScrub

Cavotec: Shore Power Exhibit at POLA

Cavotec, the Port of Los Angeles (POLA) and the historic Battleship Iowa museum unveiled a public Alternative Maritime Power (AMP) educational exhibit during a reception commemorating Battleship USS IOWA's new shoreside power connection, just south of the Port of Los Angeles' World Cruise Center. "Working together, we have helped to reduce emissions from ships at berth at POLA and its sister port, POLB [Port of Long Beac]," said Luciano Corbetta, Cavotec Group Market Unit Director, Ports & Maritime.

Jonathan Williams, president of the Pacific Battleship Center and the Battleship Iowa attraction, was joined by POLA Executive Director Gene Seroka, Los Angeles 15th District Councilman Joe Buscaino, and Corbetta to officially unveil the educational exhibit.

The Iowa, an iconic battleship that first saw service in the Second World War, is one of the most popular tourist attractions on the LA Waterfront at the Port of Los Angeles. The vessel's on board power requirements are now supplied through the Los Angeles power grid, rather than diesel generators.

Cavotec and POLA have worked closely on AMP technologies since 2001. In 2004, at Pier 100, POLA introduced an AMP barge, which enabled China Shipping Container Line to become the first company to connect one of its container ships to AMP at the quayside. POLA's first AMP-fitted terminal came on line in 2007.

While the U.S. Navy had used shore power connection for many years, POLA was the first port in the world to introduce AMP for in-service container vessels.

www.cavotec.com

Shiphandlers Beware

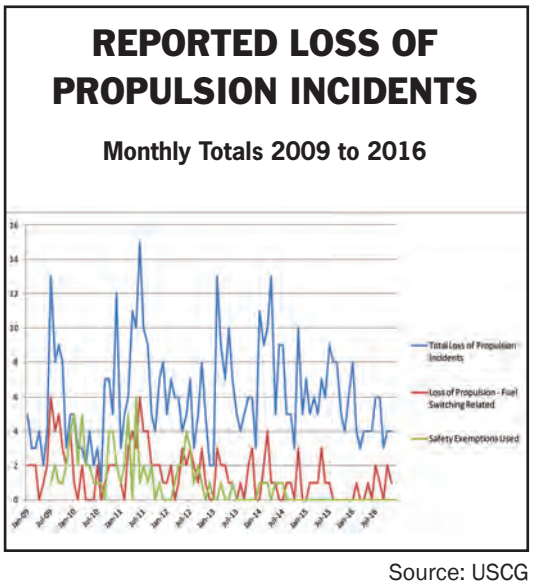
By Jeff Cowan, Mike Morris & Claes Jakobssen

Was the closing of the Houston Ship Channel for over three days in March 2015 due to the use of Ultra Low Sulphur Fuel Oil (ULSFO)? After reviewing the testimony, and evidentiary material presented by the National Transportation Safety Board (NTSB) regarding the 2015 Conti Peridot's collision with the Carla Maersk, it is the author's opinion the report fails to address significant contributing factors. The NTSB has overlooked a serious threat to vessel operations throughout the world. In its oversight, NTSB's findings set the foundation for future collision, allisons, and groundings by not acknowledging the threat these conditions pose and recommending remedies for them.

While NTSB's report recommends that the local harbor safety committee study ways to help avoid accidents during the rapid onset of fog and other foul weather, it is our position that the root cause of the crash was likely the combination of low sulfur fuel complications and the ship's poor handling characteristics which caused the bulk carrier to veer and slow just when it needed increased RPM's to meet the Carla Maersk.

NTSB noted in a Board meeting on June 07, 2016 that "Navigation equipment, vessel propulsion and steering systems, alcohol and other drug use, fatigue, medical conditions and medication use, and distraction from personal use of electronic devices were not factors in this accident."

NTSB's finding that vessel propulsion did not contribute to the incident between the Conti Peridot and the Carla Maersk raises particular alarm. The requirement to use ULSFO with sulphur content below 0.1% went into effect on January 01, 2015. Terminology for this type of fuel is confusing. The USCG in its Marine Safety Alert 13-15 (https://www.uscg.mil/hq/cg5/cg545/alerts/1315.pdf) uses the term ULSFO but this is a bit of a misnomer. A residual fuel oil is defined as a product with a viscosity over 12 centistokes (CST) and gas oil is defined as a product with a viscosity under 12 CST. Most of the ultra low sulfur fuel used by ships today, transiting within ECA's are low sulphur marine gas oils (LSMGO).



Source: USCG

Since this start date harbor pilots are not only seeing loss of propulsion (LOP) issues, but also the inability of some vessels to deliver critical increases of RPM in a timely manner (less than 30 seconds) to aid in steerage (known as a "kick" in harbor pilot vernacular).

According to Henry H. Hooyer in Behavior and Handling of Ships:

"When the ship is under rudder at the moment of increase in engine revs, we have an increased thrust on the rudder as well as a momentarily increased leverage of the rudder while the ship proceeds at a comparatively low speed through the water. The improved steering will last until the resistance forward corresponds again with the engine revs." (Chapter 2, p 30, 2004).

In layperson terms, the combination of forces creates greater maneuvering capability without creating greater speed. ULSFO in some instances may not support this maneuverability.

A timely "kick" on the engine in a narrow channel is a critical tool in a pilot's toolbox, but the characteristics of ULSFO may take it away. This is adding more risk to navigation in these areas.

The pilot on the Conti Peridot went to half ahead prior to meeting two ships for several reasons. Visibility was bad, the ship was handling poorly, and there was an inbound tow ahead that he did not want to overtake while meeting the second outbound ship. He felt confident that with a 'kick' in his back pocket the next few meetings would go smoothly. Pilots are also finding some vessels are having problems at the low end, in that they cannot stay on what is called a "dead slow bell" when anchoring or berthing without having a loss of propulsion.

Engine manufacturers design ship engines to run on residual fuel as the primary fuel source since it is both the prevalent fuel in the market and the cheapest but it requires heating (150°C) to enhance flow characteristics. The engines may also run on ULSFO (50°C), but operational parameters are markedly different.

Slow speed compression ignition engines use the fuel oil in the fuel systems to lubricate internal parts of the system such as fuel pumps and injectors. Residual fuel oil has plenty of sulfur, which actually has lubricating properties necessary for this internal lubrication. Sulfur contributes a micro corrosion on close tolerance metal parts that affords lubricating molecules adhesion. ULSFO is designed to reduce emission pollution, specifically for sulfur dioxide. It does not contain sufficient sulfur to provide the internal adhesion affording the lubrication that fuel systems need, and sometimes requires a lubricity additive in the fuel. Manufacturers also recommend close tolerance parts be changed out when wear is at

REPORTED LOSS OF PROPULSION INCIDENTS ... 2004 - 2016

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
San Francisco	15	11	11	10	12	37	26	54	37	39	45	38	18
Los Angeles / Long Beach	8	13	6	14	14	30	26	38	26	37	43	36	30
San Diego	0	1	3	0	0	0	2	1	0	1	6	2	2
Total per year	23	25	20	24	26	67	54	93	63	77	94	76	50

Source: USCG

10% of new specification. Not adhering to this recommendation is more common than it should be. This accentuates "O" ring leakage in the engine room creating a fire/safety hazard. Review of the service letters and technical papers from the "MAN Marine Engine & Systems" reveals a recurring theme. The following are critical for ship engine operations

- Correct viscosity & Fuel pump pressure
- Correct temperature
- Proper cylinder lubrication (This is referring to slow speed main engine cylinder lubrication via injected cylinder lube oil and not fuel pump and injector lubrication via the fuel consumed)
- Fuel specification

If any of the above criteria are not met, then the use of ULSFO may cause performance issues.

Introduction of International Maritime Organization (IMO) – Emission Control Areas (ECAs) only spoke of Sulfur content and its verification. It does not focus on engine modification/suitability and leaves that to the ship owner. ECA requirements focus primarily on controlling emissions by ensuring sulfur in the fuel is maintained at certain levels. IMO set certain standards to measure and verify the levels of sulfur in the fuel provided to the vessel. Beyond this requirement, the fuel specs are very relaxed.

The ship crews use what they think are workable procedures – with no verification if they followed the manufacturer's circulars for conversion to ULSFO. Manufacturers advise attention be increased to wear on components.

Though engine manufacturers have been issuing guidelines for use of ULSFO, there is no enforcement or verification mechanism in place. Vessels owned and/or operated by responsible management teams are having fewer of these failures, but they can still occur so diligence is required. The key goal should be to educate ship owners, operators, and pilots with the information they need to safely and efficiently handle, treat, maintain and consume ULSFO onboard.

It is important for vessel personnel to understand the potential limitations on vessel maneuverability, especially those due to a change in fuel type. It is critical during the Master/Pilot Exchange that the Master share engine limitations due to ULSFO with the pilot. If the pilot is not getting this information, he should ask.

Having said this, it is important to point out that many ships are using the ULSFO in narrow waterways without any loss of RPM's or any additional time deltas between bells. This leads the authors to believe the problem is both maintenance and educational based.

The Houston Pilots passed on information collected regarding the incremental times on ships in the channel going from half ahead to full ahead. The times appear all over the place; however, the average is certainly well below the 3 minutes it took the Conti Peridot to increase rpm's. This information is conspicuously absent in the docket.

Early in the investigation, the Houston Pilots pointed out to the NTSB that the Conti Peridot exhibited poor handling characteristics. Did the NTSB in its evaluation consider this issue? It appears many of the vessel parameters that could have led to a review of why this vessel handled so poorly was never collected. An example of these parameters are:

- Rudder size compared to wetter surface area of the vessel
- Shape of the stern
- Ship's block coefficient
- Engine Horsepower
- Time response between bells

The Houston Pilots also raised the issue of vessel trim with the NTSB. It was discussed that despite past efforts by the pilots, vessels continue to arrive even keel. Adding just 18" (46cm) of trim makes a huge difference in a ship's handling ability. Would this have contributed to the incident?

Based upon review of the report and unaddressed critical issues, the authors make the following recommendations:

- Maritime industry regulators should consider requiring owner operators ensure that whatever fuel they use to comply with ECA requirements does not adversely affect vessel performance and any known operating characteristics be documented and made known to pilots during Master/Pilot exchange.
- Maritime industry regulators should engage stakeholders, including port, shipping, engineering interests, and classification organizations regarding the challenges of using ULSFO.
- Due to the immediate threat and danger posed by the use of ULSFO, maritime industry regulators should establish the necessary port entry requirements. To avoid the hazards effecting Ports within ECA's economically and environmentally due to vessel collisions, allisions or groundings.

About the Authors

Captain Jeff Cowan graduated from the California Maritime Academy, earning and sailing on his Master's license.

Claes Jakobssen sailed as a Chief Engineer (after attaining CE status at age 29) for three years for a Northern European shipping line, and is now working with shipping projects and shipping consulting.

Mike Morris was a Houston pilot for 25 years, now retired former head pilot.

Photo: Crystal

Fast Facts: Edie Rodriguez

Title: CEO and President, Crystal
Chairman, Crystal Luxury Corporation, Ltd.
Twitter: @EdieRodriguez
October 2013:
Joined Crystal as president and COO
May 2015:
Crystal acquired by Genting Hong Kong, Rodriguez is promoted to Chairman, CEO and president.
Native: New York
Countries Visited: 100+
Favorite Destination: Tuscany

Edie Rodriguez

CEO & President, Chariman, Crystal Luxury Corporation, Ltd.

Edie Rodriguez is Chairman, CEO and president of Crystal Luxury Corporation, Ltd., a broad travel brand that includes Crystal Cruises, Crystal Yacht Expedition Cruises, Crystal River Cruises, Crystal Luxury Air, Crystal AirCruises and Crystal Exclusive Class ships with Crystal Residences. She met with Maritime Reporter in NYC to discuss the evolution of the cruising brand, as well as the benefits of owning your own shipyards in today's torrid cruise market.

BY GREG TRAUTHWEIN

You've been at the helm of the Crystal brand for about three years now. Briefly characterize the evolution you've seen in cruising in general, and specifically at Crystal.

The evolution has been incredible. If you look back 30 years ago when the North American cruise market was going through a resurgence, they really didn't have dining options, they really didn't have gyms, and they didn't have the diversity of activities. Even if you look at the evolution of Crystal Cruises. We are a 26-year-old brand, and when Crystal started we only had 12- to 14-night voyages; we had black tie required; we were not an all-inclusive brand. If you look at Crystal Cruises today to see how we have evolved: we have black-tie optional/country club casual style of dress; we have voyages ranging from five nights to 128 nights; we are all-inclusive; and we offer a myriad of ways to experience land-based destinations.

I know your brand is extensive, but let's talk about the physical assets, specifically the ships.

The ships have evolved incredibly as well. First of all, our parent company – Genting Hong Kong – went out and bought five shipyards in Germany so that we could control our own destiny long-term in the shipbuilding process. That is a critical process, starting with the GA and evolving through design and construction. At the end of the day there are basically two major yards, arguably three (that dominate cruise ship building). Now that we own our own shipyards, we will be in a stronger position, primarily because brands that want to build new have to wait for open shipbuilding slots. We are fortunate, as the shipbuilding process is amazing, and I enjoy going to the yards and being involved in the process from the embryonic stages through delivery. To that point, there are so many things that we can take advantage of in this

Photo: Crystal

"On our (Esprit) yacht cruising it's a young and active (demographic), 35 year olds."

While the "Crystal" name is perhaps best known for its large oceangoing cruise ships, the luxury travel brand is experiencing growth in all sectors, from yacht and river cruising, to its airline.

Eco-friendly, technological age, specifically harnessing all of the new technologies and incorporating them into the newbuilds.

Discuss if you will the advantages of the new ownership – Genting Hong Kong – of the Crystal brand.

Brands either grow or die. Our founding owners were phenomenal but they did not want to make the investment in the growth to harness the power of that the brand developed over a quarter of a century. Genting Hong Kong has been a phenomenal owner. They quickly realized the power of the brand, and that's why they bought us.

The cruise market, as you know, is "hot" and growing fast. Given that, what challenges do you see ahead?

The challenge starts in the shipbuilding process because it takes years (to design, build and deliver a new ship).

I wish that we could just snap our fingers like a 3D printer and have everything done quickly. It doesn't happen like that, as we all know, (but we still) want to be in the market (as quickly as possible). On the flip side, sadly in the shipbuilding world a new ship is only new for about one year.

Where do you see opportunity?

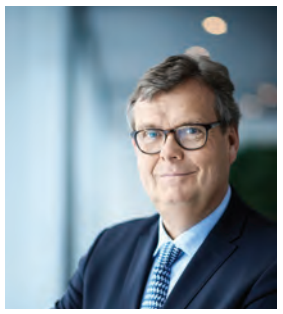
The world is truly our oyster for growth as such a small part of the population has gone on a cruise. (Our brands have grown and strengthened), and we've lowered the age demographic, bring in people new to cruising. On our (Esprit) yacht cruising it's a young and active (demographic), 35 year olds; on our river cruise experiences "it's not your grandfather's river experience" with a 32-ft. wide boat and an average age of 45. On our new experiences roughly 50% of our guests have never cruised before. So we are attracting new people to the all things Crystal experience.

Technology: If you could name the one technology that has most significantly transformed the cruising experience, what would it be?

WiFi. because people cannot not be connected at sea. We had a couple that went on a four-month around the world cruise for their honeymoon. The only reason that they could do that was because of WiFi; the husband was able to take his business on the road.


MV Werften

Gruenhagen


A.P. Moller-Maersk

Rasmussen


Seaspan

Roth


Seaspan

Thomas


Seaspan

Hale


Seaspan

Petticrew


Seaspan

Lyle


CMA CGM

Saadé


Global Diving & Salvage

Coppes


SAFE Boats

Willis


Damen

Durk-Jan Nederlof, Clift Christiaan & Eugene Rhuggenaath, Minister of Economic Development

Gruenhagen Named CFO at MV Werften
MV WERFTEN appointed Richard Gruenhagen as Managing Director of Finance and Administration to reinforce the group's Management Board as new CFO effective February 1.

Maersk Chairman Rasmussen Quits
A.P. Møller - Maersk's chairman of the board will step down at the end of March as the group missed fourth-quarter profit expectations amid low prices and oversupply in the oil and freight sectors. Michael Pram Rasmussen said he will not stand for reelection as chairman of the board of directors, opting to stand down when his election period expires March 28, 2017, the date of group's annual general meeting. The board intends to elect former SAP co-CEO Jim Hagemann Snabe as chairman. Rasmussen has served on the A.P. Moller- Maersk as a Board member since 1999, 14 years as Chairman.

Seaspan Appoints Five
Seaspan announced the following new senior leadership appointments:

- Steve Roth has been promoted to President of Seaspan Ferries Corporation (SFC). In this position, Steve will continue to have the primary accountability for the overall performance of the SFC business unit, including management of day-to-day operations of SFC.
- Paul Thomas has been promoted to Senior Vice President and General Manager – Vancouver Shipyards (VSY).
- John Petticrew was promoted to Vice President, Engineering, Vancouver Shipyards (VSY).
- Andy Hale has been promoted to the position of Vice President – Program Delivery, Vancouver Shipyards (VSY).
- John Lyle has been hired as Vice President – Operations, Vancouver Shipyards (VSY).

Evac Names Rudling President
Evac Group appointed Claes Rudling as global Business Area President, Offshore and Merchant, effective January 23, 2017. Rudling will continue as CEO of Uson Marine, which was acquired by Evac Group in December 2016.

Saadé: New CEO at CMA CGM
Rodolphe Saadé is the new chief executive of container shipping line CMA CGM, taking over the role previously held by his 80-year-old father. The top spot at CMA CGM Group has been passed from one generation to another. Jacques Saadé announced on his 80th birthday that his son Rodolphe Saadé would take over as the French shipping line's next chief executive officer. Jacques Saadé, who founded the company 1978, will remain chairman of the board of directors. Previously executive officer, Rodolphe Saadé has been with CMA CGM since 1994.

Global Hires Coppes
Bas Coppes has joined the senior management team at Global Diving & Salvage, Inc., aiming to guide the global growth of the marine services company. Coppes previously was with Mammoet Salvage Americas.

SAFE Boats Names Willis VP
SAFE Boats International has promoted Janice Willis to the position of Vice President Program Management. Willis has over 25 years' experience in program management and contract administration.

Damen Takes Control of Curaçao Yard
Damen Shiprepair & Conversion (DSC) has taken over the management of the Curaçao Droogdok Maatschappij (CDM) as of February 1, 2017, following an agreement between the Government of Curaçao and Damen Shipyards Group in September 2016. The location will now continue its activities under the name of Damen Shiprepair Curaçao (DSCu). A new management team, led by Jaap de Lange as Managing Director, has been appointed and is already on site to introduce and implement Damen working methods and standards.

Glosten Promotes FitzGerald
Seattle-based naval architecture and marine engineering consultancy Glosten has promoted Ken FitzGerald to Principal. FitzGerald joined Glosten in 2003 after 13 years working in commercial oceanography.

Socha Joins VT Halter
VT Halter Marine, Inc., a subsidiary of Vision Technologies Systems, Inc. (VT Systems), appointed Robert A. Socha as Senior Vice President of Business Development and Estimating, effective January 30, 2017.

Miliaras Takes Carnival Maritime Post
Minas Miliaras has taken on the role of Vice President Fleet Cruise Execution at Carnival Maritime, the Marine Service Unit of the Costa Group (AIDA, Costa) in Hamburg. Minas will head the fleet teams and the maintenance development team for all AIDA Cruises, Costa Cruises and Costa Asia ships. He will be responsible for the fleet management of the 26 vessels.

Nautisk Names Dawson Manager
Nautisk has appointed John Dawson as Project Manager. Based in the U.K., Dawson will be responsible for driving new business with a focus on Europe, and identifying new business areas across the market. He will also take a lead role in new product development.

Johansen Joins EBDG Team
Erik Johansen joined Elliott Bay Design Group's (EBDG) New Orleans office in December 2016 bringing with him 20 years of marine electrical experience.

Moensi Extends MPR Blue Fits Service
Harold Moensi has joined the Maritime Propeller Repairs BV (MPR BV) team at its workshop in Drunen.

Joore Shares His Vision
Robert Joore, the new General Manager of marine lubricants supplier Total Lubmarine, has laid out his vision for the company, focusing on developing a range of innovative solutions for ship operators operating in poor freight markets in a low-sulfur era. "Total Lubmarine believes that innovation is the key to success. In 2017 we will continue to invest heavily in developing a generation of marine lubes which are suitable for engines running both low and high sulfur fuels. At the same time, we anticipate that the demand for environmentally acceptable lubricants (EALs) will continue to grow, driven by the rising numbers of ships trading in the Polar regions," said Joore. In early February Total Group announced that its affiliate Total Marine Fuels Global Solutions signed a three year memorandum of understanding to ensure that containership operator CMA CGM would be able to meet the latest


Glosten

FitzGerald


VT Halter

Socha


Carnival Maritime

Miliaras


Nautisk

Dawson


EBDG

Johansen

MPR BV

Moensi


Total Lubmarine

Joore


Seafarers' House

Swartz

Hubert


Fincantieri Bay Shipbuilding

Another busy winter for Fincantieri Bay Shipbuilding (FBS) in Sturgeon Bay, Wisconsin

Laborde

Laborde to distribute Bukh engines.

low sulphur regulations by supplying it with LNG, 0.5 percent sulphur fuel and 3.5 percent sulphur fuels for use in ships installed with scrubbers. The agreement also covers the supply of lubes suitable for all fuel types.

Seafarers' House to Honor Swartz

Jan Swartz, group president of Princess Cruises and Carnival Australia, has been selected as recipient of the Seafarers' House International Golden Compass Award for 2017. As president of Princess Cruises, Swartz oversees a global cruise line and tour company with a fleet of 18 ships that carry 1.8 million passengers annually. The company is part of Carnival Corporation & plc.

Brunswick Promotes Hubert

Brunswick Commercial & Government Products (BCGP) has promoted Jeff Hubert to director of sales, responsible for product development initiatives and worldwide business development.

Another Busy Winter for FBS

The winter repair season is in full swing at Fincantieri Bay Shipbuilding (FBS) in Sturgeon Bay, Wis., where 16 vessels of various sizes from the Great Lakes bulk carrier fleet are in for winter repair, including five 1,000-foot bulk carriers, eight medium sized ships 600-700 feet long and three tugs. The scope of the repairs is as wide as the variety of ships at dock and include vessel repowering from steam propulsion to diesel, steel and piping repairs, bulkhead renewals, machinery inspection and repairs, exhaust scrubber installation, painting and regulatory inspections.

Helping the yard to perform this work on a tight schedule, a three-acre expansion to the now 55-acre shipyard included new manufacturing buildings and additional computer-aided manufacturing equipment. The shipyard is equipped with a 7,000-ton floating dry-dock and two graving docks along with lifting capacity to meet the most demanding requirement.

ABS Issues First Cyber Safety Notation

ABS issued its first notation for the ABS Guide for Cybersecurity Implementation for the marine and offshore Industries. "The focus on cyber safety is increasing, and that is changing the expectations industry has for classification services," said ABS Chairman, President and CEO, Christopher J. Wiernicki." ABS is ahead of the curve in tackling this fast moving challenge, creating actionable guidance and helping clients protect themselves against cyber threats." The ABS CyberSafety program is aimed at mitigating the risk of cybersecurity-related conditions or incidents that could negatively affect operations. Awarding the CS1 notation (Asset, Basic-level, Informed Cybersecurity Implementation) is a significant industry first and underscores ABS' leadership in addressing cybersecurity.

Laborde to Distribute BUKH in the U.S.

Laborde Products was selected as BUKH Diesel Marine Distributor for the United States marine market. The announcement was made January 1, 2017. BUKH has produced marine engines since the beginning of 1899, and with more than 100 years of experience their marine engines have developed into being the most reliable in the world. They provide retailers all over the world of which most are specially trained to counsel and render service on the marine engines of BUKH.

Palau Ship Registry Opens Piraeus HQ

The Palau International Ship Registry (PISR) has opened a new head office in Piraeus, Greece.

Radio Holland, Cisco Partner

Radio Holland Group has signed a strategic agreement with American ICT company Cisco. The aim of the cooperation is to help accelerate digitization in the maritime sector by developing and offering maritime ICT solutions such as remote monitoring and diagnostics services, data management and networks on board. Dennis Mol, Chief Operations Officer at the Radio Holland Group, said, "In a challenging maritime market it is Radio Holland's drive to keep finding and developing solutions that reduce the 'cost of ownership' of vessels and improve the efficiency of ship's operations. If a ship can't sail because of technical problems, the costs incurred are substantial. Our customers are looking for innovative ways to make and keep the operations of their fleet more reliable, efficient and effective. Together with our partner Cisco and with our complementary expertise, we can develop scalable ICT solutions for various types of ships and market segments. We aim to translate 100 years of Radio Hollands experience into the right 'dashboards', creating useful information which will allow our customers to optimize their operations and to give them optimal support. Radio Holland sees opportunities to improve the unlocking of data on board in line with the trend of the 'Internet of Things' and to optimize the data connection between ship and shore. With our knowhow in maintenance processes we are also continuing to develop predictive maintenance concepts."

Dry Dock Conference

May 5-6, 2017, Houston

Dry Dock Conference/Advanced Training Forum 2017 is the ninth in a series of international conferences held every 2-3 years. This year's conference will be held May 5-6 , 2017 in Houston, immediately following the Offshore Technology Conference.

The goal of the conference is to educate and provide technological updates to personnel in the dry dock industry. The papers and presentations cover a broad spectrum of topics dealing with a multitude of issues facing the dry dock community. Professionals from around the globe will share their endeavors in planning, financing, permitting, designing, constructing, operating, and maintaining dry dock facilities. Conference attendees will leave with a greater understanding of the challenges faced by the industry and gain valuable insight into how to overcome them.

The Dry Dock Conference is the international platform and the leading forum for the world's drydocking industry. This is where the Dry Dock Community leaders present their innovations, trends and forward looking technologies to set the course for future success. The conference provides a venue to learn about new products, services, and generate vital contacts. The immensely successful series of conferences has consistently drawn an international audience of professionals who come to share their knowledge and learn from the experiences of others.

www.drydocktraining.com

BUYER'S DIRECTORY

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

ANCHORS & CHAINS

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

AUTOMATIC SELF-CLEANING FILTERS

Forsta Filters, 8072 San Fernando Road, Sun Valley, CA , USA

BARGE FABRICATION

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

BOAT BUILDING AND DESIGN

All American Marine, 200 Harris Avenue, Bellingham, WA , USA , tel:(360) 647-7602, fax:(360) 647-7607, jhudspeth@allamericanmarine.com

COMMUNICATIONS

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

CORDAGE

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

CRANE - HOIST - DERRICK - WHIRLEYS

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

DECK MACHINERY- CARGO HANDLING EQUIPMENT

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

DRILLS

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

DRIVESHAFTS

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

DRY DOCK TRAINING

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

EDUCATION

San Jacinto College, 8060 Spencer Highway Pasadena, TX 77505

FILTERS/FILTER SYSTEMS

UT 99 AG Oil Mist Separators, Schaubenstrasse 5 CH-8450 Andelfingen , Switzerland , tel:+41 52 397 11 99, fax:+41 52 397 11 90, info@ut99.ch , www.ut99.ch/en

FILTRATION

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

FIRE FIGHTING

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

FUEL TREATMENT

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

GROUNDING & EARTHING BRUSHES

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

HYDRAULIC SYSTEMS

Jastram Engineering, 135 Riverside Drive, North Vancouver, BC, V7H 1T6 Canada , tel:Office: (604) 988-1111 Cell: (604) 808 - 6281, csimon@jastram.com

LIFESAVING EQUIPMENT

CM HAMMAR AB, CM Hammar AB, August Barks gata 15, 421 32 Västra Frölunda, Sweden, , tel:+46 31 7096550, info@cmhammar.com , www.cmhammar.com

LIFT EQUIPMENT

Kleeco, 10110 S. M43 HIGHWAY Delton, MI 49046

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

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

MARINE EQUIPMENT

Alfa Laval Inc., 955 Mearns Road, Warminster, PA 18974 , USA

Smith Brothers, Inc., P.O. Box 124, Galesville,, MD , USA , tel:(410) 867-1818, fax:(410) 867-7813, smithbarge@comcast.net

MARINE TRANSPORTATION

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

MECHANICALLY ATTACHED FITTINGS (MAFS)

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

MILITARY PATROL CRAFT MANUFACTURERS

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

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

MONITORING SYSTEMS

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

NAVAL ARCHITECTS, MARINE ENGINEERS

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

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

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

NITROGEN GENERATORS

Air Product AS, Vige Havnevei 78, 4633 Kristiansand, Norway, P.O.Box 4103 Kongsgaard, 4689 Kristiansand, Norway , tel:+47 38 03 99 00, norway@airproducts.com , www.airproducts.no

PAINTS AND ANTI FOULANTS

Sherwin-Williams, 101 W. Prospect Avenue Cleveland, OH 44115 , tel:(216) 515-4739, klarmstrong@sherwin.com contact: Kim Armstrong

PIPING INSTALLATION AND SERVICES

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

PRESS FITTINGS

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

PROPELLERS

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

PROPULSION CONTROL SYSTEMS

BAE Systems - HybriDrive Solutions, 1701 North Street, Endicott, NY , USA , tel:(607) 770-2083, carol.gorenflo@baesystems.com

RUST AND PAINT REMOVAL

Rustibus, 2901 WEST SAM HOUSTON PKWY, NORTH SUITE E-325, HOUSTON, TX , tel:832-203-7170, fax:832-203-7171, houston@rustibus.com , www.rustibus.com

SATELLITE COMMUNICATIONS

MARLINK, Lysaker Torg 45 Post Box 433 NO-1327 Lysaker NORWAY , tel:+47 22 58 20 50, customercare@marlink.com , www.marlink.com

SEATING

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

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

SHIP REPAIR

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

SHIPBUILDING-REPAIRS, MAINTENANCE, DRYDOCKING

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

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

STEERING GEARS/ STEERING SYSTEMS

Jastram Engineering, 135 Riverside Drive, North Vancouver, BC, V7H 1T6 Canada , tel:Office: (604) 988-1111 Cell: (604) 808 - 6281, csimon@jastram.com contact: Chris Simon, www.jastram.com

SURFACE PREP TOOLS

Water Cannon, 4300 West Lake Mary Blvd. Units 1010-424 , USA , tel:321-800-5744, sales@watercannon.com , www.watercannon.com

WASTE WATER TREATMENT

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

WATER JET SYSTEMS

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

WINDSCREEN & WINDOW WIPERS

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

Marine Operations Manager

Full Time
Category: Shoreside Operations
Job Location: 61 Route 9W Palisades, NY, 10964 USA
Contact
Email: ho2225@columbia.edu
61 Route 9W Palisades, NY, 10964 USA

Skills:
•A Bachelor's degree and 6 years direct experience in marine management and the operation of a seagoing vessel or its equivalent required.
• Licensed as a ship's officer and seagoing experience preferred.
• Knowledge of seagoing scientific programs with at-sea experience preferred.
• Managerial experience related to research programs and their support highly preferred.
• Marine geology background and UNOLS association a plus.
• Position may require up to 1 month per year at sea with extended out-of-office assignments to contract with shipyards for periods of maintenance and repair.
• Must possess a current US passport and be able to obtain a Transportation Workers Identification Card (TWIC).

Description:
Marine Operations Manager, Lamont-Doherty Earth Observatory (LDEO) of Columbia University
The Lamont-Doherty Earth Observatory (LDEO) of Columbia University, located in Rockland County, NY, is seeking a Marine Operations Manager to join its Office of Marine Operations (OMO) team.
We are a premier research institute that is located in Palisades, NY, which is close to New York City. For more information about our campus, LDEO's varied research initiatives and OMO, please visit: **http://www.ldeo.columbia.edu**
We invite applications for our Marine Operations Manager position to support the OMO's Director with the following primary responsibilities:
• Oversee and administer shorebased support and at-sea operations of the Research Vessel (R/V) Marcus G. Langseth. The R/V Langseth is a 235' research vessel that works globally and is owned by the US National Science Foundation (NSF) and is operated by OMO as part of the US academic fleet. This position includes coordination and management of ship's budget, logistics, and regulatory compliance.
• Directly supervises a Port Engineer, Masters, Chief Engineers and ship's crew as required.
• Represent OMO with vendors, NSF, and other external organizations as required.

Deck Training, Instruction, Operations and Watchstanding - Summer 2017

Maritime College
Job Location: Throggs Neck, New York, 10465 United States
Contact
Email: none@given.com
Work Phone: 888-888-8888
Apply Online Bronx, NY, 10465 USA

Skills:
Summer Sea Term Crew 2017 – Deck Training, Instruction, Operations and Watchstanding
SUNY Maritime College located on a 55-acre scenic waterfront property on the outskirts of New York City on the Throggs Neck peninsula where the East River meets Long Island Sound. The campus blends the best of two worlds: a comfortable college-town feel with the greatest city in the world. An impressive view of the sound extends toward the North Atlantic, yet only a few miles away are Yankee Stadium and midtown Manhattan. SUNY Maritime offers an array of employment opportunities stemming from entry level to professional positions which encourage growth and development among its employees.

Job Description:
The State University of New York Maritime College is currently looking to employ officers and staff for this year's summer training cruise aboard T.S.EMPIRE STATE. Positions for the Engine department [Engine Training, Instruction, Operations and Watchstanding] are available. This is a unique opportunity to assist with the at-sea, practical training of future mariners and the chance to participate in a great itinerary offered. Salary commensurate with licensure, certification and experience.
The FULL Cruise appointment will begin May 1, 2017 and end August 11, 2017. However, you may apply and be considered for one of the following.
1. Cruise A (May 1, 2017 to June 22, 2017)
2. Cruise B (June 22, 2017 to August 11, 2017)
3. Full Cruise (May 1, 2017 to August 11, 2017)
Please indicate clearly in your cover letter and/or via email which cruise term you are interested in (A/B/FULL)

Requirements:
• US Passport
• TWIC
• Merchant Mariner Credential (MMC) - **Note: All applicants must have an MMC**
• Valid Medical Certificate - **Note: The Medical Certificate is issued with the original MMC; however it must be renewed every 2-year**
• Demonstrated ability in teaching applicable materials (for academic appointments)
• Recent sea experience (for operational appointments)
• DOT/USCG Periodic Drug Testing Documentation
• Letter from employer indicating that you have been in a random testing program meeting the criteria of 46 CFR 16.230 for at least 60 days (from May 1, 2017) during the previous 185 days, and have not failed nor refused to participate in a chemical test for dangerous drugs.
OR
• Passed a chemical test for dangerous drugs, required under Title 46 CFR 16.210 within the previous 185 days (from May 1, 2017)

A COPY OF ALL REQUIRED DOCUMENTATION SHOULD BE UPLOADED AT THE TIME OF YOUR APPLICATION. FAILURE TO PROVIDE THE DOCUMENTATION MAY PREVENT YOUR APPLICATION FROM FURTHER CONSIDERATION. **ALL DATES FOR US PASSPORT, TWIC, MMC AND MEDICAL CERTIFICATE MUST BE VALID FOR THE ENTIRETY OF YOUR ANTICIPATED APPOINTMENT.**
Preferred qualifications:
• Senior USCG license or related industry/teaching experience
• Demonstrated effectiveness in teaching professional subject matter
• Demonstrated communication skills
Additional Information: For those desiring additional information please contact:
Joann Sprague, Office Manager **regiment@sunymaritime.edu** (718) 409-7352
This is a temporary appointment. FLSA Exempt position, not eligible for the overtime provisions of the FLSA. Internal and external search to occur simultaneously.
Travel and interviews expenses will not be reimbursed.

Salary/Compensation: The salary is based on a daily rate of pay and will commensurate with license, certification and experience.

Descriptive Title: Various **Budget Title:** Technical Specialist CSL **Salary Grade:** NSSL **Item #:** Various

Application Instructions: Persons interested in the above position should indicate which cruise period (Cruise A, Cruise B, or Full Cruise) option they prefer.

When applying online, please submit the following:
• Resume
• Cover letter including cruise option (Cruise A, Cruise B, or Full Cruise)
• Copy of TWIC
• Copy of Passport
• Copy of Merchant Marine Credential (MMC)
• Copy of valid Medical Certificate
• Copy of the appropriate DOT/USCG Periodic Drug Testing Documentation
• Three recent references

https://maritime.interviewexchange.com/static/clients/373SMM1/index.jsp
Apply Here: **http://www.Click2Apply.net/xhhh9ygbq6**
PI96890888

Yacht Hotel Work Offer

Sunborn International

Salary: $ 6,500 GBP to 10,500 GBP , Full Time , Company Employee

Category: Shipboard Officer / Personnel / Crew

Job Location: Royal Victoria Dock London, London, E16 1XL United Kingdom

Email: recruitdept@dr.com

Royal Victoria Dock London, London, E16 1XL United Kingdom

Description:

Hello, Sunborn is the pioneer of a unique approach to the development of exclusive hotel accommodation – the super yacht hotel. In 1998 we built the world's first yacht hotel, followed in 2003 by our first international yacht hotel in London. In the spring of 2014 we opened two new yacht hotels, the 5-star super yacht hotel Sunborn Gibraltar and the new Sunborn London at Royal Victoria Dock. In 2015 the first floating casino, Casino Sunborn, was opened onboard the Sunborn Gibraltar.

Superyachts have become the world's ultimate symbol of wealth and exclusivity. The unique yacht hotel concept combines the high value associated with luxury yachts and a modern hotel. At the same time, they have the advantage of leaving no environmental footprint after removal and can be sited on locations with no available land for building or which are naturally or historically protected.

We cruise all around United Kingdom, We are looking for high performing leader to help us meet us our customer acquisition and revenue growth target by keeping our company competitive and innovative.

Job Salary: Depending on your roll of specialization, Salary Ranging from 6,500 GBP to 10,500 GBP (Per Month) or negotiable and We shall take care of your Transportation expenses, Accommodation, feeding and a month training on arrival if needed.

Below are the list of position available for your to apply for with salary assign to them.

Captain: 10,500 GBP Mate, 9,500 GBP Engineer, 10,000 GBP 1st Engineer, 9,500 GBP Skipper, 9,500 GBP Chef, 9,000 GBP Stewardess, 6,500 GBP Deckhand, 7,500 GBP

Specialty Positions: salary Varies depending on your speciality Kindly get back to us and let us know the position you want to apply for and also send in your CV to **recruitdept@dr.com** Recruiter William Sherlock Sunborn Cruise Ship 5 GAINSFORD STREET, LONDON, SE1 2NE United Kingdom Sunborn International London

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