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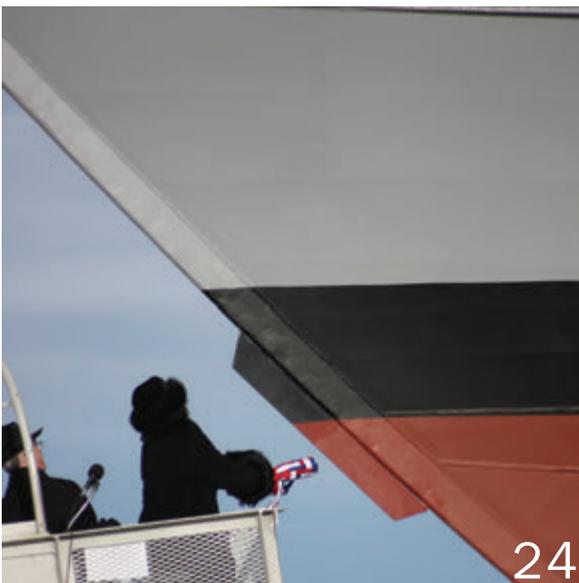


(Photo: U.S. Navy)

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(Photo: ASRY)



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(Photo: Greg Trauthwein)



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(Photo: Library of Congress)



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(Photo: R.W. Fernstrum)

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FROM OUR ARCHIVES



THE COVER



Pictured on this month's cover is the S.S. Patrick Henry, which was the first of the Emergency Class Liberty ships to be built and launched. The famous quote by its namesake helped to give this class of ships its name. Patricia Keefe's coverage starts on page 32.

Did You Know?
Between 1941-1945, the U.S. built an unprecedented 5,777 Navy and Merchant ships.

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Happy Birthday to Us!

GREG TRAUTHWEIN, EDITOR & ASSOCIATE PUBLISHER

This year *Maritime Reporter & Engineering News* celebrates its 75th Anniversary. Founded by **John J. O'Malley** in 1939, the publication today reigns as the largest audited publication serving the global maritime industry, with a circulation of more than 35,000.

While the publication, with its signature size and booming red logo, easily remains our most recognizable brand, unlike 1939 when it was the stand-alone information product of the company, today it is surrounded by a family of four print and more than a dozen online and electronic editorial products that cover everything on the commercial maritime, offshore and subsea markets.

While the world, the industry and surely the collection and dissemination of information has changed immeasurably in the past 75 years, our mission – to deliver quality, relevant and insightful news, data and analysis – stands strong. We do this literally everyday, 24/7/365, via a team of editorial contributors positioned globally filling our pages print and electronic. You consume and we deliver information when you want it, where you want it and how you want it.

In my 20+ years serving this industry personally, I've seen time and again the value and demand for articles that discuss maritime history. To that end, throughout 2014 we have a special series of feature articles planned for each edition, articles which examine a particular era or topic. Fittingly, this month, we look closely at the time period when the magazine was founded, specifically the effects of World War II on the domestic shipbuilding industry. In my humble opinion veteran business journalist **Patricia Keefe** has done an outstanding job in capturing both the essence and scope of the Liberty ship shipbuilding program. Her story starts on page 32, and her work will be featured regularly throughout 2014, including next month's look back at one of the world's most famous cruise ships, the SS United States.

While in this and every edition of 2014 we will look back, we surely will not lose site of the business today and tomorrow, which in case you have not noticed is starting to heat up considerably. While the Floating Production System market is niche with only 319 units in service globally today, it is a very high-value and rapidly expanding niche.

Jim McCaul of International Maritime Associates has been tracking this market for nearly 20 years, and in each edition he will provide exclusive insight and analysis to this offshore market sector (p. 12).

The rapidly evolving energy market in the U.S. is having a dramatic effect on the boat and shipbuilding market, too, and not just in the U.S. As energy production locale changes, so too do many traditional shipping routes and patterns. Lest we not forget, it was only about 6 or 7 years ago when the U.S. was spending billions to become a major LNG importer. How quickly things change, as most effort and investment is looking to energy export.

What's next? Of that I am not 100% certain, other than the fact that we'll be there right along with you for another 75-year ride.

trauthwein@marinelink.com

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New Norm for Jones Act: Big Profits?

There's been a new twist to the Jones Act. Money crunchers are making a huge profit from the artificial market in the domestic oil trade. ExxonMobil has chartered the Overseas Cascade at \$110,000 a day, almost 50 percent higher for the same ship a few months ago. Meanwhile one of the Koch brothers has scored big off the same oil company by reletting the American Phoenix for \$100,000 a day, more than double the rate Koch Industries is paying for the ship. The cause is of course the booming oil shale industry (fracking) and the 50 or so U.S.-flagged tankers that can carry the oil between U.S. ports. The boom in tanker rates bears out the predictions of some analysts, who have been saying for years that protecting the industry has led to the opposite of what was originally intended – less competition instead of more. Alarms and warnings are spreading about the need to change all legislation relating to U.S.-flag shipping. Richard Bank, who was at one time a senior official in the State Department's Office of Maritime Affairs and now runs a consulting firm, reckons that the principle of protecting the U.S. Merchant Marine is not being maintained. In a recent interview with Forbes, he said that operators such as APL have been swallowed up by foreign corporations, while others have withered and died. He gave three reasons – high operating costs, bureaucracy and regulations, and unhelpful trade unions.

Meanwhile merchant shipping subsidies and the like, particularly the food aid program, are going to foreign-owned ships [Maersk is the best-known of these in the industry] conveniently flagged in the U.S. In theory, these ships have to be made available to the government or navy in emergencies, but Bank says a government of the owning company (e.g. Denmark with Maersk) could prohibit the vessel being used in a war zone.

Jones Act supporters say, with some justification, that it's needed for military operations and also supports thousands of jobs. Opponents say that those jobs are becoming an expensive luxury and that even more jobs would be created if the law is loosened.

Posted by Martin Rushmere, December 30, 2013 on MaritimeProfessional.com

Maritime Revival Within Reach

Experts see several options that can help bring about a turnaround of the industry despite the present downturn

The current lackluster phase experienced by Indian shipping is expected to drag on for another two years at least. Earnings will bump along the bottom of the market. Ship owners don't see returns from acquisition in any significant way. A recent study undertaken by some ship owners indicate that ship utilization continues at around 83% in general when a 90% to 95% would offer a healthier pattern of operation. However, long term ship owners need to keep their vessels young in order to be ready for the market when the turnaround takes place.

This long lifeless phase has seen some of the stalwarts in shipping closing shop or getting deeper into the red. Already Jasu Shipping Company, Varun Shipping, Pratihba Shipping and others have either got their licenses of some of their ships cancelled by the Director General of Shipping, the Indian Maritime Administration, for lack of a seaworthy certificate and in the case of Varun Shipping, almost got their "Documents of Compliance" withdrawn. But experts postulate the early revival of the industry is not much of a challenge.

Everyone is watching India's economic revival and India can make the change like China has done. Among the top shipping companies in the world, China ranks 9th and India is 23rd. China with the highest population in the world has a coastline of 14,000 km whereas India with the second highest population has a coastline of 7500 km. Worse is that Indian ships carry less than 9% of the India's oversea's trade. Ship building is seen to act as a catalyst to overall growth as it has enormous job potential. In China which builds over 900 vessels has made a transformation on the job front. Vice Adm. S. K. K. Krishnan, former Chairman of Mazagaon Dock and Independent Director of Cochin Shipyard recommends that since Indian shipyards lack orders they should concentrate on building smaller vessels, especially the high technology offshore vessels as well as vessels for the dredging industry. "Government of India should go out of their way to deepen the approach channels of the major ports, which in turn will give a fillip to the dredging industry," he said. "Unless more orders come up for ship building, the industry cannot expect to grow. Unless the government ensures that more Indian built ships operate in the Indian waters, nothing positive can happen."

With renewed focus on cost, ship owners can make the most of their existing tonnage through upgrades, retrofit and conversions. Akshay Jain, CEO of Vedam Design advocates a pragmatic and effective approach towards ship repairs, at the same time cautions that instead of directly

going for repairs work it is better to undertake a survey of the ship to identify first the extent of the repairs to be under taken. "More importantly carefully select the ship repair yard and make a comparison of the cost, capability and the technical advantages." He suggests that all options for retrofitting and ship conversions should be considered in detail as they offer opportunities for bringing in good returns to the ship owner. By taking the time to gain in-depth knowledge of the customer's needs, one can ensure optimal vessel performance by upgrading the right hardware and software systems.

"India's trade has tripled in the last 10 years," points out Capt Kapil Kekre, Advisor – Commercial to the Indian National Shipowners' Association (INSA). "Unfortunately, Indian ships carry less than 9% of India's international cargo and there is lot of scope for growth with the government's support. There is tremendous scope to build up tonnage especially to carry crude oil. Our own need for oil transportation over longer distances exists unlike other countries. Advance planning of voyages for carrying crude oil will help both the ship owners as well as the consumers. Thus, there is good opportunity for oil transportation that needs to be planned in advance and India should not lose out on this opportunity."

India is the fourth largest steel producer in the world and is expected to climb to the second place soon. CRISIL Research estimates domestic steel demand growth at 6-7 per cent CAGR between 2013-14 and 2017-18 compared with around 9 per cent CAGR over the last decade. This rate of increase will see steel demand in India touching 93-94 million tonnes by 2017-18. Since incremental demand for finished steel is expected to be considerably lower the demand-supply gap will widen, when majority of the planned capacities are scheduled to be commissioned (16 million tonnes in 2013-14 and 8 million tonnes in 2015-16). "The steel industry is facing raw material and water scarcity," informed P. Raychaudhury, Executive Director of Steel Authority of India. "Land issues, environmental protection etc., could pose a problem. Besides, coking coal available in India is not suitable for steel production. The demand is expected to go up by 2025 – 26, factoring an average GDP growth of 7%. But these are issues of little consequence considering the immense potential steel offers to the Indian shipping. A turnaround is not impossible and very much in the hands of stakeholders if they play the cards right.

Posted by Joseph Fonseca, January 1, 2014 on MaritimeProfessional.com

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Upgraded Maneuvering, Seakeeping Basin



Birds eye view of the wavemaker in action at the ribbon cutting ceremony marking the opening of Carderock's upgraded Maneuvering & Seakeeping (MASK) basin, Dec. 19.

Naval Surface Warfare Center (NSWC) Carderock Division marked the opening of the maneuvering and seakeeping basin (MASK) facility, with a ribbon cutting ceremony last month. The 360 x 240 ft. facility holds approximately 12 million gallons of water and is used to evaluate the maneuverability, stability and control of scale models. Carderock built the MASK in 1962 to test the scale model performance of ships, platforms and moored systems in realistic sea conditions. During the six-year upgrade, Carderock replaced the original pneumatic wave-making system in the MASK with 216 individually-controlled electro-mechanical wave-boards that significantly enhance the capability to create a precise wave environment. The new finger-style technology, demonstrated during the ceremony, provides the Navy with the capability to create extreme, realistic ocean environments inside of the facility. Scale models up to 30 feet in length can be tested.

WSF: One Step Closer to LNG Propulsion

After three years of study, Washington State Ferries (WSF) has a plan to convert six Issaquah Class vessels to run on LNG, and a proposal was officially submitted to the U.S. Coast Guard on Nov. 18 in a formal letter of intent (LOI) and waterways suitability assessment (WSA). The submission of the LOI and WSA marks the official starting point of the Coast Guard's review process. WSF expects the Coast Guard to issue a finding regarding the LNG conversion proposal in 2014. The average Issaquah Class vessel carries up to 124 cars and 1,200 passengers. Converting the fuel systems from ultra-low sulfur diesel to LNG will reduce emissions according to WSDOT's Air Emissions Model, including 89% reduction in particulate matter, 61% reduction in nitrous oxide, 28% reduction in carbon dioxide and 59% reduction in sulfur dioxide.

KMP Acquires Tankers

Kinder Morgan Energy Partners, L.P. entered into an agreement to acquire American Petroleum Tankers (APT) and State Class Tankers (SCT) from affiliates of The Blackstone Group and Cerberus Capital Management for \$962m in cash.

APT and SCT are engaged in the Jones Act tanker trade. APT's fleet consists of five medium range Jones Act qualified product tankers, each with 330,000 barrels of cargo capacity, with an average vessel age of four years.

SCT has commissioned the construc-

tion of four medium range Jones Act qualified product tankers, each with 330,000 barrels of cargo capacity. The vessels are scheduled to be delivered in 2015 and 2016 and are being built in San Diego at General Dynamics' NASSCO shipyard.



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Floating Production

The number of floating production units grew 5% in 2013. Here we examine the global market and future opportunities.



BY JIM MCCAUL, IMA

Currently, there are 319 oil/gas floating production units are now in service, on order or available for reuse on another field. FPSOs account for 65% of the existing systems, 75% of systems on order. Another 24 floating LNG processing systems are in service or on order. Liquefaction floaters account for 13%, regasification floaters 87%. No liquefaction floaters are yet in service – all 3 are on order.

In addition, 100 floating storage units are in service, on order or available. (See Figure 1)

Growing Number of Floating Production Units

The number of floating production systems has grown at a strong pace over the past decade. Aside from a tapering off in 2009/10, year to year growth has been in the range of 5 to 12% during this period.

Ten years ago 203 oil/gas production

floaters and no LNG processing units were in service or on order. Five years ago there were 269 oil/gas units and 6 LNG processing units. By the beginning of 2013 there were 306 oil/gas production floaters and 20 LNG processing floaters. Now there are 319 and 24 units respectively.

Overall, the number of units grew 5% during the past year, 69% over the past decade. (See Figure 2)

Redeployment Prospects for Available FPSOs

Eighteen FPSOs have stopped producing and are available for redeployment. The latest to join the inventory of idle FPSOs are Kuito and Brasil, VLCC-size units owned by SBM. The lease on each concluded at end 2013. They are to be decommissioned.

Some of the 18 available FPSOs are actively for sale. Some are being re-

tained for use on another field controlled by the current owner. All require modification and upgrade to be reused. Depending on the new field, the cost to modify the processing plant, mooring system and refurbish the unit can easily exceed \$100 million.

Ten of the available units are single hull, five are double hull and three have double sides or double bottom. Single hull units are less marketable than double hull units.

Details for available FPSOs can be found at www.imastudies.com.

Many of these available FPSOs (particularly single hull units) will not find another field. This is behind the decision of SBM in December to write down the book value of the FPSO Falcon. Explaining its decision to take a special charge of \$55 million on Falcon (marketed since 2009) and Alba (a tanker acquired in 2009 as a conversion hull), SBM said the “estimated recover-

able amount under current market conditions is considerably lower than the carrying value.”

To place the issue in perspective, 24 FPSOs have been redeployed over the past ten years – accounting for ~20% of the FPSO contracts during this time period. Assuming this redeployment pace continues, more than 7 years will be needed to clear the inventory of FPSOs now looking for a field contract. And this assumes a project match can be found for all units (which will not happen) and no further units come off field over the next several years (which will happen).

Bottom line is there are far too many available FPSOs for the market to absorb. This situation should cause lenders to look very carefully at residual values in FPSO financings. Anything more than scrap value may be optimistic, even for FPSOs built on new or young hulls.

Figure 1

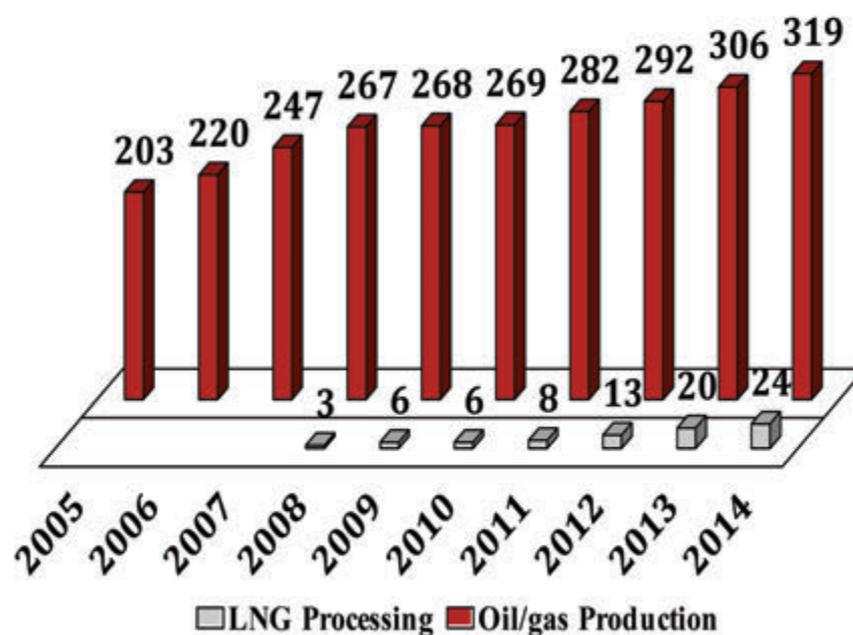
Number of Floating Production and Storage Units In Service, On Order or Available for Reuse

(as of 1 January 2014)

	Total	Active	On Order	Available
Oil/Gas Processing				
FPSO	211	156	37	18
Production Barge	9	8	1	0
Production Semi	48	40	4	4
Production Spar	23	18	4	1
TLP	28	24	4	0
Total	319	246	50	23
LNG Processing				
FLNG	3	0	3	0
FSRU	21	9	12	0
Storage Systems				
FSO	100	89	10	1

Figure 2

Number of Floating Production Units at Beginning Each Year (in service, on order and available)



Orders in 2013

Orders for 22 production floaters with a total contract value of ~\$17 billion were placed in 2013. The orders include 11 FPSOs, 2 TLPs, 1 Spar, 1 Barge, 6 FSRUs and 1 MOPU. A 12th FPSO (Rosebank) was ordered but the contract was suspended pending review.

Details for orders in 2013 are available at www.imastudies.com.

The market seemed to hit resistance in 2013. FPSO orders in particular were relatively weak. Over the past ten years an average of 13.6 FPSOs have been ordered annually. Only 11 FPSO contracts were placed in 2013.

Resistance seems to be in the supply chain.

Construction costs have been increasing, local content targets have been creating bottlenecks and access to financing has been constrained. Oil company investment resources also have been shifting to shale oil and gas project development.

We see supply chain resistance and competition for investment resources from shale oil/gas projects continuing

over the near term. Our new five year forecast of production floater orders reflects this – and our forecast of orders between 2014 and 2018 is down significantly as a result.

Backlog of Planned Floater Projects

234 floating production projects are in various stages of planning as of beginning January. Of these, around 55% involve an FPSO, 15% another type

Breakdown of Planned Projects by Type Production System Required (as of 1 January 2014)

Type System Required	Number of Projects
FPSO	132
OTHER FPS	37
FLNG	28
FSRU	25
FSO	12
Total	234

oil/gas production floater, 25% liquefaction or regasification floater and 5% storage/offloading floater.

This large backlog of projects in the planning cycle is further indication that project investment opportunity is not the cause of the recent lethargic order pace.

There are plenty of floater projects at or near the final investment decision stage. The decision to move to the contracting stage has been slowed by supply chain resistance and better uses of investment resources.

Where Planned Projects are Located

Brazil and Africa are the major locations of floating production projects in the visible planning stage. We are tracking 50 projects in each region – 43% of the visible planned floating production projects worldwide.

Brazil clearly leads in terms of production floater requirements – as several Brazilian projects will require multiple production units. Libra could require 12 production units, Jupiter 6 units, Lula 2+ units.

When these large projects are taken

into account, Brazil represents almost 30% of visible floating production system orders in the planning stage.

The Author

IMA provides market analysis and strategic planning advice in the marine and offshore sectors. Over 40 years we have performed more than 350 business consulting assignments for 170+ clients in 40+ countries. We have assisted numerous shipbuilders, ship repair yards and manufacturers in forming a plan of action to penetrate the offshore market. Our assignments have included advice on acquiring an FPSO contractor, forming an alliance to bid for large FPSO contracts, satisfying local content requirements and targeting unmet requirements through technology development.

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Shell Floats Hull for World's Largest Floating Facility

The 488-m-long-hull of Shell's Prelude floating liquefied natural gas (FLNG) facility has been floated out of the dry dock at the Samsung Heavy In-

dustries (SHI) yard in Geoje, South Korea, where the facility is currently under construction. Prelude will unlock new energy resources offshore and produce

approximately 3.6 million metric tons of liquefied natural gas (LNG) per annum (mtpa) to meet growing demand, 1.3 mtpa of condensate and 0.4 mtpa of



Photo: Shell



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Once complete, Prelude FLNG will be the largest floating facility ever built, longer than four soccer fields laid end to end and longer than the Empire State Building is tall. The FLNG facility will weigh more than 600,000 metric tons fully loaded, displacing the same amount of water as six of the world's largest aircraft carriers.

"Making FLNG a reality is no simple feat," said Matthias Bichsel, Shell Projects & Technology Director. "A project of this complexity – both in size and ingenuity – harnesses the best of engineering, design, manufacturing and supply chain expertise from around the world. Getting to this stage of construction, given that we only cut the first steel a year ago, is down to the expert team we have ensuring that the project's critical dimensions of safety, quality, cost and schedule are delivered." FLNG will allow Shell to produce natural gas at sea, turn it into liquefied natural gas and then transfer it directly to the ships that will transport it to customers. It will enable the development of gas resources ranging from clusters of smaller more remote fields to potentially larger fields via multiple facilities where, for a range of reasons, an onshore development is not viable. This can mean faster, cheaper, more flexible development and deployment strategies for resources that were previously uneconomic, or constrained by technical or other risks. Prelude FLNG is the first deployment of Shell's FLNG technology and will operate in a remote basin around 475 km north-east of Broome, Western Australia for 25 years. The facility will remain onsite during all weather events, having been designed to withstand a category 5 cyclone.



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R/V Point Sur CASE STUDY

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Voith Schneider Propulsor

The Maritime Research Institute Netherlands undertakes the first-ever investigation into VSP-induced hull-pressure fluctuations



BY RIEN DE MEIJ, MARIN

For the first time an investigation into Voith Schneider Propulsor-induced hull-pressure fluctuations has been carried out. This investigation was part of a New York City Department of Transportation (NYCDOT) study to retrofit the Molinari Class Ferries, which operate to the world-renowned Staten Island, with Voith Schneider Propulsion (VSP).

One of the objectives was to investigate the modification in terms of energy efficiency.

The Staten Island Ferry carries more than 21 million passengers annually between Staten Island and Lower Manhat-

tan. The three sister ships, Guy V. Molinari, Sen. John J. Marchi and Spirit of America, can carry 4,427 passengers and have a crew of 16. The double-ended ferries have a propeller gondola, conventional propulsion system and one center skeg at both ends.

The study started by adapting the current hull lines for a propulsion arrangement consisting of four VSP26R5 units. After the lines were optimized, a 7.3 m long ship model was manufactured and a model test program for the optimization of the Voith Schneider propulsor arrangement was carried out in the Shallow Water Towing Tank.

The goal of these tests was to determine the best propulsor configuration, which requires the lowest shaft power at design speed, focusing on the best direction of rotation, thrust vector direction and power distribution between the fore and aft VSP units.

With the selected configuration, propulsor cavitation observations and measurements of the propulsor-induced hull pressure fluctuations were carried out in the Depressurized Wave Basin. Cavitation observations and measurements were performed on the portside aft propulsor, with all four VSPs active.

It was concluded that the level of the

measured hull excitation caused by the two active aft VSPs is low.

The highest levels are measured on the center line of the ship, which is due to interaction between the portside and starboard VSP units.

This observation resulted in recommendations for a minimum spacing between the two aft propulsors.

The main advantage of the tested configuration, compared to the existing set up, is the increased maneuverability of the vessel.

These results supported the NYCDOT in its decision-making for future developments of the Staten Island Ferry.

MARIN's Depressurized Wave Basin was the site for a test of the best propulsor configuration for the Staten Island ferries.



Crowley Orders LNG-Powered ConRo



(Photo: Crowley)

Crowley announced plans late last year to effectively extend its legacy of shipping in the U.S. ordering LNG-powered combination container – Roll-On/Roll-Off (ConRo) ships. Crowley signed a contract with VT Halter Marine to build two of the world’s first LNG-powered ConRo ships, ships that are designed to travel at speeds up to 22 knots and carry containers ranging in size from 20-foot standard to 53-foot-long, 102-inch-wide, high-capacity units, along with hundreds of vehicles in enclosed, weather-tight car decking.

The Commitment Class, Jones Act ships, scheduled for delivery in second and fourth quarter 2017, will replace Crowley’s towed triple-deck barge fleet, which has served the trade since the early 1970s. The new ships will be named El Coquí (ko-kee) and Taíno (tahy-noh). El Coquí is the common name for several species of small frogs that are native to Puerto Rico, and Taíno were native Puerto Ricans who lived off the land and who had great appreciation and respect for their environment.

“Our investment in these new ships – the first of their kind in the world – is significant on so many fronts,” said Tom Crowley, company chairman and CEO. “We named them the Commitment Class of ships because they represent our commitment to our customers and the people of Puerto Rico whom we will continue to serve for years to come with the superior service they expect from Crowley.”

“Second, it reflects Crowley’s commitment to EcoStewardship in that we are developing and using best-available technology that allows for improved emissions, advanced ballast water management and alternative fuel selection,” he said. “And lastly, our actions are clear evidence of our commitment to the U.S. maritime industry and the Jones Act. American built, crewed and owned ensures U.S. shipbuilding capabilities, skilled U.S. merchant seamen, and available domestic vessel tonnage, all of which are of vital importance to our national defense.”

The vessel design has been brought to life by Wärstila Ship Design in conjunction with Crowley subsidiary Jensen Maritime, a Seattle-based naval architecture and marine engineering firm. The new double-hulled ConRo ships have been designed to maximize the carriage of 102-inch-wide containers, which offer the most cubic cargo capacity in the trade. The ships will be 219.5 meters long, 32.3 meters wide, have a deep draft of 10 meters, and an approximate deadweight capacity of 26,500 metric tonnes. Cargo capacity will be approximately 2,400 TEUs, with additional space for nearly 400 vehicles. The main propulsion and auxiliary engines will be fueled with LNG.

“Safety and environmental protection were also at the forefront of our design process,” said Johan Sperling, Jensen vice present. “For example, one of the superior safety systems we engineered included a feature that places all fuel tanks behind double-wall voids with no exposure to the environment.” Additionally, Sperling said the ships will meet or exceed all regulatory requirements and have the CLEAN notation, which requires limitation of operational emissions and discharges, as well as the Green Passport, both issued by classification society Det Norske Veritas (DNV).

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Submarine Maneuvering Simulations

The numerical simulation of submarine maneuvering is a challenging problem that has only recently been addressed by advances in Computational Fluid Dynamics (CFD) software.

In this article, we demonstrate how CD-adapco's simulation technology can be applied to accurately predict how a submarine's motion is driven by hydrodynamic forces, and compare numerical results with experimental data.

The physics-based simulation of a full-scale submarine performing maneuvers is an expensive proposition relative to many CFD applications. This is principally due to the wide range of length and timescales that must be resolved in order to predict accurately the flow around the submarine hull. An additional challenge involves representing the full geometric complexity of an appended submarine and propulsion unit. The length scales range from the very thin boundary layer to the full length of the submarine. The time scales range from a fraction of the propeller blade passing period to the total duration of a maneuver - more if several maneuvers are combined in a single simulation. These disparities in scale lead to very large computational meshes and simulation times

that, until recently, have challenged the state-of-the-art in computational resources.

The submarine in question is propelled by a three-bladed rotating propeller. Maneuvers were executed through the application of rudder and stern planes, and controlled by varying the position of these control surfaces in response to the submarine motion predicted by the simulation.

Numerical method

During the course of a maneuver, the submarine changes its position and orientation continuously in time in response to the pressure field generated by application of the control surfaces. The simulation of a maneuver requires the coupled solution of equations of motion of the rigid body (in six degrees of freedom) with unsteady Reynolds-averaged Navier-Stokes equations (URANS). The URANS solver uses a fully-implicit iterative time-integration scheme. It computes the flow field around the body first and

integrates the computed shear stresses and pressure distribution on the surface of the body, providing the hydrodynamic forces and moments acting on it. The equations of motion are then solved in order to obtain instantaneous displacements and rotations.

This information is used to update the computational mesh which is rotated and translated as a rigid body with respect to an inertial frame of reference.

The integration and rigid body mesh movement are performed automatically using CD-adapco's Dynamic Fluid-Body Interaction (DFBI) model at each iteration. By converging this iteration process at each time step, the trajectory of the body is obtained. The implicit nature of the method (in which equations of motion are calculated simultaneously with the flow field) is important to ensure the overall stability of the simulation without using an impractically small time step.

Computational mesh

The discretized domain consisted of 3 million computational cells, including layers of prismatic cells next to the walls, which was prescribed in order to capture the near wall boundary layer. The mesh was automatically constructed using CD-adapco's automatic hexahedral meshing methodology: a simple background hexahedral mesh was created within the boundaries of the computational domain, overlapping the geometry of the submarine. Any hexahedral cells that were located completely inside the body or the extruded layer were deleted, while those that intersect this layer were trimmed so that any overlaps were removed. Finally, the mesh was locally refined in regions where large flow variations were expected.

The propeller was enclosed inside the cylindrical



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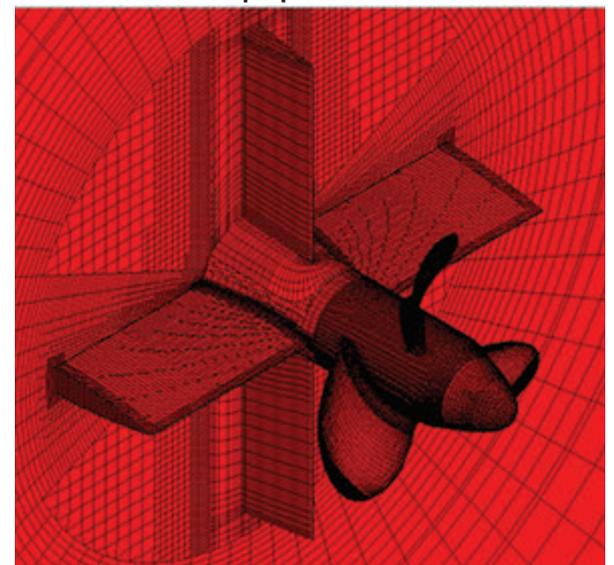
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Mesh resolution on propeller and control surfaces.



mesh block that rotates about the propeller axis, with a sliding interface between the cylindrical mesh block and the surrounding fluid domain. Rudder control surface motions were accounted for by using mesh distortion. As the rudder is deflected to a new position at each time step, the mesh in this structured block is locally deformed and smoothed. By employing this procedure only a single computational mesh had to be generated for the entire simulation - rather than creating several meshes for various rudder positions and interpolating between them. Because the rudder mesh motion was integrated into the solution process, less user input was required.

Maneuvering simulations

For the case of constant heading and large depth, the submarine is assumed to be traveling through an infinite domain of stagnant water. The motion of the submarine is controlled by a 3-bladed propeller, rudder and stern planes. The entire computational mesh including the submarine body is assumed to be moving with the body without any deformation. The flow field computations were performed in the inertial frame of reference, which makes the specification of boundary conditions easier. Since the body moves through infinite volume of stagnant water, the velocity specified at the far field boundaries of the computational domain is zero.

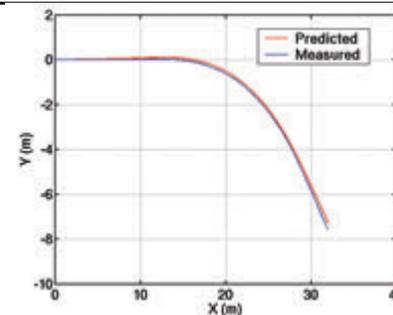
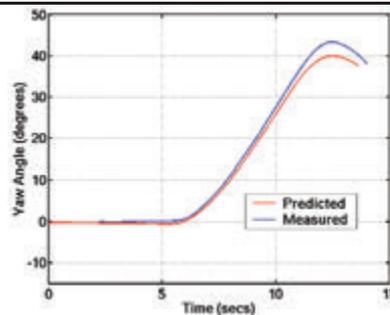
For the case of horizontal overshoot maneuvering, the top and bottom rudder surfaces were actuated to initiate the maneuver. In the experiment, the rudder was first deflected to 10 degrees and held in this position until the body reached a yaw angle of 30 degrees. The rudder was then reversed. Figure 2 shows predicted pressure distribution on walls and streamlines behind propeller. Predicted time history of roll, pitch and yaw angles show good qualitative agreement with measurements, see Figures 3 and 4.

Conclusions

Good qualitative agreement has been shown between predictions and measurements for the studied maneuvers. The results obtained demonstrate the suitability of the present methodology for the simulation of submarine maneuvers and motion of similar underwater autonomous vehicles. CFD simulation tools will help engineers to optimize the design and analysis process and improve the maneuvering capabilities, survivability and cost of submarines.

Chart Left: Figure 1
Comparison of predicted yaw angle with measurements for horizontal overshoot maneuver.

Chart Right: Figure 2
Comparison of predicted in-plane trajectory of body center-of-gravity with measurements for horizontal overshoot maneuver.



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Sonar & The USCG

The USCG Plans to Widen its use of the subsea surveillance technology. The question is: is the investment warranted?



BY DENNIS L. BRYANT

The US Coast Guard is planning to widely use sonar to support its maritime security and marine environmental protection missions. The agency currently has limited capability to detect objects below the water's surface and relies on others (such as the US Navy or the commercial sector) when such detection is needed.

Sonar is an acronym for Sound Navigation and Ranging. The principle is similar to radar, used in the atmosphere. While radar uses radio waves, sonar relies on sound waves, which propagate much better than radio waves do in water. There are two major types of sonar – passive and active. Passive sonar only listens, detecting sounds made by vessels, persons, fish, and other things in the water, or the water itself (i.e., waves). Active sonar transmits a sound signal that then is reflected off an object within range and returns to the transducer. Measuring the time difference between transmission and reception provides an indication of the range of the target. Measuring the angle of the received signal provides an indication of the direction of the target.

Sonar transmissions are made in a variety of frequencies, depending upon the intended purpose. Low frequency transmissions have the advantage of very long range. On the other hand, these sonar transmissions can only detect very large objects and with minimal accuracy relative to range or bearing. Mid-frequency transmissions have a range measured in miles and are able to detect objects such as submarines and large whales with good accuracy relative to range and bearing. This is the type of sonar utilized almost exclusively by the military, having virtually no commercial application. High frequency and ultra-high frequency sonar transmissions have a short range, but are able to detect small objects. This type of sonar is utilized commercially and is the type under consideration by the Coast Guard.

A civilian contractor steadies a M18 Mod 2 Kingfish Unmanned Underwater Vehicle (UUV) as it is lifted with a crane onto the deck of an 11-meter rigid-hull inflatable boat. The Kingfish uses side scan sonar to search and discover objects of interest. This marks the first time these UUVs have been added to mine countermeasure operations in the U.S. 5th Fleet area of responsibility.



U.S. Navy photo by Mass Communication Specialist 2nd Class Blake Midnight/Released

Sonar in the form of echo-sounders has been utilized for years by ships to determine the depth of water under the keel. A signal is transmitted straight down. The signal reflects back when it hits the seabed. The time difference provides the operator with an accurate measure of the depth. More sensitive versions are in use as fish finders. These devices differentiate between the strong signal generated by reflections off the seabed and weaker signals generated by reflections off objects in the water column. Sophisticated versions provide more detailed information, allowing determination of the size of the fish school, etc. Sonar transmitters can even be attached to trawl nets, allowing for better placement of the nets relative to the target species.

Stronger and more sophisticated sonar can be used to penetrate the upper layer of the seafloor, allowing determination

of characteristics such as bottom type (i.e., mud, sand, gravel) and depth to hard strata. This information can prove valuable for determination of anchorage grounds and for laying of submarine cables and pipelines.

Sonar is used commercially to examine hulls, pilings, and underwater structures such as offshore platforms. This type of sonar is sometimes handheld by a diver or mounted on the end of a pole. Increasingly, it is mounted on remotely operated vehicles (ROVs) or on unmanned underwater vehicles (UUVs). ROVs have greater capabilities regarding power and data transmission, since they are tethered to a shore location or to a manned vessel. UUVs have less power and data transmission capabilities, but can get into tighter spaces and have longer potential range.

Diver detection sonar is used for detection of divers and submerged swimmer

delivery systems, such as those used in several of the James Bond movies. This sonar provides detection, classification, and tracking information on human underwater incursions that could endanger lives or property. It is being employed around some marine facilities worldwide, but not yet to a great extent.

Limpet mine imaging sonar is used for detection of small underwater objects. Originally used for detection of limpet mines potentially attached to the hulls of ships, it can now be used to detect caches of drugs and other contraband. This type of sonar may also be used to detect hull damage and underwater structural damage.

The Coast Guard proposes to utilize commercially-available sonar equipment to broaden its capability to locate, image, and classify submerged and underwater targets of interest (TOIs). This would include such things as terrorist

attacks and environmental threats (i.e., pipeline leaks). This usage is aimed at protecting human safety, preventing property damage, and protecting the marine environment.

Use of the sonar by the Coast Guard is envisioned as of short duration and within a limited geographic area. For example, it might be used to protect a high-level dignitary during a visit to a waterfront facility. Alternatively, it could be used to examine an offshore facility from which oil is emanating to determine the location and extent of damage or other cause of the discharge so that it can be promptly remedied.

At least for now, the Coast Guard intends to utilize commercially-available sonar with frequencies above 50 kHz. As a result the capabilities, limitations, and potential adverse effects of equipment are reasonably well-known. This, combined with the short duration and limited geographic scope of the sonar use, will serve to minimize any environmental impact.

Further, the Coast Guard proposes to consult with other agencies, such as the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) prior to each planned use in all but emergency situations to determine whether there are particular environmental concerns that should be considered, such as endangered species in the vicinity. The Coast Guard also plans to utilize observers to monitor usage and identify any unexpected risks, such as boaters or swimmers approaching the area.

The sonar systems under consideration by the Coast Guard operate within the hearing range of toothed whales (150-180 kHz) and pinnipeds (75 Hz – 75 kHz). Some clupeid fish (i.e., herring, shad, sardine, menhaden) may also react to these sonar transmissions. Minor adverse impacts could also occur in the unlikely situation if a ROV or UUV were to touch down on seagrass, coral, or sediment. The use of low-power HF and UHF sonar (as opposed to high-power MF military sonar) minimizes adverse environmental impact by reducing the area ensounded by the equipment.

The purpose of the Coast Guard proposal is to broaden the agency's capability to locate and classify underwater threats and other targets of interest and to more safely and effectively accomplish the Coast Guard missions. Targets of interest could include combat swimmers or divers; explosives or other offensive devices that could be delivered to underwater hulls, piers, or other shore structures; and objects that have become submerged as a result of natu-

ral or man-made disaster and have the potential to interrupt maritime transportation, trade, commerce, recreational boating, or other maritime activities. The use of HF (50-999 kHz) and UHF (1,000 kHz and higher) active sonar technology would provide operational commanders with enhanced ability to support maritime security, marine safe-

ty, and maritime stewardship with minimal impact on the environment.

The likelihood of a terrorist attack by divers in US waters is extremely low. More likely are suspicious incidents that require prompt investigation and response, similar to the various private pilots that negligently stray into restricted airspace around the White

House. It is expected that the Coast Guard will more frequently use sonar to investigate suspected contraband stashes affixed to the underwater hull of incoming vessels, marine casualties, hazards to navigation, and environmental threats. Used properly, sonar can provide the Coast Guard with important new capabilities.

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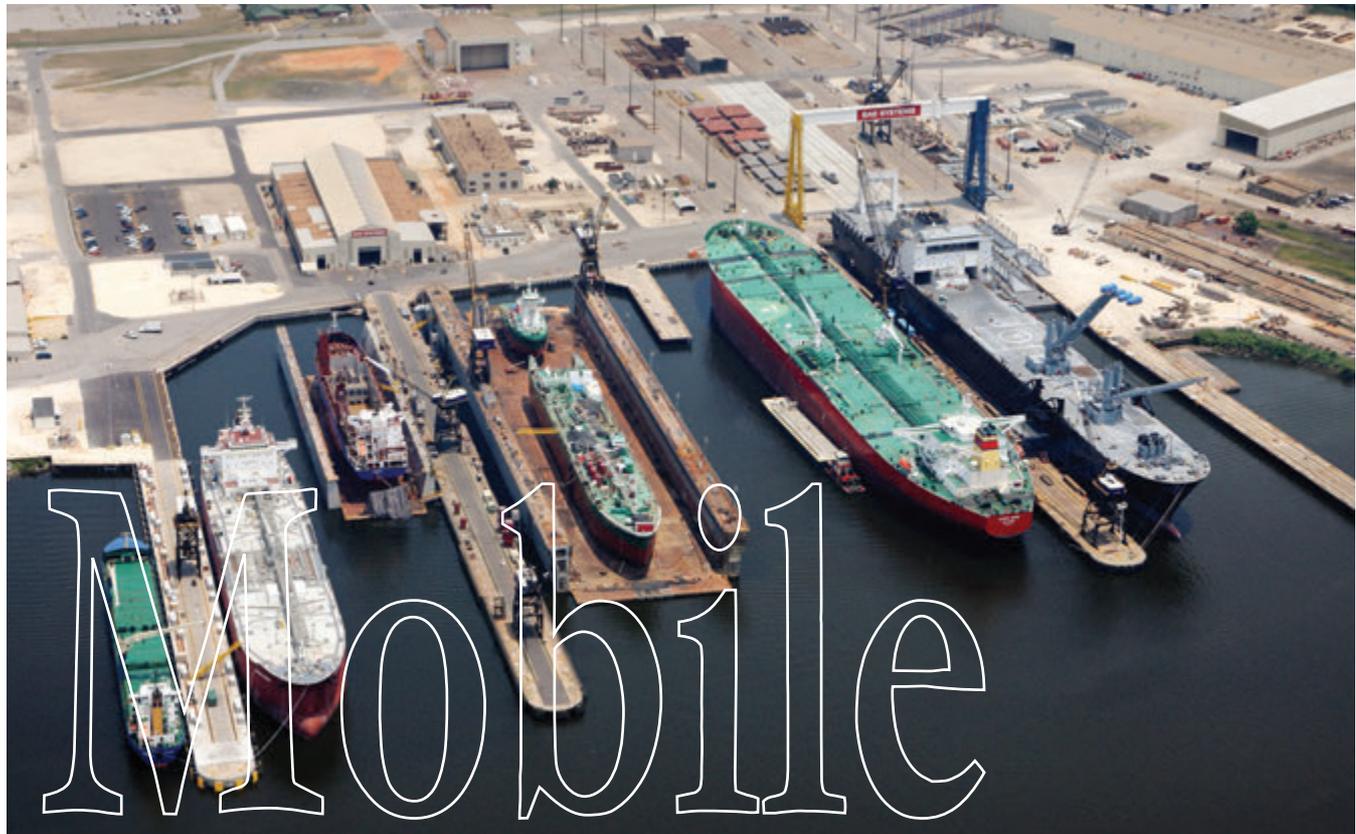


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A Rebirth in

Timing, they say, is everything. Cliché, for sure, but BAE System's strategic decision a few years ago to buy, invest and reinvigorate newbuild and repair operations in Mobile, Alabama, seems poised to pay off handsomely as the U.S. maritime market faces a historic rebound.

By Greg Trauthwein

As the energy profile of the United States changes, so too do the prospects for its commercial shipbuilding and repair sector, which virtually overnight has enjoyed an influx of new construction orders and general maritime business. The ATB and tank barge markets were long-thought dead, but with vast new sums of oil and gas in both the offshore and land-based being produced, so too comes the need to transport the goods to refinery and market, as well as the need to feed the inland energy production frenzy born from hydraulic fracturing, or fracking.

Shipbuilding and repair in Mobile, Alabama is certainly not novel, as Mobile holds a long and proud tradition. While rich in history, this is not a story of looking back, rather forward, starting three years ago when BAE Systems took over the yard in Mobile and enacted a revitalization of a storied shipbuilding and repair facility that continues in earnest today.

"The main batteries of our business are the capital investment in piers, dry docks and cranes," said Vic Rhoades, Director, BAE Systems' Mobile, Alabama shipyard. Since the acquisition in July 2010 we have invested nearly \$30m in capital improvements, and anticipate spending \$10m over the next 24 months.

Upgrading the new construction facilities with robotics and automation, and investing in people has been one of our big successes."

Repair & Conversion Coexist

"We have two business approaches here: one is repair and conversion and the other is new construction," said Rhoades. "Both co-exist equally in the yard. Our repair business is 70% commercial; 30% other government, specifically MSC, MarAd and Coast Guard," as well as others. Predictably, the repair business is dominated by domestic Jones Act carriers, with about 15% of the shipyard's repair business coming from international carriers.

But as anyone in the ship repair and conversion business can attest, it is always a delicate balancing act to plan workload on the repair side of the house: when times are bad, owners tend to require bare bones work to keep ships in good regulatory order. When business is booming, owners want to keep assets in the market earning money, not sitting in drydock for maintenance and repair.

In assessing the impact of the global economic meltdown of 2008 and lingering tough economy through 2012, Rhoades offered this: "As an industry, it made us stronger. Smaller players and those without the financial wherewithal disappeared, and those that remained came back stronger. This business is not for the weak at heart: it's cyclical, it's feast or famine, difficult to level load; today we don't have enough people, tomorrow I don't have enough work due to the operators charter and repair schedules."

If running an efficient and effective repair yard were not difficult enough, running newbuild and repair opera-

tions in the same facility is traditionally a difficult act, too. "There is a reason why companies don't do both ... and that's because it is very difficult to do," Rhoades succinctly summarized. "I am not sure we have a secret. It's two different mind-sets (on both accounts). On the repair side, it's about fixing what is pre-existing (similar to taking your car to a mechanic), and it doesn't necessarily have to be brand new when it is done," Rhoades said. "The work can be spec'd to that level but the owners normally decline due to cost. Owners want quality and timely repairs. On the new-build side, everything is fit and finish, prim and proper ... it is a higher level of completion. It's like buying a brand new car. It is difficult to make the transition from one side to the other. It's a different mindset of how you go about your day's work."

While Rhoades maintains there is no secret to success, he does admit that the cornerstone to the company's future lies not necessarily in machinery or space, rather people.

"The primary strength of our shipyard is without question our highly skilled workforce. Our employees commitment and professionalism are what makes us successful. The labor market on the Gulf Coast is very challenging. We compete daily with Tier 1, 2 and 3 yards for skilled labor. There isn't enough qualified personnel to go around. We're currently bringing in people from out of town. Long-term we're working with the state to establish educational grants, develop an apprenticeship program and



Balancing newbuild and repair in the same shipyard is the task of Gene Caldwell, Director of New Construction (left) and Vic Rhoades, Director, BAE Systems' Mobile, Alabama shipyard.

trying to focus the school system on reinvigorating the blue collar workforce at a junior high level.”

One key to finding and retaining good people is maintaining a steady log of business, and with the addition of the new construction business BAE Systems aims to do just that. The formula to date appears successful: when Rhoades came onboard three years ago when BAE Systems acquired the yard, the workforce was just shy of 500; today the workforce is 850 full time and 200 temporary employees.

New Emphasis on Newbuild

While BAE Systems continues to make a number of tangible investments in its Mobile facility, perhaps the most significant was the resurrection of its new construction business, bringing back Gene Caldwell as its director of new construction. Caldwell is well suited for the task at hand, given the ripe markets before him and the high level of investment from BAE Systems.

“I still see the PSV and oil and the energy circuit driving business,” Caldwell said. “The Macondo incident effectively drained everything in the Gulf, so a lot of companies are in rebuilding mode.” Newbuild targets for Caldwell and his colleagues are numerous, from vessels for the transportation of crude oil, including ATBs and tankers. Also, the market for multi-purpose vessels, well intervention and well ops, as well as ROV support could be strong, according to Caldwell. “We thought the ATB building was done

for awhile, but today we are fielding quite a few inquiries. (In fact) our new-build sweet spot is the ATB market,” said Caldwell. “ATBs based on our history of building them here; PSVs fall off nicely from there, and then the specialty vessels, with our diversity of labor talent.”

While the current newbuild orderbook is diverse and impressive, the core revolves around energy, specifically the shale gas boom and its dramatic impact on the business and that of energy transportation in general. “They get it (oil) down to the Gulf of Mexico refineries (from the pipeline) and the refineries can’t handle all of the volume, hence the need for the tankers to transport it to other refineries when it comes out of the pipeline,” said Caldwell.

It is the newbuild side of the business that essentially is “carrying the water” today, as repair business dips as vessels stay in the market working. Current new construction business includes:

- Two dump scows for Great Lakes Dredge & Dock
- Trailing arm dredge for Weeks Marine
- A second Platform Supply Vessel for GulfMark.: The 300-Class DP2 PSVs for Gulfmark were designed by MMC Ship Design and Marine Consulting, Ltd. of Poland and will be based on similar PSV currently under construction for GulfMark abroad. The vessels will be U.S. flagged and will support the anticipated future demand in the Gulf of Mexico offshore market and other areas around the world and will be delivered in 2014.



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Five Minutes With ...

Nils Kristian Berge

Last last year ASRY appointed Nils Kristian Berge acting Chief Executive to succeed Chris Potter. As ASRY is a driving force in the key Middle East ship repair and offshore markets, MR spent some time with Berge for his insights on the ship repair market in general, as well as ASRY specific initiatives for the coming year.

By Greg Trauthwein

You replace Chris Potter, who obviously had a long and notable career. What are the top challenges and advantages going forward?

■ Chris did a great job over his six years as CE of guiding the company to the next level. He was at the helm while ASRY went through a major shift from being ship-centric to being a multi-service yard with a series of diversifications, most importantly the creation of ASRY Offshore Services. He also oversaw a major facilities expansion, and two other diversifications – ASRY Energy and ASRY Consultancy. As I take the company forward, I have a strong foundation that gives ASRY a robust launch pad for its next phase. The challenge going forward is going to be to unify all these new developments into a single cohesive

proposition that simultaneously maximizes all their potential, yet also uses our resources in the most efficient way.

Specifically, where and how is ASRY investing today that is intended to pay dividend in 2014?

■ 2014 will see the introduction of a series of new developments aimed to maintain our position as the go-to yard in the Arabian Gulf for safety and operational excellence. First, the company is going to undergo a corporate re-structuring that will re-organize divisions, departments and responsibilities so as to streamline efficiency and improve cost-effectiveness. This will be rolled out in Q1 of 2014. Second, the company will adopt a new system of accountability which allows us to set targets and measure performance,

through Key Performance Indicators. These improvements will feed into a cycle of continuous improvement for ASRY. We've ended 2013 with some very encouraging developments: the Shipyard of the Year award from *Lloyds List*, our 4000th ship repair, the 50th rig repair, our third straight year of revenue growth, and more.

By market or region, where do you see opportunity in 2014 and beyond?

■ Saudi Arabia is definitely on our growth path. Up until now our Saudi-based rig work has mostly been modest repairs, for example steelwork, leg repairs, pipework repairs, sandblasting and painting. However, we have now opened a Representative office in the Kingdom, so as to quickly and efficiently respond to immediate



repair requirements in Saudi, with major rig repairs still being carried out in our Bahrain facility. The ability to respond with more efficiency is just one of the advantages of having a branch in Saudi Arabia, another advantage being the greater variety of jobs the yard will be exposed to. For example, ASRY has been contracted to install fiber optic cables for a client in Saudi on its offshore rigs, which was an interesting departure from regular repair jobs. ASRY will start with minor repairs and services in Saudi Arabia with all the larger repairs being covered by its Bahrain facility.

By product, where do you see opportunities for ASRY in the next few years.

■ New projects from Saudi Arabia will likely include land rig work, with that being a growth area for the Kingdom, and we are also looking at

small sized new build projects in the region. We have already constructed a fleet of workboats and will be targeted this market more aggressively in 2014. The Floating Power Plants market will continue to be focused on, as we have built two barges for an ASRY-Centrax joint venture product, and are in late stage talks for new contracts. Naturally the new regulations for BWTS and Emissions will gradually become more prevalent in our portfolio, and I expect a significant increase in retrofits of fuel treatment systems in the not too distant future.

When you look at the changing shape of repair in the Gulf region, how do you see ASRY's position in what is becoming a crowded marketplace?

■ ASRY has three unique qualities that separate it from regional yards.

First it has the greatest depth of experience in the region having been operational since 1977. Second our variety of facilities from drydock to floating docks, to slipways, to over 4 km of alongside berth space gives our customers flexibility and choice. We can service any kind of vessel, but more importantly we can service many different types simultaneously. Third, ASRY is very lucky to be located in Bahrain, not just for its prime geographical location, but because of the country's business-friendly policies. Customers are constantly pleased by the speed at which we can import both spare parts and labour to get jobs done ahead of schedule. When days and hours are vital to cost-reduction for our clients, other Middle East countries can get expensive, but Bahrain has the most advanced setup for ensuring quick turnarounds. ASRY has also built up a portfolio of in-house specialist contractors capable of service-

ing all aspects of the repairs, which is unique in the Middle East, and creates a "One stop shop" effect for customers using the yard.

Can you discuss your outlook for the care and maintenance of U.S. Navy ships (and for that matter, U.S. cargo ships) operating in your region?

■ We have a very good relationship with the US Navy, and continue to assist with the fleet maintenance on a regular basis. We are also supporting the other Navy's present in the region which has allowed ASRY to become well established in meeting Navy requirements. This has been an area of growth recently and we expect further positive development. Also, US-Flagged merchant ships as well as US-operated ships are regularly repaired at ASRY and this will continue to be an important market.

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Shipyards gain Strength through Synergies



By William W. “Bill” Crow & Michelle L. Tomaszewski, VSRA

In the U.S. and across the globe, shipyards create solid, long-term economic stability in their regions. Ship construction and repair requires an extraordinary amount of expertise, time and resources. This work is made even more challenging because current economic pressures drive companies to reduce costs wherever possible without hindering production or quality. Having multiple shipyards in a region creates a naturally interdependent, yet highly competitive culture. This is because the industry shares a geographically close environment and has to rely on shared resources to protect common interests even while competing for projects. Shipyards have the potential to create innovative cultures because their master craftsmen have perfected techniques, efficiencies and quality controls that can be passed down to apprentice levels. This frees up the craftsmen’s time to further improve upon existing practices. Competition could impede synergies that would potentially strengthen

the industry as a whole. Even though companies seek competitive advantages, they must maintain a focus on commonalities to ensure collaboration on overall industry expertise and capacity improvements. In Virginia, we have nine shipyards, 250+ companies and more than 40,000 workers working in the industry. The synergies that emerge from interdependent environments can breed efficiency and innovation. Companies in Virginia realize that working together on specific cost-saving projects can benefit the entire industry without diminishing their individual business advantages.

These companies have several examples of collaborative projects that have resulted in identifying key elements that make joint efforts more likely to succeed. For example, ship work is extremely challenging from a safety perspective, and requires a high level of diligence and preventative measures. In Virginia, shipyards have implemented a common Safety Orientation. This provides all workers access to consistent resources that estab-

lish baseline expectations. This reduces costs by eliminating duplicate training, while helping to prevent misunderstandings when projects are performed by multiple companies on the same ship. The ability for an individual shipyard to singularly control their working environments is also complicated by having such a highly fluid workforce. Shipyard workers who have acquired a great deal of expertise over time may work at multiple facilities to accomplish complex jobs. This may cause challenges in the area of quality assurance. To address this issue, the companies collectively created a quality assurance audit program. The program allows all companies to utilize a common system of standards which eliminates the need for multiple audits and allows the yards to collectively monitor where improvements might be made. This audit program provides cost savings for everyone. The success of these two examples involved consistent commitment from dozens of companies.

The following list outlines key ele-

ments identified by these companies that make such joint efforts more likely to succeed.

- 1. Find the point of synergy.** This is the target identified that affects all companies equally without infringing on competitive advantage. Safety and quality mentioned above are examples of common core issues that impact every company in our industry.
- 2. Leadership.** Everyone is invited to the table, but the largest and most relevant companies must believe that addressing a particular point of synergy has benefits for everyone and is worth an investment of their time and resources.
- 3. Neutral Facilitation.** The administration and execution regarding the point of synergy should be facilitated by a neutral party. It is important that no one competitor thinks another one is driving the train to their own advantage. Even though some companies may benefit more than others, or the effort may be more strongly supported by some com-

panies than others, the neutral party takes the role of keeping the focus on what is advantageous to the industry overall. In Virginia, the industry association may serve in this capacity, usually through a committee and staff liaison that gathers inputs to ensure everyone has the opportunity to contribute.

4. Recognition of differences. Inevitably, companies will at times reject part of a proposal because they have a different philosophy, practice or need. These are recognized, but the group continually goes back to keeping the focus on the synergy point and drives the group to a consensus on solutions that do not diminish business autonomy, but employs commonalities.

5. Key Ground Rule: Highest Standard. No matter what individual company practice or expectation exists, the standard for the project is to use the higher level practice to establish the common expectation. This often resolves issues that arise when recognizing differences. For example, some of yards have different safety requirements: While cloth safety shoes are acceptable under federal regulations, companies agree the leather option is better for shipyard environments and should be the one presented in the safety orientation. Although each individual company may enforce that standard differently, they all agree it is the expectation to be taught.

6. Frequent meetings with minimal scheduling changes. Collaboration projects take a lot of attention, focus and man hours. Meeting often with consistency initially is imperative to maintain the flow of discussion and decisions. Always providing thorough notes on decisions and progress is important to keeping the group moving forward. As work

progresses, meeting frequency may be reduced.

7. Implementation. There must always be a few companies that agree to be the first out of the gate in testing and implementing. This provides the opportunity to tweak any issues that arise, as well as to help with promotion and broad

dissemination.

8. Quarterly or annual reviews must be established for the resolution of issues and keeping updates to maintain the integrity and quality of the initiative.

Internationally, the shipbuilding and repair industry is continuously subject

to increased economic pressures, material resource constraint and skilled workforce issues.

A valuable resource would be for an appropriate organization to create a forum where points of synergy could be identified so collaboration efforts can be leveraged.

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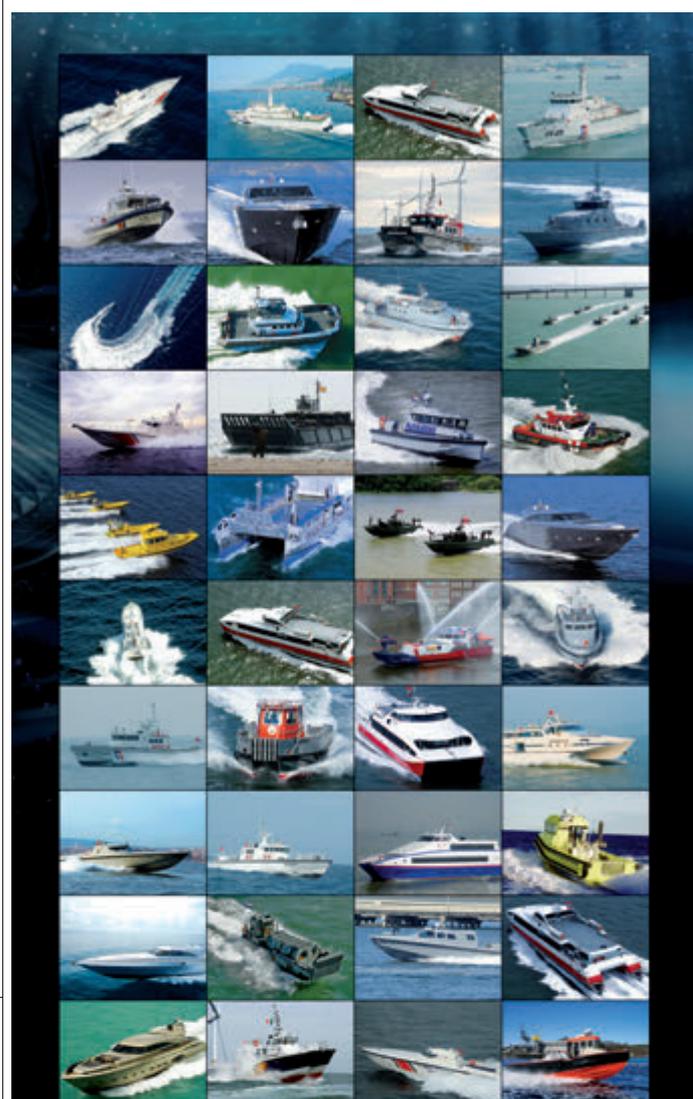
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William W. "Bill" Crow, President of the Virginia Ship Repair Association, is a retired 30 year Navy Surface Warfare Officer heavily involved in fleet maintenance. His last Navy Command assignment included extensive oversight of collaboration efforts regarding the consolidation of Navy-Army installations.

Michelle L. Tomaszewski, Ph.D. has worked with VSRA for nine years developing new initiatives. She has 20 years of experience facilitating public-private partnerships in workforce and economic development for maritime and manufacturing industries.

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MULTI-MISSION, DUAL DESIGN, SINGLE FOCUS

Littoral Combat Ship

By Greg Trauthwein

Last month marked the launch of two new Littoral Combat Ships: Milwaukee (LCS 5) launched by Marinette Marine into the icy Menominee River; and Jackson (LCS 6) launched by Austal into the far warmer waters found off of southern Alabama. While the two LCS variants and shipyard climates are a world apart, this innovative U.S. Navy ship production program has the common goal of fortifying U.S. defense interests while spurring investment in the creation of two state-of-the-art ship production facilities.

The Ships

Mid-December in Marinette, Wis., can be described with one word: cold. December 18, 2013 did not disappoint, as the temperature hovered just above zero for the ceremony to launch LCS 5, Mil-

waukee, into the Menominee River at Marinette Marine.

While the temperature was cold, the mood was not, as hundreds of dignitaries, shipyard workers and their families were on hand as the Lockheed Martin-led industry team commandeered the side launch of Milwaukee into the Menominee River, which required icebreakers to work throughout the morning to create an ice-free space for the ship.

Marinette Marine builds the Freedom design, a semi-planing steel monohull designed to operate close to shore in the littoral, able to provide an array of flexible and easy to switch out mission packages. Milwaukee measures 389 x 57 ft. with a 13.5 ft. draft and full load displacement of approximately 3400 metric tons. Courtesy of its combined diesel and gas turbine power plant driving waterjets, its top speed is greater than

40 knots.

Central to both LCS designs is the reduction of crew size with a corresponding increase in mission flexibility. To this end, Milwaukee's crew of 40 sailors can launch and recover watercraft in conditions to Sea State 4; and launch and recover aircraft in conditions to Sea State 5.

Milwaukee's core self defense suite includes 3D air search radar, rolling airframe missile, medium caliber gun, electro-optical infrared gunfire control system and a decoy launching system.

The ship's sponsor was Mrs. Sylvia M. Panetta, and speakers included Chuck Goddard, President and CEO, Marinette Marine; Joe North, VP, Lockheed Martin; VADM Tom Copeman, USN Commander, Naval Surface Forces, U.S. Pacific Fleet; and the Honorable Sean Stackley, Assistant Secretary of the

Navy, Research, Development and Acquisition.

"With the Milwaukee, Marinette Marine Corporation is now in full serial LCS production, an exciting accomplishment made possible by our skilled and dedicated workforce and our parent company, Fincantieri's, investment of \$100 million," said Goddard.

The U.S. Navy awarded the contract to construct Milwaukee in December 2010. The ship is one of four LCS currently under construction at Marinette Marine. Following christening and launch, Milwaukee will continue to undergo outfitting and testing before delivery to the Navy in 2015.

The Lockheed Martin-led team designed and built USS Freedom (LCS 1) and USS Fort Worth (LCS 3). USS Freedom recently departed from the U.S. 7th Fleet following successful multi-nation-



Photo: Austal / US Navy

The Austal USA facility in Mobile, Alabama, is a state-of-the-art ship production facility, sporting a new dual line Module Manufacturing Facility (not pictured) which is as close to assembly line production as you can get in the maritime industry.

al maritime exercises during her deployment to Southeast Asia. USS Fort Worth has completed her scheduled maintenance period and is currently in her San Diego homeport. Detroit (LCS 7), Little Rock (LCS 9) and Sioux City (LCS 11) are in various stages of construction at MMC. Wichita (LCS 13) and Billings (LCS 15) are in the early stages of material procurement.

If you hopped in your vehicle and drove 1,184 due south (this is not simply writer hyperbole: Marinette, Wis., lies at 87.6306 degrees West; Mobile, Ala., lies at 88.0431 degrees West) you would find yourself at the second production facility for the Littoral Combat Ship program, Austal USA in Mobile, Alabama. Austal USA builds the Independence variant of the LCS, an aluminum construction trimaran that measures 417 ft. with long with a 14.8 ft. draft. It, too, is able to exceed 40 knots, able to launch and recover watercraft in conditions up to Sea State 4; launch and recover aircraft in conditions up to Sea State 5. The Independence variant features a massive mission bay with a volume of 11,000 m, and a range of more than 3,500 nautical miles.

Last month Austal launched the future USS Jackson (LCS 6), unique in that it was the first ship built in Austal's new

59,000-sq. ft. assembly hall, Bay 5. The launch was conducted in a multi-step process involving Berard Transportation's self-propelled modular transporters (SPMTs) to lift the entire 1,600-metric-ton ship almost three feet in the air and moving it 400 feet onto a moored deck barge. The deck barge was then towed a half mile down river to BAE Systems' Southeast Shipyard where it was transferred to BAE's floating dry dock, the Drydock Alabama. The floating dry dock was submerged with Jackson entering the water for the first time. Jackson was then towed back to Austal USA's facility, where it will undergo final outfitting and activation before sea trials and delivery to the Navy.

This vessel is the first of ten 127-meter Independence-variant LCS class ships Austal has been contracted to build for the U.S. Navy as prime contractor subsequent to a \$3.5 billion block buy in 2010.

Austal's teaming partner, General Dynamics Advanced Information Systems (a business unit of General Dynamics) is the ship systems integrator, responsible for the design, integration and testing of the navigation systems, C4I, and aviation systems. The ship's flexible open architecture computing infrastructure (OPEN CI), designed, developed, and integrated by General Dynamics Advanced Infor-

mation Systems, allows "plug and play" integration of both the core systems and the LCS mission modules.

The LCS program is in full swing at Austal USA with four ships currently under construction. Coronado (LCS 4), delivered to the Navy in September, will sail away soon with a commissioning ceremony in Coronado, Cal. in April. Montgomery (LCS 8) is being assembled in Bay 4 in preparation for launch in the spring. Construction is well underway in Austal's Module Manufacturing Facility (MMF) on Gabrielle Giffords (LCS 10) and Omaha (LCS 12). Fabrication on Manchester (LCS 14) is scheduled to begin in early 2014.

The Yards

While the Littoral Combat Ships themselves are testaments to advances in marine technology and modern, flexible weaponry and performance packages, a peak behind the scene at the shipyards tells the real tale, as both Marinette Marine and Austal USA have invested mightily to deliver what are arguably the most modern and efficient ship production facilities in the country.

Austal USA set up shop in Mobile, Ala., in 1998, initially with a single ship-building shed. The evolution of the yard, particularly through the eyes of someone

who saw it first at start-up and then not again until late 2013, is nothing short of stunning. More than a decade and \$300m in investment later, the ship construction facility in Mobile has evolved into a true vessel construction production line, where every piece of material, every piece of equipment, every ship module is well choreographed to minimize unnecessary time and handling, resulting in a straight path from design to delivery.

While the shipyard is vast, still growing and impressive, the centerpiece is the Module Manufacturing Facility (MMF) which sports two side-by-side manufacturing lanes, a straight path linear, highly automated workflow which takes in material from one end and from the sides, moving it down the manufacturing lanes on rolling jigs and producing finished modules on the other end. The aim of the facility is simple enough: improve quality and reduce costs.

"It's simple; it makes sense ... but it's something that no one has ever done," said William C. Pfister, Vice President, Strategic Facilities Development, Austal USA.

While both lanes could be used for the same ship, today Austal uses one lane for the LCS program, the other for the Navy's Joint High Speed Vessel (JHSV) program.



(Credit: PRNews Foto/Lockheed Martin)



(Credit: Greg Trauthwein)

“It (the production flow at Austal) is an evolution of what we envisioned from the start. Everyone knows there is a different expense to do things on land versus in the water. There are certain things that become very expensive to do in the water, but there are certain things that you have to do in the water, such as starting the engines. When you get right down to it this is an assembly line.”

It was only three years ago when ground was broken for Phase 2 of the MMF, the second line of the MMF which doubled existing manufacturing floor space to 700,000 sq. ft and add 30,000 sq. ft. of office space. As completed, the facility is able to build six large aluminum vessels such as the Navy’s LCS and/or JHSV per year.

Assembly Bay 5, from which the future USS Jackson (LCS 6) recently emerged, features 59,000 sq. ft. of floor space, 425 ft. long by 135 ft. wide and is similar to that of the existing Assembly Bays 3 and 4, with the ability to join with the future expansion of Assembly Bay 6.

“I’m so proud of our team, especially when you consider how fast we’ve grown over the past few years while still being able to successfully support this very important program with these cutting edge, high quality, highly capable yet cost-effective warships,” said Craig Perciavalle, Austal USA President, on the launch of LCS 6.

Austal’s growth is not captured solely in buildings and machines. The shipyard has become a prime employer and technical talent developer in the region, adding 3,000 employees since November 2009.

MMC: Investment in Minds and Matter

While Maritime Reporter was not able to tour the physical facilities at Marinette Marine during the recent christening and launch of LCS 5, Francesco Valente, President and CEO of Fincantieri Marine Group, was available for comments on the sidelines of the event that day.

Marinette Marine Corporation is a long-tenured member of the U.S. shipbuilding fraternity, founded in 1942 along the Menominee River in Marinette, Wisconsin to meet America’s growing demand for naval construction. From its first contract – a deal to build five wooden barges – MMC has evolved steadily, having designed and built more than 1,500 vessels. Ongoing capital ex-

On an exceptionally cold day in Marinette in mid-December ship sponsor Sylvia M. Panetta cracks the traditional champagne across the bow of Milwaukee (LCS 5).

penditure improvements will add to the shipyard's already expansive facilities, giving MMC 550,000 square feet of manufacturing, warehouse and receiving space. Marinette Marine Corporation is part of the Fincantieri Marine Group, a subsidiary of Fincantieri, since 2009, and since then has enjoyed a high level of investment in technology, technique and people. "We came to America with a great commitment to this country," said Valente. "We stand by this with investments that we made here at Marinette totaling \$74m, and an additional \$25m in our other facilities. Bay Shipbuilding in Sturgeon Bay, which is focused on commercial shipbuilding and just delivered two Platform Supply Vessels to Tidewater Marine; and Ace Marine (in Green Bay) which is focused on building in aluminum, primarily for the Coast

Guard (RB-M) program."

"So we have come here, and the investment is only the first step," said Valente. "We have also brought in new technology and know-how, to further develop our local workforce so we can be the best shipbuilders in America."

In the Spring of 2013 Marinette Marine held a ceremonial ribbon cutting ceremony to commemorate the opening of its newest facility, and to mark the completion of Fincantieri's \$74m investment in the shipyard.

"With new facilities, computer-controlled manufacturing equipment, the best engineering minds in the business, and the industry's finest master craftsmen," said Goddard at the event.

The \$74m invested since Fincantieri took over in 2009 is easy to see, as MMC has doubled its indoor production space

and increased its workforce by 60% to 1400 employees. The shipyard, with purpose designed facilities, has geared up toward not only cutting edge technology to maximize production efficiency but also to minimize energy consumption. The investment in MMC was necessary for the yard to meet and exceed the US Navy's requirement to deliver two LCS per year, leaving the company with additional capacity to pursue other programs, such as the USCG's Offshore Patrol Cutter.

"In terms of processes, we have refined the way in which we handle production control," said Valente "It's the way in which we organize the flow of work. As you heard Mr. Goddard say (Chuck Goddard, President and CEO, Marinette Marine), we have cut eight miles out of the flow. We have also developed better

relationships with our suppliers, developing some important partnerships nationwide."

"The challenge here was to transition this yard, which already had a very long history building ships," said Valente. "But the history was building ships one at a time most of the time. We have brought in a different mentality, an industrial mentality with the focus on series production.

So today we have five of the LCS ships in production, as well as the ARV, a research vessel. This is building six ships at the same time, and with that you have to develop a different mindset; a cultural development focused on industrial, serial production.

This requires not simply the latest technology, but the incorporation of shipbuilding process know how."

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Steaming the Way to Victory in WWII on

“Ugly Ducklings”



Credit: "Liberty Ship, The Voyages of the JOHN W. BROWN, 1942 - 1946," by Sherod Cooper, Naval Institute Press, 1987

John W. Brown returning to New York on March 18, 1944, at the end of her third voyage, where she shuttled between ports in the Mediterranean Theater for five months before returning home. The ship carried a varied cargo outbound that “required a manifest 61 pages long to list the more than 2,500 items, ranging from TNT, Sherman tanks, and a locomotive, to Purple Heart medals, cigarettes and skirts for female officers.”

The design and construction of WWII Liberty cargo ships revolutionized ship-building by overhauling the blueprint process and standardizing on commonality of parts, welding, pre-fabrication and assembly line construction.

By Patricia Keefe

“Give me Liberty, or give me death!” a rallying cry of the Revolutionary War, got a second act in World War II. This time the call was more like, “Give me Liberty ships, and make it quick!” as the country, desperate to build up its outdated flotilla of cargo ships and devastated naval fleet, bet big on a homely vessel that touched off a ship-building revolution and became key to winning the war

“Built by the mile and chopped off by the yard,” Roosevelt promised the no-frills Liberties would form a “bridge of ships” across the Atlantic. And they did. “Without the supply column of Liberty Ships that endlessly plowed the seas between America and England, the war would have been lost,” declared a grateful Winston Churchill:

That’s big praise for what were essentially dumpy, lumbering vessels – dubbed “ugly ducklings” after Roosevelt, in his generation’s version of an ill-advised tweet, described the Liberty as “a dreadful looking object.”

An exaggeration perhaps, but in truth, the Liberty wasn’t much to write home about. They were throwaway ships with a five-year life expectancy, notes Prof. Joshua Smith, interim director of the American Merchant Marine Museum at

the U.S. Merchant Marine Academy at Kings Point. “The Liberty cost \$2 million to build, but could carry \$87 million worth of cargo,” says Toni Horodysky, editor of the American Merchant Marine at War website (usmm.org). Hence, “If it made a one-way voyage, it paid for itself.” It’s estimated the Liberties delivered 75% of the cargo used in the war.

The full scantling type Liberty had a range of 17,000 miles, a carrying capacity of about 10,800 tons, steam-operated winches and was propelled by an 1870’s engine design - a triple expansion reciprocating steam engine fueled by two oil-fired boilers, single screw, 2500 HP, running at a top speed of 11 knots. They ran about 440 feet, had a raked stem and cruiser stern, a contra-balanced rudder, a windlass and warping winch, two full decks, seven watertight bulkheads, five cargo holds, and a set of defensive armament.

Less is More

Looks aren’t everything; its genius lay in the design’s embodiment of a clichéd rule of thumb that summed up the marching orders for wartime ship building: keep it simple stupid. For example, although ships of that era had been running on steam turbines, the old-fashioned piston engines were easier to make, oper-

To celebrate Maritime Reporter & Engineering News’ 75th Anniversary, each edition in 2014 will offer a specially commissioned feature article which examines a historical topic. This month we look at the impact of WWII on domestic ship production.

Don’t miss the special 75th anniversary edition to publish in June 2014, made possible in part by our 75th Anniversary sponsors seen on pages 33 & 35.



ate and repair - important considerations when materials are limited, time is of the essence and the workforce is green.

That simplicity opened the door to enabling radical changes on every level – cost, time, modularity and commonality of systems and parts – in the construction and design of the Liberty and other ships going forward.

Under a government plan that stretched back to 1936, a record-setting 2710 Liberty-class ships were built between 1941 and 1945, at 18 mostly “green field” U.S. ship yards - many of them hastily built from the ground up around ships already under construction. A combination of wholesale adoption of more simple construction methods - chief among them welding - standardized vessel and com-

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Photo credit: LCS2

“If you want fast ships, fast shipbuilding, fast women or fast horses, you pay through the nose.”

Vice Admiral Emory Scott Land, Chairman of the U.S. Maritime Commission during WWII, in remarks he made to a Senate committee investigating shipyard billings.

(VADM Land, right, as published in the December 13, 1939 edition of MR)



ponent plans, and a radical switch to pre-fabrication and assembly lines, enabled U.S. shipyards by 1943 to crank out the badly needed transports faster than the German U-Boats could sink them.

That speed was critical. Germany's efforts to secure victory at sea by winning a tonnage war were going swimmingly through 1942, having taken out 3,000 Allied merchant ships, of which only 900 were replaced. This made the American production speed, and ability to maintain a steady stream of supplies to the front, decisive factors in winning the war.

The American “manufacturing miracle” was based on a ship design that made its way to the U.S. as part of a call for help Britain. Unable to replenish its battered fleet, Britain was forced to turn to the U.S. in 1940 to build 60 10,000-ton deadweight capacity steamers, to be based on a vintage ship design dating back to 1879 from Sunderland, England.

The design for those steamers became the basis for the U.S.-flagged Liberty ships, but the seed for these “workhorses of the war” was actually sown during a failed attempt to bolster the U.S. merchant marine during the first World War. The United States didn't enter that war until midway through 1917. The Ger-

mans surrendered less than two years later before most of the 2,500 ships that were being built were ready to be launched. “It was a day late and a dollar short,” says Capt. Patrick A. Moloney, acting executive director of the National Liberty Ship memorial and master of the SS Jeremiah O'Brien. Embarrassingly, some of that glut was scrapped, some were sold, some mothballed. But with the stock market crash and resulting Depression, only two cargo ships, a few tankers and a small number of passenger ships were built in the U.S. in the years that followed.

“What they learned is that you have to have a plan, and the government has to intervene strongly. You can't just trust private businesses to do this,” says Smith. “Next [war], we wanted to hit the ground running,” adds Moloney.

Laying the Foundation

By 1936, with the winds of war stirring once more in Europe, over 90% of the U.S. merchant fleet was more than 20 years old, and its complement had dwindled to a combined 1,340 cargo ships and tankers - an estimated 14% of the world's tonnage. Roosevelt took action. By the time he was through, at the end of the war, the U.S. would hold 60% of the world's tonnage.

The Merchant Marine Act of 1936 sought to ensure development of an adequate American merchant marine via government subsidy, and also established the U.S. Maritime Commission, which was tasked with building 500 modern cargo ships and tankers in 10 years - a goal it exceeded by more than 10 times over in just four years.

The government, meanwhile, needed a lot of merchant ships, and it needed them yesterday, so in January 1941, Roosevelt further announced a \$350 million Emergency Shipbuilding Program to build both merchant and military ships. This was followed in 1942 by the War Shipping Administration, tasked with overseeing the operation of the new fleet of merchant ships, and successive orders for ever more Liberty Ships. Part and parcel of this effort was finding people to build new ship yards all over the country (see chart) as most of the existing shipyard activity was based in urban areas on the east coast with little option to expand, and what space they had was devoted to Naval orders.

The new ship yards were going to need a lot of cheap land and a lot of labor, factors that made the South and West Coast particularly attractive. Leading the way was industrialist, builder and production wizard Henry J. Kaiser, who built

seven of the 18 shipyards (see chart on page 35) and set up a consortium called Six Services Inc. with Todd Shipyards. Among the innovations to fall out of Kaiser's shipyards were assembly line construction and the first Health Maintenance Organization, a precursor to today's Kaiser Permanente.

The British ship design intrigued the Maritime Commission, which was looking to build its first generation of Emergency Class (EC) cargo ships quickly and cheaply, and wanted all the shipyards involved to build the exact same ship in tandem. “The way to build quickly is to use what is already proven,” points out Richard Neilson, dean and professor of naval architecture at the Webb Institute.

The Commission turned to Gibbs & Cox, Inc., an independent naval architecture and engineering firm that ended up designing more than 70% all WWII ship designs, and which had already been retained by the British to supervise its cargo ship order. The commission asked Gibbs & Cox both to adapt the British design to American needs and shipbuilding practices, and to help standardize the design and process across all the shipyards. “They wanted fast production of a repeatable design at a low cost per ship; we said it can't be done the traditional way,” said Shawn Tallant, Gibbs



(Credit: Project Liberty Ship)

SS John W. Brown Liberty ship steaming down Chesapeake Bay en route port visits in Georgia and Florida in May 2002.

The Liberty Ships From Stem to Stern

Displacement: 14,245 tons

DWT: 10,800

Length: 441 ft. 6 in.

Beam: 56 ft. 10.75 in.

Draft: 27 ft. 9.25 in.

Propulsion: Two oil fired boilers, triple expansion reciprocating steam engine, single screw, 2500 horsepower, fuel consumption of 26 tons a day.

Speed: 11 knots

 Range: 11,000 miles or 20,000 nmi
 (37,000 km; 23,000 mi)

 Complement: 38–62 merchant marine sailors
 21–40 Naval armed guards

 Armament: Stern-mounted 4 in (102 mm) deck gun,
 variety of anti-aircraft armament

Capacity: 9,140 tons

Five holds could carry over 9,000 tons of cargo, plus airplanes, tanks, and locomotives lashed to its deck. A Liberty could carry 2,840 jeeps, 440 tanks, or 230 million rounds of rifle ammunition.

& Cox Vice President, Business & Strategy Development.

A Revolution in Design

Getting all the shipyards on the same page would create efficiencies, speed and economies across the board. It would make it possible to get identical parts and components from a broader array of manufacturers, who in turn could make fewer products to supply more customers – no customization necessary. It would be nothing short of revolutionary.

Up until about 1940, explains Tallant, most ships were custom-built, one at a time, in a single yard, using a set of plans that left many profitable details up to the imagination of the individual boat yard. To mass produce a large number of ships, there needed to be a huge paradigm shift. Gibbs & Cox made every component on the ship well-defined and interchangeable, according to Mike Schneider, a retired Navy captain, Project Liberty Ship member and SS John W. Brown volunteer.

But the starting point for that transformation was the blueprints themselves, “which meant you had to change the entire design process,” said Tallant. Every design firm had their own blueprint

symbols, for example, which led Gibbs & Cox to create a common set of symbols covering not just all the parts of a ship, but extending to purchase orders, graphs, charts, reports and statistics. “At the peak of the war, we were pushing out 10,000 blueprints a month and almost 6,700 purchase orders a day. It was a huge amount of paperwork.”

Standardization enabled centralization of the procurement process, and streamlining the paperwork made it easier to keep track of, order, and allocate constantly in short supply materials and parts, which could be routed away from a ship still under construction to one almost ready for launch when the need arose. These changes – probably one of the earliest examples of just-in-time manufacturing – along with the introduction of modular construction, are the foundation of cost-effective shipbuilding today, notes Tallant. “And this was all done by phone call or letter, before the advent of computers or the internet,” marvels Schneider.

The latter is where “Hurry up Henry” Kaiser came in. He set up his shipyards as assembly plants where thousands of components preassembled at other factories were finally laid in place. He set up training schools onsite to teach un-

skilled laborers and switched from riveting to welding, creating Wendy the Welder. Changes like this were said to have reduced man-hours by a third, cut ship costs from \$2 million to under \$1.7 million, and advanced ship construction into the next century. On average, it took 592,000 man-hours and 6,850 tons of steel to build a Liberty Ship.

Modern Shipbuilding

The most revolutionary change of all was the decision to go full bore to prefabrication and assembly lines. The Liberty was comprised of some 250,000 parts, a portion of which would come preassembled – i.e. the bow and parts of the deck house, bridge, double-bottom sections, stern-frame assemblies and bow units. Some estimates claim there was 43 miles of welding, 5 miles of wiring and 7 miles of piping in each ship.

Taking this modern factory approach demonstrably shrunk construction time from the 10-12 months required in 1917 to 244 days at the start of WWII to an unheard of average of 30-42 days by the peak. Some Kaiser shipyards could do it in 2 weeks. By war's end, as many as three Liberties a day were being launched. Drilling down into the actual physical construction, a decision

was made to go to welded hulls, which required less skill, and a third less labor. “You can lay a line of solder much faster than someone can heat the rivet through,” says Horodysky. It also saved on metal as plates were now butted instead of overlapped, and that saved on weight, adds Schneider. The aggressive oversight of the commercial merchant fleet, combined with standardization and revolutionary techniques, paid off. By the end of the war, the Maritime Commission had succeeded in running the most productive shipbuilding effort in history. From 1941 to 1945, the U.S. increased its shipbuilding capacity by more than 1,200%, producing 5,777 merchant and naval ships – a feat unmatched since.

A few lessons were learned along the way – some the hard way.

First, the Liberty design was tweaked to improve on the British predecessor. Changes included:

- Moving to a single, mid-ship house to accommodate the crew, which reduced piping and heating needs.
- Replacing three Scotch coal boilers with two water tube boilers.
- Reshaping the hull into more of a straight line to better support mass production to cut down on the need for furnaceing to shape plates.

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“They wanted fast production of a repeatable design at a low cost per ship. We said it can’t be done the traditional way”

Shawn Tallant, VP, Business & Strategy Development, Gibbs & Cox

- Increasing the size of the bilge radius to help from a hydrodynamic and structural standpoint.
- Increasing the size of the parallel mid-body to make the ship faster, easier to construct and provide more cargo volume
- Using a contra rudder to improve speed and maneuverability
- Inventing a cold-rolling process to save on steel.

“Kaiser Coffins”

One thing they couldn’t improve much on was the ship’s roll motion, which crew discomfort aside, created instability and stress on the hull. “They were terrible to sail in; it wallowed in heavy seas,” says USMM.org’s Horodysky. Instead of sending empty ships off to rock and roll the entire way home, one solution was to load solid ballast into the holds for stability.

Welding came with its own set of problems, chief among them cracking. Square angles built into the hatches were aiding cracks caused by fatigue, a problem rectified by rounded corners on those hatches. More serious was cracking that could occur where there were no rivets to stop them; cracks zip past a weld. After some ships broke open at sea, earn-

ing Liberties the name “Kaiser coffins” in some circles – a crack arrestor strake plate was put on ships, forward mast to after mast. Some yards also mixed riveting and welding to avoid that issue.

Brittle steel was a serious problem. When an overloaded (stressed) ship was exposed to freezing water, the less than optimal steel could crystallize, lose its ability to flex, and develop fractures, often near the midship accommodations. “Once a crack develops in brittle steel, the speed of the crack is like 6 feet per second, virtually instantaneous. The way they stopped it was to drill a hole on each end of the crack,” says Moloney. Abutting arrestor plates helped too since there was no chemical connection to propagate the crack from one plate to the other, explains Prof. Neilson.

Post War Fleet Disposal

With the armistice, the U.S. found itself with over 40 million tons of shipping - an enormous glut, much of which it never expected to survive the war. A little more 4 million tons was in merchant marine vessels. In short, it had more ships than cargo to move, says Schneider. Congress almost immediately passed the 1946 Merchant Ship Sales Act, to enable sale of surplus ships to do-

mestic and foreign buyers.

America’s overage allowed allied nations to rebuild devastated naval fleets, and also provided the foundation for what became the Greek shipping magnates. Commercial buyers like Aristotle Onassis were able to buy Liberties cheaply and then “man them with bargain basement crews working for a song out of devastated Europe,” observes Moloney. “It promptly drove the U.S. Merchant Marine off the water because they worked for so much less,” he adds. These sales also helped former enemy nations rebuild their merchant marine capacity.

The Liberties were also used to transport relief supplies to a stricken Europe and Japan in the aftermath of the war. Some were pressed into service for the National Defense Reserve Fleet, which moors ships along the Atlantic, Pacific and Gulf coasts. A percentage was mothballed, rehabbed and saw service in Korea and Vietnam. More than 40 were deliberately sunk to create breeding reefs off Florida. King’s Point took over some for training purposes. Most ended ignominiously, sold for scrap.

Just two remain fully operational: the SS Jeremiah O’Brien is docked in San Francisco, and is run by The National

From Sea to Shining Sea

Liberty ships were built at 18 mostly new shipyards located mostly along the Atlantic, Pacific and Gulf Coasts. (Existing East Coast shipyards were tied up building Naval vessels, which were more complicated and required higher skilled workers.)

The Liberty shipyards, seven of which were owned by Henry Kaiser, included:

- Alabama Drydock and Shipbuilding, Mobile, Alabama
- American International Shipbuilding Bethlehem-Fairfield Shipyard, Baltimore, Maryland
- California Shipbuilding Corp., Los Angeles, California
- Delta Shipbuilding Corp., New Orleans, Louisiana
- J. A. Jones, Panama City, Florida
- J. A. Jones, Brunswick, Georgia.
- Kaiser Company, Vancouver, Washington
- Marinship, Sausalito, California
- New England Shipbuilding East Yard, South Portland, Maine, a subsidiary of Bath Iron Works.
- New England Shipbuilding West Yard, South Portland, Maine
- North Carolina Shipbuilding Company, Wilmington, North Carolina
- Oregon Shipbuilding Corporation, Portland, Oregon
- Richmond Shipyards, Richmond, California, a Kaiser facility
- St. Johns River Shipbuilding, Jacksonville, Florida
- Southeastern Shipbuilding, Savannah, Georgia
- Todd Houston Shipbuilding, Houston, Texas
- Walsh-Kaiser Co., Inc., Providence, Rhode Island

Liberty Ships Built by City, 1942-1945

Locality State	Number
Richmond CA.....	489
Baltimore MD.....	385
Terminal Island CA.....	336
Portland OR.....	322
South Portland ME.....	44
Houston TX.....	208
New Orleans LA.....	188
Wilmington NC.....	126
Panama City FL.....	102
Savannah GA.....	88
Brunswick GA.....	85
Jacksonville FL.....	82
Mobile AL.....	20
Sausalito CA.....	15
Providence RI.....	11
Vancouver WA.....	10
TOTAL	2711

Source: L.A. Sawyer and W. H. Mitchell, *The Liberty Ships*

MR'S 75TH ANNIVERSARY

Liberty Ship Memorial; and the SS John W. Brown is berthed in Baltimore, and is maintained by Project Liberty Ship. Both ships are taken out on the water several times a year on cruises open to the public.

The 18 wartime shipyards immediately shut down; all were sold off to other entities, some many times over. The various government agencies created during the war to oversee ship construction were also disbanded. The U.S. Maritime Commission was closed in 1950 and essentially re-emerged as the United States

Maritime Administration, which is under the U.S. Department of Transportation.

The ships may be mostly gone, but their legacy lives on. They helped to save Europe twice - first during the war and then through humanitarian deliveries and as fodder for rebuilt fleets in other countries. Many of the shipbuilding techniques and design conventions have become standard. The shipyards contributed greatly to one of the countries' largest demographic shifts, as workers climbed out of the Depression on the backs of wartime jobs. The newly

diversified workforce broke barriers for women and minorities, opening the door for the first time to the American labor market. Entire neighborhoods and new schools were built to accommodate shipyard families, and early efforts to provide affordable health care to working families have morphed into today's HMOs. History will record that these lowly emergency class vessels lived up to the Liberty name, and then some, well beyond their supporters' wildest dreams, freeing so many, here and abroad, from the oppression of outdated thinking and

terrible tyrants.

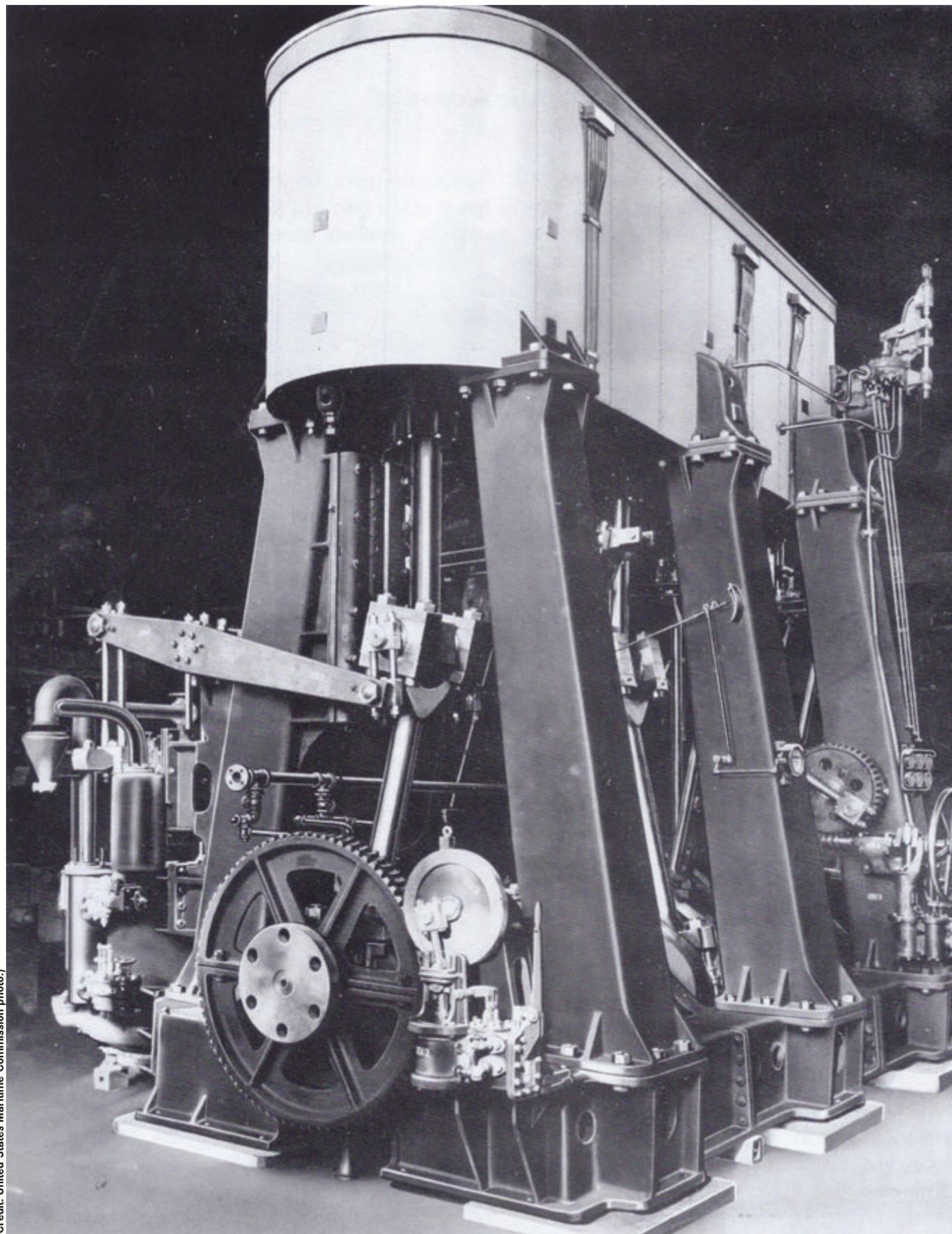
Liberty Ships at a Glance

- **Class of Ship:** EC2-S-C1: 'EC' for Emergency Cargo, '2' for a ship between 400 and 450 feet long (Load Waterline Length), 'S' for steam engines, and 'C1' for design C1.
- **Nicknames:** Ugly Duckling, Workhorse of the Deep
- **Design:** Based on British-flagged Dorrington Court, designed and built by J.L.Thompson & Sons of Sunderland in 1939, and brought to the U.S. by the British Merchant Shipbuilding Mission in 1940, seeking to get 60 ships built in the U.S. The U.S. Maritime Commission adopted the design but asked naval architects Gibbs & Cox to make alterations for speed and American shipbuilding practices and sent the standardized plan out to all the shipyards.
- **First ship launched:** S. S. Patrick Henry (Sept. 27, 1941); the Benjamin Warner was the last Liberty launched on the West Coast, on July 1, 1944, while the SS Albert M. Boe was the last overall, launched on Sept. 25, 1945.
- **Number built:** 2751 was the goal; 2710 were built between 1941 and 1945.
- **Average cost to build:** Under \$2M/hull at the start of the war. By war's end, Kaiser was producing ships for about \$1.75M/hull. Some estimates go as low as \$1.5 million plus.
- **Materials:** 3,425 tons of hull steel, 2,725 tons of plate, and 700 tons of shapes, which included 50,000 castings. The 250,000 parts were pre-fabricated in 250-ton sections and welded together in about 70 days.
- **Power Plant:** an oil-fired, triple expansion 2,500 hp, 24-ft. high, 140-ton, 3-cylinder reciprocating steam engine capable of speeds of 11 knots. The Hendy Ironworks in Sunnyvale, Calif., produced a record breaking number of 754 Liberty Ship engines at the rate of one every 40.8 hours.
- **Average time to build:** the Patrick Henry, the first ship, took almost 8

(Continued on page 39)

140 Tons of Power

Two-story, 140-ton, vertical triple expansion reciprocating steam engine of the type used to power World War II Liberty ships. It was designed to operate at 76 rpm and propel a Liberty ship at about 11 knots. Hendy Iron Works, the top supplier of these EC-2 piston engines (one out of every three Liberty ships was powered by a Hendy engine) spit them out at a rate of one every 40.8 hours, or 754 engines in 3.5 years - a world record.



(Credit: United States Maritime Commission photo.)



Necessity ... The Mother of Invention

Plato said it and Robert W. Fernstrum proved it, leading to the creation of R.W. Fernstrum & Company, a ubiquitous name in commercial maritime circles.

Necessity is indeed the mother of invention, a point proven time and again throughout history. For better or worse, war historically has proven the impetus for invention, as was the case with Robert W. Fernstrum.

R.W. Fernstrum & Company of Menominee, Mich., is a leader in engineering and manufacturing keel cooling technologies, and today remains a privately held, third-generation company run by brothers Sean and Todd Fernstrum, grandsons of founder Robert W. Fernstrum. **The company came to fruition in 1945 when Robert W. Fernstrum patented the first rectangular tube keel cooler with an angled header for the United States Army and Navy.**

As Sean Fernstrum, President, explained, during World War II the U.S. Navy encountered engine cooling problems with its landing craft (pictured above) – a problem discovered during a mock invasion off of Iceland—and required a new closed circuit cooling system.

“As WWII started, Gray Marine was building landing craft for the Army. When the Army conducted a mock assault of Iceland, less than half of the landing craft made it to shore,” said Sean Fernstrum. “The ice plugged up all of the strainers and it became a nightmare. So the Army went back to Grey Marine and said ‘you’ve got a problem.’ And (the management of Gray Marine) went to its Chief Engineer, my grandfather, and said ‘you’ve got a problem!’ Out of that problem he ended up designing the prototype of our keel coolers.”

So the first real use of the R.W. Fernstrum coolers was on a landing craft, which didn’t actually occur until the conclusion of WWII, but are found on military landing craft from the Korean conflict onward. The company officially got its start in 1949, and expanded its references to include the Army Corps of Engineers then shrimp boats, and today includes a wide variety of commercial craft globally. In 2014 R.W. Fernstrum celebrates its 65 anniversary.

G. Trauthwein

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(Photo Credit: Library of Congress)

The S.S. Patrick Henry

was the first of the Emergency Class Liberty ships to be built and launched. The famous quote by its namesake helped to give this class of ships its name.



(Photo Credit: Library of Congress)

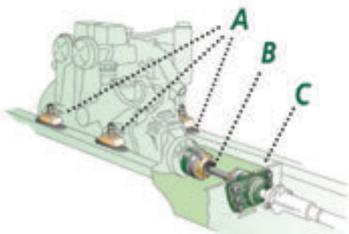
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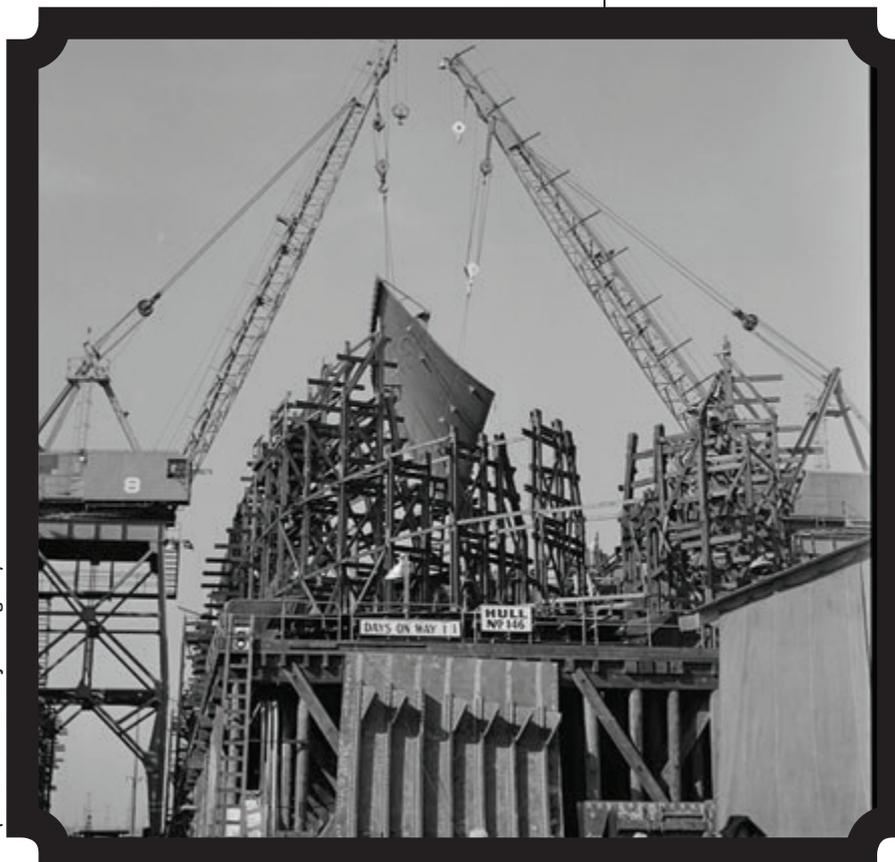
- A. Soft engine mounts isolate engine from hull.
- B. Constant Velocity (CV) drive shaft absorbs engine vibration and eliminates need for accurate alignment.
- C. Thrust unit on load bearing hull section reduces stress on transmission and engine mounts. Prop pushes boat, not engine.



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Prefabricated pieces

of ship being hoisted into place by cranes at California shipbuilding yards, Terminal Island, Calif.



(Photo Credit: Library of Congress)

months to build. The average dropped to 42 days per ship by mid war and some yards pulled it off in 16 days. **As a publicity stunt, the SS Robert E. Peary, was built in world record time of 4 days, 15 hours, 26 minutes at the Kaiser shipyard in Richmond, California** (plus another three days to be fitted out.) By 1943, three Liberty Ships were being completed each day

- **Merchant Marine:** The civilian mariner workforce rose from about 55,000 on December 7, 1941 to 215,000 in March 1945, and rose to over 250,000 by the war's end.. A pre-war merchant fleet of 1,340 cargo ships and tankers expanded to at least 4,221 U.S. merchant ships by war's end. The U.S. Merchant fleet went from 14% of the world's tonnage at the start of the war, growing to 60% after the war.

- **Number lost:** 243. Overall Merchant Marine casualty rate was the highest, estimated at 1 in 26, during the war. The Merchant Marine served in World War II as a Military Auxiliary. Of the nearly quarter million volunteer merchant mariners who served during World War II, over 9,000 died.

- **Crew:** A typical roster included 38-45 or so merchant mariners and anywhere from 13-just under 30 Naval personnel. Each ship had an attachment from the U.S. Navy Armed Guard, tasked with defending U.S. and Allied merchant ships from attack. They served as gunners, signal men and radio operators.

- **Postwar Dispersal:** Under the Mer-

chant Ship Sales Act of 1946, most sold off cheaply to foreign shipping companies, including Onassis and the Japanese. Some were deployed in Vietnam, others were scrapped, and others were mothballed.

- **Number remaining today:** Two fully operational Liberty ships remain

afloat today: The SS Jeremiah O'Brien is docked in San Francisco, and SS John W. Brown is berthed in Baltimore.

Sources: *American Merchant Marine at War* (www.usmm.org); *Project Liberty Ship* (<http://www.liberty-ship.com>), *The National Liberty Ship Memorial* (<http://www.ssjeremiahobrien.org/>), www.merchantnavyofficers.com, <http://www.sunderlandmaritimeheritage.org.uk>, *National Liberty Ship Foundation*, *WW-2Ships.com*, *National Park Service and Liberty Ships and Associated Designs* By Sam Peters, "The Liberty Ships" by L.A. Sawyer and W.H. Mitchell, *The National American Archives*.

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The Author

Patricia Keefe is a veteran business journalist and editor who has covered high-tech industries and maritime topics. She discovered while researching this story that her father came within a hair's breadth of being assigned to a Liberty ship. After finishing Navy boot camp, the 16-year-old was sent to armed guard camp in Little Creek, Va., coincidentally at the same time the father of a future son-in-law was also sent there. (That man went on to lead naval gunnery crews on several Liberty ships, including part of the first convey to make it across the Mediterranean without being attacked). Her father was sent onto the armed guard camp in Brooklyn, N.Y., which was looking to staff Liberties. However, a naval detachment came through seeking personnel to crew the shiny new U.S.S Hancock aircraft carrier, and scooped him up, thereby making him one of that ship's original plank owners.

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LNG is a Crystal Clear Alternative

By Peter Pospiech, Germany

Norway-based shipping company Fjord Line's Stavangerfjord represents a new-generation of advanced and environmentally friendly Cruise Passenger Ferry with outstanding passenger facilities in order to operate both as a day and night ferry. The vessel is built to provide passengers with pleasant experiences, even under the harsh weather conditions of the North Sea. A modern and flexible interior design provides a capacity for 1,500 passengers (1200 passenger during winter), and a total of 306 cabins on two decks provide first class accommodation and a variety of restaurants, shops and entertainment to enable travelers to have an enjoyable sailing along the Norwegian coast line to Denmark. Stavangerfjord is touted to be the most environmentally friendly passenger ship in international operation, as it is powered by pure natural gas enabling a complete elimination of SOX emissions as

well as reducing the CO2 emissions by 23%, NOX emissions by 92% and particulate emissions by 98%, compared to ships powered by traditional heavy fuel oil. The Waste Heat Recovery System provides both electricity from a steam generator and heating from warm water in the accommodation areas. The 170 x 27.5m ship provides a service speed of 21,5 knots.

Norway is trailblazer in several maritime areas, and has emerged as an early leader in the design, construction and operation of vessels with gas propulsion. Today there are about 35 RoPax ferries and offshore supply vessels in operation which are powered solely by gas, but none as large as the 170m Stavangerfjord.

Consequently the supplier industry followed the challenge and today has an appropriate array of ship engines available, either for the main drive as well as for the electrical on-board network. Norway's classification society Det Norske

Veritas (which is now DNV GL courtesy of its merger with Germanischer Lloyd), among others, have worked to establish the necessary building regulations, building a knowledge database and experience from the operation of gas powered ships which now stretches more than a decade. Consequently the new ferry has been built under the survey of the DNV and has been stamped with the class notation: DNV+1A1, Ice 1B, CAR FERRY A, EO, Clean, Naut-AW, VIBR, MCDK, TMON, F-M, COMF V(2).

Meet the Gas Cruise Ferry Stavangerfjord

The Norwegian Bergen Group Fos-en AS shipyard built the cruise ferry Stavangerfjord to its owner Fjord Line AS, based in Egersund, Norway. The ship is powered solely via pure natural gas propulsion, and the most important criteria to chose natural gas as propul-sion drive – which is fed from two 293 cu. m. gas tanks – is the environmental

protection. A strong additional driver comes in more tangible form: Money. Financial support for the project was had from both the EU's Marco Polo program as well as the Norwegian NOx-fund.

Originally the ferry was ordered with diesel engines, but the owner made the decision to replace these with Rolls Royce Bergen BV35:40P2G gas engines so as not to be adversely affected by regulations which apply in Emission Control Areas (ECAs) such as those in the North- and Baltic Sea, that limit emissions of NOx and SOx.

The streamlined and elegant new RoPax ferry has been phased into the route linking Bergen and Stavanger on the Norwegian west coast in mid-July, with the Danish port of Hirtshals at the north of Denmark. After the arrival in Hirtshals, it than makes a day return trip to Langesund in southern Norway, before going back into the overnight sailing to Stavanger and Bergen and then repeating the cycle.

“We are very pleased with the uncomplicated handling of this advanced propulsion.”

Chief Engineer John Tolle and his crew in the engine control room of the RoPax ferry Stavangerfjord.



At the end of 2013 the sistership Bergensfjord will be placed into the same service allowing the company to offer daily departures throughout the year on the Bergen / Stavanger / Hirtshals / Langesund routes.

The design of Fjord Line’s two cruise ferries grew from a close collaboration between Bergen Group Fosen and Falkum Hansen Design. The concept for the ferries combines daytime and night operation with certain decks, 6 and 7, serving as common areas that are charac-

terized by intimacy and flexibility, while other decks, 8 and 9, are clearly defined as locations for cabins in standard and more luxurious versions. The design and interior support the special logistical considerations of 24 hour a day operation and food services. For passengers, MS Stavangerfjord and MS Bergensfjord should appear as nothing less than a floating dream.

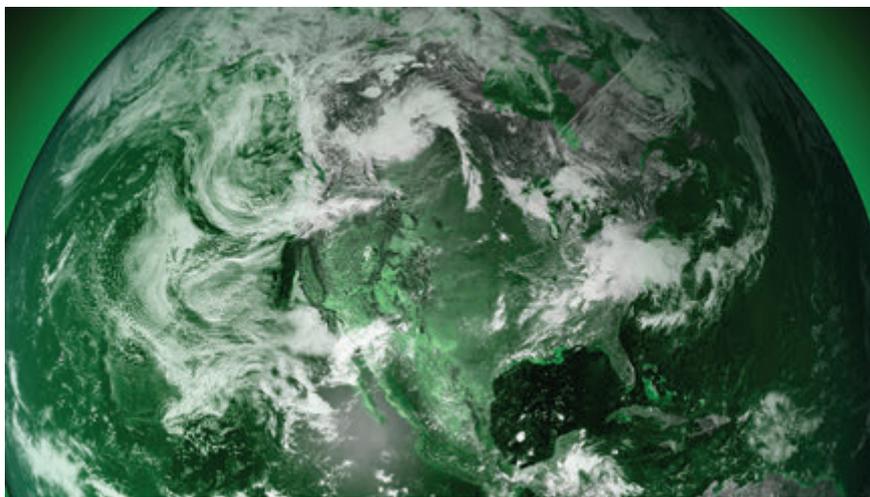
The architect firm Falkum Hansen Design specializes in the design of passenger ships. The basis of the thinking

behind the interiors of Fjord Line’s ships has been a desire to create a distinctive signature, a brand that makes these cruise ferries stand out from other ships in the same category. The vision was to create a ‘Lifestyle Liner’ based on the values associated with intimacy, signature, maritime and liner.

The hulls of both the new cruise ferries are designed in a way that reduces water resistance and increases stability. This contributes to greater comfort on board in high seas and reduced fuel con-

sumption. The wave-neutralizing effect is enhanced by a large bulb at the bow of the ships.

The length of the ships will result in the crossing between Norway and Denmark being much smoother than normal. In the North Sea, the average length of three waves together is 65m. The cruise ferries are 170 meters long so they will float on three waves instead of dipping down between the second and third wave. This will contribute to a much more comfortable trip.



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Main Particulars

MV Stavangerfjord

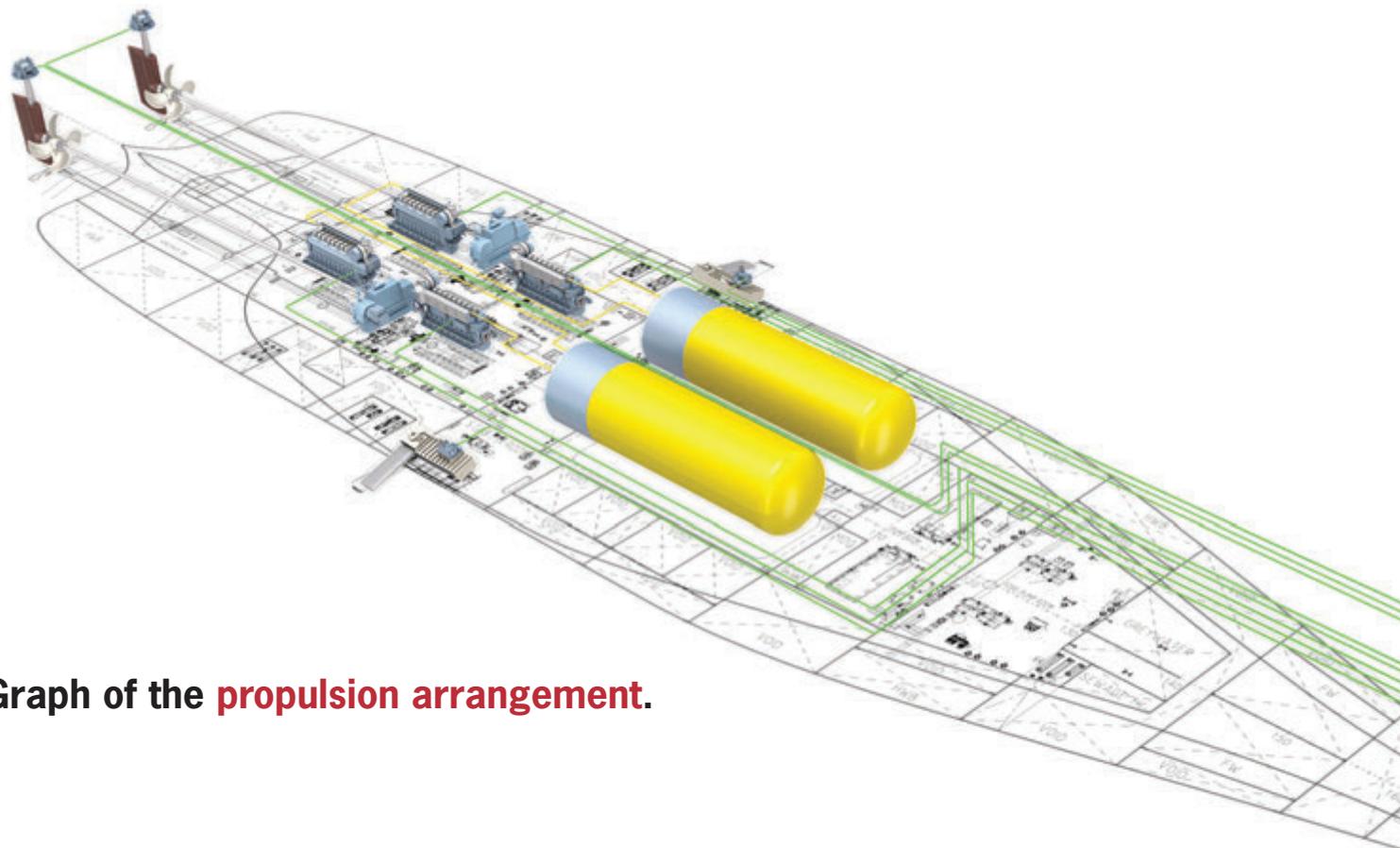
Owner Fjordline-Bergen, NO
 Shipyard..... Stocznia Gdansk, Bergen Group Fosen
 Hull production..... Stocznia Gdansk Shipyard, PL
 Interior and ships completion:Bergen Group
 Engineering:Deltamarine, FIN
 Interior Design services-architect:..... Finn
 Falkum-Hansen
 Ships typeRo-Pax Ferry
 Length 170 m
 Width 27.5 m
 Depth..... 6.35 m
 Gross tonnage 31,678 gt
 Net tonnage 14,270 t
 Deadweight 3,900 dwt
 Output..... 2 x 5,400 kW / 750 rpm
 Shaft generators..... 2 x Marelli MJB6 630 SC6
 Power 2 x 1,850 kW
 Gearbox 2 x Renk MAN
 Propulsion 2 x Rolls Royce Kamewa CCP
 Onboard gensets 2 x MAN 6L21/31;
 1 x MAN 7L21/31
 Output..... 2 x 1.300 kW; 1 x 1,500 kW
 Bow Thruster 2 x Rolls Royce CCP
 Fuel /LNG tanks 2 x Aritas
 Life boats 6 x Fassmer
 Passengers, summer season 1,500
 Passengers, winter season 1,200
 Ro-ro capacity..... 1,350 lane-m, 600 cars
 Rudder 2 x Rolls Royce Promas
 Naut. equipment L3-Valmarine
 WHRAlfa Laval, Aalborg, DK
 Sewage treatment plant..... Gertsen & Olufsen
 Service speed.....21,5 kn
 ClassDNV+1A1, Ice-1B, Car Ferry A, EO, Clean,
 Naut AW, VIBR, TMON, F-M, COM F V(2)
 Main Engines: 4 x Rolls Royce B35:40V12P
 Shaft generators:..... 2 x Marelli MJB6 630 SC6
 Gearboxes:..... 2 x Renk MAN
 Steam Turbine generator: 1 x Shinko RG65
 Main propulsion:..... 2 x Rolls Royce Kamewa CPP
 Emergency generator:..... 1 x Mitsubishi
 Side Thruster:..... 2 x tunnel thruster Rolls Royce
 Stabilizer: 2 x Rolls Royce, Dunfermline, GB

Life Saving Equipment:
 Viking:.....MES, 2 x 500 + 200 persons Life rafts
 Life boats: 4 x Fassmer, Berne
 MOB boats/fast rescue boats: . 2 x Fassmer, Berne
 Rescue Safety & Fire Equipment:..... Viking, DK
 Davits for life boats: Davit International, GE

LNG Tanks: 2 x Aritas,TR, via Rolls Royce
 Exhaust gas boiler:.....Aalborg, DK
 Hatches, Steel doors:..... TTS
 Mooring winches: Rolls Royce
 Paint: Hempel
 Paint work:Premator & Bergen Group Fosen
 Provison Crane: Fuchs, GE
 Pumps: Allweiler, GE
 RoRo Equipment: TTS
 Rudder: 2 x Rolls Royce Promas
 Sewage treatment plant:..... Gertsen & Olufsen
 Air compressor: Sperre Industrie and TMC
 Water mist system:Novenco Fire Fighting
 Windows Boxes&Frames:.....Bohamet Glasteck, PL
 Bridge Navigation Equipment: L3-Valmarine
 Electrical Installation:..... Elpro
 Elevators:Kone
 Chillers: Novenco
 Tax free shop:..... Heinemann
 Waste heat recovery system:Alfa Laval,
Aalborg, DK



LNG-bunker procedure by trucks during embarkation of passengers in Hirtshals.



Graph of the propulsion arrangement.

To make the voyage more comfortable for the passengers in the very often harsh conditions of the North Sea's Skagerak area retractable stabilizer fins are fitted to reduce slamming and rolling.

The Propulsion

The ship is a two CCP propeller design. Each shaft features two gas engines which are mounted on both sides of one Renk MAN gearbox. A Marelli shaft generator is mounted additionally on both the gearboxes. The vessel is powered by four natural gas engines of type Rolls-Royce Bergen B35:40V12PGas. The 12-cylinder, V-configuration units deliver 5,400 kW at 750 rpm each, 10,800 kW total. All the Rolls Royce gas engines are pre-chamber spark ignited lean burn engines according to the Otto cycle, the ignition of the main charge takes place in the pre-chamber with, a so called, rich mixture. Fuel (gas) consumption has been recorded by the ships crew of approximately 126 kg per nautical mile in total for all four engines.

Proven Environmental Technology

"This is a well-proven technology, produced in Norway, that has been used on a number of ferries and ships used in the offshore industry. In addition to meeting important environmental considerations, natural gas operation will be more cost-effective than heavy fuel oil," said Fjord Line's CEO Ingvald Fardal, in explaining the choice of Rolls-Royce powerplants.

Fardal said that emissions of sulfur from shipping in Northern Europe starting in 2015 cannot grow by more than 0.1 percent. Natural gas contains no sulfur or heavy metals. It reduces CO2

emissions by 20-30% and emissions of NOx by around 90% compared to heavy fuel oil. After 2015 the only alternatives to natural gas will be diesel with extremely low sulfur content, or investing in expensive scrubbing technology that removes the emissions from the combustion of heavy fuel oil. Natural gas is also

expected to be the most cost-effective fuel in the future and delivers a much bigger environmental benefit than all the other alternatives.

Fuel is taken from two 293 cu. m. capacity LNG tanks which are arranged in separated rooms under the car decks. The liquified gas, LNG, is transferred from

each tank through a cold box, where it is converted back into gas condition, which then flows through a gas reduction unit for exact temperature and pressure condition before feeding the engines.

In transit the electrical power is generated from the shaft generators, during port lay times additional diesel gensets

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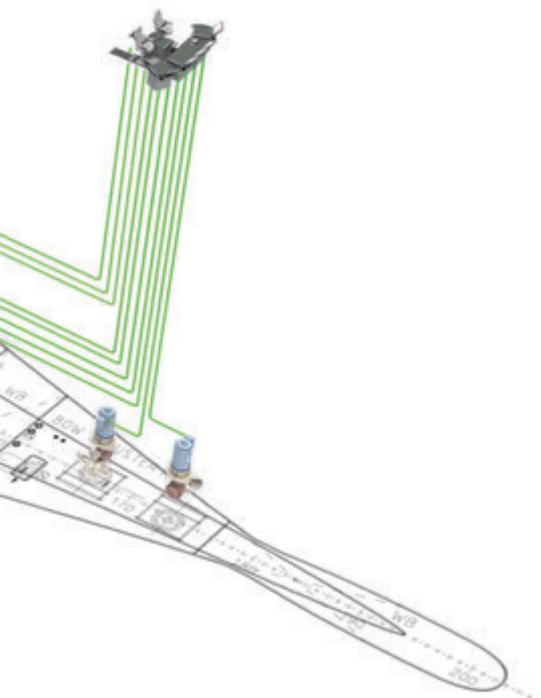
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are in operation to provide the required on-board power. This is done by three MAN sets consisting of: 2 x MAN 6L21/31 (1,300 kW at 900 rpm) and 1 x MAN 7L21/31 (1,500 kW at 900 rpm). They are running with sulfur free diesel fuel. To complement the use of clean fuel, a full-scale Aalborg waste and heat

recovery system (WHR) has been installed on board, resulting in a reduction in gas use by about five percent. The system converts waste heat from the exhaust gases to steam-generated electricity. The system consist of four economizers drawing on the exhaust stream from all four main engines, and supplying steam

to a Shinko steam turbo generator. This covers the electricity needs for all cabins and public areas used by the ship's passengers and crew.

Bunker Procedure

The ferry company has contracted the Norwegian company Skangass AS for

bunkering. For the time being gas is provided by trucks, with 30% accomplished at Risavika (Stavanger) and 70% at Hirtshals. Complications followed, as existing Norwegian regulations up to now do not allow bunkering of LNG with passengers on-board, hence the ship has been taking on LNG in Denmark by

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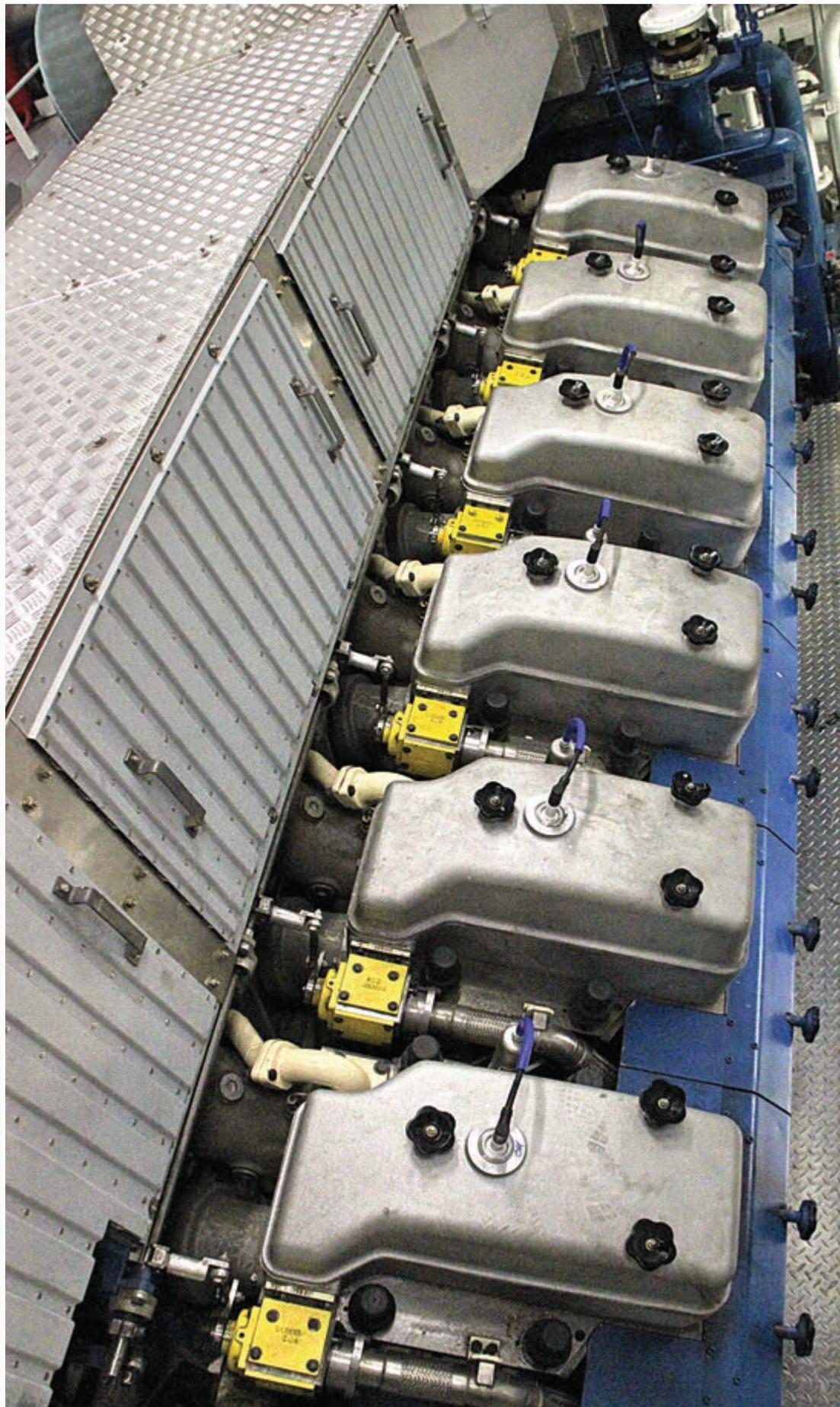
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The Rolls Royce B35:40V12P Gas engines deliver 5,400 kW at 750 rpm.

truck coming from Norway.

Denmark, as well as Sweden, allows bunkering with passengers onboard. With each truck taking an hour to transfer its load to the ship, and with 12 to 15 truckloads per week, the company has adjusted its itineraries: it takes now a bit more than one hour to bunker around

130 cm³, from two 65 cm³ capacity trucks, in Hirtshals.

This LNG amount is enough for a round trip to Bergen. According to Fjord Line CEO Ingvald Fardal, plans called for installing a larger LNG tank in Hirtshals, which would enable faster bunkering, saving seven hours or more per

week. However, there were reports that Norway will change its restrictions, possibly allowing bunkering with passengers on the ship maybe by the end of the year. That means the Stavangerfjord can bunker in Stavanger with gas trucked from nearby Risavika. Plans are also underway with Skangass to transport gas to

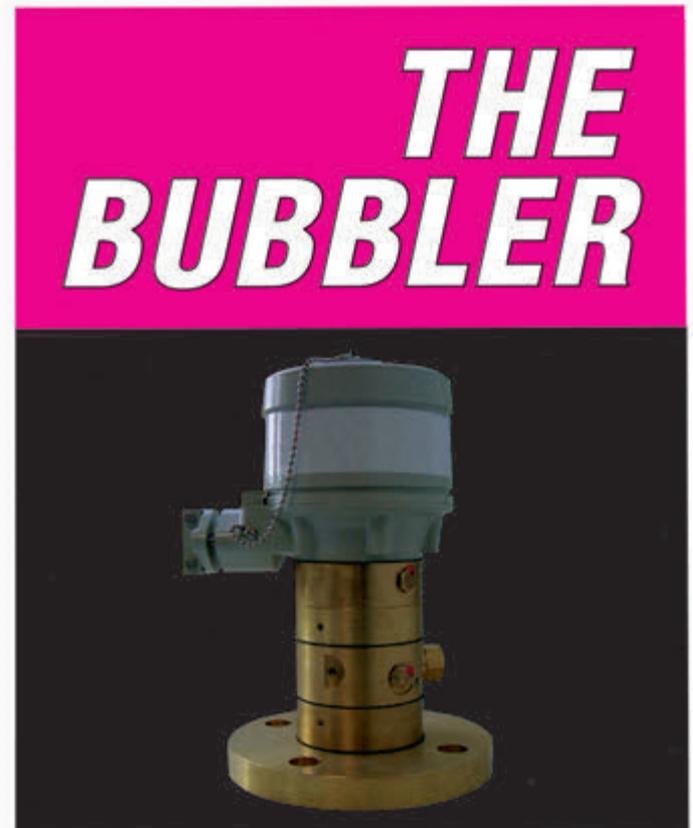
the ship via pipeline.

According to Fjord Line CEO Ingvald Fardal, plans called for installing a larger LNG tank in Hirtshals, which would enable faster bunkering, saving seven hours or more per week. Recently the Stavangerfjord won the IMO's Energy Efficiency Award for 2013.



Above: The **yellow painted double-walled pipes** are indicating that they contain natural gas.

Below: The **Renk MAN gearbox** combines the power of two gas engines.



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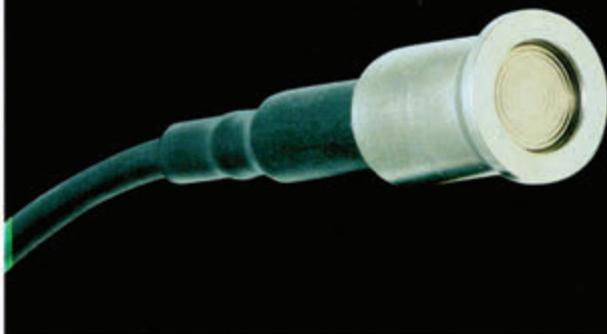
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Drillship Tungsten Explorer

The Tungsten Explorer is an ultra deepwater, dynamically positioned mobile offshore drilling unit (Drillship). The primary areas of activities of the Drillship shall be in the Gulf of Mexico, West Africa and Brazil. The drillship has drilling equipment on the topside with a continuous main deck and forecastle deck. Three engine rooms which house six diesel engines (7,000 kW x 720 rpm) are arranged aft in the hull. Thruster machinery spaces are arranged in engine rooms and in the forward machinery space of the hull, with each space containing motors and controls for azimuth thrusters of 5,500 kW used to dynamically position or propel the drillship. While the drillship is equipped with a ship's anchors for temporary mooring, no spread mooring system is fitted for station keeping. The hull contains no permanent ballast.

The "double" hull (i.e., inner bottom and wing tanks arranged) exhibits no sheer but has straight camber on the outboard portion of its weather or main deck. A large moonpool is situated with its center slightly forward of midships; a flap is arranged at its aft end to prevent wave slap in the moonpool during transit.

An accommodation house is situated inside and above the forecastle; a helideck is located on top of the house. The drilling equipment has been arranged on top side area mostly. From fore to aft, the modules are as follows: mud module for mud pump, sack storage, cement unit, liquid mud storage and auxiliary machinery, substructure with derrick, substructure buildings for shale shaker and BOP control and riser & well test platforms for riser racking, ROV and well test equipment. A pipe rack is arranged on the roof of the mud module.

Tungsten Explorer Main Particulars

Hull No.	3615
Model test	MARIN
Flag	Bahamas
IMO number.....	9631735
Length (o.a.).....	238 m
Length (b.p.).....	230 m
Breadth molded	42 m
Depth molded to freeboard deck.....	19 m
Depth molded to upper deck.....	19 m
Width of double skin, side.....	6.6 m
Width of double skin, bottom.....	2.7 m
Draft, scantling	13 m
Draft, design.....	12 m
Tonnage	68,000 gt
Displacement.....	102,000 mt (operating)
Deadweight, design.....	65,000 metric tons
Deadweight, scantling	74,000 metric tons
Speed, service (85 %MCR output)	12 knots
Bunkers, diesel oil.....	9,400 cu. m.
Water ballast	58,235 cu. m.
Daily fuel consumption,	
Main engine only	184 t/day @ 100% load
Classification American Bureau of Shipping + 1A, (E), "Drillship", *AMS, *ACCU, *CDS, *DPS-3, SH-DLA, UWILD, CRC.	
Main engine.....	6 x STX-MAN-B&W, 14V32/40
Output of each engine	7,000 kW x 720 rpm
Propellers.....	6 x Rolls-Royce
Main engine driven alternators.....	6 x HHI HSJ7 1209-10P
Emergency Generator Set.....	STX-MAN 7L27/38(engine)
Cranes	4 x Liebherr, Slewing Bearing type
Special lifesaving equipment	Norsafe - 6 sets and
.....	70 persons (95kg)
Ballast control system	GE Power Conversion (Former Converteam)
Water Ballast Treatment System.....	PANASIA (700 m ³ /hr x 2)
Complement	200
Bow thrusters	3 x Rolls-Royce, Aquamaster Model UUC 455
Output (each):	5,500 KW
Stern thrusters ..	3 x Rolls-Royce, Aquamaster Model UUC 455
Output (each):	5,500 KW
DP & Integrated Automation System.....	GE Power Conversion (Former Converteam)
Fire detection system	Tyco
Integrated bridge system	Furuno

Bravante's New PSV

Eastern Shipbuilding delivered M/V Bravante V (Hull 155) Boldini S.A., Bravante Group of Brazil. Bravante V is the first STX SV290 design of five vessels in a series which are all ABS, SOLAS, DPS-2, AC Diesel-Electric powered, twin Z-drive propelled PSV's measuring 284 ft. (86.5m) x 60 ft. (18.3m) x 24.5 ft. (7.5m). The vessels all feature four Cummins QSK-60DM 16-cylinder turbo-charged IMO Tier II diesel generator engines each rated at 1825 kW at 1,800 rpm. Cummins also furnished the four Marathon Model 744 690VAC main generators. Main propulsion power is provided by two 690VAC electric motors driving two Schottel Combi-Drives SCD 2020 Single Fixed Pitch Propellers with Nozzles rated at 2,500 kW at 750 rpm each for a total of 6,700 Hp. Schottel also provides two STT 4 Fixed Pitch Reversing Tunnel Thrusters rated at 1,180 kW at 1,170 rpm, each with direct coupled Hyundai 690VAC electric motors. GE Energy provides the complete system integrated diesel electric package, including the thruster drives, motors, control systems, DP system, switchboards, motor control centers, automation and navigation/ communication electronics. The Bravante V is the first of five in a series of Plat-

form Supply Vessels under contract, each with below-deck segregation capacities:

- Total Fuel Oil Capacity: 442,675 USG (1,600 cu. m.)
- Fuel Oil Day-tanks: 62,608USG (237 cu. m.)
- Drill Water/Ballast Capacity: 513,550 USG (1,944 cu. m.)
- Potable Water Capacity: 26,575 USG (100.6 cu. m.)
- Drill/Brine Water Capacity: 5,030 Barrels (800 cu. m.)
- Fuel/Liquid Mud Capacity: 5,030 Barrels (800 cu. m.)
- Dry-bulk Mud: 8,631 Cubic Feet (244 cu. m.)
- Clear Deck Area: 9,494 Square Feet (882 sq. m.)

All five vessels under contract are Marshal Island Flag, IMO/SOLAS, ABS Classed A1, Off-shore Support Vessel Ocean Service, Loadline, AMS, ACCU, Circle E, with additional ABS Class notations UWILD, ENVIRO, DPS-2. ESG is currently under contract to build 16 vessels of similar size and complexity for customers in the U.S. and Brazil.



Brazil-bound Platform Supply Vessel (PSV) is first of five to the STX SV290 design; Eastern-built, Cummins powered

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MHI to Build for Astomos Energy

Shale Gas revolution in the United States drives Japanese LPG Newbuild



(Photo MHI)

Mitsubishi Heavy Industries, Ltd. (MHI) received an order for a very large liquefied petroleum gas (LPG) carrier able to navigate the Panama Canal from Astomos Energy Corp. Completion and delivery are scheduled for the second half of 2015.

The LPG carrier will be built at MHI's Nagasaki Shipyard & Machinery Works, and will measure 230 x 36.6 m with an 1.1 m draft. It will have a gross tonnage of 48,300 tons and deadweight of 51,100t. The ship will have a capacity to carry up to 83,000 cu. m. of LPG. With the unfurling of the "shale gas revolution" in the United States, demand to transport LPG produced in North America is projected to increase in the global market, including East Asia. In tandem with market expansion, a trend is also under way toward longer transport distances. MHI's LPG carrier ordered by Astomos Energy can accommodate these dual needs, augmented by its specifications enabling passage through the newly expanding Panama Canal.

NYPD Receives First of Five

New York Harbor, the NYPD's Harbor Unit turned to Gladding-Hearn Shipbuilding for five new patrol/rescue boats, three 61-footers and two 70-footers. The first high-speed vessel, outfitted for the harbor unit's dive team, was delivered November 4, 2013. Measuring 61 ft. on deck with a 17-ft. beam and 3-ft. draft, the boat was designed by C. Raymond Hunt and features the shipyard's Chesapeake Class pilot boat deep-V hull.

The heated forward-leaning windows in the front and the side and aft windows on the flush-mounted pilothouse offer 360-degree visibility of search and rescue operations. The view is further enhanced from the fly-bridge.

In the forecabin is a patient triage area, with two upper and lower berths, a small, fully-equipped galley, and a head. Aft of the pilothouse is the diver's ready-room, with a settee and table and a work counter. Behind the ready room, the open aft deck is partially covered by a removable canopy for the divers' dressing table, gear, and scuba tanks, and a decontamination shower. On the aft deck is also a 13-foot inflatable tender, launched by a hydraulic, knuckle-boom crane. The boat's main propulsion comes from twin 10 cylinder MTU-10V2000M94 diesel engines, each producing 1600 Bhp at 2,450 rpm, giving the boat a top speed of over 35 knots, and at 25 knots a range of about 180 miles. The engines turn a pair of Hamilton HM521 water-jets through ZF3000 gearboxes. A 30 kW Northern Lights/Alaska Diesel generator provides service power.

Russian Icebreaking Rescue Vessel



Arctech launched the icebreaking multipurpose emergency and rescue vessel for the Russian Federal Agency of Sea and River Transport and to be operated by the FGI Gosmorspassluzhba (Russian Marine Emergency Rescue Service) on December 12, 2013 at Helsinki Shipyard. Baltika will be used in icebreaking, rescue and oil combating operations in the Gulf of Finland.

The vessel features an asymmetric hull, patented oblique design and three 360 degrees rotating propulsors, which allow it to operate sideways, astern and ahead. In oblique mode the vessel will be able to generate 50 m wide channel in 0.6 m



(Photo: Arctech Helsinki Shipyard)

thick ice. Bow and stern first the vessel can operate in 1.0 m thick ice. The design of the vessel is based on ARC 100 concept, which has been developed by Aker Arctic Technology.

When the vessel is delivered, it will be used in the Gulf of Finland in icebreaking, rescue and oil combating operations.

The advanced oil recovery system is suitable for operation also in heavy waves. The vessel measures 76.4 m in length and 20.5 m in breadth. The three main diesel generator sets have the total power of 9 MW and the total propulsion power is 7.5 MW.

Cameroon Navy Takes Two

Spanish shipbuilder Grup Aresa Internacional delivers for the Cameroon Navy

The Cameroon Navy (CN) has taken delivery of two new 24m ARESA 2400 CPV Defender and one new 23m ARESA 2300 LD Craft to patrol and secure its coast. Cameroon's Chief of Naval Staff, Rear Admiral Jean Mendoua, commissioned the 23m Aresa 2300 landing craft and two 24m Aresa 2400 CPV Defender patrol boats at the Cameroon Navy Base in Douala on November 21. The commissioning also included a presentation meeting as well as a tour of the boats while moored at the Naval Base.

The Spanish shipbuilding group has worked extensively with Cameroon, supplying a sizeable number of vessels to its Navy, which has 12 Aresa boats in service. This figure includes six Aresa 750 Commandos RIBs - delivered last August -, five 1200 Stealth RIBs and one 1200 Defcon RIB - delivered in May 2013. Further deliveries will take place in February when two 32 meter patrol boats will be delivered.

The ARESA 2400 CPV Defender is a 24m coastal patrol vessel that can be used for a number of applications such as offshore patrol, border patrol, anti-piracy, anti smuggling, troop transport, and search and rescue missions, amongst others. The ARESA 2400 CPV Fighter is powered by two diesel engines driving two water jets that reach a maximum speed of 30. The boat has a length of 24.5 meters and a range of 750 nautical miles.

Standard equipment on ARESA 2400 CPV Defender includes X-band surveillance/navigation radar and electro-optical sensor system for day and night surveillance, armored optional, Fi-Fi gun equipment, Auxiliar RIB ARESA 550 Commandos RIB, custom electronics and hard point for multi-weapons mount.

The ARESA 2300 Landing Craft is a cargo, troop and roll-on roll-off transport vessel able to carry 32 people aboard. It is powered by two 450 hp diesel engines, and can reach a speed of 12 knots. This 23.30 meter long vessel has a range of 250 nautical miles at 11 kn and features one hydraulic crane (capable of lifting 10 tons), 12.7 mm gun mounts and optional ballistic protection.



(Photo: Grup Aresa Internacional)

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HT900s for High Speed Crew Boat

HamiltonJet reports that four HT900 waterjets were selected by Incat Crowther's latest project, a first-of-type 70m Catamaran Fast Crew Boat for operations in the Caspian Sea oil industry in Azerbaijan. When completed later this year, the vessel reportedly will be the world's largest high speed crew boat. The new 70m, DP2 class vessel class will feature four control stations, each using Hamilton Jet's MECS control system integrating with a DNV DYNPOS-AUTR dynamic positioning system. Powered by four 2880kW MTU engines each turning 900mm diameter waterjets, expected top speed is 36 knots with an efficient service speed of 30 knots at full load and 90% MCR. The vessel will be capable of carrying 150 passengers and 14 crew, along with 200 tons of deck cargo, in up to 40 knot wind and seas of 3m significant wave height. The vessel is under construction at the Incat Tasmania shipyard, with the design by Incat Crowther and production engineering by Revolution Design. In designing this



new 70m vessel class, Incat Crowther drew on its previous experience with the SEACOR CrewZer class of fast catamaran crewboats, with the fourth of these

recently launched in the U.S. These vessels use HamiltonJet waterjet propulsion (quad HM811s). Prior to this vessel, the largest vessel HamiltonJet waterjets

were used in was the 68.5m Gulf Craft-built crew boat Ms Netty. Designed by Incat Crowther, it uses quad HT900 waterjets and has a top speed of 32 knots.

Carnival Selects MAN Power

MAN Diesel & Turbo has won an order from Miami-based Carnival Cruise Lines to supply five medium-speed 48/60CR engines to power its next-generation diesel-electric propulsion cruise liner to be built by Fincantieri.

With a gross tonnage of about 133,500 tons and a passenger capacity of about 5,000, the ship will be the largest vessel in the Carnival Cruise Lines' fleet. Its construction represents the introduction of a new class of ship that will be powered by five MAN Tier-II-type engines – 2 × 14V48/60CR + 3 × 8L48/60CR types – capable of delivering 62,400 kW. The vessel is scheduled for delivery in the spring of 2016.



Image courtesy of MAN

Marex OS II

for CPP, Waterjets, Hybrid Drives

Rexroth added a new member to its product family of modular remote control systems: A lean control for controllable pitch propellers (CPP) based on the proven Marex OS platform. More than 10,000 units installed on vessels all over the world attest to the maturity and reliability of Rexroth's Marex OS as a hardware and software platform for controlling ship propulsion systems. Its applications range from simple reversing gear systems to redundant controllable pitch propeller systems, for example on offshore supply vessels. The latest system, Marex OS II-CPP, completes the modular Marex product range, closing the gap between Marex SB for small boats and Marex OS for more extensive applications.

With this package, a manufacturer-independent control is now available for controllable pitch propellers in small- and medium-scale applications.

Marex OS II-CPP meets all the demands of a state-of-the-art electronic remote control. The system is easily customized to the individual



Marex OS II-CPP: Optimized for applications with controllable pitch propellers, such as wind farm service vessels.

requirements of drive and control stations using the service and parameterization tool ParaEdit. With this tool, customers can quickly and easily specify the desired number of keys or special control head setups. The display and user interface options on the central unit guarantee simple commissioning.

All parameters can be set directly without the need for extra equipment.

New Cummins Tier 4 Diesel Engines

Cummins Power Generation launched two new diesel G-drive engines from 240-433 hp that are certified to meet EPA Tier 4 Final emissions regulations for nitrogen oxides (NOx) and particulate matter (PM or soot) without the use of a Diesel Particulate Filter (DPF). Instead, the new engines employ a combination of in-cylinder combustion improvements, exhaust gas recirculation (EGR) and selective catalytic reduction (SCR) exhaust after treatment. The new engines are suitable for powering generators from 150-300kVA.

The first Tier 4 Final G-drive engines, available Q2 2014, will be the QSB7 and QSL9. The QSB7 is rated

at either 240 or 315 hp and designed to power generator sets with standby ratings of 150-220 kVA. Available at the end of Q2 2014, the QSL9 will be rated at 433 hp and designed to power generator sets rated at 300kVA. "By eliminating the need for a DPF, these engines offer reduced maintenance and 4% better fuel efficiency than previous Tier 3 engines," said George Iarca, regional manager for G-drive, Cummins Power Generation. The Tier 4 Final G-drive engine packages will also include diesel exhaust fluid (DEF) dosing and supply modules that control the dispensing of DEF into the SCR to cut emissions of NOx.

New Tier 4 Final G-drive engines from Cummins Power Generation



GE Powers India's First Aircraft Carrier

Four GE LM2500 gas turbines will power the Indian Navy's INS Vikrant, providing 80MW for the country's first indigenous aircraft carrier. Similar to the INS Vikrant itself, the ship's propulsion plant were manufactured in India by Hindustan Aeronautics Ltd.'s (HAL) Industrial & Marine Gas Turbine (IMGT) Division. Through its license with GE, HAL assembled, inspected and tested the LM2500 gas turbines and module enclosures for INS Vikrant. The IMGT Division's Bangalore facility provides comprehensive support including inspection, spare parts, maintenance, equipment overhauls and assembly for industrial

and marine gas turbines under license. GE LM2500 gas turbine modules assembled and tested by HAL also power the Indian Navy's INS Satpura, INS Sahyadri and INS Shivalik stealth frigates. The LM2500 gas turbines were installed prior to the ship's launch on August 12, 2013. The aircraft carrier will be delivered in late 2016/early 2017.

Upgraded MaK Engine Gets Power Boost

Caterpillar Marine announced the development of new features and increased power ratings for the MaK M 25 C propulsion engine, its ubiquitous commercial marine engine platform with more than 1,000 installations in marine appli-

cations and vessels to its credit. According to the manufacturer, updates include reduced part load fuel consumption, improved engine load response capabilities and a five percentage higher rating over the existing platform, increasing the power output to 350 kW per cylinder. First engines of the enhanced M 25 C engine platform will be available by the end of 2014. According to Detlef Kirste, Caterpillar Marine MaK product definition manager, "We wanted to give our customers increased operational flexibility which do support state of the art

propulsion technologies and the new M 25 C is designed for both traditional mechanical-and electric propulsion systems as well as electric propulsion systems, which do require variable engine speed capabilities." Manufactured in Kiel, Germany, the M 25 C will be offered in 6, 8 and 9 cylinder configurations. The platform will meet IMO II emissions regulations in its standard configuration and is designed to support the operation of Selective Catalytic Reduction (SCR) systems in order to comply with IMO III emission regulations.

LNG/Diesel MicroTurbines

Capstone Turbine Corporation, a clean technology manufacturer of microturbine energy systems, is expanding its product offering in the marine market and has appointed six Capstone marine distributors.

Capstone marine microturbines, which run on LNG or diesel, are installed on several vessels including the Argonon, a Type C tanker in the European inland waterways that has been operating with two C30 LNG Capstone microturbines since 2011. Capstone Microturbines are particularly targeted for small- and mid-size commercial ships that travel inland waterways and Emission Controlled Areas (ECAs). This innovative power technology can produce 30-kilowatts to multiple megawatts of high-efficiency onboard electricity.

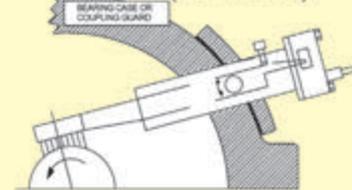
The LNG or diesel-fueled microturbines can provide all onboard electrical power. In addition, the technology becomes even more efficient when waste heat from the microturbine is captured during operation and re-used for other energy needs on the ship, such as heating and chilling.

In addition, the company has launched a contest that will give away up to 130 kilowatts of marine power to three existing or new ship owners. Winners will be selected from entries submitted which represent the most compelling marine projects that can be powered by clean-and-green marine microturbines. **Entries must be submitted at winmicroturbinepower.net by March 31, 2014.**

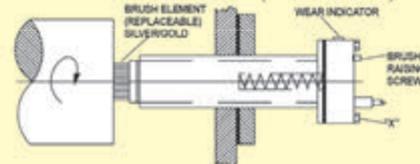
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Cuccias



Edenzon

Cuccias to Succeed Edenzon as Ingalls President

Huntington Ingalls Industries (HII) said that Irwin F. Edenzon will retire on Dec. 1, 2014. Edenzon is currently corporate vice president and president of Ingalls Shipbuilding. Although Edenzon will not officially retire until December 2014, he will step down as president on March 31, 2014, and the HII Board of Directors has elected Brian Cuccias to succeed Edenzon in the position of corporate vice president and president of Ingalls Shipbuilding, effective April 1, 2014.

Edenzon was named as Ingalls Shipbuilding president in 2011 and is responsible for all programs and operations at Ingalls Shipbuilding. Prior to this position and since 2008, he served as sector vice president and general manager for Northrop Grumman Shipbuilding-Gulf Coast. Prior to this appointment, he held several positions of increased responsibility, to include director of future carrier programs and senior vice president of technology development and fleet support for the former Northrop Grumman Newport News.

Brian Cuccias, who will report to HII President and CEO Mike Petters effective April 1, 2014, currently serves as the vice president, amphibious ship programs, for Ingalls Shipbuilding and will become vice president, program management, effective Jan. 6, 2014, until he assumes the president role in April. In this role, he will have responsibility for all program and financial aspects, including solicitations, program execution and financial performance of all Ingalls Shipbuilding programs, to include large-deck amphibious ships (LHA 6, LHA 7 and capture of LHA 8) as well as LPD and LPD variant ships production, surface combatants and U.S. Coast Guard ship programs.

Cuccias' shipbuilding career began in 1979 when he joined Litton Data Systems as a financial analyst on several Navy programs. In 2008 Cuccias was the vice president, surface combatants, for Northrop Grumman Shipbuilding, which included the DDG 51 Arleigh Burke-class destroyers, DDG 1000 Zumwalt-class destroyers and the U.S. Coast Guard campaigns. Most recently and prior to his current position, he was the vice president, large-deck amphibious ships (LHA 6, LHA 7 and capture of LHA 8).

Cuccias earned a bachelor of science degree in accounting from the University of South Alabama. He also attended Harvard Management, Leadership and Financial Skills, and the Wharton School of Business Executive Education program.



O'Brien



Gujral



Ørbeck-Nilssen



Keller

Obit: Herb Repass, Founder, New England Ropes

New England Ropes, a wholly-owned subsidiary of the Teufelberger Group, said Herb Repass, the company's original co-founder, passed away recently in Vero Beach, Fla. Repass co-founded New England Ropes, Inc. in New Bedford, Mass., with his friend and associate David Aigler in 1967. Repass served as President and chief designer of specialty ropes that were manufactured by the company for yachting, safety and rescue, arborist, mountaineering, lariats for cowboys, and Navy and Coast Guard operations. Herb, Dave and his son Randy also collaborated to sell rope for boating on the west coast, spawning West Marine.

Austal USA Names New O'Brien VP

Austal USA announced the appointment of Terry O'Brien to the position of Vice President of Business Development and External Affairs, effective November 18, 2013. In this role, he will be responsible for the all of Austal's Business Development efforts, state and federal legislative activities, as well as coordinating external communications and media relations. A retired Navy Captain with over 26 years of service, he commanded USS Pensacola and the Nassau Amphibious Strike Group during the initial stages of Operation Iraqi Freedom.

Gujral Named New Harkand CFO

Subsea inspection, repair, maintenance (IRM) and light construction company Harkand announced the appointment of Ben Gujral as the group's new CFO.

Ørbeck-Nilssen: Maritime President, DNV GL

Knut Ørbeck-Nilssen is appointed president in DNV GL Maritime. Ørbeck-Nilssen took on the role as president from January 1, 2014, and will operate out of Hamburg. Knut Ørbeck-Nilssen holds a Bachelor of Engineering degree from Heriot-Watt University where he was awarded a First Class Honor's Degree in Civil Engineering in 1990. He has an undergraduate degree from Oslo Polytechnic in Civil Engineering.

Sea Star Line, TOTE Leadership Changes

Effective January 1, 2014, Sea Star Line (SSL) President Peter Keller became Executive Vice President of Sea Star Line's parent company, TOTE, Inc. In this new capacity he will assist in the oversight of both TOTE Shipholdings and the TOTE Maritime Division, which includes Sea Star Line and Totem Ocean Trailer Express (Totem Ocean).

Succeeding Keller, as President of Sea Star Line is Tim Nolan, who has served as Sea Star Line's Executive Vice President since May.

Carnival Appoint Burke First CMO

Carnival Corporation & plc appointed U.S. Navy retired Vice Admiral William Burke to the newly created position of Chief Maritime Officer, effective December 9, 2013. Burke will report directly to Chief Operations Officer Alan Buckelew and will have oversight of the company's maritime operations around the world. He will be responsible for maritime quality assurance and policy, shipbuilding, ship refits, and research and development.

Bader Joins Martek

Martek of Palm Beach, a marine electronics engineering and support company based in Stuart, Fla., announced the addition of marine business veteran Martin Bader as chief financial officer.

Duncan Joins BMT Designers & Planners

BMT Designers & Planners (BMT), a subsidiary of BMT Group Ltd., an international design, engineering and risk management consultancy, appointed Ralph Duncan as Vice President of Business Development.

Maersk Training Appoints Bowyer

Maersk Training announcement the appointment of David Bowyer as new Head of Training and Education, and he joins the senior management team to oversee all aspects of training, following recent growth in the number of delegates attending their courses.

Tru-Marine Opens U.S. Service Station

Turbocharger specialist Tru-Marine opened in Houston to align its global service coverage with its customers' increasing expectations for integrated fleetwide maintenance, repair and overhaul (MRO) solutions. Located in Deer Park, Texas, and supported by Tru-Marine's extensive global service network and inventory, Tru-Marine Houston is now one of the largest turbocharger service stations in the area providing full range services for turbochargers in ocean-going vessels and offshore oil and gas installations.

ClassNK Tops 220 Million GT

Classification society ClassNK announced that the ClassNK register topped 220 million gross tons for the first time at the end of November 2013. The an-



Nolan



Bader



Duncan



Bowyer



Stevens



Ueda

nouncement was made following the November meeting of the ClassNK Classification Committee, which certified the ClassNK register listed 8,511 vessels totalling 220,212,135 gross tons as of November 30, 2013. Since the beginning of 2013, some 800 vessels totaling more than 9 million gross tons have joined the ClassNK register.

“We will continue to expand our services as well as intensify our global operations over the coming years in order to provide the global maritime community with the very best in classification services around the world,” said Noboru Ueda, ClassNK Chairman and President.

Volvo Penta Appoints New Caribbean Dealers

Volvo Penta of the Americas announced the appointment of Scotts Marine of Grand Cayman and Pirate Marine Hardware of Cozumel as full-line sales and service dealers.

Weston Appointed Manager at Survival Craft

Survival Craft Inspectorate (SCI), a global provider of emergency marine systems and support services, appointed David Weston training and competence operations manager at the business, which recently opened its 12th office in Rotterdam.

OMEGA Engineering Inaugurates Brazil Office

OMEGA Engineering will open its newest office in Campinas, São Paulo, Brazil with an official grand opening ceremony on December 16, 2013. This is in line with OMEGA’s strategy to expand its business and leadership globally. Headquartered in the U.S., OMEGA has been in process measurement and control in the U.S. for more than 50 years and is part of Spectris plc, a supplier of productivity-enhancing instrumentation and controls listed on the London Stock Exchange.

Aloha Foss Maritime

Hawaiian Tug & Barge, which provides harbor support services in all major ports of Hawaii, has adopted new colors and a new name: Foss Maritime Company. Founded by Young Brothers Ltd., Hawaiian Tug & Barge (HTB) was formed as a sister company to separate harbor operations and charter activities from Young Brothers’ inter-island freight operations. HTB has since become Hawaii’s leading tug and barge transportation company operating four tugs with 20 employees. Young Brothers and HTB joined the Foss

Maritime group of companies in 1999. Hawaiian Tug & Barge will officially come under the Foss name on Wednesday, December 11. “We’ve updated the name and brand of HTB,” said Paul Stevens, CEO and president of the Seattle-based Foss Maritime. “But beyond those changes almost everything else will continue on as business as usual in Hawaii.”

Farris, JA Moody Declare Sales Partnership

Farris Engineering, a business unit of Curtiss-Wright Flow Control, entered into an agreement with marine valve sales and service company JA Moody, designating them as the Farris Engineering sales representative to the U.S. Navy and commercial marine markets.

Inmarsat to Acquire Globe Wireless

Inmarsat announced the acquisition of the business and substantially all of the assets of Globe Wireless LLC. Headquartered in Palm Bay, Florida, Globe Wireless is a leading provider of value-added maritime communications services to the shipping market. Inmarsat will acquire the business of Globe Wireless for a total consideration of \$45 million and will fund the acquisition from available liquidity. Closing of the transaction is subject to certain regulatory and other approvals, which are expected to be completed in January 2014.

Incat Crowther Opens Brazil Office

Incat Crowther opened an office in Rio De Janeiro, Brazil, which was created to meet the growing demand for Incat Crowther’s products and services in South America while placing Incat Crowther at the center of the South American Offshore Oilfield industry.

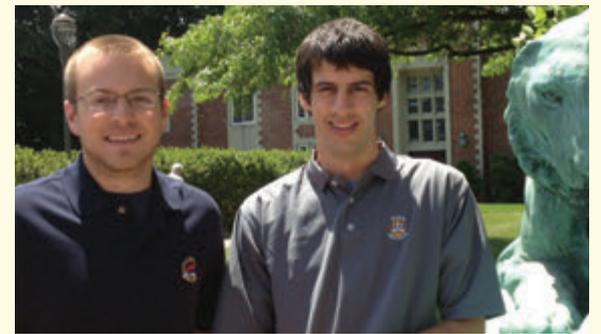
Valez Joins Hawaiian Ocean Transport

Hawaiian Ocean Transport, Inc. has strengthened its core management team by hiring Julian Velez as the new business development manager.

MacGregor Receives Huge Order from HHI

MacGregor, part of Cargotec, received an order worth \$77 million for optimized cargo handling systems for five A-14-series and five A-18-series container vessels from Hyundai Heavy Industries Co. Ltd. in South Korea. The 14,000 TEU and 18,000 TEU ships are built for the United Arab Shipping Company (UASC) and they are scheduled for delivery between 2014 and 2015. The shipyard holds options for an additional five A-14-vessels and one A-18-vessel.

Crowley Scholarships Support Industry’s Future

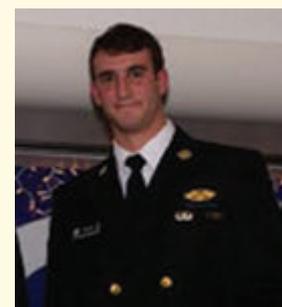


Webb Institute’s Weklar (left) & Conway

Crowley Maritime Corporation recently awarded two Thomas B. Crowley, Sr. Memorial scholarships to a pair of exceptional students from Webb Institute. Both recipients, juniors Matt Weklar and Nolan Conway, were selected for their remarkable leadership qualities, academic excellence and an unprecedented commitment to the maritime industry.

Crowley Scholarships to Two USMMA Cadets

Crowley Maritime Corporation awarded two Thomas B. Crowley Sr. Memorial scholarships to United States Merchant Marine Academy (USMMA) cadets Christopher Anthony and Thomas Treat during the 2013 Containerization and Intermodal Institute’s Connie Awards luncheon in Newark, N.J. Both recipients were selected for their strong academic records, leadership capacity and financial need. Crowley’s Jonathan Christian, marine personnel supervisor, was in attendance and presented the scholarships to the students during the event.



USMMA Cadets Anthony (left) & Treat

Castrol Cyltech CL 100

Castrol Marine will launch Castrol Cyltech CL 100 ACC in May 2014, a next-generation cylinder oil which is Castrol's technical response to the corrosion issues that can arise in modern two stroke marine engines, especially when ships are slow steaming. Castrol Cyltech CL 100 ACC (Advanced Corrosion Control) is a newly formulated 100BN lubricant developed for the latest generation of engines.

"Castrol Cyltech CL 100 ACC is not simply an existing oil that has been up-treated to give a higher BN," said Jonathan Hutchinson, Castrol Marine Marketing Director. "It is based on a new chemistry that we have been developing over the past two to three years to reflect technical challenges set by modern super long stroke engines. These operate at higher pressures causing higher dew points and increased sulfuric acid formation, which in turn can result in severe corrosive wear, particularly where higher sulfur fuels are used and the engine is operated at lower loads."

www.castrol.com

Total Debuts Talusia Universal 100

Total Lubmarine launched Talusia Universal 100, a lubricant designed to reduce the risk of cold corrosion in Mark 8.1 and newer marine engines, as well as electronically controlled engines. Following the latest guidance from certain engine manufacturers on how to effectively manage severe cold corrosion, Talusia Universal 100 supports the technical changes made to the latest generation of engines.

Talusia Universal 100 builds on the modern chemistry of Total Lubmarine's single-oil, Talusia Universal. It is designed to provide operators with all the associated benefits, including increased neutralization efficiency in extreme conditions and better control of deposit build-up in case of less severe conditions. Talusia Universal 100 is available in ports worldwide including Singapore, Europoort, Rotterdam, Antwerp, Busan, Ulsan, UAE ports, Hong Kong, Los Angeles, Houston, New Orleans and Gibraltar.

www.lubmarine.com

Wärtsilä LNG Package for New Ferry



Wärtsilä will provide a complete dual-fuel propulsion and LNG equipment package for a new passenger ferry being built for Reederei Cassen Eils

GmbH. The contract was signed with the shipyard Fr. Fassmer GmbH. The new ferry will operate between Cuxhaven and the island of Helgoland in Germany. This route will take it close to the Lower Saxon Wadden Sea national park, an ecologically sensitive UNESCO World Heritage listed area in the south-eastern part of the North Sea. Because of the need to minimize exhaust gas emissions in this area, the ferry will operate primarily on LNG using two nine-cylinder Wärtsilä 20DF medium-speed dual-fuel engines.

www.wartsila.com

Safety Guidelines for Gas Fuelled Ships

ClassNK released its second version of the Guidelines for Gas Fuelled Ships, a version that reflects the requirements for the design of natural gas fuelled ships based on the outcome of discussions held at IMO regarding the International Code of Safety for ships using gases or other low flash-point fuels (IGF Code). With regulations curbing atmospheric pollution and greenhouse gas emissions growing stricter amid stronger calls for a greener shipping industry, the industry is turning toward the use of natural gas as a potential cleaner alternative to liquid fuel oil. Expected reductions in gas prices due to the recent development of non-conventional energy resources such as shale gas has also led to an increase in gas fuelled ship newbuildings and projects.

ClassNK published the Guidelines for Gas Fuelled Ships to provide comprehensive information on key design features including bunkering, hull structure, fire safety and explosion prevention measures in line with the results of IMO discussions on the IGF Code.

www.classnk.com

Exhaust Gas Clean Retrofit



Wärtsilä was contracted by TT-Line to retrofit an exhaust gas cleaning system to its RoPax vessel, M/S Robin Hood, as part of TT-Line's Green Ship strategy. The full turnkey project will be managed

by Wärtsilä, and the vessel will be fitted with four Wärtsilä Hybrid Scrubber Systems designed to reduce sulfur oxide (SOx) and particulate emissions from the ship's exhaust. The ferry operates in the Sulfur Emission Control Area (SECA) between Travemünde, Germany and Trelleborg, Sweden. The Wärtsilä systems will enable compliance with the SECA regulations, as well as with anticipated future legislation.

www.wartsila.com

Klüberbio Lubricants

Klüberbio EG 2 gear oil for thrusters and Klüberbio RM 2 stern tube oil now carry the European Ecolabel, signifying compliance with the U.S. Environmental Protection Agency's (EPA's) 2013 Vessel General Permit (VGP). The EU Ecolabel is a label of environmental excellence that is awarded to products and services meeting high environmental standards throughout its lifecycle, from raw material extraction, to production, distribution and disposal. Klüber's gear oils for thruster and CPP propulsion units and its stern tube oils are approved for use by thruster and seal system OEMs and now have independent assurance, from the EU Ecolabel Program, that the products achieve the U.S. EPA's requirements for classification as an Environmentally Acceptable Lubricant (EAL). Therefore, these lubricants meet the standards for biodegradability, minimally toxic, and non-bioaccumulating standards set in Appendix A of the U.S. EPA's VGP.

www.klueber.com

New Marine Cylinder Oil

Condition of the liner following the trial to assess the performance of Mobilgard 5100 in a new generation MAN engine. Mobilgard 5100 provided good corrosion protection and outstanding engine cleanliness throughout the trial period, with the engine running on fuel with a sulfur content from 2.5-3.1%.

ExxonMobil Marine Fuels & Lubricants launched Mobilgard 5100, a specially formulated cylinder oil designed to mitigate the effects of cold corrosion in new design two-stroke marine engines operating on heavy fuel oil. Mobilgard 5100 joins Mobilgard 560 VS and Mobilgard 570 as the latest addition to ExxonMobil's range of cylinder oils. ExxonMobil created Mobilgard 5100, a 100 BN cylinder oil, which has been formulated to address the problem of cold corrosion which occurs when the engine's cylinders operate at conditions below the acid dew point, creating the potential to cause significant liner wear.

The introduction of Mobilgard 5100 follows ExxonMobil's recent upgrade of its comprehensive two-stroke engine condition monitoring program, MobilGard Cylinder Condition Monitoring (CCM). Leading engine builders, including MDT, now advocate using scrape down oil analysis, which is part of the MobilGard CCM program, to support marine operators with new or modified engines. The new MobilGard CCM offers operators and owners quick and easy comparisons of onboard scrape down oil samples against ExxonMobil's database of nearly 100,000 test results, helping marine operators to enhance protection and realise further cost and efficiency savings.

www.exxonmobil.com/marine





Successful MX-Scrubber Testing

As per December 1, 2013, a closed loop Scrubber installation designed for marine applications has been up and running successfully at the Marine Exhaust Technology test facility in Frederikshavn, Denmark. Thus, Marine Exhaust Technology becomes the first supplier in Denmark and among the top three suppliers worldwide of Exhaust Gas Cleaning Systems with operational full scale Scrubber and SCR test facilities, where technology and solutions can be tested and proven under various conditions and in various setups. The ongoing tests at the Marine Exhaust Technology test facility in Frederikshavn include tests of different combinations of SCR, boiler and Scrubber systems, tests of various process water treatment systems, of monitoring and logging systems as well as of advanced online remote control systems. The test facility features a setup based on a 1MW MAN Diesel 9L16/24 marine engine connected to a generator and a heat recovery system. The engine is able to run on both Marine Gas Oil and Heavy Fuel Oil. The electricity and heat generated is fed into the public electricity grid and the heat generated is used as heating source for the MAN Diesel & Turbo SE production and R&D center next to the test facility.

www.maexte.com

EGCS for VLGCs



Clean Marine was selected by Hyundai Heavy Industries to supply exhaust gas cleaning systems (EGCS) for a Very Large Gas Carrier

(VLGC) being built for Dorian LPG Ltd. Clean Marine has developed an EGCS based on the Advanced Vortex Chamber technology that provides unique particulate matter trapping efficiency. The system's integrated fan and gas recirculation technology also allows the one EGCS unit to simultaneously serve several combustion units. The system supplied to Dorian LPG is a hybrid system that allows the vessel to operate seamlessly in all types of water (including low alkaline and saline water) without loss of efficiency.

www.cleanmarine.no

ValvTect BioGuard Plus 6

BioGuard Plus 6 is a multifunctional diesel additive that contains a micro-biocide to prevent bacteria plus six additional components that the maker claims can double fuel filter life, stabilize diesel up to two years, lubricate injectors and fuel pumps and clean-up injector deposits to improve power output and reduce fuel consumption. This biocide is formulated to prevent bacteria as well as all other diesel fuel related problems. BioGuard Plus 6 is an EPA registered multifunctional biocide that prevents bacteria and other biological contamination, plus it provides the following benefits:

- Lubricates fuel pumps and injectors to prevent pre-mature wear.
- Stabilizes diesel fuel up to two years that can double fuel filter life.
- Prevents corrosion to protect the entire fuel system.
- Disperses moisture to help prevent sludge and extend fuel filter life.

www.valvtect.com



Nano Fossil Fuels Technology

As shipping lines and suppliers scramble to meet existing and future pollution regulations, part of MARPOL, which sets limits on NOx and SOx emissions. Nano Fossil Fuels Technology has a simple solution for these emission problems - the Nano Fuels Combustion Catalyst. When added to Bunker fuels the catalyst reduces the viscosity of the fuel permitting more efficient burning. This results in two benefits: reduces smoke emissions by up to 75% and reduces fuel consumption by almost 13%.

nanofuels@sbcglobal.net

Schottel: Two New Facilities



With an inauguration ceremony Schottel opened new facilities in Houma, La., in October 2013. As an answer to the growing request for new Schottel propulsion systems and the steadily growing population of drives on the market the German manufacturer moved from St. Rose, La. to new facilities in Houma, La. The new premises offer a large administration area and state of the art service halls equipped with heavy lift cranes especially suitable for large units. SCHOTTEL claims this is a further step towards enhanced commitment to the customer.

www.schottel.de

Bosch Emission Systems

Bosch Emission Systems offers a full line of diesel emission systems for on- and off-road applications, including marine and stationary engines. Bosch's diesel exhaust systems include particulate filters, oxidation catalysts, selective catalytic reduction systems and other components, and the company offers full system integration on OEM and retrofit exhaust applications. Bosch Emission Systems has extensive research and development capabilities to develop the right after-treatment system for diesel exhaust applications. Bosch Emission Systems after-treatment technologies can help make marine vessels cleaner and greener and provide an economic advantage.



www.besg.com

Powerful Direct Drive

The new Hägglunds CBM hydraulic motor from Bosch Rexroth, taking over from the Hägglunds Marathon motor, reportedly packs 50% more torque into a motor that is smaller and up to 50% lighter than its predecessor. According to the manufacturer, that gives it the world's highest torque-to weight ratio. Bosch Rexroth said the Hägglunds CBM not only handles heavier workloads, but also takes up less space and places less weight on the drive shaft. This means that customer machines, and in some cases the facilities that house them, can be smaller, lighter and simpler.

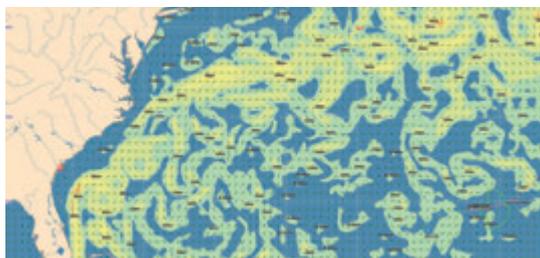


www.boschrexroth.com

FleetWeather

FleetWeather Ocean Services, Inc. introduced a business intelligence solution for the global commercial shipping and maritime industry. FleetWeather's new services provide insight, intelligence and innovation for global shipping leaders, helping them manage change, opportunities and complex decisions resulting in increased profits and significantly reduced costs. FleetWeather offers a range of services, all of which can be fully customized. All services rely on three core components in the FleetWeather delivery process: Front-End Presentation Portal; Conduit of Information; and Back-End Data.

www.fleetweather.com



Fleet Decision Support

Applied Weather Technology, Inc. (AWT) offers the latest version of its customizable fleet management system with the release of Fleet Decision Support System (FleetDSS) Version 2.0. In addition to being suitable for use within a company's IT network, FleetDSS has new tools, including an ETA confidence tool and a comparative vessel type performance graph, making it easy for operators to closely monitor the efficiency of their fleets. FleetDSS 2.0 includes high-resolution wind, wave and current data to provide operators with more detailed information.

www.awtworldwide.com

New ECDIS-E

Northrop Grumman is introducing the VisionMaster FT Electronic Chart Display and Information System-E (ECDIS-E), a new navigation solution for commercial tankers, containerships, bulk carriers and passenger ferries including retrofit installations. It is based on the Northrop Grumman Sperry Marine VisionMaster FT platform. The system meets International Maritime Organization requirements for certain classes of vessels operating internationally to be equipped with ECDIS for paperless navigation. The design of the new VisionMaster FT ECDIS-E is focused on ease of use and features a simplified menu structure. It operates on a new standard commercial panel PC, which handles the functions of the monitor, PC unit and related subassemblies and incorporates Total Solid State (TSS) technology. TSS enables Northrop Grumman to build panel PCs that use only microchips instead of the traditional mechanical or rotating active components.

www.northropgrumman.com

MATRIX AIS/GPS GX2200 Launched



Standard Horizon announced the new GX2200 Matrix AIS/GPS, now with Class D DSC Fixed Mount VHF with integrated AIS and GPS, 30W PA/Hailer and

RAM mic option, available starting January 2014. According to the manufacturer, key features include Integrated AIS and GPS, 4800 and 38400 baud rate selections (Allows connection to GPS Chart Plotter with 1 NMEA IN/OUT), selectable True and Magnetic readings for AIS target and PA/FOG simultaneous operation with AIS display and GPS status page. Minimum Advertised Price: \$399.99.

www.standardhorizon.com

Koden KGC-222 GPS Compass



SI-TEX Marine Electronics offers the new-for-2014 Koden KGC-222 GPS Compass for commercial fishing vessels, work-

boats and high-end recreational yachts across North America. With its streamlined antenna, professional-grade performance and standard dedicated digital display, this new system is an ideal solution for any vessel that requires precision position accuracy and output of stable, three-dimensional heading data for autopilots, radar systems, echosounders, sonar, AIS, onboard PCs and more. The Koden KGC-222 provides accurate and stable heading data with 10 RMS heading accuracy and 0.10 heading resolution. In addition to its parallel 16-channel GPS receivers, the KGC-222 utilizes an internal electronic compass as a backup sensor.

www.si-texkoden.com

New Portable Combustion Gas and Emissions Analyzer

The E8500 industrial combustion analyzer from E Instruments is a complete portable tool for EPA compliance level emissions monitoring and testing. It is suited for regulatory and maintenance use in boiler, burner, engine, turbine, furnace and other combustion applications. The analyzer features up to nine gas sensors. The E8500 also includes electrochemical sensors – O₂, CO, NO, NO₂, SO₂, H₂S; NDIR sensors – CO₂, CxHy, high CO; low NO_x and true NO_x capable; real time PC software package; wireless remote printer; internal thermoelectric chiller with automatic condensate removal; stack gas and ambient air temperature measurements; draft and differential pressure measurements and efficiency, excess air and CO₂% calculated values.



www.e-inst.com

New Engine Room Simulator



Resolve Maritime Academy completed its installation of Transas engine room simulator platform, the ERS 5000 TechSim. As part of the Academy's Simulation Training Center in Fort Lauderdale, Florida, the engine room has booked classes for January 2014.

The ERS 5000 TechSim has allowed Resolve Maritime Academy to expand its course offerings to engineers from all sectors of the maritime industry including the offshore, tanker and cruise sectors.

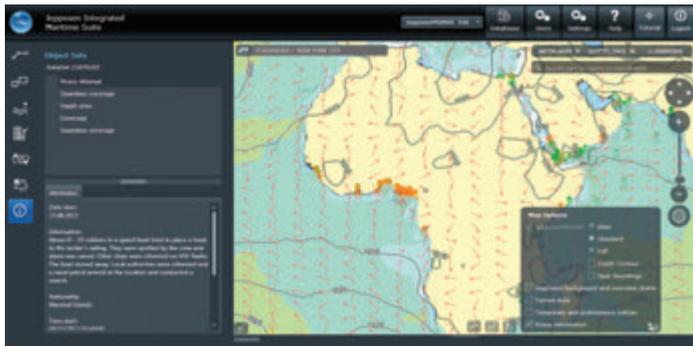
The engine room simulator is connected to Resolve Maritime Academy's full mission bridge simulator, allowing integrated training options for a variety of courses. "Connecting the simulators means we can offer Resource Management and Integrated Systems training to our clients," said David Boldt, Simulation Training Group Manager at Resolve Maritime Academy.

Resolve Maritime Academy hired Rosemary Mackay, an engineer with nine years of experience in maritime education (and 12 years of at-sea experience) to manage the ERS 5000 TechSim. Mackay joins the Academy from Star Center, where she instructed classes offered at the Star Center Engineering Department and was directly involved in course design and development.

The Transas ERS meets STCW code requirements. The scope of training objectives corresponds to specifications of standard competence for engine department personnel, which provide for the use of simulators for training engineers as well as engineering instruction for operational, management and support personnel.

www.resolveacademy.com

Jeppesen Simplifies Routing, Chart Management



NauticalManager from Jeppesen allows mariners to easily plan, generate and document routes using an ECDIS and onboard PC. It also makes it simple to create the reports required by port state control and class auditors for checking a vessel's ECDIS compliance. NauticalManager eases the bridge-side burden of ENC management by making it simple to order Official ENCs, review the chart portfolio and integrate temporary and preliminary Notices to Mariners, according to the manufacturer. NauticalManager was developed after ECDIS users requested a way to simply or automatically plan routes that are in compliance with the ECDIS mandate. It features automated route planning and chart selection – resulting in better voyage planning and less time spent managing digital information. Routes are generated from a database containing thousands of waypoints, legs and ports, allowing a mariner to simply edit a recommended route and transfer it straight to an ECDIS. With NauticalManager, users also can create a semi-automatic route from anywhere on a chart.

The NauticalManager software can also integrate supplementary data layers that provide: ENC Notices to Mariners, including daily temporary and preliminary (T&P) notices; DNV-recognized weather information; Accurate piracy overviews; Notification before charts expire; Weekly updates of the entire chart portfolio; and Notification when new charts, weather updates and chart licenses are available

To increase user friendliness, NauticalManager guides mariners through the process of route planning, chart selection and ordering and the downloading of weather forecasts. The solution also comes with instructions on how to keep a chart database up to date and how to export chart licenses to the ECDIS/ECS.

www.jeppesen.com

K-Sim DP



Photo: Kongsberg

The latest version of K-Sim DP, a Dynamic Positioning (DP) Maneuvering simulator from Kongsberg Maritime received Class A Certification from DNV, making it compliant with the highest DNV standard for DP simulators according to Standard of Certification of Maritime Simulators number 2.14. K-Sim DP is built on the same technology platform as the K-Sim Offshore (previously known as the Kongsberg Offshore Vessel Simulator) and has the power to provide realistic and relevant DP training in various simulated conditions and environments. The new K-Sim DP Maneuvering simulator is configured with a dual redundant DP system and a 240 degree or wider visual scene.

www.km.kongsberg.com

Lowrance Introduces Elite-4 and Mark-4 HDI Series

Lowrance announced the newest addition to its Elite and Mark family of compact fishfinder and chartplotter products, the Elite-4 and Mark-4 Hybrid Dual Imaging (HDI) series. The new HDI units feature built-in GPS antenna, high-definition mapping options and the Lowrance exclusive Hybrid Dual Imaging technology that combines Broadband Sounder and Downscan Imaging. Replacing previous Lowrance Elite-4 and Mark-4 models, the larger and super-bright Elite 4.3-inch color and Mark grayscale displays have 70% more pixels and 36% more useable screen area.



Photo: Lowrance

www.lowrance.com

Iris Launches NightRunner Camera System



Iris Corporation launched its new NightRunner Dual Payload Thermal Imaging/Daylight Color Camera. With its ability to provide both high-resolution thermal imaging and full Pan/Tilt/Zoom daylight color imaging in a single sleek, waterproof housing, NightRunner is suitable for a range of cruising vessels, sailboats and sportfishers. At the heart of NightRunner is a Vanadium Oxide (VOx) 17M pitch, high-resolution thermal core that provides crisp, detailed images to a thermal sensitivity of less than 50mk. According to its manufacturer NightRunner retails at \$4,500 (MSRP).

www.boat-cameras.com

Comark's 15-in. HMI



Comark completed full environmental testing of its new 15-in. Military HMI, including MIL-901D Grade A lightweight shock testing. The 15-in. HMI is a sealed and

fanless computer display unit developed for DDG 51 Machinery Control Applications. As with all Comark products, this new 15" HMI is designed with the latest technology, including current Core i5 processors, an LED backlit display, a rugged IR touchscreen, and integrated speaker. Manufactured in the U.S., the 15" HMI uses long lifespan components to ensure multi-year availability for sustainability in all Navy applications.

www.comarkcorp.com

The EcoMod Series LED Floodlight

The EcoMod LED floodlight from Phoenix Products offers 150 and 300W models with light outputs of 12,500 and 25,000 lumens, respectively. Available packages range from wide flood to narrow spot optics to accommodate any application. The EcoMod Series utilizes exclusive EcoVent Technology that extends the life of the fixture by allowing heat, water, and debris to flow between the modules. Furthermore, the fixture offers the many benefits of LED technology, including significant maintenance reduction, energy savings and instant-on lighting to reduce downtime. According to the manufacturer, the EcoMod Series uses up to 70% less energy when compared to equivalent HID floodlights.

www.phoenixproducts.com

Great Lakes Shipyard Commissions New Cutting Machine

Great Lakes Shipyard installed a new plasma cutting machine, the Plate Pro Extreme 3100. The addition of this cutting table



expands the range of services available to its customers and improves the efficiency of Great Lakes Shipyard operations, while also enhancing the quality and precision of the work being produced. Bringing this capability in-house allows the shipyard to make more of its own parts without relying on outside vendors or subcontractors. An American made product of Koike Aronson Inc./Ransome, the plasma burn table is an automated dual side drive, plasma cutting machine.

www.thegreatlakesgroup.com

Six Thrusters Launched from Thrustmaster



Six Thrustmaster 5,000 hp (3,700 kW) Azimuth DP3 Thrusters classed by ABS were launched on November 25, 2013 during the OOS

Gretha naming ceremony. The Brazil bound semi-submersible drilling rig was built at its ship yard in Yantai, China by CIMC Raffles and is due to work for Petrobras offshore. CIMC Raffles said it is the first asymmetric semisubmersible unit without bracing in the world. This reduces the towing resistance and dynamic positioning load, improving self propelled transit speed from an average 8 knots to more than 12 knots. The asymmetric pontoon outline, with pneumatic de-ballast system, also aids quick ballast adjustment, to suit heavy lifting operation.

www.thrustmastertexas.com

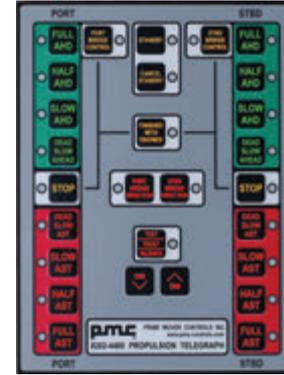
MTU Diesel Engines to Power Singapore's New Naval Fleet



Tognum announced that its MTU Series 4000 diesel engines have been chosen by Singapore Technologies Marine Ltd. to power eight Littoral Mission Vessels for the Republic of Singapore Navy (RSN). The Littoral Mission Vessels will be installed with state of the art, high efficiency MTU 20V 4000 M93L diesel engines, known for their low consumption and long service life, with each unit producing 4,300 kW (5,766 bhp), Tognum said. MTU Series 4000 diesel engines offer unrivalled power density in terms of volume-to power ratio and power-to-weight ratio.

www.tognum.com

Pushbutton Propulsion Order Telegraph



PMC introduced its next generation compact pushbutton style engine order telegraph, the Series 8202-4000. The 7.5-in. (192 mm) high x 5.7-in. (144 mm) wide telegraph unit features nine propulsion order buttons per shaft. Other new features include isolated output connection to the ship's VDR, redundant communication networks and setup / alarm viewing via LCD display.

www.pmc-controls.com

Twin Disc Propulsion Packages to ADSB



Nico International, a Twin Disc distributor in the Middle East, signed a contract with Abu Dhabi Ship Building to supply and commission 30 complete propulsion packages for 15-m patrol boats under construction for Mozambique Navy. Nico said it will supply an entire range of Twin Disc products - Twin Disc Quickshift Marine Transmissions, Arneson Surface Drives, Rolla propellers complete with Twin Disc Control System and BCS Trim Tabs making this the single largest order for Twin Disc from this region. These carbon fiber boats are designed to achieve target speeds exceeding 50 knots and follow first series of 12 boats that are currently in UAE Coast Guard service.

Dyena Acceleration Recorders

Scorpion Ribs is a leading boat maker, and its Scorpion Sting can also provide proof of the ride quality and performance courtesy of data obtained using the Dyena Acceleration Recorder. The Dyena Acceleration Recorder (DaccR) is proving to be a valuable tool for the development and comparison of fast boats. Traditionally, most boat operators have relied upon subjective comparison to evaluate the differences between vessels.

www.dyena.com



Noise Insulation Product Range

Halyard extended its range of noise insulation products with the introduction of Rockwool Marine Firebatt 2000. Aimed at the commercial marine sector, the multi-



purpose Marine Firebatt 2000 is a rock mineral wool slab, providing fire protection, thermal insulation and significant noise reduction to marine craft and offshore installations. Marine Firebatt 2000 has been designed to meet stringent requirements for fire protection and insulation on commercial vessels. It is rated noncombustible in accordance with IMO A799 and is Lloyd's Register of Shipping and MED (Marine Equipment Directive) certified, providing A30 and A60 fire protection to steel decks and bulkheads.

www.adpr.co.uk

Kappel Propeller Retrofit for Tanker



MAN Diesel & Turbo's PrimeServ retrofit team signed an agreement with Great Eastern Shipping Company (GESCO) of Mumbai, India regarding a propeller retrofit upgrade for their M/T Jag Lavanya – a Samsung-built 105,000 DWT crude oil carrier from 2004. MAN Diesel & Turbo announced a strategic focus that added the Kappel design to its fixed-pitch propeller portfolio, both for newbuildings and as a retrofit solution to vessels already in service. After a decade's cooperation with inventor J.J. Kappel, MAN Diesel & Turbo took over the Kappel design business in 2012 and has since developed it further in terms of fixed-pitch propellers. The fuel savings and performance characteristics for controllable-pitch propellers, featuring the unique Kappel blade design, have been well documented over the last five years.

Retrofit calculations on different fixed-pitch propellers evaluated for the M/T Jag Lavanya show the superiority of the Kappel design. Christian Wollerup Sørensen, Sales Manager, MAN Diesel & Turbo said, "With this vessel's speed and operating profile, the new Kappel propeller will deliver a fuel saving of 4% together with a reduced level of pressure impulses to hull – and without adding any other, efficiency-improving devices." The four-bladed, 6.9 meter Kappel propeller for the Jag Lavanya will be delivered from China in January 2014.

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

ALUMINUM BOATS

Brunswick Commercial and Government Products, 420 Megan Z Avenue, Edgewater, FL 70518, USA, tel:(386) 423-2914, BCGPI@WHALER.COM
Metal Craft, 347 Wellington Street, Kingston, Ontario, 77552, Canada, tel:(800) 410-8464, fax:(613) 542-6515, laurence.b@metalcraftmarine.com

ANCHORS & CHAINS

Anchor Marine & Supply, INC., 6545 Lindbergh, Houston, TX, tel:(800) 233-8014, fax:(713) 644-1185, sales@anchormarinehouston.com

AUTOMATIC IDENTIFICATION SYSTEM

Saab TransponderTech AB, SE-589 41 Linköping, tel:46 13 180000, fax:46 13 180011, Info.transpondertech@saabgroup.com

BARGE FABRICATION

McDonough Marine Services, 1750 Clearview Pkwy, Suite 201, Metairie, LA 78634, USA, tel:800-227-4348, fax:(504) 780-8200, pstant@marmac.net

BOAT BUILDING AND DESIGN

Metal Craft, 347 Wellington Street, Kingston, Ontario, 77552, Canada, tel:(800) 410-8464, fax:(613) 542-6515, laurence.b@metalcraftmarine.com contact: Laurence Bishop, www.metalcraftmarine.com

BOATBUILDING AND DESIGN

Brunswick Commercial and Government Products, 420 Megan Z Avenue, Edgewater, FL 70518, USA, tel:(386) 423-2914, BCGPI@WHALER.COM

Tampa Yacht Manufacturing, LLC, 4350 62nd Avenue North, Pinellas Park, FL, USA, tel:813-792-2114, fax:727-954-3436, robert.stevens@tampa-yacht.com contact: Robert Stevens, www.tampa-yacht.com

BOW AND STERN THRUSTERS

Omnithruster, 2201 Pinnacle Parkway Twinsburg, Ohio 44087, tel:330 963-6310, fax:330 963-6325, widmer@omnithruster.com

CAPSTANS

Superior-Lidgerwood-Mundy, Corp., 302 Grand Ave., Superior, WI 75024, USA, tel:(715) 394-2383, stenerelli@lidgerwood.com contact: Sean Tenerelli, www.lidgerwood.com

COATINGS/ CORROSION CONTROL/ PAINT

Hempel A/S, Lundtoftevej 150 DK-2800 Kgs. Lyngby, tel:45 4593 3800, fax:45 4588 5518, marine@hempel.com
Jotun Paints, 9203 Highway 23, Belle Chasse, LA, USA, tel:(800) 229-3538, milton.campo@jotun.com contact: Milton Campo, www.jotun.com
Tri-State Coating and Machine Co. Inc., 5610 McComas Road, PO Box 296, Salt Rock, WV V4W 3S8, USA, tel:1-800-477-4460, fax:304-736-7773, brichmond@tscminc.com contact: Beverly Richmond, www.tscminc.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

CORROSION CONTROL

CS Unitec, 22 Harbor Avenue, Norwalk, CT 11758, USA, tel:(203) 853-9522, fax:(203) 853-9921, tcarrroll@csunitec.com contact: Tom Carroll, www.csunitec.com

Rustibus, 2901 West Sam Houston Pkwy, North Suite E-325, Houston, TX, USA, tel:(832) 203-7170, fax:(832) 203-7171, houston@rustibus.com, www.rustibus.com
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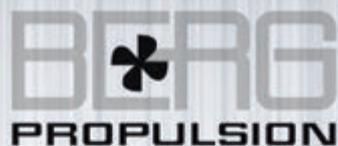
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