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Zumwalt (DDG 1000) Leads the List of 13 "Great Ships" in 2013

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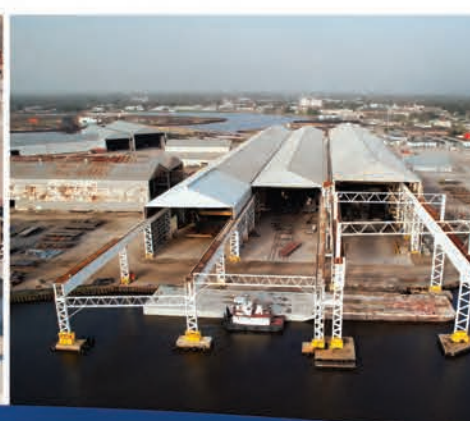

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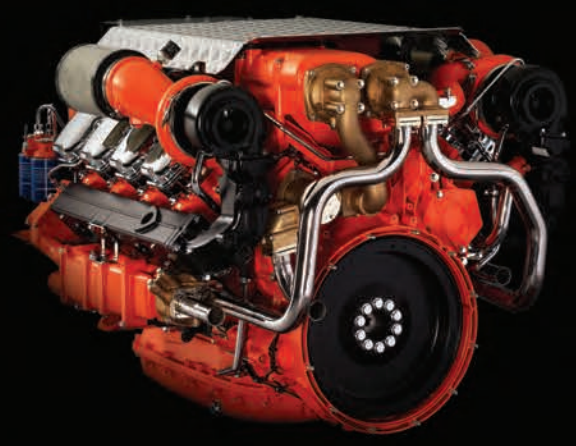

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(Photo: U.S. Navy)

Pictured is the crew of *Maritime Reporter & Engineering News'* Great Ship of 2013, the U.S. Navy "Battlewagon of the 21st Century," the newest and most transformational warship ever built, the DDG 1000 or Zumwalt class.

GREAT SHIPS OF 2013

Maritime Reporter & Engineering News presents insights and information on a group of 13 vessels – large and small, near and far – worthy to be dubbed "Great Ships" of 2013.

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ON THE COVER

Zumwalt, inaugural ship of the DDG1000 type, is a gray giant and stealthy ghost, the Navy's "battlewagon" of the 21st century.

(Image: GD-BIW, M. Nutter)

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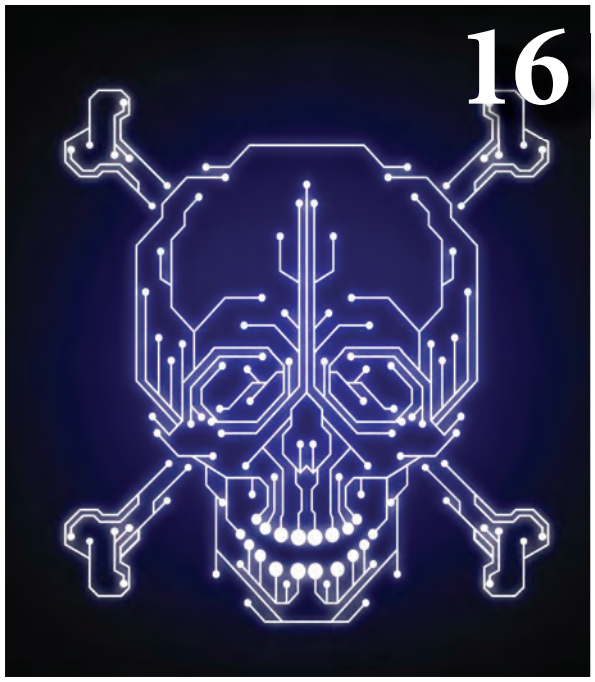

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This being our annual anointment of the "Great Ships" of the year makes it a good time to reflect on the year's achievements, but also to examine the opportunities and challenges that lie ahead.

This month's cover subject, the de facto ship of the year, is the U.S. Navy's new DDG 1000 Zumwalt, or the "Battlewagon of the 21st century" as eloquently described by contributing editor Edward Lundquist. While we do not make a habit of positioning Navy grey front and center in our Great Ships round-up, this particular ship was a virtual lock as it embodies nearly everything we discuss in our pages, print and electronic, on a daily, weekly and monthly basis:

- Cutting edge ship design
- Advanced electronics and propulsion machinery
- The use of technology to reduce crew size
- Everything efficiency and environmental
- (and not to mention, it packs a monumental military punch!)

Built at General Dynamics Bath Iron Works, the ship is certainly transformational in many regards, something you can decide on your own after reading Lundquist's article on the ship starting on page 34.

Looking forward, 2014 is shaping to be one of the most dynamic years in recent memory. Domestically, shipyards in the U.S. – from large to small and everywhere in between – are stacked up with business, driven, predictably, by energy production and consumption. As the Gulf of Mexico shallow and deepwater sectors get back in business in the wake of Macondo, there is a decided uptick in business to rebuild the offshore fleets which departed our shores in search of work when the GOM was effectively shut down after the historic oil spill. The shale oil and gas revolution, much discussed here and in the mainstream press, is having a dramatic impact not only on the energy profile of the United States, which is steaming toward energy independence, but on the maritime market, which is seeing a strong resurgence in Jones Act tonnage to handle the new capacity. Simultaneously, emerging environmental regulation regarding the North American Emissions Control Area (ECA) is reaping big dividends for shipyards, as owners are forced to invest in new tonnage to continue operations.

While "the environment" gets much coverage, there is a decided changing of the tide regarding not just the environmental benefits of new designs, fuels and machinery, but the efficiency of the vessels, too. It seems the "ECO Ship" is here to stay, as owners faced with the choice of picking up medium aged and older tonnage (10 years plus) are opting instead to order new, as the efficiencies to be found on newer ships truly make the return on this larger investment a more logical and profitable choice. The Marine Money team held one of its signature shipowner events in Manhattan last month at the Harvard Club, and the room was literally overcapacity with most of the talk centered on the new ship efficiencies and the building boom set to commence across many sectors.

An interesting side note though was a conversation with a shipbuilder I had at the recent Marintec in Shanghai, China. In discussing the new norm of Slow and Super Slow Steaming, and the prospects for its permanence in the global shipping community, he pointed out: "They are still ordering ships that are capable of doing 25 knots or more."

The renaissance of the shipbuilding business, particularly here in the U.S., is particularly timely as January 2014 starts Maritime Reporter & Engineering News' year-long celebration of its 75th Anniversary. Each edition will offer topical historical features, looking back in time over the past 75 years at the maritime world's most influential ship owners, shipbuilders, icons and vessels, starting in January 2014 with a look at WWII and its impact on U.S. Shipbuilding, then and today. This "Celebrate 75" will weave its way through everything that we do, from MarineLink.com to our Maritime Global News App, and will culminate with a special "75th Anniversary Edition Supplement" to publish along with our June 2014 Yearbook edition.

As we exit 2013 and enter a historic year in the history of our organization, it is the perfect time to thank all of you for your continued interest, participation and support.

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When you leave the page and head to the screen, Maritime Reporter offers the most digital and online news offerings. Here are select stories from last month on MaritimeProfessional.com

Strict Criminal Liability & MBTA

Why are ship owners and operators held to a higher standard than are hunters and farmers?

When Congress enacted the Migratory Bird Treaty Act (MBTA) in 1918, the statute was intended to implement the treaty with Great Britain (acting on behalf of Canada) largely to control the over-hunting of migratory birds that were shared by the neighboring nations. Over time, similar treaties have been ratified with Mexico, Japan, and Russia. Gradually, courts in the U.S. began interpreting the MBTA literally. Since the statute does not contain a criminal intent (i.e., scienter) provision, the courts have ruled that the MBTA created a strict liability crime. This means that if you performed the act that takes (e.g., kills or harms) a migratory bird, you have violated the MBTA, regardless of whether your act was intentional, negligent, or truly accidental. The MBTA establishes a regulatory program to control and limit hunting of migratory birds. Among other things, persons such as farmers are prohibited from baiting fields and hunters are prohibited from hunting on or near baited fields. After some hunters were convicted of violating the MBTA despite their contention that they did not know the field had been baited, Congress amended that MBTA in 1998 to require proof that the hunter knows or reasonably should know that the field was baited and that the person baiting the field did so for the purpose of causing, inducing, or allowing the hunter to take or attempt to take a migratory bird by the aid of baiting. A bill was recently introduced in the Senate (S. 1634) to broaden this exemption. That may be all well and good for farmers and hunters, but reduces the risk of prosecution and conviction for no one else. **Since the Exxon Valdez oil spill in 1989, the MBTA has been used to prosecute the owners and operators of ships from which oil is spilled.** Facing the threat of imprisonment for a violation for which there is no defense, ship owners and operators have agreed to plead guilty and pay substantial (sometimes multi-million dollar) fines. It is only fair that, in this regard, ship owners and operators be treated in a manner similar to that accorded farmers and hunters.

Posted by Dennis Bryant on MaritimeProfessional.com

HOUSTON

Home for the Happy Holidays?

A pilot rate increase on the Houston Ship Channel may be a bridge too far for a maritime industry that is still reeling in a recovering economy.

There is nothing like a pilot rate war. Nothing. Well, unless the rate war is taking place over the holidays. And, then, it is really special. As a former resident of the Bayou City and someone who made his living shipping up and down that channel, and then later, climbing shore tanks and vetting ships all along its 52-mile length, I now write about all things maritime. Hence, when a Houston story pops up, I take notice. Recently, the Houston Pilots – the state-sanctioned monopoly of licensed mariners who guide the large, deep draft ships in and out of port – requested a 3.5% tariff increase, to start in 2014.

It's a bigger story than you might think. There are probably very few people that are happy about the rate increase request and that's because the Houston Pilots already make more than just about everybody else on the Gulf Coast and the customers they serve – foreign registered tonnage – remain stuck in a decidedly bad financial pickle. The West Gulf Maritime Association (WGMA), a nonprofit voice and advocate of Gulf Coast maritime stakeholders, says that pilot rates have all but doubled since 2000.

According to the brief submitted by the WGMA, the 86 Houston Pilot professionals received $44.4 million in distributions in the calendar year ending December 2012, with a corresponding average distribution per pilot of $516,766. Beyond this, and according to a certified public accountant hired by the WGMA, the average Houston pilot was awarded another $233,482 in benefits in 2012. Outpacing their Louisiana colleagues annually by an average of $100,000 and dwarfing that received by in-state Corpus Christi pilots by $168,000, it is clear that Houston pilots are doing just fine. I'd venture to say that all of them are. They all work hard, do a reportedly good job and are collectively critical to the intermodal engine.

The Houston Pilots will tell you that the Houston Ship Channel is the busiest and most dangerous in the nation. The busy part is easy to see and work itself isn't for the faint of heart. Still, one could argue that there are other equally difficult ports to navigate in the U.S. and I'm betting that the good people who navigate Sabine Pass and/or the Mississippi River could tell you a thing or two about dangerous work. So, too, could Boston pilots who make less and have to practically use grease to ease product tankers in and out Gasoline Alley in Boston Harbor.

But, really, how busy are these Houston pilots? I took a look at the numbers. As we head into the New Year – the one which the Pilots hope Father Christmas will bring another 3.5% in fees above and beyond what I already described – the Houston Ship Channel (according to numbers given to me by others, and these coincide nicely with traffic estimates taken from the port of Houston's own web site) is averaging about 687 ship arrivals per month. In contrast, Corpus Christi is averaging about 163 port calls. The Bayou City is exponentially busier, to be sure and in fact, typically averages more deep draft port arrivals than the rest of the Lone Star state's deep water ports combined.

Nevertheless, I took those monthly deep draft port call numbers and doubled them (each ship has to come in and out) and then, for good measure, I assumed that every other vessel that comes into the port(s) has to shift at least once (bunkers, split disport, lay berth for repairs, etc.). That increased the total movements per month in Houston to 1,718 and at Corpus Christi, 408. Then, I divided those numbers by the (WGMA) reported number of pilots at each port of call (Houston – 86; Corpus Christi – 13). In theory, then, Houston pilots handle about 20 ships per month each, in contrast to their Corpus Christi colleagues who, if my calculations are correct, board about 31.

You could argue that Houston is anything but understaffed, overworked and/or underpaid. Conversely, if so, then we've got a worrisome situation in Corpus Christi and those guys deserve an immediate raise (and a vacation). But, I finish up that analysis by assuming that both groups follow maximum, fully compliant safety rules which meet or exceed OPA-90 rest rules and/or the newly coined MLC (2006) work rules.

We can play with numbers all day. I'm sure that someone else might interpret the data in a different way. That said; these rate increase requests often follow a similar path. The pilots in any given port who want a raise will collate the salary and benefit packages from deep draft U.S. ports, and point to other ports where pilots make more. In this case, however, there appear to be few, if any U.S. pilot groups who earn more. So, I'm still not sure what the basis is for this latest rate request.

Arguably, the rate increase request in the Port of Houston comes at the worst possible time for the international shipping stakeholders that the port serves. Foreign flag (registered) vessels are required to take a pilot every time they move within the port. Global freight rates also remain at perilously low levels amidst overcapacity in several sectors, regulatory pressures to install new equipment (ballast water treatment, increasingly cleaner engines and emissions abatement equipment, just to name a few) have never been more onerous and the cost of so-called "green" bunkers is also an issue. Those aren't the problems of the Houston Pilots. In a perfect world, however, rates in one aspect of a business shouldn't go up while all other indicators head south.

Posted by Joseph Keefe on MaritimeProfessional.com-

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(Photo: Alex Sergienko)

Coming your way, a 3% rise in Operating Costs

A new survey from Moore Stephens finds that vessel operating costs are expected to rise by more than 3% in both 2013 and 2014. While this news should not be unexpected it is nevertheless bad news for ship owners that continue to struggle with low freight rates and over capacity across several oceangoing sectors. In total the survey examined 10 main cost areas, summarized in charts one and two. **Crew expenses, broken in two categories as 'wages' and 'other' by far dominated the cause of cost escalation, accounted for a 4.5% rise in 2013 and a projected 4.7% rise in 2014.**

"Crew costs, as always, emerged as a major concern for respondents, which is no surprise given the potential budgetary implications of the entry into force of MLC 2006 and the increasing involvement of both international and regional bodies in the oversight of crew competence and its effect on safety," said Richard Greiner, Moore Stephens shipping partner.

Running neck-and-neck though were cost increases due to rising insurance costs, with P&I insurance expected to escalate 2.4% in 2013 and by 2.5% in 2014, and hull & machinery insurance projected to increases 2.0% and 2.3%, respectively.

Expenditure on spares is expected to increase by 2.1% and 2.3% in 2013 and 2014 respectively, while respondents anticipate a 2.2% increase in the cost of lubricants in both years under review. The cost of stores is expected to increase by 1.9% and 2.0% respectively for 2013 and 2014, while repairs & maintenance expenditure is predicted to increase in those two years by 2.3% and 2.4% respectively.

Drydocking costs over the same period are expected to rise by 2.1% and 2.4% respectively. Meanwhile, as was the case in the 2012 survey, management fees are deemed likely to produce the lowest level of increase in both 2013 and 2014, at 1.4% and 1.7% respectively.

The cost of fuel occupied the thoughts of a number of respondents, one of whom noted, "Fuel costs remain the biggest chunk of our operating expenses due to surging price increases."

Referring to political volatility in the Middle East and increasing regulation on sulfur emissions levels, another respondent predicted that many owners would "have to switch to Marine Gas Oil, which will involve a very big cost increase. We have already seen how the switch between high and low-sulfur fuel is causing problems for some ships, and instances of black-outs and loss of power are on the increase."

Moore Stephens also asked respondents to identify the three factors that were most likely to influence the level of vessel operating costs over the next 12 months. Overall, 21% of respondents (compared to 27% in last year's survey) identified finance costs as the most significant factor, followed by crew supply (20%), competition (18%), demand trends (16%) and labor costs (13%). The cost of raw materials was also cited by 10% of respondents as a factor that would account for an increase in operating costs.

"Ship operating costs fell by an average of 1.8% across all the main ship types in 2012, so at first blush the predicted increase in costs for this year and next might come as something of a disappointment," said Greiner. "In truth, however, the levels of increase anticipated for 2013 and 2014 are still way below many of those we have seen in recent years."

In regards to increased costs for underwriting, Greiner said "the projected rise in P&I premiums for 2013 and 2014 can be attributed, among other things, to a number of major casualties to which the clubs and their reinsurance underwriters have had to respond, as well as to the escalating cost of wreck removal. For these reasons, the anticipated cost increases are not unexpected. The fact that the projected increases for hull & machinery cover are lower than those for P&I is perhaps an illustration of the difference between physical loss & damage cover and third-party liability cover, and of the distinction between commercial and mutual insurance."

By the Numbers

Chart 1

Cost type (mean)	2013	2014
Crew wages	2.4%	2.5%
Other crew	2.1%	2.2%
Lubricants	2.2%	2.2%
Stores	1.9%	2.0%
Spares	2.1%	2.3%
Repairs & Maintenance	2.3%	2.4%
H&M Insurance	2.0%	2.3%
P&I Insurance	2.4%	2.5%
Management fees	1.4%	1.7%
Dry docking	2.1%	2.4%
Total operating costs	**3.0%**	**3.2%**

Source: Moore Stephens

4.7%

Projected cumulative rise in crew expenses in 2014

Chart 2

By Vessel Type

Expected % Cost Increases for Year Ending December 31, 2014

Mean	Bulkers	Tankers	Container Ships	Offshore	Total
Crew wages	2.2%	2.4%	2.8%	3.4%	2.5%
Other crew	1.9%	2.3%	2.5%	2.9%	2.2%
Lubricants	2.1%	2.2%	2.6%	2.5%	2.2%
Stores	2.0%	2.0%	2.1%	2.2%	2.0%
Spares	2.3%	2.4%	2.4%	2.2%	2.3%
Repairs & Maintenance	2.4%	2.6%	2.4%	2.4%	2.4%
H&M Insurance	2.2%	2.3%	2.8%	2.2%	2.3%
P&I Insurance	2.6%	2.4%	3.0%	2.0%	2.5%
Management Fees	1.5%	1.7%	2.1%	2.1%	1.7%
Dry docking	2.2%	2.3%	3.1%	2.5%	2.4%
Total costs	**3.0%**	**3.2%**	**3.6%**	**3.5%**	**3.2%**

Source: Moore Stephens

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Tore Morten Olsen

Astrium Services took a survey of seafarer's usage of crew communication solutions in the commercial shipping sector to establish a picture of mariner communications requirements. According to Tore Morten Olsen, Head of Maritime Services, Astrium Services, the survey was illuminating in more ways than one, helping to shed light on modern comms usage for onboard business and personal reasons.

By Joseph Keefe

MLC 2006 is here. What is your sense that ship operators and owners will incorporate an increased availability of communications solutions for seafarers?

The MLC asks for "reasonable access to ship-to-shore telephone communications, and email and Internet facilities, where available." The wording is quite soft. Plus it is located in the non-mandatory guidelines. So there's some room for interpretation. The MLC does not strictly dictate that all crew must have an opportunity to send and receive private emails on board, have access to a phone whenever they wish to call home or connectivity to browse the web or chat with their friends via Facebook. We'll have to wait and see how the flag states will define the details. However, the pressure from seafarers for a better offer of private onboard communications is growing. We see this as a bigger driver than the MLC 2006. And ship owners will have to react. It's important to understand that offering such services to crew does not necessarily mean an increase in costs for the vessel operator. Crew emailing, phone calling and web usage don't have to be at the expense of the vessel owner. Astrium offers an extensive range of crew services that allow crew to prepay. Take SkyFile MyMail, for example, where crew can set up their own email account without generating any administrative work for the captain and pay for their incoming or outgoing emails using Universal Card prepaid credit.

Owners offering "free" communications services to mariners is still the exception, rather than the rule. Would you agree that a widening gap of "qualified" officers will increase this employment benefit in the near future?

15% of the crew interviewed for Astrium Services' crew communications survey in 2012 stated they had at least some free use of the internet on board – meaning that the huge majority, 85%, don't. In fact, while at sea, the majority of crew still have no access to the web at all. However, whenever speaking to crew, the desire to be able to access the web on board – ideally for free – is right at the top of their wish list. So, yes, a job offering for a vessel with free on board internet usage has a strong appeal and will therefore be beneficial for the employer when competing for scarce resources.

The survey shows an average length of "time at sea" for all seafarers to be 8+ months annually. At the same time, 98% of sailors reported at least limited access to communications. With a reported 1.37 mil. seafarers out there, obviously this is a huge market. What are the spend trends looking like?

The Astrium Services crew survey implied that a growing number of seafarers want onboard Wi-Fi connectivity to the web. They bring their own smartphones, tablets and laptops and want to use them. Unsurprisingly, social media - especially Facebook - was highlighted as one of the most popular web destinations for crews. And a large majority of the seafarers stated that they are prepared to pay for connectivity.

The typical Facebook user wants to view and post pictures, videos etc., leave a comment or conduct an instant messaging chat session. Which, in the context of a vessel, requires reasonable bandwidth at reasonable cost. The changing usage patterns in private communications can in the context of a vessel best be accommodated by using VSAT. When the vessel produces significant data traffic, VSAT is simply more affordable than an L-band service. So it's not surprising to see a strong growth in VSAT installations. And to a large degree this is due to what the crew expect to be provided onboard.

What is your projection for growth in voice and data SATCOM / VSAT usage at sea in the coming year? Five years?

We expect that in 2-3 years, the vast majority of merchant vessels that belong to large shipping companies and have 20-25 crew or more will be using VSAT (including Inmarsat GX) as their primary means of satellite communications.

What we know is that most L-band users today use most of what their data allowance packages provides them, typically 200 MB, 2GB or 6GB, but it differs from ship owner to ship owner how quickly they spend their total allowance depending on their communication policies onboard for admin and crew. We also know that when ship owners opt for VSAT the communication policies normally opens up to more users and more consumption of data, both for admin and crew. Over the next five years we should expect almost all larger deep sea vessels going from MSS to VSAT to double their consumption without increasing the costs. For those already using VSAT today, we should expect an increase, but not as much as

ship owners who upgrade from “pay-as-you-go” to “all-you-can-eat”.

Survey respondents reported spending an average of $150 per month on communication costs. Would a larger subset of users paying a little bit less provide more revenue for satellite communications providers?

The $150 rough average spend by crew for personal communications is not only for satellite communications – it includes what they spend using cell phones and other means of communications when in the harbor or within GSM coverage. If they were willing to spend that much on satellite communications alone, the average personal communications offer on board would look dramatically different from what it does today.

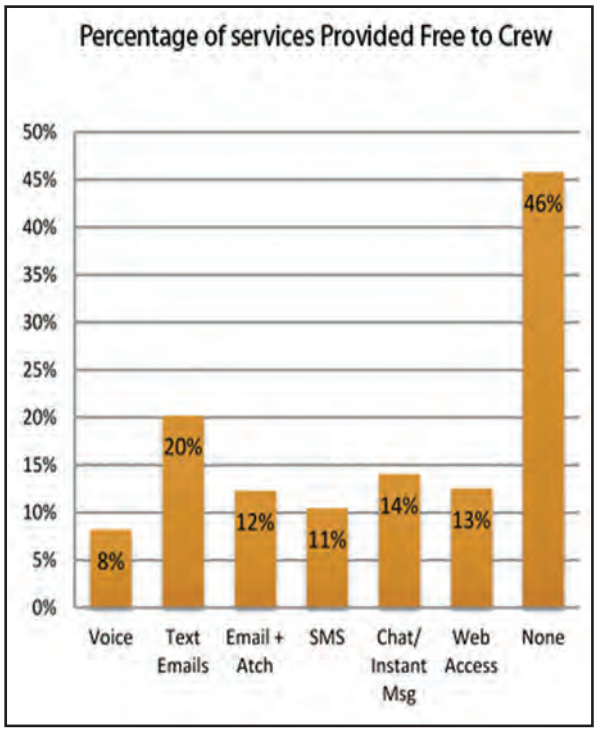
Are crew getting more out of the money they spend on broadband satellite communications technologies than what they did, say, five years ago when they used MSS legacy services? Sure. Per-minute-prices for analogue crew voice has declined dramatically and new possibilities like VoIP can push the prices further down. Take for instance Simon Møkster Shipping’s 23 strong fleet of offshore supply and specialist vessels, which as part of our Sealink customized VSAT service, use a unique VoIP solution for crew members from the Faroe Islands (the majority of its crew), which reduces their calling costs by at least 50%. Data rates are coming down also.

Your survey focuses on ‘officers and ratings usage and need for communications solutions.’ But what about data transmissions?

The data consumption is undoubtedly growing and it’s growing fast. The best way to project this is really to look at how the development has been onshore. 10 years back most of us accepted some waiting time when using the internet, whereas today we expect to be online almost everywhere and with a connection that can accommodate more and more cloud based and streaming based services. We are not completely there yet at sea, but not that far away either.

The initial focus of bringing broadband terminals on board was certainly based on corporate usage. Security concerns, the potential complexity of giving crew private internet access and, probably most of all, the cost per Megabyte, discouraged ship owners from establishing any offer for personal web usage on-board. The need for a broadband connection for business usage, ideas like the ‘office at sea’; which is seamlessly integrated into the shipping company’s infrastructure onshore has always had a great appeal. It made MSS broadband services like FB and IOP a great success. Crew data communications have moved more into the spotlight since then.

Besides the growing demands from crew, recent years have seen a huge surge in the amount and variety of IP applications available for enhancing vessel efficiency. This has come from the fact that Ku/C/Ka-band VSAT offers greater throughput, which opens up for more users and more “heavy” applications. I’m thinking of online equipment/vessel monitoring, video conferencing, file sharing etc. Normally vessel monitoring is either in real-time or as bulk data packages, depending on what you are monitoring and to what



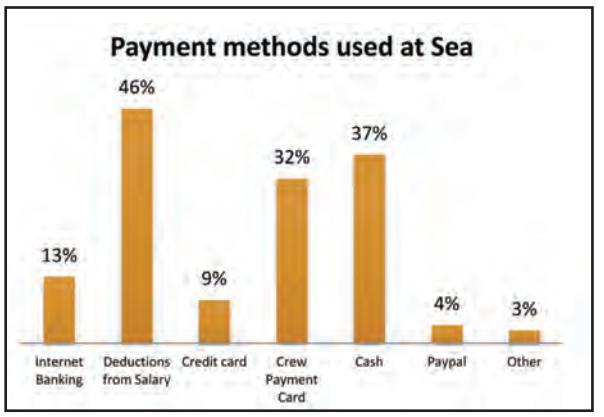
What are onboard crew calling trends and habits? Astrium commissioned a Crew Communications Research Report to find out.

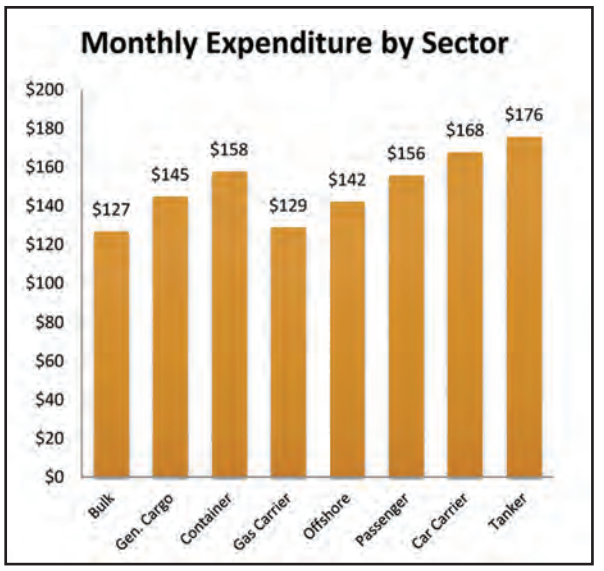
extent 'live' monitoring is needed. This data is normally transmitted via either L-band or VSAT, depending on what system the ship owner has on board. If real-time monitoring is the preferred approach, an all-you-can-eat type of data plan, like you get with VSAT, will be often most cost-efficient. Those taking the bulk transmissions approach mostly use either Fleet, FleetBroadband or Iridium OpenPort to transmit. VSAT offers the most cost-effective data transfer available as long as your vessel or fleet has the volume requirements (I.e. more data than would be viable on L-band). With the massive savings a vessel or fleet can make by just reducing fuel consumption by a few percentage points it is no surprise that e.g. live engine monitoring sees growing popularity.

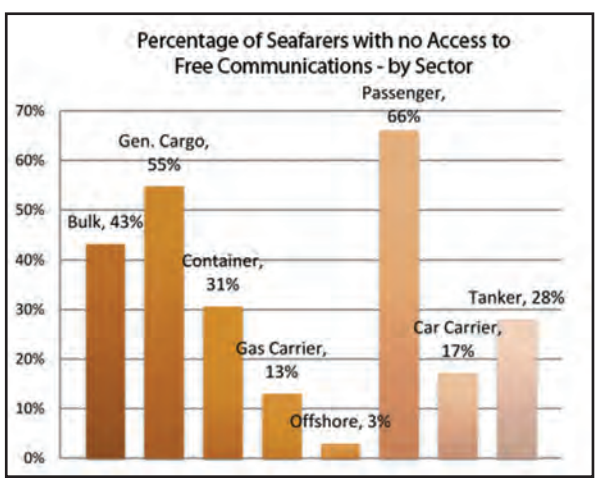
Finally – in a nutshell – how can an operator reduce costs while increasing service (to crew) and still maintain quality or improve it?

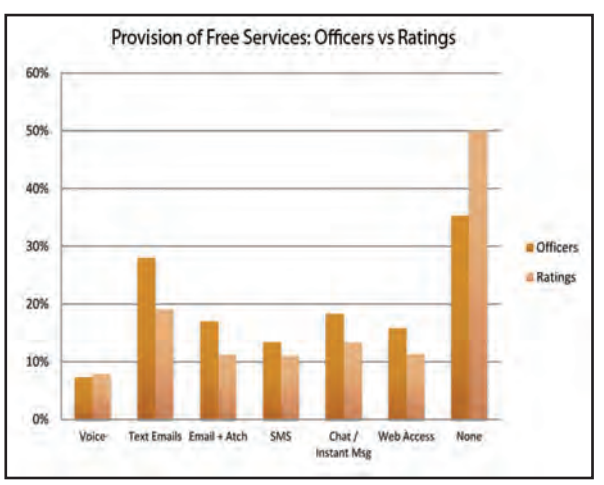
An operator reduces cost when he starts sharing his airtime commitment between crew and corporate usage. Quite typically, airtime commitments are not fully used by corporate usage alone. When he starts "re-selling" data to crew by giving them access to VoIP telephony, web access or at least to email, he gets some of his money back. Meanwhile, crew are happy to get a means of communications they previously did not have on board. A typical win-win situation. As an example, using our WaveCall standardized VSAT services on more than 35 vessels, CMA CGM is able to provide crew services at prices that are not infinitely far away from those of shore based connectivity. CMA CGM increase the crew welfare offer on board without increasing their own operational communication. Because the crew spend covers the additional monthly cost of the services. Of course, it's absolutely key that management and billing is straightforward and transparent when spreading the cost between different parties. And this is a job handled by the XChange solution from Astrium. XChange provides enhanced control and management of connectivity as well as a comprehensive set of Internet-café like crew communications features.

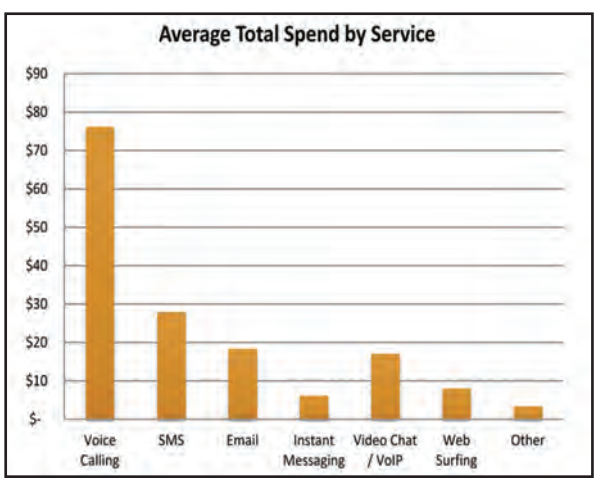
CMA CGM's fleet covers global trade routes, so extensive Ku-band coverage was a key requirement when choosing the WaveCall solution (Aug 2013). The WaveCall proposition to CMA CGM is based on a cost-effective 5 GB/month data plan, which enables a significant increase in email, web browsing and voice calling, when compared to the 200MB/month FleetBroadband packages used before. So the company manages to meet demand for enhanced connectivity for crew and strengthen its operational communication, without paying any more, in fact less in this case, than the previous communication systems it used.











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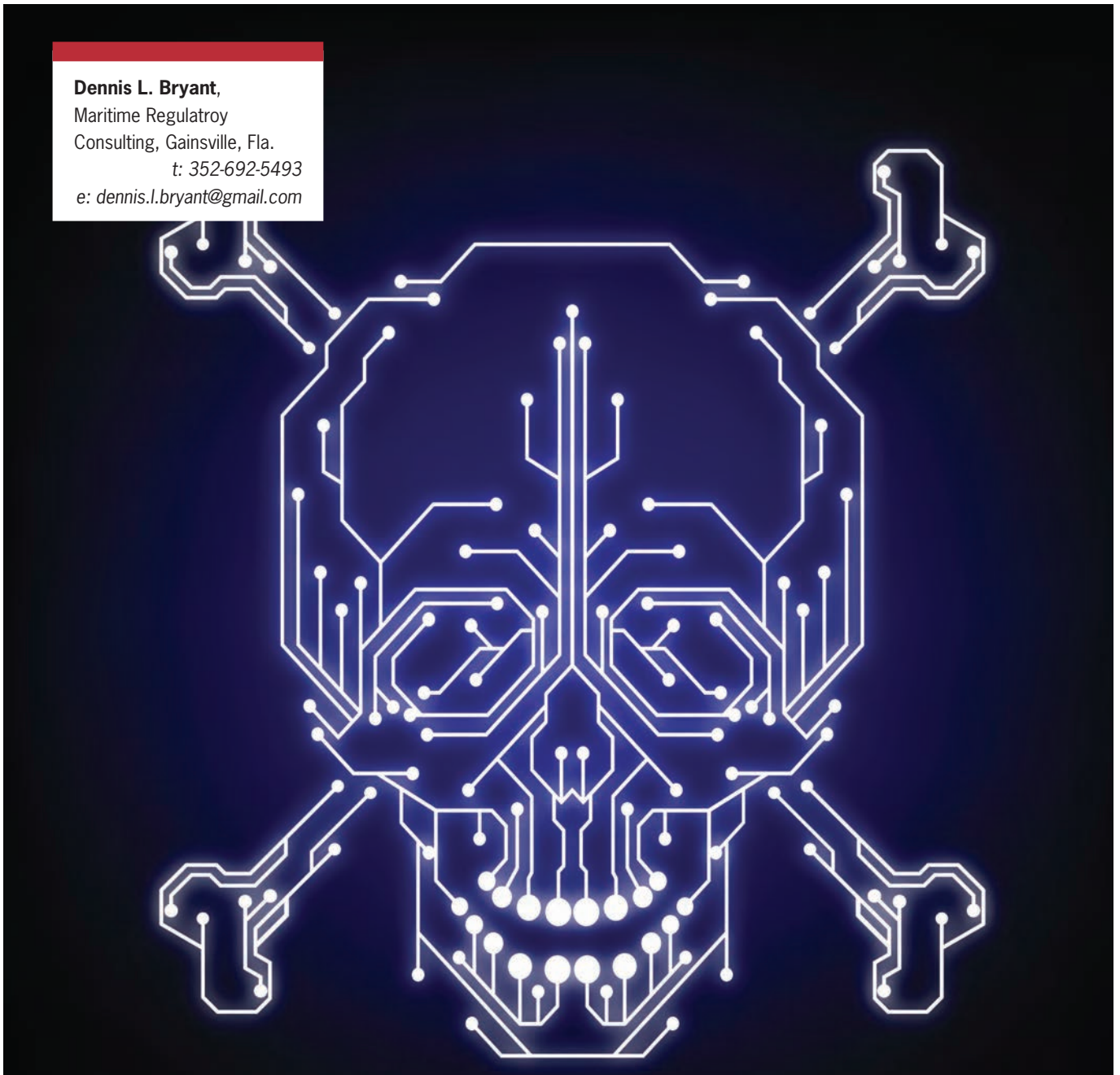

There is a growing threat to marine safety, security, and environmental protection from the over-reliance on electronics to accomplish operational tasks.

On February 12, 2013, President Obama issued Executive Order 13636 – Improving Critical Infrastructure Cybersecurity. Citing repeated electronic intrusions into critical infrastructure, the document states that it is the policy of the United States Government to increase the volume, timeliness, and quality of cyber threat information shared with U.S. private sector entities so that these entities may better protect and defend themselves against cyber threats. It directs the Secretary of Homeland Security (DHS), in coordination with Sector-Specific Agencies, to establish the Voluntary Critical Infrastructure Cybersecurity Program together with the owners and operators of critical infrastructure and other interested entities. If current regulatory requirements are deemed to be insufficient to protect critical infrastructure from electronic intrusions, the Sector-Specific Agencies are to propose prioritized, risk-based, efficient, and coordinated actions to mitigate cyber risk.

The prefix "cyber" is derived from a Greek adjective meaning skilled in steering or governing. The prefix is commonly used in the computer and electronic context to denote control. Thus, cybersecurity means control of computer or electronic security.

The National Institute for Standards and Technology (NIST) has developed a Preliminary Cybersecurity Framework (on the web at http://www.nist.gov/itl/upload/preliminary-cybersecurity-framework.pdf). It provides guidance to public and private organizations on managing cybersecurity risk. The objective is to encourage organizations to consider cybersecurity risk as a priority similar to financial, safety, and operational risk, while factoring in larger systemic risks inherent to critical infrastructure.

The DHS has established a Cybersecurity Training & Exercises Website (on the web at http://www.dhs.gov/cybersecurity-training-exercises) to assist organizations in becoming familiar with and staying current on cybersecurity threats and available countermeasures. The site itself, though, is frequently outdated.

Of more relevance to the maritime community is the US Coast Guard cybersecurity site accessible through Homeport. I have to admit that I am not a fan of the Coast Guard's broad use of the Homeport website. Few things on the site are directly accessible. To get to the cybersecurity site, go the Homeport (on the web at https://homeport.uscg.mil), then click on Maritime Security under Missions on the left side of the screen, and then click on Cybersecurity, the third topic down in the center of the new screen. The site provides access to a variety of background documents and links to other cyber-related websites.

The National Infrastructure Protection Plan (NIPP), (available on the web at https://www.dhs.gov/sites/default/files/publications/NIPP_Plan.pdf), provides overall guidance regarding government efforts and recommendations for protection of critical infrastructure. Implementing that overall plan are 18 sector-specific plans, including the Transportation Systems Sector-Specific Plan (TSSSP), (available on the web at http://www.dhs.gov/xlibrary/assets/nipp-ssp-transportation-systems-2010.pdf). In accordance with Presidential Policy Directive 21 (PPD-21) on Critical Infrastructure Security and Resilience, the Department of Homeland Security and the Department of Transportation serve as co-chairs of the Transportation Systems Sector. The US Coast Guard advises the co-chairs on maritime issues.

The Coast Guard has included cybersecurity issues in its various Area Maritime Security Plans. It also hosts the Cybersecurity Homeport Community. To join the Community, you must al-

ready have a Homeport account. You then send an email to homeportcyberscurity@uscg.mil, asking to join. Members are provided with recommendations and activities helping them keep abreast of cybersecurity issues.

All of this may appear overwhelming to a ship owner or operator. After all, what is the likelihood that a terrorist will target your particular company or vessel or facility? Admittedly, the odds are low, but not zero. We know from the terrorist attacks of September 11, 2001, as well as the maritime attacks on the destroyer USS Cole in Aden on October 12, 2000, the supertanker Limburg off Yemen on October 6, 2002, and the supertanker M Star in the Strait of Hormuz on July 28, 2010, that terrorists seek soft targets. Marine facilities have not been exempt from terrorism, with attacks on Ashod, Israel (March 13, 2004); the Iraqi Khawr al Amaya crude oil terminal (April 24 2004); and the Karachi East Wharf in Pakistan (May 26, 2004). If your company or vessel or facility appears to be hardened, the terrorist will probably go elsewhere. There is plenty of evidence that the average maritime company or vessel or facility is vulnerable, particularly to a cyberattack.

Terrorism aside, there is a selfish reason for hardening your company, vessel, or facility against cyberattack. By taking such steps, you also may harden your operation against such threats as spurious electronic signals, malicious activity, industrial espionage, and criminal activities.

On May 10, 1993, the Coast Guard promulgated a regulation that came into effect on July 9, 1993 providing, among other things, that tankers equipped with an integrated navigation system (INS) could, under certain circumstances, use the INS with the auto pilot engaged while in the navigable waters of the United States. A suspension of the effectiveness of that regulation was issued on July 6, 1993 after a vessel utilizing its INS experienced a sudden, unintended, and drastic course change when the INS malfunctioned as a warship in the vicinity emitted a strong electromagnetic pulse. In its suspension order, the Coast Guard stated that currently (in 1993) "there is no performance standard for a shipboard INS in terms of accuracy, integrity, or reliability. Although the Coast Guard recognizes that the use of INS with an autopilot offers the potential to improve navigation safety, adequate testing and evaluation of this technology has not been conducted. The Coast Guard intends to conduct further rulemaking concerning necessary testing and methodology for certifying that performance standards have been met and will provide further opportunity for public input." There have been no further developments regarding INS performance standards since 1993.

In the June 2003 edition of *Maritime Reporter & Engineering News*, I authored an article entitled: **"AIS – Panacea or Pandora's Box."** I pointed out that, when operating as intended, the Automatic Identification System (AIS) was an important navigational safety tool, particularly with respect to collision avoidance. I also pointed out, though, that because of the way the transceiver was configured, much of the data being transmitted could be manipulated. Specifically, I questioned reliance on AIS as a maritime security tool. I didn't know the half of it. It has recently been demonstrated that spurious AIS signals can be transmitted showing vessels to be far from their actual location and on incorrect courses and speeds. AIS signals can also be generated showing phantom ships. One can no longer inherently trust the AIS signals being received by your transceiver and displayed on your ECDIS. The system needs to be revised to incorporate an authentication program.

In the September 2013 edition of this same magazine, I authored an article entitled: **"GPS spoofing."** I pointed out that it is now possible to spoof Global Positioning System (GPS) and other space-based positioning, navigation, and timing (PNT) services. As with AIS, these PNT services must incorporate an authentication system or adopt other measures to avoid accidental or intentional presentation of erroneous data. Work is currently underway to address these issues. Even then, it will likely only make spoofing more difficult, but not impossible.

I do not claim to be prescient. I am only reporting the work of others, more technologically proficient than myself. I am saying, though, that steps should be taken by members of the maritime community to enhance their cybersecurity. There is a growing threat to marine safety, security, and environmental protection from the over-reliance on electronics to accomplish operational tasks. Adopting appropriate cybersecurity measures will reduce business risks.

New Year, New Rules

Export Reform Brings New Compliance Obligations to the Shipbuilding Supply Chain

Early in the coming year, the U.S. export control regime governing the shipbuilding supply chain will undergo a sea change with the implementation of export reform in the naval and marine categories of the U.S. Munitions List (USML) and the Commerce Control List (CCL). Reforms affecting the aerospace industry**(1)** were published April 16, 2013**(2)** and took effect October 15 of this year, and the final rules published on July 8, 2013 for the naval and marine categories will take effect on January 6, 2014. As previously reported,**(3)** one of the goals of the export reform initiative is to protect the nation's "crown jewels" with higher export control walls while removing restrictions on less important items and technologies in order to promote, among other things, interoperability of U.S. and allied forces. All sectors of the shipbuilding supply chain must adjust their export compliance procedures to conform to the new rules, but the naval shipbuilding supply chain in particular will face considerable upheaval as it becomes subject to two separate export control regimes – both the Export Administration Regulations (EAR), which include the CCL, and the International Traffic in Arms Regulations (ITAR), including the USML, with which most shipyards and suppliers have become familiar.

Each set of final rules published as part of the export reform process includes revised USML categories (published by the U.S. Department of State, which, through its Directorate of Defense Trade Controls (DDTC), implements the ITAR) as well as conforming revisions to the applicable CCL categories (published by the U.S. Department of Commerce, which, through its Bureau of Industry and Security (BIS), implements the EAR). In addition, the final rules typically contain new definitions, and these may have a broader application not limited to the revised USML and CCL categories contained in the particular rule with which the new definitions are published. For example, the aerospace rules that became effective on October 15 incorporated the newly defined term "specially designed" in both the ITAR and the EAR – definitions that will apply to all revised USML and CCL categories – as well as numerous other transitional provisions affecting all categories of reform, such as transitional use of existing authorizations. The naval and marine rules scheduled to come into effect on January 6, 2014 affect USML Categories VI (Vessels of War and Special Naval Equipment) and XX (Submersible Vessels and Related Articles), as well as Category 8 of the CCL, to which a new "600 series" of Export Control Classification Numbers (ECCNs) has been added to accommodate items transferred from the USML. **(4)** However, while the principal naval and marine categories are USML Categories VI and XX and CCL Category 8, it should be noted that effective January 6, 2014, amendments to Category 9 of the CCL will affect gas turbine engines for surface vessels, and the revised Category XIII will contain controls related to ship signature management. In addition, as in the past, other items incorporated in vessels will continue to be covered by various other USML and CCL categories (e.g., radar systems, which are covered by USML Category XI or CCL Category 6, depending upon whether they are specifically designed for military applications). The current rules, to the extent not amended, will continue to apply to categories not yet amended as a result of export reform.

Also included in the new DDTC rules are revised definitions of "surface vessels of war" controlled under USML Category VI and "submersible vessels" controlled by USML Category XX. If a surface vessel is specially designed for military use but not covered by the new definition, under revised Section 121.15(b) it will be subject to the EAR under ECCN 8A609. Likewise, under revised Section 121.14(b), submersible and semi-submersible vessels not covered by the new definition will be subject to the EAR under ECCN 8A620. Both Categories VI and XX cover developmental vessels funded by the Department of Defense, subject to certain exceptions, as well as specially designed parts and components therefor.

In addition, the new "600 series" will incorporate controls on test, inspection and production equipment and related commodities specially designed for the development, production, repair, overhaul or refurbishing of both items enumerated in ECCNs 8A609 and 8A620 and items enumerated in Categories VI and XX of the ITAR. This is a new development for the naval shipbuilding supply chain in particular, as the ITAR traditionally has not controlled means of production.

The DDTC Final Rule further revises USML Category VI to abandon ITAR controls on most generic parts, components, accessories, and attachments specifically designed or modified for Category VI surface vessels (with the exception of developmental vessels, as discussed above) in favor of a positive list of parts and components that in the U.S. Government's view continue to merit USML control. That positive control list, found in revised USML Category VI(f), includes only nine types of parts and components. All parts and components not specifically enumerated on the USML will move to the new "600 series" in Category 8 of the CCL. The approach taken in Category XX is somewhat different, in that all "specially designed" parts and components, including those for developmental vessels, will remain ITAR controlled.

The starting point for compliance with the new rules will be to determine the classification of the vessel under construction. Suppliers will find that they must implement separate compliance systems for similar products, depending upon the platform into which the products are incorporated.

Take, for example, a systems integrator who is supplying foreign sourced heating, ventilation and air-conditioning (HVAC) systems for the LCS as well as for unarmed underway replenishment ships. As littoral combat ships are enumerated in the new ITAR definition of surface vessels of war, the LCS will continue to be ITAR controlled. The HVAC system, on the other hand, while covered by the current USML Category VI(f) as a "specifically designed" component, is not found on the list of nine parts and components that will remain subject to ITAR control under the revised Category VI(f), nor is it enumerated in any of the other paragraphs of Category VI. Consequently, the HVAC system moves to the CCL and is classified under ECCN 8A609. The applicable sub-category under ECCN 8A609 will drive the restrictions on the HVAC system and related technology. In comments contained in its Final Rule published July 8, 2013, BIS explicitly declined to include HVAC equipment in the most permissive subcategory (8A609.y, which is subject to export licensing requirements for only a limited range of destinations), thus relegating HVAC systems for the LCS to ECCN 8A609.x (covering "specially designed" parts, components, accessories and attachments, which requires licensing for all countries except Canada). Related technology therefore will be controlled under ECCN 8E609. However, technical data related to the LCS itself and related defense services will remain controlled under Category VI(g) of the ITAR. Thus, while the integrator's relationship with its foreign supplier (and any foreign employees) will remain subject to ITAR licensing requirements to the extent technical data exchanges involve information directly related to the LCS itself, EAR requirements also will apply to the extent that technical data exchanges relate to the HVAC system or controlled test, inspection and production equipment. Depending upon the nationalities of the foreign supplier and foreign employees and whether license exceptions may be available, the EAR will impose an additional layer of licensing requirements that the integrator will have to comply with. On the other hand, if the same systems integrator also is supplying HVAC systems for unarmed underway replenishment ships, transfer of the ships from the USML to the CCL will make both the ship and its components subject to the EAR. However, while this may simplify export compliance for the integrator as to this particular program, integrator personnel working on both the underway replenishment ship program and the LCS program will find themselves subject to two different sets of export compliance procedures when communicating with the foreign supplier. As noted above, ECCN 8A609.x will "catch" "specially designed" parts, components, accessories and attachments moving from the ITAR to the EAR. Application of the EAR definition of "specially designed" to each part or component will be required to determine whether the part or component is captured by ECCN 8A609.x (or any other ECCN that utilizes this term). All parts, components, accessories, attachments and software "for use in or with" a commodity or defense article enumerated or described on the CCL or USML will be considered "specially designed" unless "released" under subsection (b) of the definition (which is found in Part

Maddening as it may have seemed at times, for many in the naval shipbuilding supply chain the "all ITAR" environment of years past has become familiar territory. As new compliance obligations materialize in January, the old restrictions may be fondly remembered.

772 of the EAR). Note that each of the terms parts, components, accessories, attachments and software is itself defined in Part 772 of the EAR. Subsection (b) lists six categories for exclusion or release, each of which should be examined in turn.**(5)** For example, items for which a commodity jurisdiction determination or commodity classification ruling has been obtained assigning the item to a different classification will be excluded from ECCN 8A609.x, as will fasteners, washers, spacers, insulators, grommets, bushings, springs, wires and solder. Moreover, a part or component that also is used in the production of a commercial vessel classified under previously existing ECCN 8A992 also will be released. In addition, "specially designed" items specifically enumerated in ECCN 8A609.y (such as galleys or filters and filter assemblies) will be excluded from the more restrictive ".x" sub-category.

The ITAR equivalent of the "specially designed" definition must be applied to determine if Category VI or XX paragraphs capture certain items (e.g., "specially designed" hulls or superstructures for Category VI vessels or "specially designed" electric motors for Category XX submarines). For "catch all" parts and components sub-categories, application of the definition will be similar to application of the EAR definition discussed above. In addition, as when applying the EAR definition to end items, the focus will be "properties peculiarly responsible for achieving or exceeding the controlled performance levels, characteristics, or functions."

Long anticipated, export reform will require renewed focus and expenditure on export control compliance by shipyards and their suppliers. Those who have not done so already should begin with a review of their programs to determine whether the vessels they are building are ITAR controlled or subject to the EAR. Suppliers at all tiers should ensure that these determinations are made in consultation with the shipyards who are their ultimate customers. Once jurisdiction over the vessel has been established, an analysis of the classification of each item supplied must be undertaken, together with an analysis of related technology or technical data and means of production. Export activities related to ITAR or EAR controlled items then must be conducted according to the applicable compliance procedures. This includes everything from appropriate marking of technical data to obtaining license authorizations for technical data exchanges with foreign suppliers and foreign national employees. Most companies will have to update their existing procedures at least to some degree to conform to the new ITAR rules, and companies who focus exclusively on the naval shipbuilding supply chain will have to become familiar with the EAR as well as the ITAR and develop new EAR compliance procedures to cover export activities related to items and technology no longer subject to the ITAR.

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This article reflects developments through November 19, 2013, the date of submission for publication. The views expressed herein are those of the authors, do not necessarily reflect the opinion of the firm or other members of the firm, and should not be construed as legal advice or opinion or a substitute for the advice of counsel.

1 Amendments to USML Categories VIII (Aircraft and Related Articles) and XIX (Gas Turbines Engines and Associated Equipment) and related amendments to Category 9 of the CCL.

2 Various amendments to the DDTC and BIS rules published April 16, 2013 were published on October 3, 2013 and additional conforming amendments to the EAR were published on October 4, 2013.

3 Our previous reports on the export reform process can be found in the August 2012 ("Export Control Reform in the Shipyard: Will it Simplify Regulation of the Supply Chain?") and May 2011 ("U.S. Export Control Reform: What It Means for Shipyards") editions of Maritime Reporter.

4 Also scheduled for implementation on January 6, 2014 are revised USML Categories VII ("Ground Vehicles") and XIII ("Materials and Miscellaneous Articles"), as well as accompanying amendments to Category 0 of the CCL, and amendments to Category 9 of the CCL related to gas turbine engines for military vehicles and surface vessels.

5 In the case of the HVAC system example discussed above, none of the bases for exclusion applied.

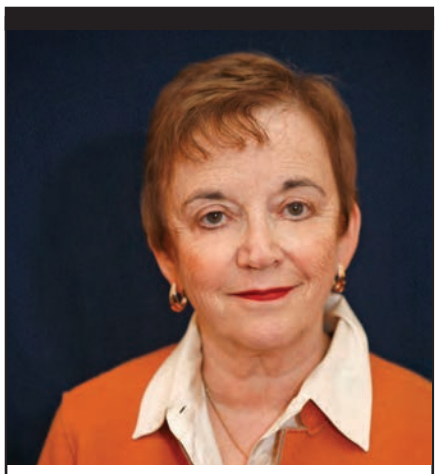
Sequester & Budget Woes

Impact of the Sequester and Budget Showdowns on Ports and Port Security & the Outlook for WRDA

Coast Guard transportable port security boats attached to Port Security Unit 308 and riverine command boats from Riverine Squadron (RIVRON) 2 practice maneuvers together in the Intracoastal Waterway in North Carolina.

(U.S. Navy photo by Mass Communication Specialist 1st Class Richard Brunson)

By Joan M. Bondareff



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This article describes the impact of the "sequester" and budget showdowns on ports and port security, and also gives a preview of the House-Senate Conference on the Water Resources Development Act (WRDA). On the one hand, ports and port security have been severely hampered by the ongoing budget battles, as has the rest of the U.S. Government and economy. On the other hand, Congress appears to be on the brink of reauthorizing the Water Resources Development Act for the first time in six years. This law will authorize increased use of the Harbor Maintenance Trust Fund (HMTF) on port dredging and maintenance projects allowing a number of major ports to attract more business as a result of deeper harbors, and the accommodation of the anticipated post-Panamax vessels.

Budget Background

The Budget Control Act of 2011 (BCA) put in place a process by which, if the Congress and the President could not agree on how to balance the budget, automatic across-the-board budget cuts, known as the sequester, would come into effect. The sequester would remain in place, unless superseded, from 2012 to 2021. As we now know, no such deal was reached by the so-called "Super Committee" thereby triggering the first round of funding reductions on March 1, 2013.

These cuts are not only automatic but they provide very little, if any, discretion to cabinet and agency heads to choose what programs to cut. As a result, virtually no federal program is left untouched. As mandated by the BCA, the cuts will be divided between Department of Defense/national security spending and all other discretionary spending. Pay for active duty members, VA benefits, as well as Social Security benefits, are exempt from the sequester.

Department of Homeland Security (DHS) officials testified before Congress in April of this year that the sequester required "more than $600M in cuts across [Customs and Border Protection] CBP, affecting operations in the short, and long term." Not only did these cuts affect travel at all U.S. ports and entry gates for foreign visitors, but CBP was forced to reduce 21,000 in flight hours for its fleet of aircraft impacting national security. The Transportation Security Act (TSA) also suffered an 8.8 percent budget cut as a result of the sequester, again hampering work at our major airports. The Maritime Administration reported in September that if the sequester continues, the Maritime Security Program could lose upwards of 15 vessels; ships in the Ready Reserve will be cut; and merchant marine jobs will be lost. The Army Corps of Engineers was similarly affected by the sequester until Defense Secretary Hagel found relief in the Pay Our Military Act allowing him to recall 400,000 furloughed civilian personnel.

Eventually Congress enacted a FY2013 Consolidated and Further Continuing Appropriations Act for the remainder of 2013. Having done this in the middle of the year made it nearly impossible for agencies to start new programs or fund any grant programs. Contracting was also severely hampered by the lack of budget certainty.

The Shutdown

As if sequestering funds is not bad enough, the FY2014 fiscal year began with a two-week government shutdown.

On October 1, 2013, the new 2014 budget year began, but, to date, no single appropriation bill has been enacted. Once more the Congress and the White House could not agree on a budget deal in time for the new fiscal year, resulting in a two-week budget shutdown. Except for "essential" personnel, all other government personnel were furloughed, leaving most agencies without the wherewithal to manage any program. Once again, port and security projects were held up and delayed until a short term Continuing Resolution (CR) deal was passed on October 17, 2013, funding the government through January 14, 2014, and extending the debt ceiling until February 7, 2014.

According to a statement from Senator Barbara Boxer (D-CA), Chair of the Senate Committee on Environment and Public Works, the shutdown forced the Army Corps of Engineers to "completely shut down the permit process for proj-

ects nationwide…halt[ing] 650 pending actions in just one of the Corps' 38 Districts." Rating agencies such as Standard and Poor's and Moody's estimate that the shutdown cost the economy approximately $23 billion in lost economic output.

The New Budget Negotiations for 2014

The FY2014 short-term CR also called for the establishment of yet another committee to resolve differences between the House and Senate. Senator Patty Murray (D-WA) and Congressman Paul Ryan (R-WI) are the respective Co-Chairs of the new committee. Their goal, as mandated by the law, is to negotiate a broader FY2014 fiscal deal by reconciling the differences between the House and Senate budget resolutions.

The work of the budget committee is herculean because there are not only vast differences between the House and Senate budgets, but there are ideological differences between the two chambers, led by different political parties, on the role of government. The Senate budget proposes $1.85 trillion in additional deficit reduction over the next ten years, equally divided between new revenue and cuts to defense and civil programs. The House budget would eliminate the sequester for defense programs, while keeping it in place for civil programs and not providing for any new revenues or tax increases.

In Washington, DC, expectations for a grand bargain are very low, but there is some hope that a new resolution on the budget can be worked out –at least for 2014.

Both sides agree that the sequester has been injurious to managing government programs, but what will replace it remains to be seen. If a resolution is worked out, the appropriators can write legislation to live within the new budget guidelines. Senator Mikulski (D-MD), Chair of the Senate Appropriations Committee, is urging the joint committee to act quickly so she and her House counterpart, Rep. Hal Rogers (R-KY), can begin to write the real budgets for FY2014 in the form of the required appropriation bills.

Impact on Ports from Budget Games

As this article goes to press, we are waiting to see what the joint budget committee can produce, how sharp the cuts are to civil programs, and whether appropriations will finally be enacted for 2014. If all Congress can continue to do is enact another CR, agencies will be forced to live within 2012 or 2013 budget limits and have little discretion to administer new programs or grants. Without appropriations, DHS will not be able to award port security grants; and the Maritime Administration will not be able to award any new port development grants or small shipyard grants.

WRDA: The Water Resources Development Act

The House and Senate are also in the midst of negotiations to adopt a final Water Resources Development Act. This law has not been reauthorized since 2007. Without its passage, the Army Corps of Engineers can not undertake any new port dredging projects making this law vital to the port infrastructure of this country and its economic growth. The House and Senate have passed very different versions of WRDA. But with its passage in the House by a vote of 417-3, and in the Senate by a vote of 83-145, expectations are much higher for final passage of a bill that the President will sign into law. The result will be the first WRDA bill in six years and a major step forward for critical port development work.

In brief summary, the House and Senate took different approaches to a WRDA bill and most of the convoluted results were because neither body wanted to pass a bill with "earmarks" in it. The House approach was to identify in the legislation 23 projects that the Corps would execute, including dredging the Sabine-Neches Waterway (at a cost of $780M), Savannah Harbor in Georgia ($461M federal share), and Cape Canaveral, FL; gradually phase in the use of funding from the HMTF (up to 80%); set a three-year limit on Corps' feasibility studies, capping them at $3M, with only three levels of Corps' review, the so-called 3-3-3 rule; and de-authorize $12B in inactive projects. Because the House bill contains significant environmental reforms, Chairman Shuster has added the word "Reform" to the title of his bill, making it the "Water Resources Reform and Development Act."

The Senate approach was to authorize those dredging projects for which the Corps has finished reports and referred them to Congress; increase flexibility for non-Federal sponsors of projects; codify a Corps initiative to complete feasibility studies in less than three years; maintain while improving, the environmental review process; direct all funds in the HMTF be spent for port maintenance; and create a legislative process to identify projects for de-authorization.

One can begin to see the outlines of a WRDA compromise. Credit must be given especially to House Transportation Committee Chairman Bill Shuster (R-PA) for getting a major port infrastructure bill reported and passed by the House in such a decisive manner.

We will report the outcome of this major legislation and the outcome of the budget battles for 2014 in a future issue.

BMT Isis

Delivering Optimum Results

By Bob Hockham

Bob Hockham
a Master Mariner and former Port Operations Manager, now Business Development Manager at BMT Isis, a subsidiary of BMT Group

The operational complexities and changing landscape of ports and terminals continue to present ongoing challenges for port authorities and operators globally. In particular, changing legislation, diversification, security concerns, higher traffic density, larger vessel sizes, as well as movements of hazardous cargoes, reflect on a port's required level of traffic management, vessel scheduling and navigational planning. This can, in some instances become a very complex task. In a bid to help manage these challenges and improve navigational safety and efficiency, many ports and harbors have turned to Vessel Traffic Services (VTS). However, there are multiple considerations surrounding the implementation of VTS which require detailed investigation.

Bob Hockham, a Master Mariner and former Port Operations Manager, now Business Development Manager at BMT Isis, a subsidiary of BMT Group, reinforces the need to undertake a detailed and independent risk assessment, highlighting the factors port/terminal decision makers should consider before procuring VTS equipment. He believes that vital elements of the process are both the vessel traffic pattern analysis and modeling together with consultation and workshops with the end-users, including pilots - recognizing that experienced staff are the key to safe and efficient operations.

It's important to firstly clarify the purpose of VTS – that is to improve safety and efficiency of navigation within a port/harbor area, similar to the way in which air traffic control works. Port and terminal operators also need to consider safety of life at sea and protection of the marine environment.

Before implementing VTS, port/terminal decision makers must ask the question as to which service category its VTS will fall into - i.e. an information service, a navigational assistance service or a traffic organization service.

VTS can be used as an information service which provides timely navigational information including the position, identity and intentions of traffic; weather information and waterway conditions (i.e. congestion and marine works in progress such as dredging) to assist navigators within the decision making process. Using VTS as a navigational assistance service involves monitoring vessel op-

erator navigational decision making and the resulting effects on the navigational situation. This can be provided as either a contributory or a participatory service. Delivering a traffic organization service, VTS is implemented to prevent dangerous maritime traffic situations from occurring within the VTS monitored area. This provision is likely to be much more comprehensive and will require a larger investment in equipment, manning and support. Each of these services has their own benefits and risks which must be individually assessed.

When deciding on the level of VTS you require and in turn, the investment needed to deliver that particular service, there is a need to consider proportionality as a particular large scale investment may not be desirable or effective for the smaller inland river ports.

In order to better inform decision makers, a detailed, independent risk assessment should be carried out as this will provide the necessary information which is influential in determining the level of VTS investment required, including traffic types and patterns, the proximity of worksites, offshore installations and environmentally sensitive areas. To ascertain the level of VTS required, port and terminal operators should consider the requirement for areas such as forward planning of vessel movements, anticipated congestion and likelihood of dangerous incidents, as well as the likely movement of vessels restricted in their ability to maneuver, such as heavy transport vessels. Furthermore, traffic monitoring services will require specialized radar and other monitoring equipment, to minimize interference and blind sectors due to close proximity of buildings, structures and other vessels.

Other factors that must be considered before selecting VTS equipment include:

- The VTS equipment will need to be technically capable of monitoring navigation and providing responsible authorities with adequate operational information, within the designated port authority area.
- There should be a degree of upgradeability planned into the implementation of the VTS equipment and service to future proof against changes in legislation and port operational trends such as, changing trading patterns and vessel types, future renewables deployments near to and within the VTS managed sailing area and LNG bunkering.
- The supplier of the VTS equipment and peripherals such as radars and communications equipment should be able to confirm long term availability of spare parts and service support. The port authority may need to consider implementing an in-house maintenance team.
- Redundancy should be built into the VTS system in terms of both equipment and personnel backup, to reduce the possibility of down time (such as backup power systems, emergency VTS control stations, backup radar/AIS receivers, VTS qualified pilots and harbour officials to cover absence due to sickness etc.).
- The operating authority should consider availability of training and validation services for VTS operators, as well as travel constraints such as the remote location of VTS stations which may require forward planning.
- The operating authority will need to have a clear understanding of the distinction between different categories of VTS so that the most appropriate level of VTS for local operations is selected. This is by reference to definitions provided by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Maritime Organization (IMO) and in the UK MGN 238 (M+F).

Given the often complex nature of VTS systems, operator training is key. Operating authorities must incorporate 'on the job training' under supervision of experienced operators. The production of a VTS trainee workbook which clearly identifies tasks, deadlines and officers who will be responsible for signing off on completed tasks is also vital. Operator workload will be influenced by the density of navigation being monitored and will, in turn, reflect on the VTS operator work schedule (shift and rest periods and watch rotas) to be implemented. Therefore, reference will need to be made to the Working Time Directive to ensure operators receive the appropriate rest periods and annual leave. Communication channels and the implementation of discrete VHF/DVHF radio channels for VTS/vessel communications, as well as legislative requirements such as the Pilotage Act 1987, local byelaws and sailing direction must also be addressed within the decision making process.

Given the vast number of variables involved in vessel traffic management, ports and harbors certainly qualify as 'complex systems' and operators are becoming more aware of the possibilities of failures and accidents. With this in mind there is a growing need for more effective communication between VTS operating authorities to encourage the sharing of expertise and experience. Regardless of the level of VTS investment, ports and terminals must recognise that well trained and experienced operators are the backbone to delivering safe and efficient operations. Only then will they feel confident that they have the most economical and suitable system which provides maximum safety.

Top 10 Tips

1. **Invest in predeployment traffic and risk management studies** to clearly understand the needs of the sailing areas to be monitored, risks and required mitigations
2. **Prioritize** system requirements.
3. **Carry out regular reviews** of the VTS operation to be aware of constraints and future investment requirements in order to maximize cost effectiveness and efficiencies.
4. Consider the VTS operator work arrangements in terms of **shift patterns, rest periods and absence back-up** for VTS operators.
5. Consider ongoing **VTS operator training** and V103 certification requirements.
6. Provide VTS operator **training and career development plans** to maximize morale and encourage staff retention - experienced staff are key to safe and efficient VTS operations.
7. Invest in visiting and maintaining dialogue with working **VTS operating ports** to share experiences.
8. **Consult with pilots** and encourage their input into effective VTS operations.
9. Consider various ways of **working with VTS suppliers** regarding different methods of procuring equipment such as leasing or outright purchase.
10. Consider **on-going system maintenance** requirements and the need for dedicated in-house support.

LED Lighting

Reduce Costs, Enhance Safety

No industry has escaped the economic changes of the last decade, and the marine industry is certainly no exception. But with every economic struggle emerges new solution providers, poised to help fill new needs.

St. James Stevedoring Partners LLC is among these innovators in the marine industry. It operates the state-of-the-art St. James Stevedoring (SJS) bulk handling operations along the lower Mississippi River serving ocean going vessels and river barges and transloading millions of tons of dry bulk commodities. To offer the most efficient transfer of bulk cargo between ocean vessel and river barge, SJS uses 10 mobile harbor crane barges. This mid-stream transloading of cargo provides maximum efficiency, flexibility, and value to its customers.

Striving to continuously evolve, SJS is fully committed to finding and evaluating high-quality and reliable technological solutions that will improve its operations and service. Lighting efficiency has emerged as a key factor.

With the goals of innovation, efficiency and safety in mind, SJS began working with Phoenix Products Company to outfit its Gottwald Model 8 mobile harbor cranes with LED floodlights.

The companies collaborated to understand the challenges of lighting a barge-based bulk handling crane and ultimately chose ModCom Hi 300W LED floodlights with a customized optical arrangement to replace the existing 1000W Metal Halide fixtures.

To fully analyze this new option, SJS wanted to directly compare the lighting on two of the crane barges – one retrofitted with LED fixtures and one with existing traditional metal halide lighting.

The KevinD barge was used as the reference for their existing lighting technology, and the C.J.L. barge was chosen for the retrofit. It is now among the first mobile harbor cranes to have the main production and boom lighting converted fully to LED.

LED Stability

Many lighting challenges result from the high-vibration environment of port equipment. The constant, rapid movement of cranes does not enhance the reliability of traditional lighting fixtures, making maintenance a huge expense. And, for a bulk terminal that faces the demands that SJS experiences daily, consistency and productivity are imperative.

The cranes are operating 22 – 24 hours per day, seven days a week. There is no time for unscheduled maintenance, especially since replacing a broken lamp involves laying the crane out on the deck of the barge and keeping the crane out of service for up to two hours.

Whether it's to replace a broken lamp or repair a fixture, sending someone to perform maintenance on port equipment is time consuming, expensive and dangerous. Because LED lighting is solid-state technology, there are no moving parts, fragile filaments, or breakable glass. Quality LEDs are also typically rated for 50,000 hours. For a fixture that is on 12 hours each day, that equates to more than 11 years.

Instant-On Lighting

Traditional lighting like the 1000W metal halide floodlights installed on the KevinD requires up to a 15 minute warm-up period following a power interruption. Conversely, LED fixtures reach full brightness in less than a second. For a facility like SJS, the elimination of warm-up time increases productivity by an average of 5 – 7 cycles for every shutdown during night operations.

Safety on the deck of the barge was SJS' number one consideration when teaming up with Phoenix to outfit the

Joey Cehan
grew up working in his family's generator rewind shop in Louisiana. He then spent six years owning and operating Marine Electrical Contracting Company. In 2000, Joey switched his focus to outside sales, which has earned him a combined 32 years of experience in the marine industry.

cranes with LED fixtures. The technology has greatly increased the safety at night on the C.J.L. by eliminating periods of darkness while traditional lighting fixtures need to warm up following an operational shutdown. In the event of an emergency situation, LED lights can be turned on quickly so that assistance can be safely and immediately rendered. Because of the "instant-on" feature of LED technology, SJS crews are more comfortable with turning off the main crane generator and switching to auxiliary generators, which increases the opportunity for fuel savings.

Light Quality

All of the light output of an LED fixture is directed at a targeted area. An LED fixture incorporates an array of point sources that direct light precisely where it's needed with very little scattering or loss. Light distribution is controlled by the placement of LEDs, as well as by well-designed optics that take advantage of the focal point presented by each individual LED. Light levels were measured on various points of the C.J.L. barge in comparison to the KevinD. While cranes were in working position above the hold, light levels indicated up to 46% more lux measured at selected points on the barge and vessel. It was reported by operators that the C.J.L. barge also experiences significantly fewer shadows due to the specified LED optical package.

Crane operators commented that the operational light on the C.J.L. is brighter than it was with traditional lighting, and it looks more like normal daylight. The directional nature of LED light also allows for better illumination to the surface below and improves operator working conditions. When considering that the 61 yard bucket holds about 45 tons of bulk material, the precision of the operation is vital in staying efficient, safe, and competitive.

In addition to the operational benefits, LED is considered a green technology, as LED fixtures convert more than 75% of the electrical current they consume into light compared to the approximate 10% efficiency of some traditional lighting options.

Once all boom and tower lights were replaced on the C.J.L. by ModCom Hi fixtures, floodlighting power consumption was reduced by 5.6 kW which equates to more than 70%. Combined with the reduction in waste lamps and ballasts, the conversion provides a variety of environmental benefits.

Return on Investment

LED lighting typically requires a larger investment upfront when compared to traditional lighting. However, the resources saved on energy, replacement lamps and ballasts, and maintenance are often enough to provide a payback period of as little as one to two years. For installations that operate all day, every day like the SJS group or for facilities that operate in regions with rising electricity costs, the return on investment is even quicker.

Bulk terminals have an opportunity to improve their bottom lines with LED technology. The sooner facilities adapt to the improved options available, the sooner they will begin to realize the benefits of safety, environmental stewardship, reduced maintenance and cost savings that SJS is experiencing today.

Gateway Terminal of JNPT - 1.

India Maritime Growth

Fueled by Foreign Players

By Joseph R. Fonseca

Foreign players continue to dominate several segments of the Indian maritime industry: from salvage to dredging, chartering to ship management and ship manning, to name but a few. And the list of foreign firms setting up shop in India is growing as the country is hurriedly putting in place the required infrastructure to meet the huge demands of India's growing international trade.

Globally, India is the 7th largest country in area, 2nd in population and 11th in GDP, with the expectation that it will ascend to the top five in GDB by 2020. The country is blessed with a 4,700 mile coastline, making it one of the longest in the world not forgetting the 14,500 km of navigable inland waterways, the 12 major ports and 187 minor ports well spread along the 4,700 mile coastline play a pivotal role in the maritime transport helping in international trade.

Major and Minor Ports (non-Major Ports) are defined not by size but by how they are administered. The "Major Ports" are administered by the Central Government whilst the non-major ports are controlled by the concerned State's Government, either directly or through State Maritime Boards. Major ports (except Ennore) are trusts which fall under the Major Port Trust Act of 1963, whilst the minor ports are corporate entities, and can be private companies.

The largest private port is Mundra in the State of Gujarat and the largest Major Port is the Jawaharlal Nehru Port (JNPT) where there are a number of terminals being operated on lease. Tariffs for the Major Ports are currently set by TAMP (the Tariff Authority for Major Ports) but there is a move to allow the major ports to follow the practice of the non-major ports which set their own tariffs.

The Indian government is promoting public-private partnerships (PPPs) as an effective tool for bringing private-sector efficiencies for delivery of quality public services. India, in recent years, has emerged as one of the leading PPP markets in the world, because of several policies and institutional initiatives taken by the government. These include 100% FDI (foreign direct investment) being permitted under the automatic route for port development projects and 100% income tax exemption for a period of 10 years.

International PE funds like 3i, GIC, Eton Park, Jacob Ballas, Standard Chartered PE, Warbug Pincus have invested in several ports and terminals in India. DP World has developed 5 million TEUs of container handling facilities across 5 ports in India having terminals at JNPT, Chennai Port, Mundra Port, Vallarpadam & Vizag Port. PSA has generated 2.8 million TEUs container handling facilities across 4 ports in India. It has terminals at Chennai Port, Kandla Port, Tuticorin Port and Kolkata Port. Whereas APMT developed around 2.5 million TEUs container handling facilities and 7 million tons of bulk and liquid handling facilities giving shape to Pipavav port in Gujarat and a container terminal at JNPT.

Port traffic has increased from 368 million tons in 2001 to 935 million tons in 2013. According to the 'India Maritime Agenda' port throughput is expected to increase to 2,500 million tons by 2020. The Port sector witnessed FDI equity inflow of USD 1.6 billion during April 2000 and June 2012 as per Department of Industrial Policy and Promotion (DIPP).

The Indian Government plans to bring a new orientation to encourage greater participation by the private sector in developing port activities and operations. This goal is planned to be achieved through numerous initiatives and policies. Many international port operators are invited to submit competitive bids for BOT terminals on a revenue share

basis, which has attracted foreign players. The National Maritime Development Plan (NMDP) has been set up by the Indian government to improve facilities at all the 12 major ports in India mainly through PPP.

In market share terms, major ports accounted for 58% of total throughput in FY 2013 compared with 61% in FY 2012, while the share of non major ports was up at 42% in FY 2013, increasing from 39% during the previous year. During the first three months of FY 2014, the cargo throughput decline in major ports will continue, with a 1.0% reduction in volume over that of the corresponding period of the previous year.

The cargo growth outlook for the Indian port sector continues to be strong over the medium to long term driven by the domestic requirements of coal, for power and other sectors; crude oil, for meeting domestic petroleum requirements; and containers, given the cost and logistical advantages associated with containerization. Some near term uncertainty may, however, be associated with particular cargo categories like imported coal, due to uncertainties plaguing the power sector and persistent delays in execution of green-field power projects; iron ore, due to unresolved policy issues; and containers, due to the weak global environment affecting EXIM trade.

With respect to new capacity additions, progress on the award of projects at major ports, including PPP projects, was better in FY 2013 compared with the previous year. A total of 32 projects could be finalized and awarded in FY 2013 compared with 3 projects in FY 2012, though this fell short of the planned target of 42 projects. Despite the uptick in project awards, actual implementation of these projects could see further delays, as was seen in the case of projects awarded during the previous years at major ports.

Making a cautious remark about the PPP model, Shashank S. Kulkarni, Secretary General of the Indian Private Port and Terminal Association says, “Though PPP in the port sector took off in a successful manner in 1998, the current trends do not portray a healthy picture. Like road development this segment too, seems to be struggling hard for survival, the reasons for which are well known. The Ministry of Shipping, government of India, has therefore very aptly constituted a high level group to undertake a systematic study of the port sector PPP initiatives.”

The progress with respect to capacity creation by way of green-field non major ports also continued to be slow with very few of these moving from proposal to implementation phase owing to a host of issues including problems in land acquisition; environmental and other statutory clearances; issues in financial closure, etc. Given that no near term resolution of these structural problems appears to be in sight, the capacity addition at Indian ports is likely to fall short of envisaged targets and demand requirements. As a fallout, the major ports, most of which are already operating at peak capacity, are likely to continue facing capacity and efficiency constraints while the incumbent non major ports, by virtue of their superior cargo handling infrastructure, investment in large capacity creation and high operating efficiency, would be well placed to wean traffic away from major ports as well as to garner a larger proportion of the incremental cargo generation.

The Indian government has decided to create a minimum depth of 14 meters at all the 12 ports that it owns, where depths

(Continued on page 29)

A New Maritime Crane Concept

Liebherr has developed a new model: the TCC 14000-400 D Litronic

Meeting clients' requests for cranes with lifting capacities far above the average lifting capacity of conventional mobile harbor cranes, Liebherr has developed a new model: the TCC 14000-400 D Litronic. This combined offshore and mobile harbor crane, designed by Liebherr-Werk Nenzing GmbH, has been delivered to the customer in spring of this year. It combines know-how and existing technologies of the offshore crane department and the mobile harbor crane department, thus of two of the company's maritime business divisions.

The TCC 14000-400 D Litronic has been assembled in the port of Baku, the capital city of Azerbaijan. The first field of application for the multi-purpose crane with a dead weight of approximately 1,100 t is the construction of oil platforms in the Black Sea.

Combined Offshore and Mobile Harbor Crane

A feature of the TCC 14000-400 D Litronic is it can be used for two completely different types of application. As it is currently applied in Azerbaijan, the crane can either be fixed on a floating installation (barge) and used as an offshore crane under offshore conditions. It then meets all necessary functions and safety requirements in order to be rated as an offshore crane according to the norm EN 13852-2. As an offshore crane it is able to lift heavy loads up to a maximum of 400 t at an outreach of 21 m; at an outreach of 70 m the crane is still able to hoist 91 t. The maximum under hook height of the crane is 68 m.

Furthermore, thanks to its undercarriage the TCC 14000- 400 D Litronic can also operate onshore as a mobile harbor crane with high lifting capacities. For the undercarriage the drive technology of a Liebherr mobile harbor crane was combined with a newly designed steel fabrication. It consists of a central X-shaped structure to which four outriggers are mounted.

For travelling operation the base structure is fitted with 48 wheel sets as known from the conventional Liebherr mobile harbor crane. During crane operation the crane is propped up on support units situated at the end of the outriggers. The dimensions of the support base are 22 x 22 m. Using a large number of wheel sets and accordingly large supporting pads the crane achieves equally low ground pressure values as a standard mobile harbor crane, not only while travelling but also during crane operation. Further advantages of the universal crane are its tugger winches, which support the functionality of the crane in the best possible way. The design of the counterweight minimizes the breakdown torque of the crane. Moreover, its independent diesel drive can be listed as another remarkable benefit.

In addition, the TCC 14000-400 D Litronic offers a comparatively small obstruction area of 12.5 m. As an option it can also be used in tandem mode in combination with another crane of the same type. With the TCC 14000-400 D Litronic, Liebherr's maritime division said it offers a compact and flexible crane for a great number of different applications. This unique crane is the ideal product for customers with demand for both heavy lift cargo handling in ports and floating solutions for typical offshore applications, like the construction of oil platforms or the installation of wind power stations in the sea.

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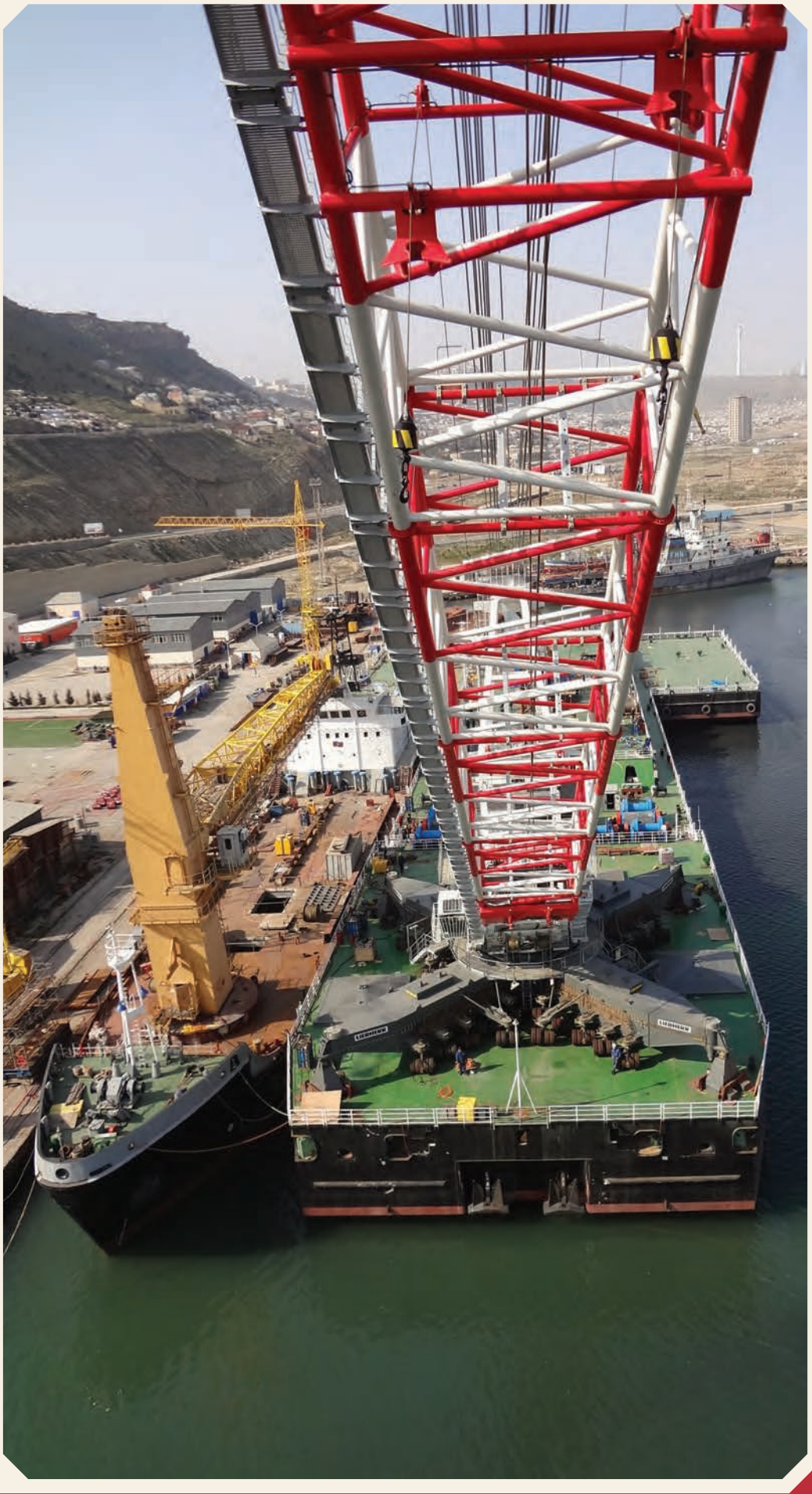


depths range from 9 -12 meters. The global average is 12-23 meters, enabling the latest generation containers, tankers and dry bulk ships to come calling. The dredging requirements of Indian ports are assessed at over 1,100 million cubic meters with plans to increase draft levels at major ports to at least 14 meters. Major ports alone are targeting an investment of over $1.5 billion in dredging.

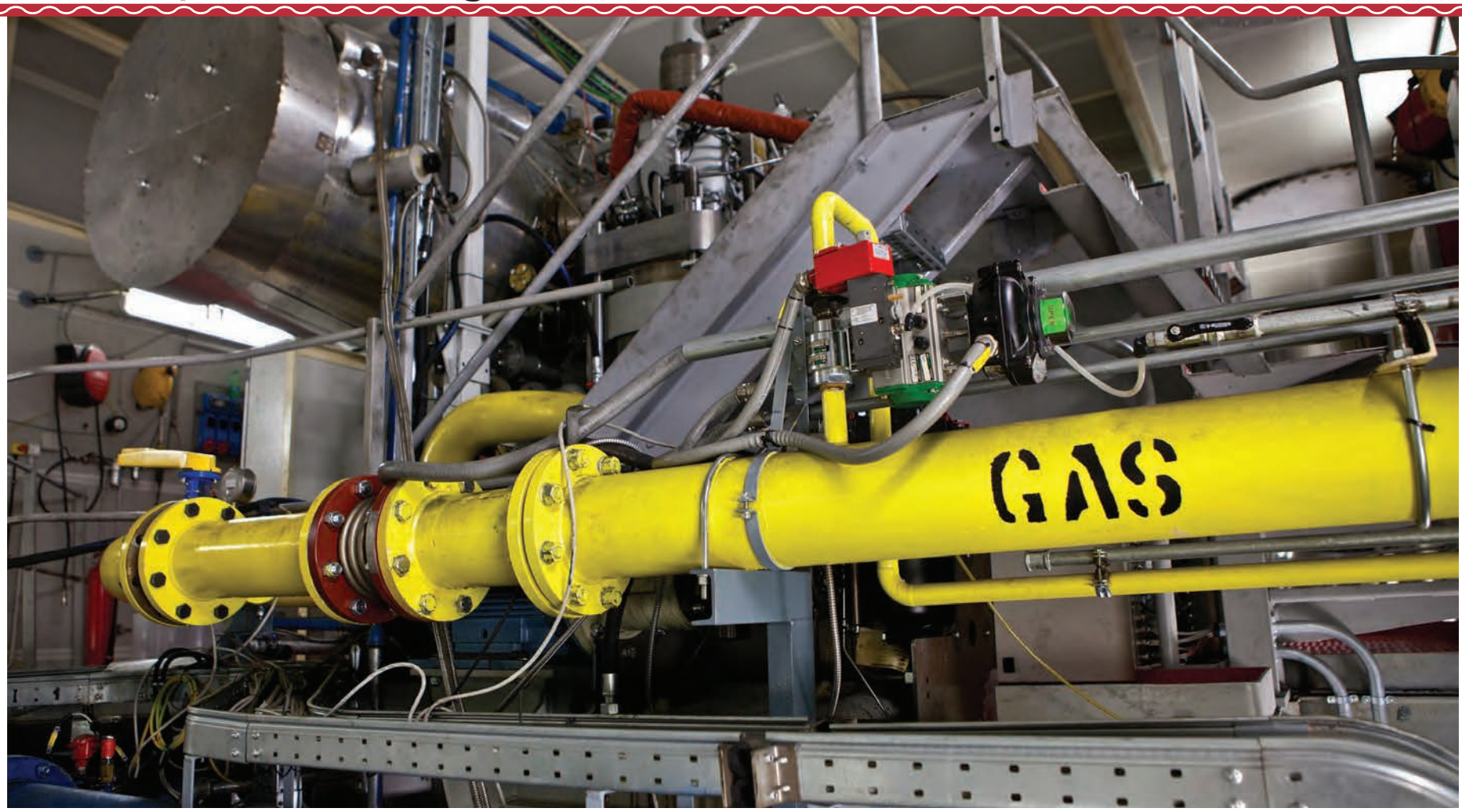
All major dredging contracts are awarded to global giants and almost none to Indian operators because of their very limited capacity. When it comes to granting dredging contracts in India, Indian players are given a wide berth according to Hemant Rao of Meka Group. “It has become a policy to allow a global major to walk away with most of the dredging contracts in the country unlike what is practiced in the U.S. and other countries. In America dredging contracts are given solely to U.S. companies, and the bidder has also to ensure he deploys dredgers made in the U.S. and manned by Americans only. Indian companies are never given any such preferential treatment in their own country.”

Salvaging too pictures a similar scenario. “Salvage industry in India is still at a nascent stage,” said Capt. Sandeep Kalia, Executive Director, GOL Salvage Services Ltd, which is the only salvor in India to have acquired full membership of the International Salvage Union. “International Salvors had dominated this niche sector and entry of Indian companies was almost limited. It is the lack of support or encouragement from the government to promote national companies, the Indian Laws with respect to Salvage & Wreck Removal and the cut-throat competition that deters prospective Indian players from entering this business.”

The ports sector in India also needs to expand substantially to meet the growing demands in the country and the ambitions of the government. Bureaucracy hampers decision-making at both the Union and state government level and the gestation period for new projects can be lengthy. However, private sector projects are progressing especially in the more progressive states, and there are some very dynamic Indian companies as well as established international terminal operators who are progressing new projects; both green-field and within established operations.

Private companies interested in private port developments include Adani, Marg, Gammon, Essar, Tata and IVRCL. These companies are open to contracting with international businesses in specialist areas and some have already established contacts with overseas companies. Many of the established international terminal operators are also active in the country. Without a local partner or representative, it will be very difficult to succeed in business in India, and companies looking to do business in the sector are recommended to seek advice on the appropriate establishment prior to the commencement of operations.

Vizag Seaport Ltd.



The new two-stroke gas engine design was developed within Wärtsilä's global R&D function. The design was carried out jointly at Winterthur, Switzerland and Vaasa, Finland. The Wärtsilä engine laboratory located in Trieste in Italy was the site for test installation as it has gas supplies.

Wärtsilä

Out of the Past Comes the Engine of the Future

By Peter Pospiech, Germany

Although the well-known Finnish company Wärtsilä has a very long history, it was founded in 1834, the diesel engine era begins when the company signs a license agreement with Friedrich Krupp Germania Werft AG in Germany. The first diesel engine sees the light of day in Turku in November 1942. From there on Wärtsilä passed a number of rapid expansions in all fields of products. Some of the products stayed and some disappeared. The concentration of being a full solution provider for the maritime industry started in the early 2000's after lots of talks with potential customers worldwide.

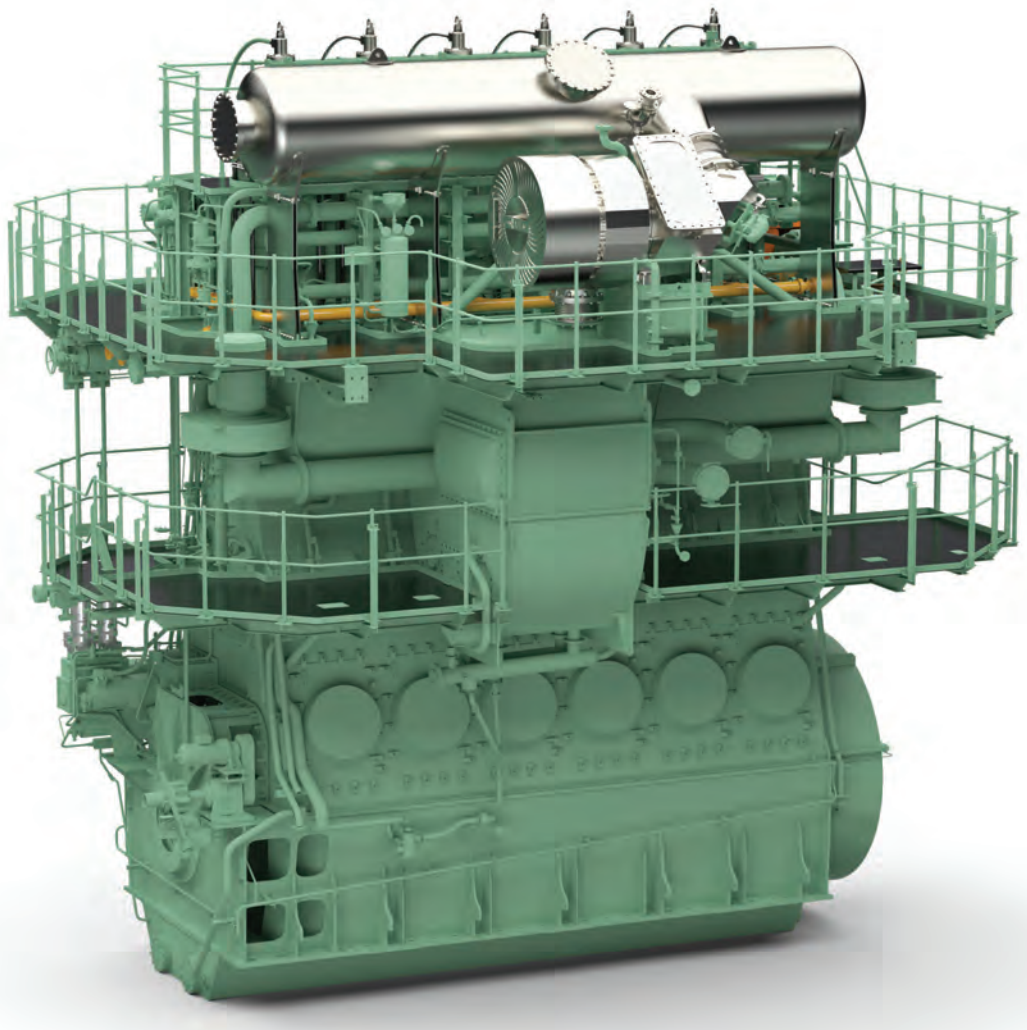
Today Wärtsilä is a corporation which develops, manufactures and services power sources and other equipment in the marine and energy markets. The core products of the company include large diesel engines. As of 2012 they employed close to 19,000 workers in more than 70 countries and it is headquartered in Helsinki, listed on NASDAQ OMX Helsinki, Finland.

Wärtsilä says they are powering one in three ships and services one in two vessels sailing the world's oceans. The company services the merchant, offshore, cruise and ferry, naval, and special vessel markets, and the offering includes ship design, main and auxiliary engines, auxiliary power systems, electrical and automation packages, propulsors (such as water jets, thrusters, propellers, and nozzles), seals, bearings, gears, rudders, scrubbers, boilers, and all related services, such as repair, configuration, upgrading, training, maintenance, and environmental services.

The Finnish engine manufacturer said it has more than 40 years of experience in marine gas applications and therefore featuring the leading position in dual-fuel engine technology. When equipping the LNG Carrier "Venator" with a low-speed dual-fuel 7RNMD90 engine in 1973, Wärtsilä (Sulzer) was way ahead of its time. The installation was successful in all aspects, but the market was not yet ready to endorse the concept. Still convinced of the potential that natural gas held, the company developed and successfully tested a high-pressure two-stroke gas engine in 1986. Again, the technology was proven but the Finnish company were once again ahead of its time, and the market was still not ready for it.

In the mid-1980s, the engine manufacturer also developed its first medium-speed high pressure gas engines, the GD series, targeting land-based and marine markets. In the 1990's it added the SG and the DF series medium-speed gas engines. On this occasion, the timing was right. The superior technology and performance soon made, according to Wärtsilä, the market leader for medium-speed dual-fuel applications. Of these the DF marine installations alone have accumulated more than 1,000,000 running hours, with close to 60 vessels in service.

According to the company, recent trends in global shipping show natural gas becoming more and more attractive as the new fuel of choice. Early adopters in both the ferry and the offshore sectors have shown increasing interest in gas, especially when operating in environmentally sensitive areas and more stringent emission control areas such as the Baltics, Norway and the coastal waters of the U.S. Partly due to upcoming legislation for SOx and NOx-emissions, and also because of its increasing avail-



The all new low speed dual fuel engine
of type RT-flex50DF comes as a 5, 6, 7, and 8-cylinder with power outputs, in gas-mode, from 4,775 kW at 99 rpm up to 11.520 kW at 124 rpm.

ability at an attractive cost level, this significant shift towards natural gas continues to gain speed, including the merchant shipping segment.

The Low-Pressure Dual-Fuel 2-Stroke Engine

Wärtsilä recently conducted full scale testing on gas of its low-speed 2-stroke dual-fuel engine and is now introducing a full range of engines based on its established and well-proven low pressure technology. The implications of this for ship owners and operators are such that the new engine is already being referred to as a game-changer for merchant shipping. The first engine using this technology, the Wärtsilä RT-flex50DF, will be available for delivery in the third quarter of 2014. The new low speed dual fuel engine of type RT-flex50DF comes as a 5, 6, 7, and 8-cylinder with power outputs, in gas-mode, from 4,775 kW at 99 rpm up to 11,520 kW at 124 rpm. Other engines from the company's new Generation X series will follow and will be available for delivery during 2015 and 2016.

A Broad Range of Benefits

The entire portfolio of Wärtsilä 2-stroke engines will be available as low pressure dual-fuel (DF) versions. The benefits of this technology are significant. Compared to other technologies, studies show that Wärtsilä's low pressure DF engines offer capital expenditure (CAPEX) reductions of 15-2%, the company says. This is achieved through a substantially simpler and lower cost LNG and gas handling system operating at pressures below 10 bar, and by the fact that no further exhaust gas cleaning systems are needed to meet future emission regulations. "This is one side of the coin – but the other side of the coin is that the initial costs, just for the bare engine (without all the additional requirements to run the engine on gas), will be around 15 to 20% higher than comparable diesel engine," said Rolf Stiefel, Sales Director, Wärtsilä Ship Power. The new engines are IMO Tier III emissions compliant in gas mode, and the minimum Tier II level is achieved with liquid fuel.

Furthermore, on the operating expenditure (OPEX) side, significant gains will be achieved with Wärtsilä's technology. This is because no high pressure gas compression system external to the engine needs to be operated onboard the vessel, and NOx abatement systems are not required. Another main advantage is that the Wärtsilä technology allows stable operation on gas across the entire load range. This means that at low loads, there is no need to switch to diesel fuel as is the case with other technologies. In other words: with the new two-stroke RT-flexDF engine a pier-to-pier operation can be performed. Moreover, the consumption of pilot fuel is approximately just one per cent of the total fuel amount, and therefore much lower than with other technologies.

Key to Low Emissions

The key to such low emissions is the engine's low pressure fuel system. Instead of pumping gas

"The benefits of the new low pressure dual-fuel technology for 2-stroke engines are significant."

Martin Wernli, Wärtsilä Ship Power

"A dual-fuel engine design is a very elegant solution for meeting the new requirements: Heavy fuel oil (HFO) can be used when crossing the world's oceans and the vessel can switch to LNG within each emissions control area."

Ingemar Nylund, Wärtsilä R&D

at 200 bar into the engine near Top Dead Center (TDC), gas is ported into the engines mid stroke at less than 10 bar which allows the gas to mix thoroughly into the cylinder and subsequently burn more evenly. This pre-mixed lean burn combustion process results almost in zero NOx emissions. In addition, because this is a low pressure system, high pressure compression systems are not required.

Ingemar Nylund, Program Director Wärtsilä Research & Development, mentioned in his presentation that the flame created in a high pressure gas engine burns in a far different manner resulting in the creation of NOx at levels well outside the limits required by IMO Tier III. He said "In the RT-flex 50DF, the ignition process is started via the combustion of a 1% portion of diesel in a pre-chamber (located in the cylinder head). When in gas-mode, this portion of diesel is the primary contributor of NOx emissions."

But what about the Methane Slip which has a strong impact on the greenhouse gas emission?

Ingemar Nylund explains: "When speaking about gas-powered engines, the emission of unburned fuel, and this is the so called 'methane slip,' into the atmosphere is always an important factor. It should be noted here, however, that methane slip, i.e. incomplete combustion of methane (CH4) in the cylinders, releasing methane on the exhaust side,

All Wärtsilä's four-stroke diesel and dual-fuel engines
are manufactured at the former Grandi Motori Triest plant, which is now Wärtsilä

will negatively influence the reduction of greenhouse gases significantly, and in worst cases eliminate the gains from CO2 reductions. In consideration of the fact that CH4 is more than 20 times more powerful than CO2 as a greenhouse gas, release of even small volumes of methane easily spoils the potential gains. But the "methane slip" inherent in the RT-flex 50DF engine is less than what is found in the equivalent four-stroke engine and still results in 25% less equivalent CO2 emissions, because the combustion has much more time to burn more completely, which is not the case in four-stroke engines. On top of this: the RT-flex DF engines have the potential to further reduce the methane slip by further developments, which means: 'Direct' methane slip can be avoided by correct gas admission valve timing, the use of pre-chamber technology to have complete combustion and an optimized combustion space to avoid 'dead volumes'."

Wärtsilä's low pressure gas system fulfills all safety requirements. Since low pressure gas technology is the standard for all four-stroke engine makers today, the merit of this concept is clearly proven. "The benefits of the new low pressure dual-fuel technology for two-stroke engines are significant. Describing this as a game-changing development for merchant shipping is certainly no exaggeration, since the many advantages of being able to use gas and LNG as primary fuel are now, for the first time ever, available to virtually all vessel types. Our well proven technologies for both the engines and the onboard gas and LNG handling systems, can now be applied to this wider market. With the adaption of low pressure dual-fuel technology to two-stroke engines, Wärtsilä brings the proven advantages it has demonstrated in the four-stroke, medium-speed DF engine market to its two-stroke low speed engine customers," said Mr. Martin Wernli, Vice President, two-stroke, Wärtsilä Ship Power.

Leading in DF Engine Tech

Wärtsilä pioneered the development of dual-fuel engine technology, and is today a leader in this field. Throughout the years, Wärtsilä's R&D work has focused heavily on these technologies. The company successfully introduced its low pressure dual-fuel engine technology for four-stroke engines for land based applications in the 1990s, and for marine applications soon afterwards. Since then, the company has delivered more than 1,000 such dual-fuel engines accumulating more than seven million running hours.

The application of natural gas as a widely accepted fuel for merchant shipping is likely to become a reality in the near future. The environmental benefits and attractive pricing that gas offers are expected to drive demand, with a resulting increase in market share for gas fuel. By introducing low pressure two-stroke DF engine technology, the Finnish engine manufacturer is accelerating this major trend since it makes the application of gas as a marine fuel easier and safer for owners, operators and yards. Wärtsilä envisages that by 2020, more than a quarter of the ordered vessels could be designed to run on gas fuel.

(Photo credit: GD-BIW, M. Nutter)

Gray giant is a stealthy ghost

The Navy's Battlewagon of the 21st Century

It is the newest and most transformational warship ever built, and yet it has also had the longest gestation period. Whether you call it new or old, you have to call it different.

By Edward Lundquist

The pedigree for DDG 1000 is not from the Spruance or Arleigh Burke class of guided missile destroyers, but rather it comes from the SC-21 (Surface Combatant for the 21st century) concept from 1994. Like DDG 1000, SC-21 was not about anti-air warfare. It was all about strike. SC-21, along with the Maritime Fire Support Demonstrator (MFSD) "arsenal ship" concept, evolved into DD-21 (Destroyer for the 21st century), also known as the 21st century Land Attack Destroyer, and featured two long-range guns and 128 missile tubes.

Unlike the existing DDG-51 guided missile destroyers, DD-21 deemphasized the anti-air and anti-submarine capabilities, although it had some of each. It was about power projection and expeditionary support.

The large size was to accommodate the power projection features, including a big magazine to provide plenty of fire support to Marines on the beach. Other concepts being tested were the new hull form, electric drive and minimum manning. While the ship was bigger, the crew would be smaller. At some point a crew size of under a 100 (96 not counting the air detachment) was arbitrarily assigned. It was a stretch goal, but planners saw that there would be no "bench" to fill in for casualties; too few Sailors to stand watches, conduct preventive maintenance or hold sweepers on what was a huge ship. To support such a dramatic reduction, the ship would require a high degree of automation to support operation and the flexibility to allow the crew to operate from multiple stations.

But in 2001 the DD-21 program was cancelled, although the development work transitioned to DD(X), now known as DDG-1000 or the Zumwalt class. Throughout this gestation period the ship was envisioned with a tumblehome hull and a stealth design that more closely resembled the Civil War CSS Virginia (the ex-USS Merrimack) or one of the Great White Fleet capital ships that circled the globe in the early 1900s. Able to fire projectiles long distance with great accuracy, the ship was supposed to give the Marines the firepower they needed for expeditionary assault, and was more a replacement for the battleships than any other class of ship.

Some of the DD(X) technology was leveraged from existing programs. Tactical Tomahawk offered a programmable strike capability and could be launched from vertical launch system VLS cells common in the fleet.

The Navy's version of the Advanced Gun System was based on an Army 6-inch (155 mm) self-propelled gun system called Crusader. The Army planned to buy 800 vehicles, so the Navy thought it was wise to leverage that development and come up with a naval version. But when the Army cancelled Crusader in 2002, the Navy was stuck with the full bill.

The United Defense (Now BAE Systems) AGS fired the long-range land attack projectile, a rocket-assisted round with GPS guidance and hoped for ranges of up to 100 miles.

The Navy looked at several different designs based on the number of VLS cells, guns and ammunition capacity. Eventually they settled on two guns with 600 rounds total, and 80 VLS cells, in a 14,800-ton ship. The 80 Raytheon MK 57 peripheral vertical launch system (PVLS) cells were installed between a double hull for survivability, and are capable of launching just about every naval missile fired from surface ships.

Most of the truly transformational technology envisioned from the beginning eventually was incorporated in DDG-1000, a ship that is unlike anything else in the fleet. The ship had a composite deckhouse and helicopter hangar to reduce weight, and the "apertures" were embedded in the superstructure; there are no rotating antennas. Electric drive on warships isn't new, but the integrated propulsion system is entirely new for the U.S. Navy, and provided significant flexibility to generate and use power as needed, including a significant reserve for future power-hungry energy weapons like lasers and electromagnetic railguns.

Significant automation and a new "autonomic" firefighting system allowed the ship to operate, fight fires and recover from damage with far fewer Sailors than ships in the fleet today.

Not so obvious to the observer is the enabling technology, the Raytheon total ship computing environment (TSCE), the key behind the ship's significant automation and reduced manning, that connects every aspect of the ships' operations with a central backbone that also enables modularity, so new or upgraded capability can be easily and seamlessly integrated without added systems or electronics.

It's a much larger ship compared to the Aegis destroyer or cruiser, wide at the waterline, a bulbous nose and no bridge wings. The gun barrels are stowed when not in use to further reduce the ship's radar cross section. When underway,

Don't Be Fooled By These Misused Words…….

Environmentally Friendly →

"Inherently" Biodegradable →

Green →

Effective December 19, 2013 Marine Lubricants Are Either Environmentally Acceptable Lubricants (EAL's), Or They Are Not

US EPA Criteria:

1. ***Biodegradation*** – The process of chemical breakdown caused by microorganisms or their enzymes in which said chemical may be decomposed and absorbed by the environment.
   - Lubricants must be rated "Readily Biodegradable." "Inherently Biodegradable" does *NOT* qualify as an EAL.
2. ***Aquatic Toxicity*** – The damaging effect on marine life and population resulting from exposure of toxic substances. Aquatic toxicity is measured by the concentration of parts per million (ppm) or milligrams per liter (mg/L) that kill a given percent of species being tested.
   - Lubricants must be rated "Practically Non-Toxic" or "Relatively Harmless."
3. ***Bioaccumulation*** – The build up of foreign chemicals within the tissues of a living organism over time.
   - Lubricants must not create bioaccumulation in living tissues or accumulate with an acceptable amount of risk as determined by the foreign European Ecolabels and allowable by the US EPA.

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EAL Product	Change in Acid Number mg KOH/g	Total Acidity of the Water Layer mg KOH
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Polyalphaolefin (Bio-based PAO)	-0.08	6.9
Synthetic Ester	0.83	19.37
Vegetable Ester	2.02	3.23

Test Method – Hydrolytic Stability – ASTM D-2619 using 75g of fluid and 25g of water are sealed in a bottle then placed in a 200°F (93°C) oven and rotated for 48 hrs. Fluids that are unstable to water under conditions of the test form corrosive acids and insoluble contaminants. Reported values are Acid Number Change in the fluid, and Total Acidity of Water – *both equally damaging to components*.

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(Photo credit: GD-BIW, M. Nutter)

Captain Kirk

DDG 1000 is Sleek, Imposing, Powerful

"Once you are in her presence, you see how beautiful and sleek she is," said Capt. James Kirk (pictured), the prospective commanding officer of Zumwalt. "I was surprised when I stood on the bow forward of the guns and was taken aback by the size of the superstructure," Kirk said. "She is imposing."

"She can operate close inshore, independently for an extended period, or with a Joint Strike Group. She's a multi-mission ship optimized for the littoral, and with an emphasis on land attack and strike," Kirk said.

DDG 1000's long-range gun and 80 MK 57 vertical launch tubes can deliver an arsenal of weapons to strike targets ashore, afloat or in the air.

According to Kirk, her designers had two important goals: increase survivability and decrease her manning. "Despite her size, she has reduced signatures to lower her vulnerability to detection, which is important in the littorals. She's about 1.5 times larger than an Arleigh Burke guided missile destroyer, yet has half the number of Sailors because her technology and automation is vastly superior." The bridge is designed for three watchstanders, and there are only two people on watch in engineering at any given time.

Kirk said the power margin and total ship computing environment (TSCE) will enable the ship to keep the combat systems relevant and support future capabilities. With TSCE and IPS, everything is connected. The crew can establish doctrine statements for operational decisions, so the system knows exactly how much power is required for any situation.

Kirk says he has frequent interaction with the Superintendent of Shipbuilding at Bath, the Program Executive Officer Ships and the DDG 1000 program manager, the Naval Surface Warfare Centers, and industry representatives from Raytheon, General Dynamics, BAE Systems, Huntington Ingalls, Lockheed Martin and others. "It takes a village," Kirk said.

"We've all worked to generate a shared understanding," Kirk said. "I'm trying to be a good listener." Kirk said the crew is coming together. "We have 41 here at Bath now, and another 40 at the detachments in San Diego and Norfolk undergoing their precom training. They are a marvelous group of dedicated young men and women." We have two objectives, to ready the ship for combat operations, and honor our namesake," Kirk said. "We couldn't be prouder to associate ourselves with the name Zumwalt."

there's no reason for anyone to be out on deck.

The DD(X) program called for 32 ships, then 24, then 12. Finally, the Navy said that analysis indicated that only seven were needed. Then Chief of Naval Operations Adm. Gary Roughead called for the program to be truncated with just two ships built, although Congress later reinstated the third ship.

Delivery to the Navy is scheduled for late next year. The formal christening ceremony originally scheduled for Oct. 19, 2013, had to be cancelled due to the government shutdown. It is now slated for spring of 2014.

Two more ships of the class are under construction at BIW, Michael Monsoor (DDG 1001) and Lyndon B. Johnson (DDG 1002).

As big as it is, it has the stealth characteristics to make it appear as a small fishing boat on an enemy's radar scope. It is a stealthy giant.

"It's a gigantic ship—14,800 tons—it's an incredible machine," said Vice Adm. Tom Copeman, commander of Naval Surface Forces. "Right now the plan is for them all to be home ported here in San Diego."

Visiting the ship on Nov. 21, 2013, Defense Secretary Chuck Hagel said the Zumwalt-class destroyer "represents the cutting edge of our naval capabilities."

Because the ship will be assigned to the Pacific Fleet, Hagel said it "represents an important shift … in America's interests to the Asia-Pacific."

Another new concept for DDG 1000: The Raytheon EMEs

Electronic Modular Enclosures (EMEs) introduced an innovation to shipbuilding, essentially preassembling hardware components prior to delivery to the shipyard. Sixteen of the ruggedized EMEs are installed onboard the new DDG 1000-class multi-mission destroyers.

According to Tom Moore, director and DDG 1000 deputy program manager with Raytheon Integrated Defense Systems, the Zumwalt's mission systems equipment are mounted on racks and installed in the EMEs. "All of the assembly, integration and testing is done on our factory floor before delivery," noted Moore. "The fully populated enclosures are installed onboard, in synch with ship construction phases, and it's done. It saves mounting, cabling and integrating individual racks of equipment, hardwired to the ship."

"Each of the ships' 16 EMEs contain up to 235 COTS racks, which equates to 90% of the combat systems equipment. EMEs offer an affordable approach to combat system integration and testing," said Moore.

Four sizes, from 18-35 feet in length, weighing up to 18 tons, the EMEs contain computing, radar, communications, sonar and sensor mission systems equipment. Additional benefits, EMEs also minimize the footprint occupied onboard the ship (size and weight) and maximize efficiencies in both power and cooling.

The EMEs were built with the space, weight and power margin to accept growth. The modules are shielded for electromagnetic interference (EMI) and have the power, cooling and open architecture standard interfaces for ease of maintenance and tech refresh. If a particular system needs to be upgraded, there's no need to replace the entire module, but only gear in the particular rack.

The ease of upgrades is important in order to capitalize on technology advancements as subsequent generations of COTS equipment and systems should be faster and smaller. "If and when the ship takes on new missions, more systems, capabilities or programs will need to fit on the ship from an integration standpoint," Marcley said.

Swapping out or changing a rack is simple. "Most equipment in the racks is the size of a box or small suitcase," said Moore.

To date, Raytheon has delivered 35 fully populated, integrated and tested Electronic Modular Enclosures, completing deliveries for the first two ship sets (DDG 1000 and DDG 1001) as well as an additional three EMEs for the Self-Defense Test Ship.

New radar helps DDG 1000 face the future

According to Wade Knudson, Raytheon's DDG 1000 Program Manager, Zumwalt has an entirely new radar, the Raytheon SPY-3, installed in three faces and embedded in the superstructure.

The Zumwalt's AN/SPY-3 is an active electronically scanned array (AESA) X-band multifunction radar. The ship was originally going to be equipped with a dual band radar with both the SPY-3 and a volume search radar, an installation also found aboard USS Gerald Ford (CVN 78). But according to Knudson, the SPY-3 software has been modified.

"We created additional software code for the SPY-3 to add the volume search capability for DDG 1000," said Knudson.

Because they can't radiate the radar yet, the SPY-3 radar will be taken to the Wallops Island test facility to operate in the maritime environment. "We'll be

A photo illustration of the Zumwalt-class destroyer USS Michael Monsoor (DDG 1001). The ship will be named after Master-at-Arms 2nd Class Michael Monsoor (SEAL) who was posthumously awarded the Medal of Honor for his actions during combat on Sept. 29, 2006 in Ar Ramadi, Iraq. (U.S. Navy illustration by Mass Communication Specialist 2nd Class Kevin S. O'Brien)

flying aircraft and missile targets at the radar to evaluate the performance. Then we'll take the radar to the self-defense test ship at Naval Surface Warfare Center Port Hueneme for more testing," Knudson said.

The ex-USS Paul F. Foster is used to test sensors and defensive systems against actual targets fired toward the ship, which is operated remotely with nobody on board for such testing. "We'll mount the radar on the SDTS at the same height as on Zumwalt, and conduct about 20 test firings.

Highly Automated Combat Capability

The highly automated system, which relies on commercial off the shelf (COTS) computers, is designed for reduced manpower for both operations and maintenance. For anti-submarine warfare, the ship has both a Raytheon medium frequency sonar for ASW and a Lockheed martin high-frequency sonar (the same as used on U.S. submarines) for in stride mine avoidance, as well as a towed array.

The total ships computing environment (TSCE) is the brain, spinal cord and central nervous system. It controls engines and motors, valves, pumps, fuel, firefighting and damage control systems. Cameras can show the crew what's going on everywhere on the ship, especially in the unmanned spaces, and sensors can detect fires and secure power and energize the water mist system.

The assembled modular sections were joined together and outfitted in BIW's Ultra Hall—super units became mega units and then ultra-units. After the sections are joined together the ship is taken outside to the Land-Level Transfer Facility (LLTF); where masts, weapons and the A/N SQQ-89A(V)15 are installed. The ship then moves aboard a barge that can be ballasted down to float the ship.

Our equipment has been delivered for the first two ships," said Tom Moore, Raytheon's DDG 1000 deputy program manager. "Now that Zumwalt is in the water we're getting equipment integrated and powered up on the ship." Knudsen said the ship can quickly be configured for different missions, such as setting flight quarters, opening the hangar doors, activating antennas. "It's all automated with preselected functions," he said. "When the ship goes to general quarters, the TSCE starts setting "condition Zebra," securing valves and hatches, even shower drains, and indicates any hatches being opened."

The ship mission center (SMC) is the hub for shipboard operations. The computerized functions rely on lots of software. "We're delivered more than 6.7 million lines of code already," said Knudsen.

"She's coming together well," said Moore. "Ship two is ready to go, right behind it."

"Producibility" was a design goal for the Navy and the shipbuilder. A three-dimensional design tool was used in production planning, allowing designers to try different options to fit pieces together before deciding upon the final arrangement and process works. The first DDG 1000 was "virtually built" numerous times in CAD to validate the process before the first piece of metal was cut.

While the Zumwalt-class is radically different from the Arleigh Burke DDGs, they do share some basic commonality with things like valves and pumps. The Zumwalt was designed to have 30% fewer parts overall, and many of those parts are common with DDG-51–63% parts commonality, according to navy officials.

Zumwalt is a "Destroyer on Steroids"

The ship is named for former Chief of Naval Operations Adm. Elmo R. "Bud" Zumwalt Jr., who served as CNO from 1970-1974. His son, James Zumwalt, said the ship means a great deal to him and his family.

"It continues our father's legacy. While CNO, my father pushed for changes 43 years ago, some of which are reflected in the DDG-1000. His push for improving life for his sailors is reflected on DDG-1000 by its four-man staterooms for enlisted personnel. His push for multi-purpose ships is reflected in DDG-1000's numerous capabilities," Zumwalt said.

While his father served on "tin cans," including USS Dewey (DLG 14), which he commissioned at Bath in 1959, he said the new Zumwalt is much more. "Calling DDG-1000 a destroyer is comparable to calling a rotweiller a yorkie. With the capability of providing far more accurate naval gunfire support (NGFS) at distances almost five times greater than our retired battleships, DDG-1000 has much more bite than the biggest NGFS ships ever built. The stealth technology provides DDG-1000 with the appearance of a yorkie but equips it with the fight of a rotweiller. As a life-long destroyerman, however, I think my father would keep to tradition, perhaps characterizing it as a 'destroyer on steroids.'"

"USS Zumwalt is the Navy's battlewagon of the 21st century," Zumwalt said.

"There is a lot of coincidence between the ship and its namesake," said Zumwalt. DDG-1000 will transform the Navy on a level not seen since my father's tenure as CNO. He is credited with eliminating more U.S. Navy ships from the active rolls than the Japanese were able to eliminate during World War II. Doing so reduced the Navy's funding for maintenance while providing the funding for research and development to build a modern era of warships."

"Also like my father, DDG-1000 proved to be very controversial. Most of what I have read about my father by Navy historians and researchers praise him for his visionary leadership, although he had his share of critics while he served in office," said Zumwalt. "He often said, however, that he knew his changes on many fronts had earned him a long list of friends and a long list of enemies—and that he was equally proud of both!"

Saint Elmo is the patron saint of mariners. "My father was known as the 'Sailors' Admiral.' I believe when the USS Zumwalt takes to sea, there will be two Saint Elmos watching over her and her crew."

(U.S. Navy photo courtesy of General Dynamics)

The First of Maersk's Mammoth Containerships

Maersk Mc-Kinney Moller

Photographs of Maersk Line's 18,000 TEU ships are flooding in from ports around the world as the carrier phases its giant new vessels phase into the AE10 string between Asia and North Europe. It's a "Where's Waldo" with maritime characteristics. Shanghai, Ningbo, Yantian, Hong Kong, Tanjung Pelepas, Rotterdam, Aarhus, Gdansk – the giant Triple-E Class ships are making history with each port call and tugboats with water cannons firing have been rolling out the aquatic red carpet.

Maersk Mc-Kinney Moller was the first of 20 Triple-Es ordered by the carrier and it sailed into service with much fanfare on June 28. In August she was followed by Majestic Maersk, and Mary Maersk was scheduled to join the fleet in mid-September.

Five of the giant vessels will be in service before New Year celebrations begin and by 2015 all 20 will be in business, an incredible 360,000 TEU of capacity shuttling between Asia and North Europe.

While the trend is big (and since this ship entered service, several carriers have announced deals for even bigger ships) the biggest and best comes at a price, and the first 10 ships cost Maersk Line $190 million each. The carrier expects optimization and energy improvements to the second 10 should see the price dropping to an average of $185 million per ship. Raw materials comprise most of the cost with each vessel requiring 55,000 tons of steel.

The more efficient engines make low fuel consumption one of the Triple-Es greatest advantages. Compared to the 13,000 TEU ships of competitors, vessels of 18,000 TEU are believed to burn around 35% less fuel per container. Maersk said the vessels will burn 30,000-35,000 tons of fuel a year, which over their lifetime will be close to three times the price of the ship.

Despite initial resistance to slow steaming, shippers have grown accustomed to longer voyage times and have adapted their supply chains accordingly. Guaranteed times have replaced speed, even though it now takes six days longer than in 2008 to ship containers from Shanghai to North Europe.

The two-propeller engine that can push the Triple-Es to 23 knots while operating at slower speeds gives the ship an operational sweet spot lower than the Emma Maersk. Design improvements see the engines in the second batch of 10 vessels reduced from eight cylinders to seven cylinders. The more efficient engines make low fuel consumption one of the Triple-Es greatest advantages. Compared to the 13,000 TEU ships of competitors, vessels of 18,000 TEU are believed to burn around 35% less fuel per container. In fact, Maersk said the vessels will burn 30,000-35,000 tons of fuel a year, which over their lifetime will be close to three times the price of the ship. As fuel accounts for well over half of all voyage costs, this kind of fuel economy is a powerful incentive for ordering the new generation of container ships.

The main drivers behind building the Triple E in the first place were to achieve greater container capacity and better fuel efficiency. Its "Triple-E" moniker refers to economy of scale, energy efficiency and environmental improvements made possible through advances in ship design and technology. At 400 m, the ships are just four m longer than E-class vessels (Emma Maersk) yet can carry 2,500 more containers. An expanded inside cavity in a wider hull with a more bulbous bow allows the additional 16% of boxes to be piled in without significantly increasing the draft. Moving the navigation bridge and accommodation five bays forward and the engine room and chimney six rows back created more space. Despite the increase in container capacity, the Triple-Es will only be one row wider than the E-class ships, 23 rows as opposed to 22. This means the ships can be handled with cranes currently in use in the hub ports.

Maersk believes its 20 Triple-Es will be enough new capacity for the next few years and has long since declined to exercise an option for a third round of 10 Triple-Es.

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Bulk Carrier Raga & its "Aero Citadel"

Imabari Shipbuilding Co., Ltd. completed the 95,000 DWT bulk carrier, RAGA at its Marugame Shipyard. The bulk carrier is unique in that it has adopted a next-generation superstructure called the Aero-Citadel, which according to the shipyard offers significant advantages in both air resistance and anti-piracy measures.

The Aero-Citadel has slimly streamlined shape and includes the accommodation quarters, engine room, and funnel casing. This superstructure can reduce the wind pressure during navigation by 25-30% based on wind tunnel testing. For example, a Capesize bulk carrier navigating at normal output against about 9m/sec head wind (Beaufort 5 class) will have fuel consumption decreased by 2%. Moreover, the new design incorporates marine use LED lighting in the accommodation and engine room lighting systems, which reduces the electric power required for lighting by about 50%.

The slim, streamlined shape facilitates turning of the bow of the ship toward windward during anchorage and decreases the risk of anchor dragging. All stairs are placed inside the superstructure as an anti-piracy measure, and the entrance on the lower level deck has thick reinforced steel doors. The accommodation windows are bulletproof, and water cannons are placed on the upper deck to prevent pirate incursions into the accommodation. A citadel facility is provided as a refuge area in the superstructure that can accommodate all the crew for several days, protected by double-layer security doors. The facility is also equipped with communication devices usable even in case of blackout, and ship maneuvering equipment such as stop main engine and steering controls, and can gather information about the ship's status including video images and sound.

Imabari Shipbuilding believes that the next-generation superstructure Aero-Citadel should be applied to all possible types of vessels

The accommodation design also includes features in accordance with the SOLAS MLC2006 requirements which will come into effect in near future, such as strengthened noise insulation and vibration counter measure.

Improved living conditions for crewmembers are provided and the wheelhouse has widened backward view for safer navigation.

Name	Raga
Type	Bulk Carrier
Shipbuilder	Imabari Shipbuilding
Shipowner	Higaki Sangyo Kaisha
Length, o.a.	234.9m
Length, b.p.	227m
Breadth	38m
Depth	19.9m
DWT/GT	95,666/50,615
Main engine	Hitachi-MAN B&W 6S60ME-C (Mark 8) diesel x 1 unit
MCR	12,950kW x 101min-1
NCR	11,010kW x 95.7min-1
Speed, Service:	15 knots
Complement	25
Classification	NK
Registry	Panama

Imbari combines fuel efficiency and anti-piracy into its sleek next-generation superstructure Aero Citadel.

This superstructure can reduce the wind pressure during navigation by 25-30% based on wind tunnel testing.

Damen's "Diamond" in the Rough

Main Particulars – World Diamond

Owner	World Wide Supply
Flag	Norwegian
Classification	Lloyd's Register
Dwt	3,500 t
Length o.a.	80.03 m
Length b.p.p.	74.75 m
Beam	16.2 m
Depth (molded)	7.5 m
Max Draft	6.15 m
Gross tonnage	3,832 GT
Deck cargo	1,520 t
Cargo area	728 sq. m.
Fuel oil (service)	454 cu. m.
Potable water	817 cu. m.
Ballast capacity	1,694 cu. m.
Liquid mud/Brine	869 cu. m.
Fuel oil/base oil	869 cu. m.
Dry bulk	259 cu. m.
Speed	13.7 knots
Main engines	Diesel-Electric, 690 V, 60 Hz
Propulsion power	2x 1500 ekW
Propellers	2x 2300 mm, FPP, Azimuth in nozzle
Bow thrusters	2x 735 ekW, 1740 mm, FPP
Exhaust gas cleaning	SCR systems on all main generator engines for effective NOx reduction
Ballast water	Ballast water treatment system

Deck Lay Out

Anchor mooring winch	1x electric-hydraulic, with two mooring rope drums and warping heads
Capstans	2x each 5 t pull
Deck crane	1x 1.5 t at 16 m (harbor)
Tugger winch	2x each 10 t pull

Cargo Handling Systems

Fuel oil/base oil pumps	2x 150 cu. m./hr at 90 m head
Fresh water pumps	2x 150 cu. m./hr at 90 m head
Drill water pumps	2x 150 cu. m./hr at 90 m head
Liquid mud / brine pumps	2x 75 cu. m./hr at 85 m head
Dry bulk compressor	2x 75 t/hr at 80 m head
Fire fighting (optional)	2400 cu. m./hr + water spray system

Accomodation

Crew	16 persons
Passengers	6 persons
Bridge system	Alphatron
Dynamic Positioning	Marine Technologies
Bow thrusters	Schottel
Waste heat recovery system	Ulmatec
Silencers	Axces
SCR installation	HUH
Electrical installation	Eekels
Engine generator set	Caterpillar
Alternator generator set	Leroy Somer
Valves and fittings	Econosto, PCC
Pumps	Allweiler
Bilge water separator	Facet
Purifier	Alfa Laval
Heat exchanger	Alfa Laval
Freshwater pressure set	Sterling Sihi
Hot water calorifiers	Ulmatec
Fresh water generator	Alfa Laval
Vacuum toilet system	Jets
Sewage treatment	BioCompact G&O (TBU)
Remote tank sounding	AE Sensors
HVAC system	Johnson Controls
Emergency generator set	Caterpillar
Dry bulk system	Alphatechnique
Liquid mud agitators	Allweiler
Cargo control systems	Hoglund
Cargo pumps	Allweiler
External fire-fighting pumps	Nijhuis
Fixed installation for internal fire fighting	M X
Consoles	Alphatron
Galley equipment	Bouter
Navigational equipment	Alphatron
Windows	Van Wingerden
Window wipers	Wynn
Paint	International Paint

The platform supply vessel World Diamond was delivered by Damen Shipyards, Galati, on June 28, 2013, to World Wide Supply. The PSV was built to a completely new and distinctive design from Damen, and World Diamond is the first of six PSVs for the Norwegian owner. The vessel is capable of worldwide operations and its construction involved close cooperation with Damen Shipyards Gorinchem, The Netherlands, which provided engineering and main equipment.

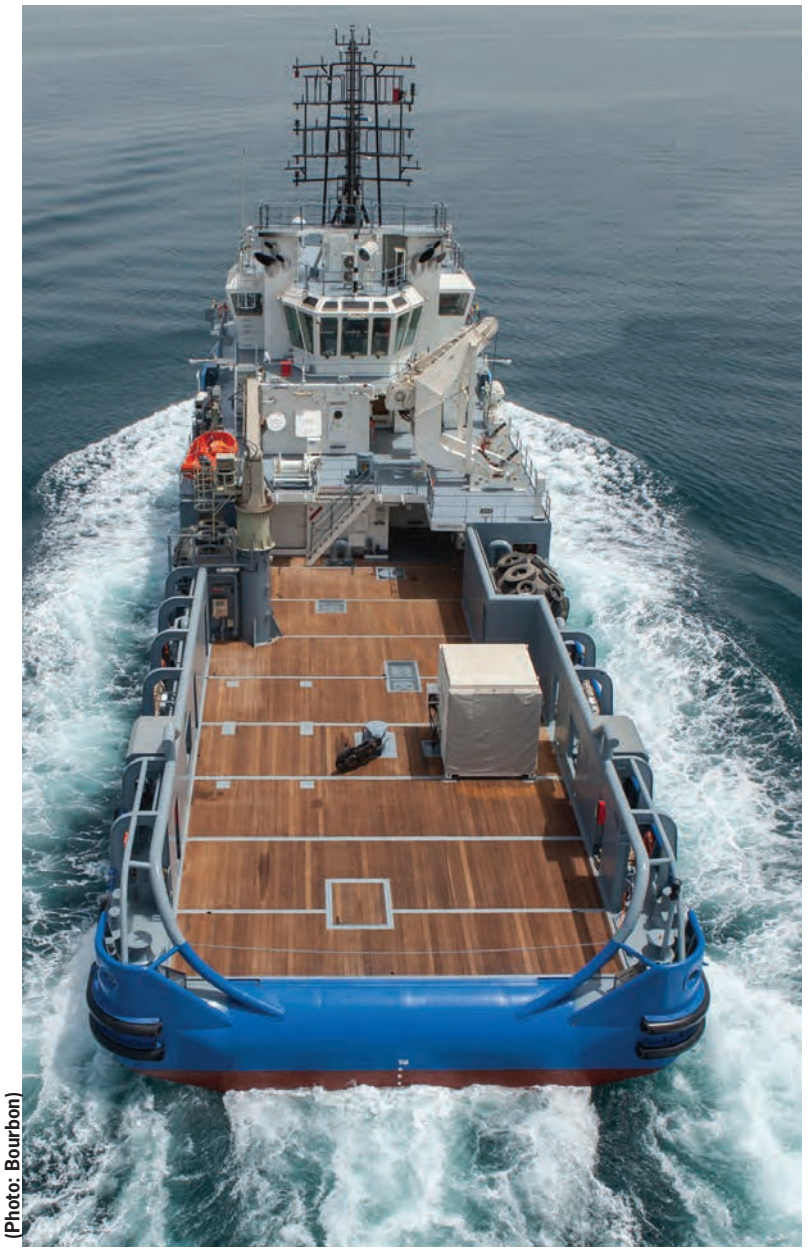
The PSV3300 represents a new era in Damen's offshore supply vessel story, having been built to a new design as part of a major extension in the yard group's offshore portfolio.

The 80.1m PSV 3300 will undertake crew and materials transport to and from offshore platforms but also offers fire-fighting and oil pollution recovery capability. Equipped with azimuthing thrusters and for dynamic positioning (DP2), the design is distinguished by slender hull lines to meet challenging conditions and minimised fuel consumption, as well as enhanced crew comfort.

World Diamond is the first delivery of the PSV 3300, developed after extensive CFD studies and hull testing at Maritime Research Institute Netherlands (MARIN) to verify the results. Built to Damen's "E3" principles, the vessel is distinguished by its sleek bow, slender hull lines and diesel electric propulsion with azimuth stern drives. This combination has been developed to minimize slamming and to balance a relatively high cargo intake with low fuel consumption, not only in calm water but also in rough seas. The azimuthing thrusters with ducted propellers in conjunction with the bow thrusters are designed to provide accurate station keeping. The vessel features DP2 capability as well as newly designed anti-roll tanks, while smooth surfaces and a distinct lack of angles, lines and recesses also have a positive effect on the durability of coatings. Other notable features of design include a new sheltered foredeck and an optimized superstructure for crew comfort, while the steel-welded wheelhouse is mounted on top of the deckhouse to ensure an optimal view in all directions.

World Diamond is powered by a diesel electric solution with Tier II-compliant Caterpillar engines; two C3512 generator sets in combination with two C32 TTA generator sets. The gensets are connected to a waste heat recovery system, greatly reducing fuel costs for heating of accommodation, tank cleaning and other purposes. The vessel is provided with a state-of-the-art Integrated Automation System (IAS) that incorporates a redundant topology reflecting the vessels design intent.

Bourbon's Seismic Survey Success



(Photo: Bourbon)

Top: The Seismic Support Vessel Bourbon Petrel at sea.

Bottom: Grandweld recently invested mightily in its shipbuilding capability, opening a modern vessel manufacturing facility on the Dubai Maritime City premises in the last year.

(Photo: Greg Trauthwein)

Announced in June 2011, Bourbon and CGG entered a five-year charter agreement for a series of six custom newbuild seismic support vessels. Now more than two years later, the third ship in the series, Bourbon Gannet, is due to enter service in the early part of 2014, following the launch of the first two vessels, Bourbon Petrel and Bourbon Fulmar, in summer and autumn 2013, respectively. The remaining three sister vessels are under construction in Dubai's Grandweld Shipyard, also slated for launch in 2014.

The six Bourbon ships were engineered by naval architecture company Offshore Ship Designers to assist CGG's offshore seismic operations. The Cyprus-flagged, 53-m vessels boast 50-metric-ton bollard pull capabilities and are designed for following tasks: personnel transportation for crew rotations, equipment transportation, bunkering operations, supply of water and provisions, sewage and sludge transfer, operational protection assistance (anti-collision, clearing transit routes), emergency towing capacity to ensure the continuity of seismic operations and maritime assistance and support during maintenance operations.

Bourbon Petrel has been supporting the CGG Symphony seismic vessel in the Black Sea since July 2013, where it has carried out many refueling operations, including inline bunkering, in addition to towing work and crew rotations. Bourbon Fulmar is currently assisting the Viking Vanquish, a seismic vessel operating in Northern Europe.

"We are pleased to announce the delivery of the hybrid Seismic support vessels," said Jamal Abki, General Manager, Grandweld. "The highly innovative features of these vessels will set high market standards for efficiency and operational excellence. The delivery of these vessels marks yet another fruitful collaboration between Grandweld and Bourbon."

Importantly, the six support vessels operate on versatile hybrid propulsion systems to provide optimized fuel efficiency over a diverse range of tasks: diesel-electric power is often better suited for escort operations, while mechanical propulsion is used for maximum power in transit and during operations. The propulsion systems include Berg shaftlines, Caterpillar engines and generators and Techsol electrical systems.

Representatives from Bourbon and CGG declined to say how much the hybrid propulsion hiked the ships' overall cost, but they did estimate fuel savings in the range of 30-40% compared to standard vessels. Each vessel saves a few thousand dollars per day on fuel thanks to the operational flexibility of the hybrid propulsion systems.

In addition to these advantages, Yves Rastoin, Maritime Director, CGG, said his company reaps a number of other benefits from its partnership with Bourbon. He said Bourbon fit CGG's need for a "long term partner of choice" while meeting the specialized nature CGG's 22 globally active seismic vessels – and at a good price. Furthermore, Rastoin cited Bourbon's strong track record as a platform on which to develop a long-term relationship. "We selected Bourbon for their experience in vessel series management, and for their capacity to optimize their availability, and deliver their high operating standards."

"Along with our efforts to streamline our fleet of seismic vessels and reduce the number of shipmanagers, CGG has launched a dedicated program for its chartered fleet of support vessels," Rastoin said. "The series of six specially designed vessels under a long-term charter agreement with Bourbon is the first of its kind for our industry. Given the successful operations already carried out by the Bourbon Petrel and the Bourbon Fulmar, we feel confident about having made the right choice of partner and customized support vessel design for our seismic operations. "

For Bourbon, the newbuilds are encompassed in its "Bourbon 2015 Leadership Strategy" plan, which entails company-wide investments nearing $2 billion (USD) to bolster the group's global fleet. "The partnership with CGG is entirely consistent with Bourbon's development strategy, based on a modern, standardized, high-performance fleet and perfectly trained crews, in accordance with our operational excellence goal," said Rodolphe Bouchet, vice president of business management for Bourbon's marine services department. "The success of these first seismic support vessels attests to Bourbon's capacity to assist clients on demanding projects by providing them with quality services in constantly evolving environments and markets."

Also part of the deal, Bourbon and CGG extended their partner in a number of other related areas, most specifically safety and training operations: the captains of the Bourbon vessels receive training on CGG's seismic operations simulator; drills and training exercises focusing on operational quality are held on a regular basis to prepare Bourbon and CGG crews together and to share best practices; and finally, a single contact person at Bourbon is responsible for vessel contract administration - this person is the key client contact on a daily basis.

By Eric Haun

Shuttle Tanker RIO 2016 for TEN

RIO 2016 is the first vessel in a series of two shuttle tanker in Brazilian water operation, designed by Sungdong Shipbuilding & Marine Engineering for Tsakos Energy Navigation Ltd., two companies with a long and good historic relationship. This vessel was chartered to Petroleo Brasileiro SA.

The ship is built under the survey of DNV and designed in accordance with IACS common structure rule (CSR). The vessel has six pairs of cargo oil tanks, two slop tanks, fore and aft peak tanks, segregated water ballast tanks, fuel oil tanks and fresh water tanks. Cargo tanks are divided by plane type transverse and longitudinal bulkhead. Engine room and living quarters, and the navigation bridge are located aft.

The ship was been designed as IMO DP Class 2 shuttle tanker, and is outfitted with a single slow speed diesel engine, one controllable pitch propeller, two bow and one stern thrusters, one bow and one stern retractable azimuth thruster and a bow loading system suitable for tandem loading operation in the Brazilian Waters-Campos Basin. It has a flush deck with forecastle deck for arrangement of the bow loading system. And the full spade rudder with flap system has been installed for good maneuverability.

The main engine of MAN 6S70ME-C8.2 Tier II is derated to 15,200 kW of MCR at 82rpm for fuel economy and flexible operation at part load. The speed of the vessel at draft of 16m is 14.8 knots at 90% MCR (13,680 kW) with 15% sea margin.

The cargo pumping system allows a maximum unloading rate of cargo oil 12,000 cu. m./hr. with three cargo oil pumps. The maximum cargo loading rate is 17,000 cu. m./hr. through midship cargo manifold or a cargo loading rate of 9,000 cu. m./hr. through the bow loading station. The vessel is equipped with Bow/Stern tunnel thruster having a power of 2,200 kW and azimuth thruster having a power of 2,500 kW with single speed motor for using dynamic positioning and auxiliary propulsion.

Length, o.a.	278.5m
Length, b.p.	264m
Beam	48m
Depth	23.1m
Draft	17.15m
Deadweight Tonnage	155,710 ton
Displacement	183,367 ton
Gross Tonnage	83,078 ton
Speed	14.8 knots
Cargo oil	167,500 cu. m.
Heavy oil	500 cu. m.
Marine diesel and gas oil	500 cu. m.
Water ballast:	52,600 cu. m.
Flag	Greece
Classification	DNV
Main Engines	MAN B&W / 6S70ME-C8.2
Generators	HHI
Cargo control system	Saab
Fire detection system	Hanla
Fire extinguishing systems	NK
Integrated bridge	Kongsberg
Bridge control system	HHI
Sewage plant	Jonghap Machinery
Bow Loading System	Aker Pusnes AS
DP system	Kongsberg
Diesel switch	Jowa Technology

GREAT SHIPS 2013

World's Largest Chemical Tanker

Bow Pioneer was built for Odfjell SE by Daewoo Shipbuilding & Marine Engineering, designed with two longitudinal corrugated bulkheads with lower stools and transverse corrugated bulkheads with lower stools to have 10 sets (P&S&C) of cargo tanks, and 11 tanks for WB consisting of four pairs of wing and double bottom tanks, one U-type tank and two water ballast heeling tanks. The ship is equipped with a cargo handling system for the loading, storage and discharging of the intended cargos of IBC ship type 2 & 3 with typical cargoes such as Methanol, Vegetable Oils, MEG (Mono Ethylene Glycol), EDC (Ethylene DiChloride), MTBE (Methyl Tert-Butyl Ether), Xylene, Toluene, Cyclohexane, etc., as well as refined petroleum products (products with flash point below 60 deg-C). The ship has a continuous upper deck with forecastle, a raked stem with a bulbous bow, a transom stern with open water type stern frame, a balanced spade rudder with flap and a fixed pitch propeller directly driven by MAN B&W 5S60MC-C8 engine with maximum rating of 10,870 kW at 103.7 rpm. Double side and double bottom are provided in cargo area and the volume of each cargo tank not to exceed 3,000 cu. m. The deadweight of the vessel will be 75,000 metric tons at the design draft of 13.2 m, without trim, with the vessel afloat in SW with SG of 1.025, and 81,200 metric tons at the scantling draft of 14 m. The speed of the ship is 14 knots at the designed draft of 13.2 m on even keel at 85% MCR. The vessel is trimmed with Inorganic Zinc Silicate coating for cargo and slop tanks, and stainless steel pipes for cargo related systems. Thirty-one cargo manifolds are arranged on the port and STBD sides with two tiers at the middle length of the ship. One raised catwalk is arranged from the front of the accommodation to manifold platform area and to forecastle deck on the upper deck.

Length (o.a.)	228 m
Length (b.p.)	219 m
Breadth molded	37 m
Flag:	Singapore
Hull No	2018
IMO number	9595632
Depth molded,to upper deck	19.2 m
Width of double skin, side	2.07 m
Width of double skin, bottom	2.04 m
Draft, scantling	14 m
Draft, design	13.2 m
Tonnage	44,452 gt
Deadweight, design	75,000 metric tons
Deadweight, scantling	81,200 metric tons
Speed, service (85 %MCR output)	14 knots
Classification society and notations	DNV
Main engine	MAN B&W 5S60MC-C8
Boilers	2 x Alfa Laval-Aalborg, 12,000 kg/h
Lifesaving equipment	Fassmer Marland
Cargo pumps	Frank Mohn AS
Cargo control system	Kongsberg Maritime
Ballast control system	Scan-jet Macron
Water Ballast Treatment System	Alfa Laval (2,000 m3/h)
Bridge control system	Kongsberg Maritime
Fire extinguishing systems - Cargo holds	Foam - Wilhelmsen

Name Florida
Type Product Tanker
Shipbuilder Aker Philadelphia
Shipowner Crowley

Aker Philadelphia Shipyard ASA delivered to Crowley its second Veteran Class MT-46 product tanker. It is the 14th product tanker that the shipyard has completed and the 18th vessel overall. It is 600 feet long and has a cargo capacity of 46,000 dwt. The ship is expected to be placed into service moving domestic oil to U.S. based refineries.

Name Wuchang
Type Bulk Carrier
Shipbuilder China Navigation
Shipowner Chengxi Shipyard

China Navigation Company (CNCo) took delivery of MV Wuchang, first of the 39,000 dwt B.Delta37 bulk carriers of Deltamarin design built under Lloyd's Register's approval and survey at Chengxi Shipyard in China. Deltamarin's B.Delta37 design has attracted attention due to its performance, in terms of a range of parameters such as low fuel oil consumption, low emissions, EEDI, deadweight intake and lightweight particulars. On top of this, the vessel is designed to have excellent maneuverability and performance in heavy seas, as experienced during the sea trials. This is achieved through an optimized, energy efficient design, with particular focus on optimal hydrodynamic performance and lowest possible lightweight, without compromising either the cargo intake nor the hull structural integrity. Detailed structural finite element analysis and fatigue design assessments, in accordance with IACS' Common Structural Rules, have been used to verify the hull structural integrity.

The design characteristics have been validated during the inclining experiment and sea-trial conducted prior to delivery. Although Wuchang was contracted prior to the EEDI requirement coming into force January 1, 2013, CNCo and Deltamarin requested EEDI verification on a voluntary basis from LR. Accordingly, the EEDI value has been calculated and verified based on model testing and during sea-trials and the derived EEDI value is confirmed to be over 20% below the applicable baseline for bulk carriers.

(Copyright CNCo)

Hornbeck's HOSMAX 300 Series

Eastern Shipbuilding Group delivered M/V HOS Red Rock (Hull 202) to Hornbeck Offshore Services, LLC. Hornbeck's first vessel, the HOS Red Dawn (Hull 201), was delivered on June 21, 2013 and is currently servicing offshore drilling operations in the U.S. Gulf of Mexico. Hornbeck's third vessel the HOS Renaissance (Hull 203) was scheduled for delivery in November 2013. The HOSMAX 300 Offshore Support Vessels feature the following capacities:

HOS Red Rock is the second of four vessels designated as the HOSMAX 300 series by Hornbeck Offshore and are diesel-electric powered, twin Z-drive propelled OSV's measuring 292 x 64 x 24.5 ft. These high-tech vessels feature four Caterpillar 3516C 16-cylinder turbo-charged Tier III diesel generator engines each rated at 1,825 kW at 1,800 rpm. Main propulsion power is provided by two GE Energy furnished Hyundai 2,500 kW 690VAC electric motors driving two Schottel SRP 2020 FP Z-Drives with nozzles rated at 2,500 kW at 1,025 rpm each for a total of 6,704 hp. Schottel also provides two STT 4 fixed pitch tunnel thrusters rated at 1,180 kW at 1,170 rpm, each with direct coupled Hyundai 690VAC electric motors. GE Energy Power Conversions provides the complete system integrated diesel electric package, including the propulsion and thruster drives, motors, control systems, DP system, switchboards, motor control centers, automation and navigation/communication electronics. These vessels are capable of a maximum speed of 14 knots with a cruising speed of 12 knots. The fully integrated bridge is arranged for increased visibility and features the latest technology in navigation andcommunication equipment.

(Photo: Eastern Shipbuilding)

Oceanex Connaigra's Innovative ConRo

Oceanex Connaigra is Oceanex Inc.'s 210-m custom-designed container/roll on roll off (Con/Ro) ice class 1A ship that was built at the Flensburger Schiffbau-Gesellschaft mbH & Co. (FSG) shipyard in Flensburg, Germany. According to FSG, it will be "one of the longest, most innovative, environmentally friendly, and flexible Con/Ro ferries in the world."

Following four years of study and research, the design stage was completed. First steel was cut in October 2012, and the keel was laid on February 11, 2013. Oceanex Connaigra is the largest Canadian flag Con-Ro ship with its carrying capacity of 19,500 deadweight tons and service speed of 20 knots.

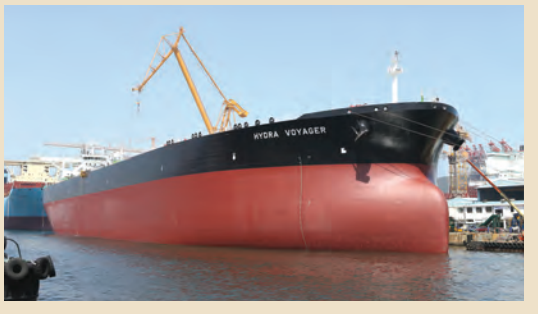
In order to address the MARPOL Annex VI emissions regulation that will be going into effect in 2015, and to ensure the Oceanex Connaigra will be environmentally friendly, a dry scrubber air emission cleaning system designed by Couple (Germany) will be installed. According to FSG, this is the first shipboard dry exhaust gas cleaning system in the world. The dry scrubber system uses pelletized hydrated lime which reacts with the sulfur, causing the sulfur to attach to the lime resulting in close to zero sulfur emissions, a technology proven in shore-based power stations. Because the lime is heated to such a high temperature, the oily residues and soot that are normally present in exhaust gases are burned off in the scrubber. The lime will be carried in specially designed container tanks to the ship where it will be loaded into onboard silos. From the silos, the lime is transferred to mix the exhaust gases using a pneumatic control system. The amount of lime used is dependent on the fuel sulfur content. The spent lime can be used as fertilizer or in the manufacture of gypsum board. DNV classified Oceanex Connaigra as a "clean ship."

The dry scrubber system is advantageous because the power that is required mainly runs small conveyor belts and a blower, compared to pumps required by wet systems which impact the electrical balance and demand larger generators.

Whereas containers on conventional ships must be lashed on all voyages, due to the ship's active and passive stabilization systems, lashing will be reduced and will only be required during periods of extreme weather conditions. Oceanex Connaigra is fitted with three flume tanks which are located above the weather deck aft. During periods of rough seas and high winds they will work in combination with two gyro-controlled fins to reduce ship motions. The fins are retractable, wide and extend out 20 feet into the water when operational.

To maximize maneuverability in port in high winds and to avoid the use of tugs, the Oceanex team specified 8,000 hp spread over four thrusters to provide mechanical redundancy and reliability.

Almi Tankers Hydra Voyager



Hydra Voyager was delivered by Daewoo Shipbuilding & Marine Engineering Co. Ltd. to Almi Tankers in 2013. The vessel has a continuous upper deck without forecastle, a raked stern with bulbous bow, a transom stern with open water type stern frame, a semi-balanced rudder and a fixed pitch propeller directly driven by a slow speed diesel engine. Duct and rudder bulb were installed as energy saving devices, and the vessel was built with four longitudinal bulkheads and transverse bulkheads to have five pairs of side cargo tanks, five center cargo tanks, two slop tanks and wing and double bottom tanks for water ballast.

The ship was designed and built to meet the requirement of American Bureau of Shipping (ABS) with the class notation +A1(E), "Oil Carrier", +AMS, +ACCU, VEC-L, TCM, AB-CM, BWE, BWT+, CSR, ENVIRO+, GP, RES, PMA, POT, ESP, UWILD, CPS, CRC, CPP, RW, NBLES, CRC, SPM.

The pump room is located immediately forward of engine room, and the engine room has been separated from cargo spaces by means of FO tanks and a pump room. The speed of the vessel is 15.8 knots at the design draft of 21 m on even keel at 90% MCR. The propulsion machinery has been located under the main deck aft and the vessel's propulsion power is provided by one set of marine diesel engine directly coupled to fixed pitch propeller through shaft line. The main engine of the vessel is MAN B&W 7G80ME-C9.2.

‘LEGO’ FOR PROFESSIONALS

Damen Modular Barge

If there is one thing that we hear time and again in the maritime world is that the manufacture of boats, ships and maritime structures in general is not as efficient as found in larger, mass market transportation modes because of the unique peculiarities of each different vessel. Damen has long been a proponent of standardized production, a concept which is extended to the “Nth” degree via the Damen Modular Barge concept. Despite the name, the “Modular Barge” concept can actually be extended to working vessels, as has been proven with the Modular Multi Cat and the Modular Ferry, both which have been built, sold and are in operation. As a Damen executive best explained the “Modular Barge” concept, it is sort of like a ‘LEGO’ for professionals, with common core components that can be transformed into many different types of vessels, ports, quaysides and platforms.

Standing strong with the Damen philosophy, it is designed to provide maritime solutions where perhaps before a solution was not readily evident or even possible. It is designed to work particularly well in land-locked areas, as the components are designed to ship easily, even on truck, to be unloaded, assembled and put to work for any number of traditional maritime or non-traditional uses (from the concept a workboat, helicopter platform, oil spill response vessel or rock band stage can evolve.)

In examining the concept, here are a few of the salient points that stand-out”

- Damen Link is multiple usable (to be used for non-standard modules),
- 100% fixed coupling (no clearance),
- Modules are according to the ISO container dimensions (certified as normal container, handling and stackable), transport costs are relatively low,
- All module sides are flush,
- Epoxy paint system at outside and inside (no sharp edges),
- Simple mounting system from the outside (no divers, nobody inside the modules), no heavy weights,
- Damen Link system is adjustable (class demand),
- LRS appraisal certificate,
- Simple to be dismantled (on site), too,
- Coupling and dismantling can be done in water on site,
- And last, but certainly not least, it is suitable for local module construction.

What's new in December with Floating Production

By Jim McCaul, International Maritime Associates

Currently, 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 units are yet in service – all 3 are on order. Also, 98 floating storage units are in service, on order or available.

Trend in Inventory – The inventory of oil/gas floating production units is 16% greater than five years ago and 67% higher than ten years back. This comparison includes all units in service, on order and off field – but excludes LNG processing units. If the latter are included, the growth is 21% and 80% respectively.

Looking at specific type units, the number of FPSOs in operation, on order and available has grown from 116 units in December 2003 to 211 units in December 2013. The combined total of other oil/gas floating production units has grown from 75 units in December 2003 to 108 units today.

Available Units – 21 production floaters (16 FPSOs, 4 Semis and 1 Spar) have stopped producing and are available for redeployment. Another 3 production units (all FSRUs) on order do not have a field contract. In effect, 7% of existing or on order production floaters are looking for a field assignment. Some of these available units are actively for sale. Some are being retained 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.

The record for time off field between deployments is held by the FPSO Falcon. This VLCC-size FPSO has been available since early 2006 – after only 4 years of use by ExxonMobil off Nigeria. When ExxonMobil could not find a reuse or buyer, the 2.2 million barrel single hull unit was returned to SBM at end 2009. It has been laid up in Malaysia since. Ironically, Falcon was the first of several generic FPSOs that incorporate design features enabling relatively easy reuse on multiple fields.

Another FPSO just delivered to Brazil (OSX 3) could come on the re-sale market. The field operator (OGX) has financially collapsed and the lenders are looking to protect their position.

Recent Orders – Since the beginning of the year there have been orders for 22 production floaters with a total contract value of ~$17.5 billion. The orders include 11 FPSOs, 2 TLPs, 1 Spar, 1 Barge, 6 FSRUs and 1 MOPU.

Here's what happened in November:

- EnQuest issued an LOI to Bumi Armada to lease an FPSO for use on the Kraken field in the U.K. sector of the North Sea. The contract was to be finalized by end November – but to date no news of the final award.
- Modec confirmed the EPCI contract + 20 year lease for the MV27 Cidade de Caraguatatuba. This FPSO is being supplied to Petrobras for use on the Carioca field.
- An earlier FPSO order became a casualty of rethinking investment decisions. Hyundai in April had been selected to build the $1.9 million Rosebank FPSO. But on 22 November Chevron announced that it is not currently economic to proceed with the investment. As a result the project is back in planning stage with the scope of field development and cost of selected development option under new review.

The pace of production floater orders thus far this year has been running above the long term average. Over the past 15 years orders have averaged 1.6 units per month. The order intake pace this year has been averaging ~2.0 units per month.

But the market seems to be hitting resistance. FPSO orders in particular have been relatively weak. Over the past five years an average of 15 FPSOs have been ordered annually. This year orders will not reach this level.

Backlog of Planned Floater Projects – 231 floating production projects are in various stages of planning as of beginning December. As shown below, close to 60% entail use of an FPSO.

Where Planned Projects are Located Brazil is the major location of floating production projects in the planning stage. We are tracking 50 projects in Brazil – 22% of the visible planned floating production projects worldwide.

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 is almost 30% of visible floating production system orders in the planning stage.

Number of Floating Production and Storage Units

In Service, On Order and Off Field/Being Remarketed (as of December 1, 2013)

	Total	Active	On Order	Off Field
Oil & Gas Processing				
FPSO	211	157	38	16
Production Barge	9	8	1	0
Production Semi	48	40	4	4
Production Spar	23	18	4	0
TLP	28	24	4	0
Total	319	247	51	21
LNG Processing				
FLNG	3	0	3	0
FSRU	21	9	12	0
Storage Systems				
FSO	98	89	8	1

Location of Floating Production Projects

in the Planning Stage
(as of 1 November 2013)

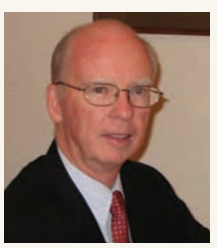
Project Location	# of Projects
Brazil	50
Africa	49
SE Asia	38
No. Europe	22
GOM	20
Aust/NZ	15
Med	12
SW Asia	12
Other	13
Total	231

Planned Projects

by Type Production System Required
(as of 1 November 2013)

Type of System	# of Projects
FPSO	132
Other FPS	35
FLNG	26
FSRU	25
FSO	13
Total	231

About IMA & Jim McCaul



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 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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2014 Editorial Calendar

MARITIME REPORTER AND ENGINEERING NEWS

ISSUE	EDITORIAL		BONUS DISTRIBUTION
JANUARY **Ad Close:** Dec 20	**Ship Repair & Conversion Edition** **Market:** U.S. Navy: Ships of War **Technical:** Marine Drives: Gears, Thrusters, Waterjets & Propellers **Product:** Marine Electronics Equipment & Supplier Guide **Special Report:** Future Marine Fuels & Emission Scrubbing Technology	MaritimePropulsion.com MarineElectronics.com	**Arctic Technology Conference** Feb 10-12, Houston, TX
FEBRUARY **Ad Close:** Jan 24	**Cruise Shipping Edition** **Market:** Marine Accommodation & Interior Outfit **Technical:** Satellite Communication **Product:** Marine Coatings & Corrosion Control **Special Report:** Clean Water Solutions: Ballast Water Treatment, Black, Grey & Potable Water	MarineElectronics.com	**Cruise Shipping Miami** March 10-13, Miami, FL **ASNE DAY** Feb 20-21, Arlington, VA
MARCH **Ad Close:** Feb 21	**U.S. Coast Guard Annual** **Market:** RIB & Patrol Boat Report **Technical:** Marine Salvage & Recovery **Product:** Shipboard Fire Suppression Systems **Special Report:** Software Solutions: Remote Monitoring, Condition-based Maintenance & Control		**CMA Shipping 2014** March 17-19, Stamford, CT **Workboats Exchange** April 13-16, Bonita Springs, FL **Sea-Air-Space** April 7-9, National Harbor, MD
APRIL **Ad Close:** Mar 21	**Offshore Edition** **Market:** Making of the Modern OSV **Technical:** Marine Fuel Selection Guide **Product:** Specialty Cranes: Heavy Lift to Cargo **Special Report:** The World's Biggest: Floating Liquefied Natural Gas (FLNG)		**Offshore Technology Conference (OTC)** May 5-8, Houston, TX **Marine Money Houston** May 7, Houston, TX
MAY **Ad Close:** April 25	**Marine Electronics Edition** **Market:** Training & Education **Technical:** Marine Power Guide **Product:** Deck Machinery, Winches and Ropes **Special Report:** Oil Spill Response & Recovery	MarineElectronics.com MaritimePropulsion.com	**Posidonia** June 2-6, Athens, Greece **HiperCraft** June, Virginia Beach, VA
JUNE **Ad Close:** May 23	**Annual World Yearbook** **Market:** Maritime Simulation & Training Centers **Technical:** Marine Firefighting, Safety & Salvage **Product:** Marine Spare Parts Guide **Special Report:** 4th Annual Global Maritime Photo Contest	MarineElectronics.com	
JULY **Ad Close:** June 25	**Offshore Energy Structures & Systems** **Market:** Classification & Ship Registries **Technical:** ECDIS **Product:** Maritime Tools: Welding & Cutting **Special Report:** Emerging Marine Propulsion Tech	MarineElectronics.com MaritimePropulsion.com	
AUGUST **Ad Close:** July 24	**Shipyard Edition** **Market:** OSV Design & Construction **Technical:** Heavy Lifting Solutions **Product:** Clean Water Technology **Special Report:** Ship Maintenance & Retrofit		**SMM** Sept 9-12, Hamburg, Germany
SEPTEMBER **Ad Close:** Aug 22	**Marine Propulsion Edition** **Market:** Maritime Security Technology **Technical:** Condition Based Monitoring **Product:** Marine Anti-Fouling Coatings **Special Report:** The Arctic: Challenges & Opportunities	MaritimePropulsion.com MarineElectronics.com	
OCTOBER **Ad Close:** Sept 19	**Marine Design Edition** **Market:** Dredging **Technical:** Pumps, Pipes, Valves & HVAC **Product:** CAD/CAM **Special Report:** The Automated Ship: Command & Control	MarineElectronics.com	**SNAME** October 22-24, Houston **SHIPPINGInsight** Stamford, CT
NOVEMBER **Ad Close:** Oct 24	**Workboat Edition** **Market:** Tug, Tow and Pushboats: Brown Water Workboats **Technical:** Deck Machinery, Winches & Ropes **Product:** Vessel & Crew Safety Systems **Special Report:** Gulf of Mexico Builder & Supplier Guide		**International Workboat Show** Dec 3-5, New Orleans, LA
DECEMBER **Ad Close:** Nov 21	**Great Ships of 2014** **Market:** U.S. Navy **Technical:** Shipyard Automation **Product:** Maritime, Port & Harbor Infrastructure & Security **Special Report:** Marine Power Provider's Guide	MaritimePropulsion.com	**Surface Navy Association** January, Crystal City, VA

Maritime Reporter Celebrates "75"

MR turns 75 in 2014. This special standard-size magazine supplement in the June edition traces the history, evolution & future of

- shipbuilding & design
- marine propulsion
- marine electronics & more!

OBITUARY

Norman N. DeJong

DeJong & Lebet, Inc. announced that **Norman N. DeJong** passed away on November 7, 2013. DeJong, 75 at the time of his death, was one of the founding partners of DeJong & Lebet, Inc., Naval Architects, in 1983 in Jacksonville, Florida. He was born in Blokker, Noord Holland, the Netherlands, immigrating to the U.S. after earning a BS in Naval Architecture at HTS Haarlem in 1959. He worked at Phillip F. Spaulding in Seattle, and NASSCO in San Diego before moving to Jacksonville, Fla., to work at Gibbs/Aerojet General in 1963.

DeJong was known for his innovative designs and problem solving ability in the marine industry. His early work in tugboat and other workboat designs started in 1968 when he founded the Naval Architecture firm Eagle Marine, which became DeJong & Associates. This was followed by more than 25 years of design and engineering work primarily in the passenger vessel industry, as well as the workboat sector of the marine industry, as president of DeJong & Lebet, Inc.

DeJong was a longtime Associate Member, supporter and active participant in the Passenger Vessel Association, starting with one of the early trade shows at the 1985 NAPVO Convention at the Holiday Inn in Riviera Beach, FL, with only 10 exhibitors set up in the lobby at banquet tables.

DeJong was well known for his innovative and creative design work, including the first Panama Canal Z-drive and Voith-Schneider tugs, as well as many other tugs, fishing vessels and workboats. In the passenger vessel industry, Norman's design and engineering work included many prominent vessels including the Majestic in Pittsburgh, several riverboat President renovations, Odyssey in Chicago and Boston, the Showboat Branson Belle, and several Casino Vessel designs.

Knudsen

Tayor

Captain Goben

Dunlop

Bruner New President , CEO of Maersk Line

The Board of Directors of Maersk Line, Limited (MLL) named **J. Russell Bruner** the next President and CEO of MLL. Bruner will succeed John F. Reinhart, who will step down on January 31, 2014 to become the CEO and Executive Director of the Port of Virginia. Bruner joined Maersk in 1989 and has been the President and CEO of Maersk, Inc. since 2004. He also has been an EVP of the A.P. Moller - Maersk Group since 2006.

Rolls-Royce Names Knudsen President for Offshore

Rolls-Royce appointed **John Knudsen** as President - Offshore, in its Marine business. Knudsen will transition into his new role through the month of January 2014. Knudsen is currently President of Bergen Engines AS.

Hornblower's Captain Goben Honored

Captain Richard Goben, Port Captain of Hornblower Cruises & Events in San Diego, received an international maritime award at the 87th Annual Convention and Maritime Industry Conference in Arlington, Va., in October. The International Propeller Club of the United States honored Captain Goben as the 2013 Maritime Person of the Year. Captain Goben is a licensed ship Master and has worked in the San Diego cruise industry as the Port Captain for Hornblower Cruises and Events for more than 25 years.

Dunlop CFO of Trojan Battery

Trojan Battery Co., a manufacturer of deep-cycle batteries, has appointed **Ed Dunlap** as senior vice president and chief financial officer (CFO).

IHC Merwede CEO Philips Resigns

IHC Merwede's CEO **Dirk Philips** will step back from his role within the company. Over the past two months, he has led the management board to formulate some important aspects of IHC Merwede's future business strategy, as well as the appropriate organization required to implement it. The mutual decision on the timing of Philips' retirement from his role coincides with the successful completion of this phase of the company's mission. The supervisory board is currently considering the future composition of the board of management. Therefore, until further notice, the board of management comprises of Bram Roelse (COO) and Dave Vander Heyde (CFO), who will jointly carry out Mr. Philips' duties.

Chouest Gets $400m for New Vessels, Refinancing

AIG Commercial Asset Finance (AIGCAF) and its affiliates provided a $400 million loan for vessels owned and operated by Nautical Solutions, LLC, which is an operating unit of Edison Chouest Offshore (Chouest). Proceeds from the loan were used to refinance existing notes and to provide for the construction of new vessels.

EBDG Expands New Orleans Ops

Elliott Bay Design Group (EBDG) is expanding its Gulf Coast operations to accommodate a staff of 20 by 2014. "We're seeking naval architects, marine engineers and designers of all disciplines," said Keith Keller, EBDG Gulf Coast GM. Since reopening its Gulf Coast Office in 2012, EBDG has garnered much attention for its exemplary OSV work on the Gulf Coast, attracting a steady flow of clients and projects both nationally and internationally, and the demand continues.

GTT Receives Tech Award

GTT won the LNG Technological Innovation Award at the World LNG Summit in Paris, November 18-21.

At the World LNG Summit in Paris November 18-21, 2013, GTT won the LNG Technological Innovation Award 2013 by CWC for its work on the development of its membrane containment systems to reduce the daily Boil-Off in LNG Carrier tanks. The LNG Technological award rewards an active member of the LNG industry, a company that has made a positive commercial or technical contribution to the LNG production, transportation or regasification over the years through commercial innovation and creativity. This award was presented to GTT in recognition of its improved membrane type containment systems for LNGC which have reduced significantly the amounts of daily cargo evaporation (Boil-Off) by up to 40%. This gives owners more flexibility by enabling them to reduce speed and divert deliveries without loss of cargo.

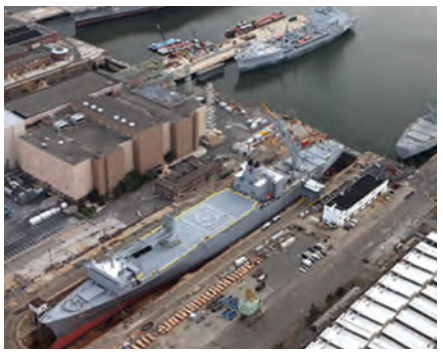
Furuno Announces New Subsidiary in Italy

Furuno Electric Co., Ltd. said a new subsidiary in Italy has been established on November 8, 2013 and will commence its business operation beginning January 1, 2014, as Furuno Italy S.r.l. (henceforward FIT) a wholly-owned Furuno subsidiary company.

Newly Merged Drew Marine and ACR under New Ownership

Drew Marine is merging with ACR Electronics, Inc. Headquartered in Whippany, N.J., Drew Marine serves global customers in nearly 100 countries around the world. ACR's operations are headquartered in Fort Lauderdale, Fla., where they will remain. The merger is taking place concurrently with the sale of both Drew Marine and ACR to The Jordan Company, a private equity firm.

J.F. Lehman Sells NE Ship Repair



J.F. Lehman & Company sold its portfolio company, Northeast Ship Repair, Inc. to affiliates of Plexus Capital and NewSpring Capital. The sale of Northeast Ship Repair follows J.F. Lehman's recent sales of ACR Electronics and Drew Marine, both announced on November 19.

Northeast Ship Repair is a provider of large vessel maintenance, repair and overhaul services for the U.S. Government noncombatant fleet and commercial customers, with facilities in Boston and Philadelphia (pictured).

Maersk Orders Routing Software for 110+ Vessels

Meteo Consult and Amarcon received an order from Maersk Line to equip a minimum of 110 Maersk Line container vessels with SPOS Seakeeping. The Seakeeping plug-in is a feature within Meteo Consults weather routing software SPOS. With this plug-in the user can define vessel loading conditions and motion threshold values based on the input of Amarcon's OCTOPUS-Onboard. Amarcon, a fully owned subsidiary of ABB, provides monitoring and forecasting software solutions for performance and availability optimization of sea-going vessels, and is the leader in vessel motion prediction solutions.

Seagull, MLS Partner

Computer-based training (CBT) specialist Seagull AS and Marine Learning Systems, a developer of advanced maritime-specific learning management system (LMS) technology, are partnering to provide the full library of Seagull learning content on the MarineLMS training platform. The partnership will provide an integrated solution to the cruise and ferry industries enabling rapid deployment of eLearning programs with course content on land and on-board, with or without connectivity. The system will also provide metrics and analytics which identify training issues before they become performance or safety problems.

Maersk Training Addresses the Human Error Factor

A new training program has been launched by Maersk Training that aims to address human errors in marine environments. The course is designed to help offshore workers understand the impact of the human error in marine incidents, and enhance their leadership and man-

Bugbee Named 2014 CMA Commodore

Robert Bugbee, President of Scorpio, has been named as the Connecticut Maritime Association (CMA) Commodore for the year 2014. The award will be presented March 19, 2014 at the conclusion of the CMA's Shipping 2014 Annual Conference and Exposition. Bugbee follows a long succession of influential maritime industry leaders as Commodore. Bugbee has more than 25 years in shipping, teaming with great companies and great partners to contribute to the successful development of multiple businesses, from his start at Gotaas Larsen to the growth and perfectly timed sale of the Craig Stevenson led OMI, where he contributed astute commercial vision as COO.

Scorpio President Robert Bugbee speaking at CMA in March 2013

Former CMA Commodores include: Ole Skaarup, Jacob Stolt-Nielsen, George Livanos, Phil Loree, Thomas Moran, Gregory Hadjieleftheriadis, Helmut Sohmen, Gerhard Kurz, William O'Neil, Richard du Moulin, Per Heidenreich, Marc Saverys, Frank Tsao, Stelios Haji-Ioannou, Peter Georgiopoulos, C. Sean Day, Torben Jensen, Morten Arntzen, John Fredriksen, Capt. Wei Jiafu, Philippe Louis-Dreyfus, Angeliki Frangou, Øivind Lorentzen, III and in 2013 Peter Evensen.

Bugbee brings an understanding of the international shipping markets and the equally important capital markets to bear in his current role as President of Scorpio Tankers, Inc. where he has been since 2010 when the company went public. He joined the Scorpio Group in February 2009. With the support of the company's investors and Chairman and CEO, Emanuele Lauro, Scorpio has articulated a view of the future of the tanker industry and created a platform from which they have 18 vessels on the water and have ordered more than 50 modern ECO MR tankers. But the growth of the Scorpio brand did not stop in the tanker sector, as the Scorpio team identified opportunity in dry bulk and Bugbee is a co-founder of Scorpio Bulkers Inc. and has been its President since July 1, 2013. The company is listed on the Norwegian OTC, focused on the ownership and operation of a fleet of 15 modern mid-size dry bulk carriers. Scorpio Bulkers has filed to list on the NYSE.

The Group and Bugbee also noted current opportunity in the VLGC gas sector and placed an order for 11 modern gas carriers which they subsequently merged through a structured investment into Connecticut based Dorian LPG, providing scale, value and liquidity through a significant consolidation of the gas sector, to Scorpio investors.

Ian Workman, President of the CMA, said"Mr. Bugbee is the personification of the sort of energy and creative thinking that makes the shipping industry great. A champion of the industry, Mr. Bugbee is a tireless contributor to the business, telling the industry's story, whether at our Association lunches and conferences or on the road speaking to the world about the Scorpio Group. His eyes are always focused on building value for his business, but he always finds time to give back as well. So for all he has done for the industry, and for our community here and around the world, it is a pleasure to recognize Mr. Bugbee as Commodore."

agement skills in order to prevent them. This course meets the latest mandatory requirements for approved training in the Human Element, Leadership and Management at Management level as directed by the STCW2010 convention and based on the Merchant Navy Training Board's criteria.

www.maersktraining.com

Ingalls Opens Maritime Training Academy

Photo: Steve Blount

Haley Reeves Barbour (center), the former governor of Mississippi, officially opens the Maritime Training Academy, which bears his name. Also participating in the ribbon-cutting are (left to right) Mike Mangum, president, Jackson County Board of Supervisors; Mississippi State Sen. Brice Wiggins; Irwin F. Edenzon, president, Ingalls Shipbuilding; Mike Petters, president and CEO, Huntington Ingalls Industries; Dr. Mary Graham, president, Mississippi Gulf Coast Community College; and U.S. Rep. Steven Palazzo.

Huntington Ingalls Industries' (HII) Ingalls Shipbuilding division opened the company's new, 70,000 sq. ft. Haley Reeves Barbour Maritime Training Academy. The building, named for the former Mississippi governor, will serve as the training epicenter for Ingalls' apprentice program and will also help bolster the number of students.

The building, a framed, two-story facility, has the feel of a college campus. It features 24 classrooms, three computer labs, a library, a bookstore, 26 offices/conference rooms, as well as several craft labs for the shipyard's various trades.

Starting in January, there will be approximately 400 students enrolled in Ingalls' apprentice program. Currently, more than 60 faculty and staff deliver 14 different trade programs and more than 120 course offerings that enable apprentices to gain not only the skills, knowledge and pride of workmanship, but also the educational foundation and personal qualities needed to fully meet the challenges of a shipbuilding career.

Since 1952, Ingalls' Apprentice School has produced more than 4,000 graduates in support of the shipyard's operational needs.

Rexroth Offers Hydraulics Training

Training for hydraulics and controls technologies used in marine, offshore and industrial applications is now available through the newly opened Rexroth Technology and Service Center at 10305 Round Up Lane in Houston, Texas. Comprehensive, five-day classroom courses will be offered by qualified Bosch Rexroth experts on the Principles of Hydraulics (POH) covering fluid flow dynamics, controls, pumps, valves, motors schematics, maintenance and more. Customized training courses and on-site training are also available.

www.boschrexroth-us.com

Secure Marine Automation

Whether workboat or yacht, for skippers and technically responsible people immediate access to vessel information and functions is elementary. The operator-oriented, adaptable user interface on Marex AMC provides a structured and clearly arranged access to all the information.

The monitoring system is classified, and thus also suitable for use in commercial shipping and offshore applications.

Every propulsion aggregate, from the generator to the main propulsion machinery, requires a reliable safety system. The Marex AMC (Alarm, Monitoring and Control) from Rexroth is a system that facilitates the integration of complex monitoring and control processes.

The system is approved by the major classification societies – also as a duty alarm system with an engineer call function for unattended engine room operation.

www.boschrexroth-us.com/marine

Regal Wins Russian OK

Regal has won type approval for its RN and RF series marine motors from the Russian River Register, one of the biggest classification societies in the world for inland waterway vessels. This complements approvals already granted from the other ship and vessel standard organizations including BV, ABS, LR, DNV and GL. The motors are standard Rotor marine motors and cover applications for both lower and upper decks. They are designed to meet the requirements set by all the classification bureau around the world and have been used on merchant ships, warships, by coastguards, passenger services, harbor service vessels and private yachts.

Jotun Offers New Solution

Jotun Hull Performance Solutions (HPS) launched the HPS Newbuilding Solution, which is aimed at yards delivering vessels with eco-design and who want to maximize the energy efficiency at both speed trial and in operation. The foundation of the HPS Newbuilding solution is SeaQuantum X200, Jotun's top of the line antifouling with documented low friction properties, designed to maximize initial and lifetime performance.

In addition comes three upgrade components with reliable guarantees. The first component of the HPS Newbuilding Solution is a Smooth Application. Jotun's second component is an Outfitting Protection Package which includes a final coat of the newly developed SeaQuantum X200-S which has superior resistance to slime and fouling. The third and last component is a 60-month high performance guarantee with cash back.

www.jotun.com

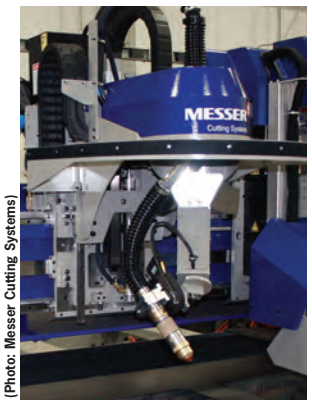
Ultra Steam Turbine Plants

Mitsubishi Heavy Industries Marine Machinery & Engine Co., Ltd. (MHI-MME) received orders from Hyundai Heavy Industries four Ultra Steam Turbine (UST) plants to be installed in four LNG carriers HHI is building for Petroliam Nasional Berhad (PETRONAS). The four UST plants consist of four marine turbines and eight boilers. The adoption of a reheating cycle results in a near 15% improvement in fuel efficiency compared to conventional steam propulsion plants, making MHI USTs more economical and environmentally compatible.

New "Energy Demand Forecast System for Ships"

Mitsubishi Heavy Industries, Ltd. (MHI) and NEC Corporation will collaborate in the development of an "Energy Demand Forecast System for Ships" applying NEC's big data analysis technologies to achieve energy savings during ship navigation. Plans call for MHI to begin marketing the system by March 2015. The new system will project future energy demand based on previously collected data relating to ships' energy consumption, weather patterns, ambient air temperature, time of day, etc. Its forecasting technology will use NEC's "heterogeneous mixture learning technologies," which automatically detect massive patterns hidden in big data. Use of the system is designed to enable control of the operating ratios of a ship's engine and power generators, as well as the number of units to be in operation, based on highly precise energy demand forecasts.

Delta Plasma Rotator



(Photo: Messer Cutting Systems)

Messer Cutting Systems announced its new product launch, the Delta plasma rotator, which features new robust compact design, drives, along with a new Messer designed torch holder assembly, coupled with its OmniBevel software.

The Delta will be featured on the company's multi-functional Titan III cutting machine. Messer is also promoting two other new products; a Telesis Pinstamp for plate marking, and QR reader program to assist in maintenance.

www.messercutting.com

LaBorde Launches New Compact Power Unit

With many customers experiencing significantly reduced pump off times with Laborde Products' Barge Power Units and after success with the previous version of its C1-D1 Power Unit, the company introduces a new and improved version. The new C1-D1 Power Unit, while retaining the marine propulsion, is a more compact, all-mechanical Mitsubishi S6B3 engine that delivers the time reducing 429 bhp. "This new unit is the result of Laborde listening and responding to the customer's wants and needs," said Thomas Cash, Laborde Products head of engineering. "Customers loved the performance of the 429 hp power unit, but it needed to be more compact to retrofit on older barge designs, and onto barges operating on the Ohio River due to height restrictions."

New features include bi-fold, side access doors, which allow retaining the doors in close-to-hard-point mount configurations. A new front mounted radiator sight glass means no more having to climb on top of the unit to check the radiator. The rail-mounted engine support system allows service access to the oil pan, as well as mounting for accessories. The redesigned lifting bracket now allows access to the front of the engine for belt and water pump servicing, while the top of the enclosure easily unbolts for service to the top of the engine.

www.labordeproducts.com

New Viking Evacuation System

Viking Life-Saving Equipment launched its latest innovation, the Viking LifeCraft system. In 2009, inspired by discussions during sessions of the Safecraft Working Group, Viking's development teams aimed to build a lifesaving craft that combined all of the advantages of modern lifeboats such as self-propelled maneuverability with the flexibility, comfort and smaller footprint of today's liferafts. The developers sought a product that would enable rapid, mass evacuation with maximum safety for passengers and crew, and thus the Viking LifeCraft System was produced. The LifeCraft System consists of two main elements: The LifeCraft itself – a self-propelled inflatable vessel with four engines for a high degree of maneuverability and safety and a storing and launching unit, either placed on deck or built in, containing up to four LifeCraft units with a capacity of 200 persons each, for a total capacity of 800 persons. According to the manufacturer, there are more advantages of this hybrid solution. For example, the new LifeCraft System is safe on an entirely new level, too. A specially designed chute system helps evacuees with special needs, such as children, the elderly and those on stretchers, setting a new standard for full-spectrum marine evacuation. And it's not just the life-saving capabilities of the new LifeCraft System that are hitting the headlines in shipowner circles. The system also takes up less room than lifeboats, freeing deck space for shipowners keen to provide their passengers with more cabins, shopping opportunities and other journey enhancements.

www.viking-life.com

Marine Coatings App

Sherwin-Williams Protective & Marine Coatings launched SeaGuard, an app that provides users with protective coating recommendations for VLCC/VLBCs, chemical tankers and OSV/PSVs. The app is designed to help port engineers and fleet managers access accurate and up-to-date coatings information via mobile technology. It's a convenient alternative to bulky binders stuffed with outdated product data sheets. If a new product is introduced, or an old product is no longer manufactured, SeaGuard has the updated information. SeaGuard's home screen allows the user to select the type of vessel in need of coating.

www.sherwin-williams.com

Optimarin Deal with V.Ships

(Photo: Optimarin)

Ballast water treatment (BWT) system specialist Optimarin signed a framework agreement with V.Ships ship management company. The contract will see MARCAS, V.Ships' contracting association, promoting Optimarin's system to some 650 ships managed by the business. The firm's OBS unit (Optimarin Ballast System), which is based on filtration and UV irradiation technology, will now be actively promoted as the BWT solution of choice for V.Ships managed assets under 52,000dwt. This encompasses a diverse fleet of cargo-carrying vessels, such as bulk and chemical tankers, through to specialized ships, including seismic and offshore vessels.

wwwoptimarin.com

Robotic Tube Cutter

The robotic tube cutting system developed by SMT passed its first practical test as the computer controlled machining system was delivered midyear to the Polish shipyard Energomontaz Polnoc Gdynia (EPG). The highly flexible industrial robot systems can process steel pipes up to 50 tons and up to 14 meters long. The tube diameter varies between 100-1,200 mm. The SMT-developers designed the robotic tube cutting system according to the requirements of EPG shipyard. Thus, the pipes are clamped into the machine and may not be reclamped in the course of the machining process.

www.smt-systemtechnik.eu

(Photo: SMT)

MTU Gensets for British Combat Ship

Tognum subsidiary MTU Friedrichshafen GmbH and Rolls-Royce have been awarded the contract to design the diesel generator sets for the Royal Navy´s future Type 26 Global Combat Ship. The propulsion system will consist of a combination of four MTU diesel gensets powered by Type 20V 4000 M53B engines, and a Rolls-Royce Type MT30 gas turbine. Combined propulsion systems utilizing diesel engines and gas turbines are increasingly gaining in significance in the naval sector. The future Type 26 Global Combat Ship will employ a CODLOG (Combined Diesel Electric or Gas Turbine) configuration. The diesel generators supply electric power for the on-board systems and for vessel propulsion in cruising mode. The Rolls-Royce gas turbine can be switched in for high-speed propulsion whenever need.

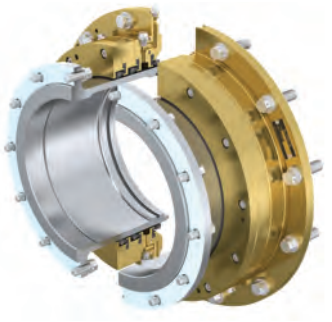
www.tognum.com

SturdiLED LED Floodlight

Phoenix Products introduced The SturdiLED Series. The mid-level LED floodlight offers an AC or DC driver with multiple output options ranging from 1600 to 2900 lumens. The two optical packages, 28° and 45°, accommodate a variety of applications including davits, life raft stations, embarkation lighting, deck winch lighting, deck mounted cranes (OSV, PSV), and various other demanding marine applications. Phoenix uses marine-grade die cast aluminum housing with a powder coat finish. The rugged shock mount base delivers durability that can stand up to even the harshest applications.

www.phoenixproducts.com

"Zero-Pollution" Seal



IHC Sealing Solutions launched the zero-pollution SUPREME Athmos seal. According to the manufacturer, the SUPREME Athmos seal enables ships – with limited draft up to approximately five meters – to prevent oil from being emitted into the environment. A system has been developed to provide a safe and sustainable operation by capturing every possible drop of oil. Water is prevented from entering the system by collecting any leakages from the seal into a drain tank. Once full, this tank is automatically drained into the vessel's general waste oil tank.

www.ihcmerwede.com

BUYER'S DIRECTORY

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

ALUMINUM BOATS

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

AUTOMATIC IDENTIFICATION SYSTEM

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

AUTOPILOT SYSTEMS

AG Marine, 5711 34th Ave NW 2nd floor Gig Harbor, Wa. 98335

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

BOW AND STERN THRUSTERS

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

CAMERAS

Kongsberg Maritime LTD, Campus 1 Innovation Pk.Balgownie Rd.Bridge of Don Aberdeen AB22 8GT , UK , tel:011 44 1224 226500, Bill.Stuart@kongsberg.com contact: Bill Stuart, www.kongsberg.com/cameras

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

CONTROL SYSTEM-MONITORING/STEERING

Prime Mover Controls, 3600 Gilmore Way, Burnaby BC

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, tcarroll@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

COUPLINGS

Centa Corporation, 2570 Beverly Drive #128, Aurora, IL , tel:(630) 236-3500, fax:(630) 236-3565, bobl@centacorp.com contact: Bob Lennon, www.centa.info

CRANE - HOIST - DERRICK - WHIRLEYS

DMW Marine Group, 1123 St Matthews Rd Chester Springs PA 19425

DECK MACHINERY- CARGO HANDLING EQUIPMENT

NABRICO, 1250 Gateway Dr, Gallatin, TN , tel:615-442-1300, brian.corbin@trin.net contact: Brian Corbin, www.nabrico-marine.com

NABRICO, 1250 Gateway Drive, Gallatin, TN 70002-4989, USA , tel:(615) 442-1300, brian.corbin@trin.net contact: Brian Corbin, www.nabrico-marine.com

Superior-Lidgerwood-Mundy, Corp., 302 Grand Ave., Superior, WI B0W 2L0, USA , tel:(715) 394-2383, stenerelli@lidgerwood.com contact: Sean Tenerelli, www.lidgerwood.com

DIESEL ENGINE- SPARE PARTS & REPAIR

Motor Services Hugo Stamp, 3190 SW 4th Avenue Ft. Lauderdale, Fla.33315

DIVING & SALVAGE

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Hydrex US, 604 Druid Rd E; Clearwater, FL, USA , tel:727-443-3900 (24/7), fax:727-443-3990, info@hydrex.us contact: Matthew Brooks, www.hydrex.us

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Centa Corporation, 2570 Beverly Drive #128, Aurora, IL , USA , tel:(630) 236-3500, fax:(630) 236-3565, info@centacorp.com contact: Bob Lennon, www.centa.info

ELECTRIC & CONTROL SYSTEMS

Jamestown Metal Marine Services, Inc., 4710 Northwest 2nd. Ave. Boca Raton, FL 33431

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Avtron, 7555 E Pleasant Valley Rd. Ste100, Independence, OH , USA , tel:216 642-1230, gabrielle.gillota@nidec-avtron.com

ENGINES

Wartsila, Ranta 2, Helsinki , tel:011 358 10 709 0000, fax:011 358 10 709 5700 contact: John Stenbergin, www.wartsila.com

ENVIRONMENTAL SOLUTIONS

Environmental Solution, Inc., P.O. Box 788, Wake Forest, NC 99835, USA , tel:(919) 740-0546, john@totalbiosolution.com contact: John Paparone, www.totalbiosolution.com

FANS

Schaefer Ventilation, 1 Industrial Blvd. Suite 101, Sauk Rapids, MN

GALLEY EQUIPMENT

Jamestown Metal Marine Services, Inc., 4710 Northwest 2nd. Ave. Boca Raton, FL 33431

LOIPART AB, P.O.Box 694/Metallgatan 2-4, ALINGSAS , tel:+46 322 668 360, fax:+46 322 637 747, loipart@loipart.se

HVAC

Jamestown Metal Marine Services, Inc., 4710 Northwest 2nd. Ave., Boca Raton, FL , USA

INTERIORS

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LIFT EQUIPMENT

DMW Marine Group, 1123 St Matthews Rd, Chester Springs, PA

MAGNETIC LIFTING SYSTEMS

Walker Magnetics, 2195 Wright Brothers Avenue, Columbus, OH , tel:603.303.0508, kknights@walkermagnet.com

MARINE CONSTRUCTION/REPAIR

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

MEASURMENT & CONTROL PRODUCTS

Omega Engineering, 1 Omega Drive, Stamford, CT

METEOROLOGICAL INSTRUMENTS

R.M. Young Company, 2801 Aero Park Dr., Traverse City, MI , tel:231-946-3980, fax:231-946-4772, vsherman@youngusa.com

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Marlink, Offices in: Oslo, London, Hamburg, Brussels, Athens, Dubai, Mumbai, Singapore, Tokyo, Washington DC and Houston , tel:+32 70 233 220, fax:+32 2 332 3327, customer.service@marlink.com

OFFSHORE SERVICES

Hydrex US, 604 Druid Rd E; Clearwater, FL, USA , tel:727-443-3900 (24/7), fax:727-443-3990, info@hydrex.us contact: Matthew Brooks, www.hydrex.us

PARTS LOCATOR SERVICE

Inventory Locator Service, 8001 Centerview Pkwy Ste 400, Cordova, TN , tel:901 794-5000 contact: Pamela Pugh, www.ILSMART.com

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SANITATION DEVICE- POLLUTION CONTROL

Scienco/FAST - a division of Bio-Microbics, 12977 Maurer Industrial Drive, Sunset Hills, MO 03055, USA , tel:866-652-4539, fax:314-756-9306, solutions@sciencofast.com

SEATING

The Springfield Marine Company, 1093 N. Cynthia Drive, Suite #1 Nixa, MO 65714 , tel:417 616-6707, fax:417 724 9035, dsweeney@springfieldgrp.com

SHIP REPAIR

Malin International, 320 77th Street, Pier 40/41 Galveston, TX 77554 , tel:409-682-0232, ghart@malinshiprepair.com

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Signal International, 1011 S.Hwy 6 Suite 108, Houston, TX , tel:281 899-2122 contact: Rob Busby, www.signalshiprepairllc.com

SIMULATION TRAINING

Kongsberg Maritime Simulation Inc., PO Box 180 70 Essex Street, West Mystic, CT , tel:709 582-1112

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TRAINING

Freelance Software, 39 Peckham Place Bristol, RI 02809, Bristol, RI , USA , tel:(401) 556-1955, fax:(401) 396-9717, chris@hawsepipe.com contact: Christopher Dady, www.hawsepipe.com

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Patterson Company, 870 Riversea Road, Pittsburgh, PA 33310-5247, USA , tel:(412) 322-2012, russ.mayhew@pattersonmfg.com contact: Russ Mayhew, www.pattersonmfg.com

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Patterson Company, 870 Riversea Road, Pittsburgh, PA , USA , tel:(412) 322-2012, fax:(412) 322-2785, russ.mayhew@pattersonmfg.com contact: Russ Mayhew, www.pattersonmfg.com

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Steamship Authority
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Electronics Technician Ship's Electrician
Job Location: USA, Castine

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Maine Maritime Academy
Box C-3

Castine ME 04420 USA
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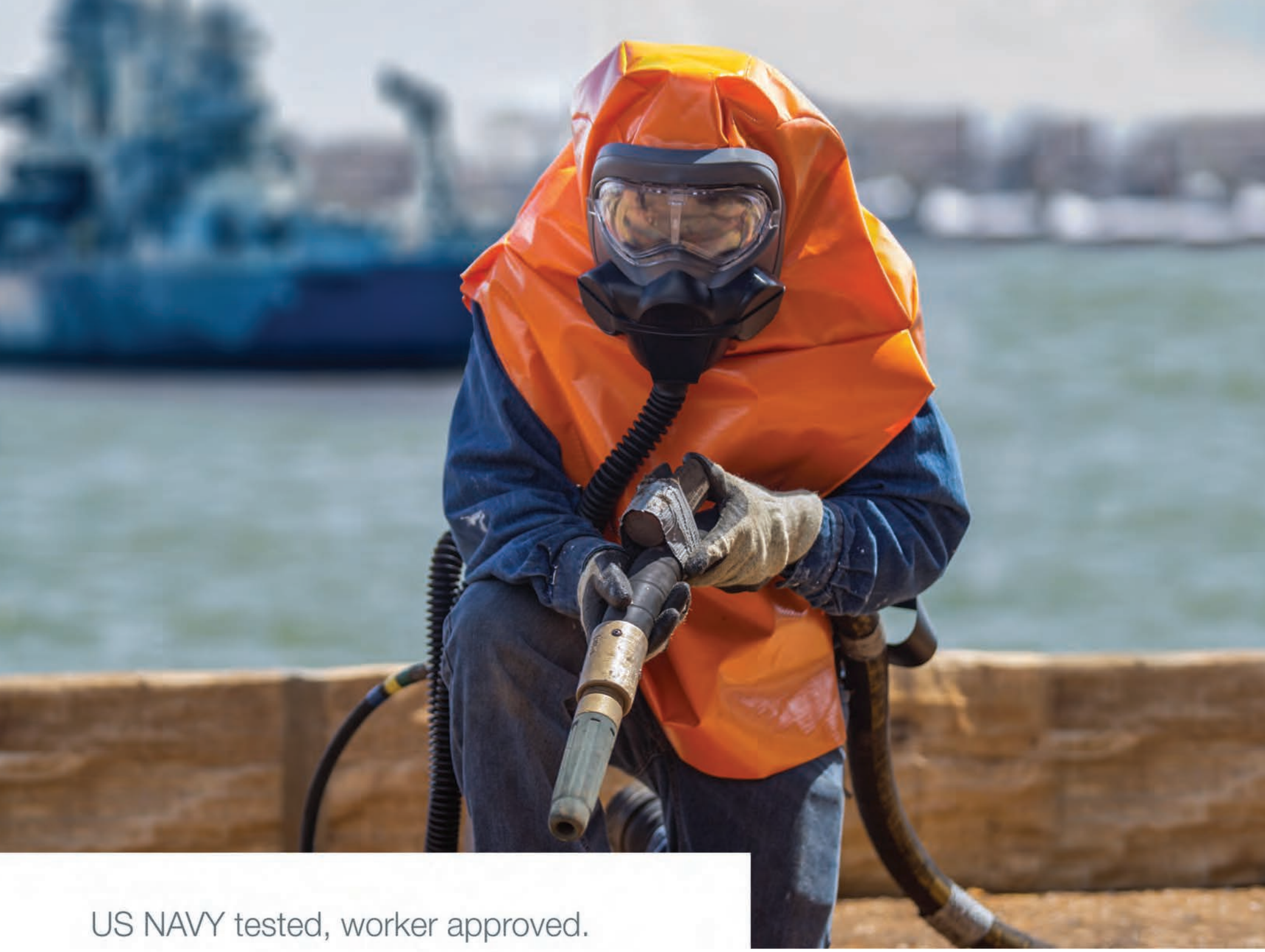

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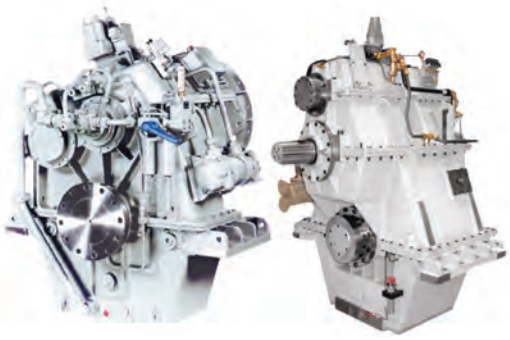
(2) Reintjes LAF 5666 Reduction Gearboxes, with a 6.875:1 ratio and a 850 kW PTO
(2) BERG BCP 950 Controllable Pitch Propellers
(1) BERG BFTT 316-S Tunnel Thruster
BERG Control System to interface with yard supplied DP system

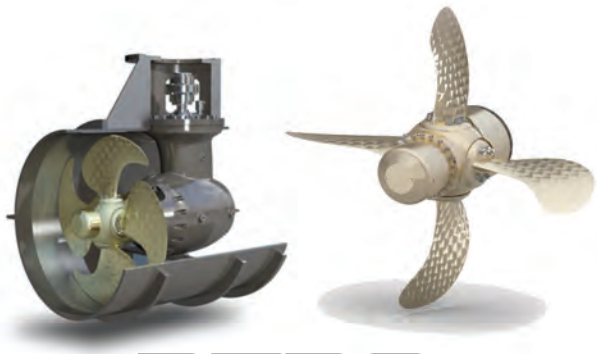
Karl Senner, LLC would like to thank NC Power Systems, Bollinger, Jensen, and Crowley for working with us on these outstanding vessels."

KARL SENNER, LLC PROUDLY CARRIES

Steerprop



REINTJES
POWER TRAIN SOLUTIONS



BERG PROPULSION

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