Maritime Professional

4Q 2014 | www.MaritimeProfessional.com

Buckley

Fifth Generation Leader of McAllister Towing Looks Back on 150, Plans for the Future

MARINE POWER
TIER 4 & BEYOND
PAGE 33

EMISSIONS
LNG IMPACTS DESIGN
PAGE 24

BALLAST WATER TECH
PARTNERSHIP & PROGRESS
PAGE 36

ALSO INSIDE:

MARPRO RECRUITER

- STATISTICS: WHAT MARINERS REALLY WANT
- MARINE & OFFSHORE LIABILITY
- SHIPYARD RECRUITMENT & RETENTION ROUNDTABLE

PAGE 47

Service & Customization

Our combined strengths are what set Catlin apart. We've built a culture that ensures we satisfy each customer's specific needs. Catlin's Marine underwriters spend every workday focused solely on Marine risks. Through personalized client service and our responsive claims handling, we use our expertise to provide you with the best coverage. It's our combined dedication to service and customization that help us stand out in the industry. Talk to the specialty insurance company that gives you more. Visit **CatlinUS.com/strengths.**

CATLIN

AM Best *rating of* **A (Excellent) XV**

MARINE INSURANCE
Brown Water Hull | Builder's Risk | Cargo | Excess Marine Liabilites | Marine Liabilites | Protection and Indemnity | Recreational Yachts

Compass water solutions

Solutions to your water needs

ALL THE WATER YOU WANT WHERE YOU NEED IT

AQUA-SEP Series (R.O. watermaker)

- **Convenience**: Choose to operate the system in fully automatic or manual mode from the same controller.
- **Performance**: Produce from 2.5m³ (660 G) to 1,200m³ (316,800 G) of fresh water per day.
- **Ease**: Easy installation, start up and commissioning. Convenient standard and modular configuration options available that are designed with easy access to hook-ups and changeable parts.

ULTRA-SEP Series (bilge water separator)

Assurance Against A Spill

- **Convenience**: Minimal operator involvement required, saving time and labor cost.
  **No Hazardous chemicals -No biological by product*
- **Performance**: Produces from .5m³ to 10m³ of clean water with less than 5ppm oil content guaranteed. No risk of accidental overboard discharge.
- **Ease**: Easy to operate and install

*** Systems that produce up to 100m³/hour**

Call us or visit our website to find out more about our products

The International WorkBoat Show NEW ORLEANS

Visit us at the WorkBoat Show
Booth #1450

COMPASS WATER SOLUTIONS
Phone: (949) 222-5777
info@compasswater.com

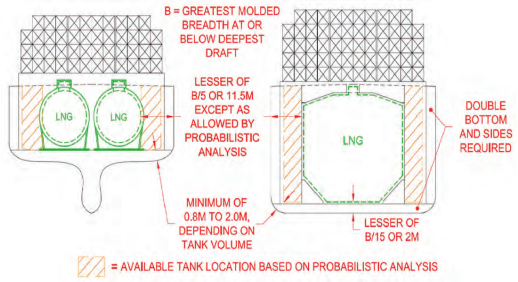
ABS ISO

www.compasswater.com

4th Quarter
2014
Volume 4
Number 4

Maritime Professional

4Q 2014 | **www.MaritimeProfessional.com**



ON THE COVER

Buckley
On the cover is Buckley McAllister the man, to the left is Buckley McAllister the tug.

KVH® INDUSTRIES

MINI-VSAT BROADBAND

WORLD'S No. 1 MARITIME VSAT SERVICE

Experience the Power of **One**

Hardware

TracPhone® VIP-series – award-winning SATCOM systems with built-in network management

Content Delivery

IP-MobileCast – a unique multicasting service that delivers content directly to your vessel

DELIVERED BY KVH IP-MobileCast™

Only **one** company delivers **one** integrated **end-to-end solution.**

Connectivity

mini-VSAT Broadband – the No. 1 maritime VSAT network offers global coverage

Rich Content

Licensed news, sports, movies, TV, and music, *plus* training, weather, and charts, delivered to onboard devices

Connectivity *and* Content

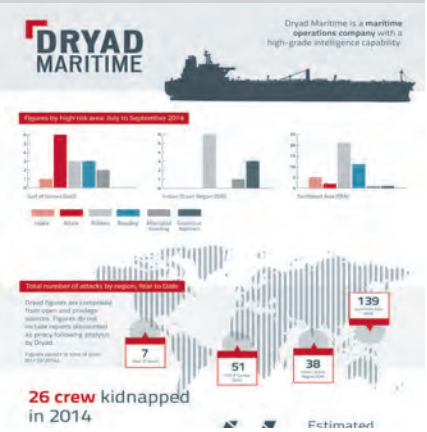
Deliver the bandwidth your operations demand, keep your crew happy, and manage your budget... all at the same time.

Get the details and great limited-time promotions:

kvh.com/powerofone

KVH®

22



20

54

36

LEGACIES START HERE.

What if you had a once-in-a-lifetime opportunity to be a part of the largest shipbuilding project of our era? An opportunity you can proudly put your name to and pass on to future generations.

At Seaspan's Vancouver Shipyards, you have the opportunity to build this legacy of excellence. Under the National Shipbuilding Procurement Strategy, Vancouver Shipyards will be Canada's long term partner to build state-of-the-art Non-combat vessels for the Royal Canadian Navy and Canadian Coast Guard. This multi-billion dollar program will create stable work over the next decade and beyond; and see the construction of up to 17 vessels at our new facilities in Vancouver, Canada.

We are actively looking to grow our management teams in technical, operations and program management – if you are an experienced shipbuilding professional, we want to hear from you. Be part of history in the making with the foremost shipbuilder on Canada's West coast. Seaspan Shipyards.

BORN TO BUILD

www.seaspan.com/careers
hr@seaspan.com

seaspan
VANCOUVER SHIPYARDS

The Contributors


Keefe


Parker


Peters


Van Rynback


Ward

Patricia Keefe

Patricia Keefe is a veteran journalist, editor and commentator who writes about technology, business and maritime topics.

Barry Parker

Parker of bdp1 Consulting Ltd provides strategic and tactical support, including analytics and communications, to businesses across the maritime spectrum.
www.conconnect.com

Eric Peters

Eric Peters is the Managing Director of Faststream USA. Contact him at 954 626 6893 or via E-mail at: eric.peters@faststream.com

Eugene Van Rynback

Eugene Van Rynbach is Naval Architect and Marine Engineer and Vice President of Herbert Engineering Corp. He has forty years of experience in general naval architecture and marine engineering, including time as a sea going engineer, classification society engineer, new construction supervisor, and many years working as a technical manager for former containership operator Sea- Land Service. Rynbach earned a degree in Mechanical Engineering and Naval Architecture from the University of California and a Masters Degree in Transportation Management from SUNY Maritime College.

Harry Ward

Ward leads the transportation and logistics practice at The McLean Group, a middle-market investment bank based in the Washington, DC area. He has executive management experience in the marine industry and focuses on mergers and acquisitions for mid-sized companies. He is a US Naval Academy graduate.

Maritime Professional

HQ 118 E. 25th St., 2nd Floor
New York, NY 10010 USA
Tel +1 212 477 6700
Fax +1 212 254 6271

URL www.maritimeprofessional.com
Email trauthwein@marinelink.com
ISSN - 2159-7758
USPS # 005-893

Editor
Joseph Keefe
keefe@marinelink.com
+1 704 661 8475

Bloggers & Contributors @ **MaritimeProfessional.com**

Lead Commentator	Joseph Keefe
U.S. East	Dennis Bryant
Brazil	Claudio Paschoa
Mumbai	Joseph Fonseca
Thailand	George Backwell

Publisher
John C. O'Malley
jomalley@marinelink.com

Associate Publisher/Editorial Director
Gregory R. Trauthwein
trauthwein@marinelink.com

VP Sales
Rob Howard
howard@marinelink.com

Production
Nicole Ventimiglia
nicole@marinelink.com

Corporate Staff
Vladimir Bibik, IT
Mark O'Malley, Public Relations
Esther Rothenberger, Accounting
Gabby DelGatto, Office Manager

Subscription
Kathleen Hickey
marprocirc@marinelink.com

Advertising Sales

Terry Breese
breese@marinelink.com
+1 561 732 1185

Frank Covella
covella@marinelink.com
+1 561 732 1659

Mitch Engel
engel@marinelink.com
+1 561 732 0312

Mike Kozlowski
kozlowski@marinelink.com
+1 561 733 2477

Dawn Trauthwein
dtrauthwein@marinelink.com
+1 631 472 2715

Jean Vertucci
vertucci@marinelink.com
+1 212 477 6700


LNG
BUNKER FUEL
AVAILABLE
NORTH AMERICA
CONVERT
WITH CONFIDENCE
How: Ship-to-ship, shore-to-ship bunkering operations
Clean: Meets IMO and ECA emissions requirements
Reliable: Delivery, storage, production, and supply
Flexible: Short or long-term contracting
LNG America™
Providing LNG
Where Needed, When Needed, and in the Quantity Needed.
www.LNGAmerica.com

Shipbuilding's Dilemma: Good Problems to Have.

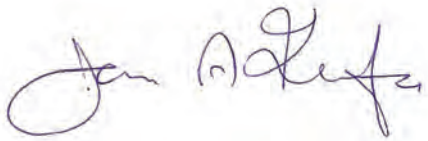
If shipyards are the bellwether of maritime market trends, then U.S. yards should today be considered the industry's market leaders, as well. Notwithstanding the recent (and dramatic) drop in global crude oil prices, the ongoing, so-called 'domestic energy boom' has left American shipyards with as many as 30 deep draft vessels on their collective backlogs. A robust inland recapitalization program is also underway with the long awaited (but still mired in red tape) subchapter M towboat rules lurking in the wings. Thousands of brown water vessels will likely need some sort of refitting to comply. On the blue water side of the ledger, ballast water treatment rules will soon transform a regulatory hassle into an estimated $80 billion bonanza for ship repair yards, some of which will be realized on this side of the pond.

It's all good – but not if you can't find anyone to do the work. Such is the quandary facing U.S. yards with 2015 looming large in the porthole. In this edition, we sampled a wide cross section of shipyard human resources professionals, training and education specialists and industry stakeholders who provided their unique take on the current situation, what's coming next and how to replace (and harvest a lifetime of knowledge from) their rapidly graying workforce. It's a work in progress. Our story starts on page 54 within our one-of-a-kind recruitment and retention feature.

Drilling down to find the source of the shipyard industry's current largesse isn't really all that hard. That's because the increasingly intrusive regulatory climate facing marine operators is also forcing their hand on a number of issues; not the least of which include installation of ballast water treatment (BWT) systems and the greening of propulsion footprints. In the ballast water / invasive species game, the trends are clear: there is plenty of help out there for those who need it and I can't think of many on either side of the equation who don't. Moreover, the (smart) OEM BWT players are actively forming partnerships and strategic alliances. Those who don't will likely be left behind – turn the pages to find out why.

The developing landscape for those looking to repower current tonnage or build new vessels has, in recent months, taken some interesting turns as the reality of environmental control areas (ECA) and stricter EPA Tier requirements take hold. Actually, it turns out there are more choices than you might have once thought. For example, the emergence of a Tier 4-compliant diesel engine – one that doesn't require SCR and/or after treatment to get to the Promised Land – might be of interest. If so, the story starts on page 33.

With all of the foregoing on your mind, the approaching New Year will be here before you know it, eventually revealing what the uncertainties of a jittery oil market and a regulatory climate that awaits definitive action on many fronts will bring. Fortunately, you have ***Maritime Professional*** to guide you through the rough spots. Look for more of the same in the coming year.



Joseph Keefe, Editor | **keefe@marinelink.com**

THE LIST People & Companies in This Edition

Insights

By Barry Parker

Powering Ahead with Wind Assist Technologies

No longer an abstract 'pie-in-the-sky' technology, wind assist propulsion could well be a game-changer in the 'Carbon Wars.'

Wind assist technologies have come of age for shipping companies. A panel discussion entitled *"Accelerating Adoption of Double Digit Fuel Saving Technologies*," at the recent Danish Maritime Days in early October drove this point home nicely. Describing the meeting in Copenhagen, Dr. Tristan Smith, from University College London's (UCL) Energy Institute, told Maritime Professional last month that "… the event involved a coming together of ship owners and the leading companies developing technologies with exciting potential to offer those owners and their charterers fuel savings." The participants were Turbosail Pte. Ltd. (sails), Magnuss Ltd. (rotors with retractable capability), Norsepower (rotors), and OCIUS Technology (sails). Dr. Smith, whose design work has ranged from kite sails to nuclear submarines, added: "Level of maturity varied from technology company to company, with the most advanced already fitting hardware in advance of a sea trial."

Wind Assist Fuel Saving Technologies

The companies presenting are looking for "…strategic partnerships and shipowners interested in game-changing fuel-saving technologies," according to Shipping Innovation Fast Tracker (ShIFT), a joint venture between the Carbon War Room (CWR) – an advocacy group and think tank most closely associated with Richard Branson, and UCL. The focus on shipping is not surprising for CWR, especially with its stated objective of "accelerating the adoption of business solutions that reduce carbon emissions." Within its Transport Group, its Operation Shipping Efficiency aims to encourage investment, development and installation of energy efficiency technology to improve the efficiency of the fleet, by providing transparent data to the wider market.

Dr. Smith's UCL group has been developing the necessary economic models to quantify and analyze savings due from energy efficient investment. James Rhodes, CEO of Magnuss, one of the featured presenters, said, "CWR focuses on accelerating the adoption of business solutions that reduce carbon emissions and selected Magnuss for ShIFT, showcasing the Magnuss VOSS (Vertically-variable Ocean Sail System) as the technology best suited to deliver a group of key benefits. Chief among these benefits are fuel savings of up to 50% and on average 10-35% for an industry breaking its back to save 2-4%."

Rhodes, based in New York, added that the technology also provides for "a substantial and differentiated means to reduce carbon emissions in the face of tightening regulation and a patented and class approved design of proven technology applied in a different way to meet the needs of global shipping today."

After the session, which was also sponsored by the Danish Shipowners Association, Dr. Smith told *MarPro*, "With regard to operational concerns, designs that offered some degree of retractability produced greater reassurance to the shipowner. Accentuating that sentiment, one shipowner commented that the decision was not 'whether' to use wind-assistance technology, but 'which' technology to use."

EASTERN SHIPBUILDING GROUP, INC.

FULL STEAM AHEAD

What is your New Construction Strategy for EPA Tier 4, January 1, 2016? Come discuss with us at WorkBoat Show.

Visit Us at Booth #3116
December 3-5, 2014

The International WorkBoat Show
NEW ORLEANS

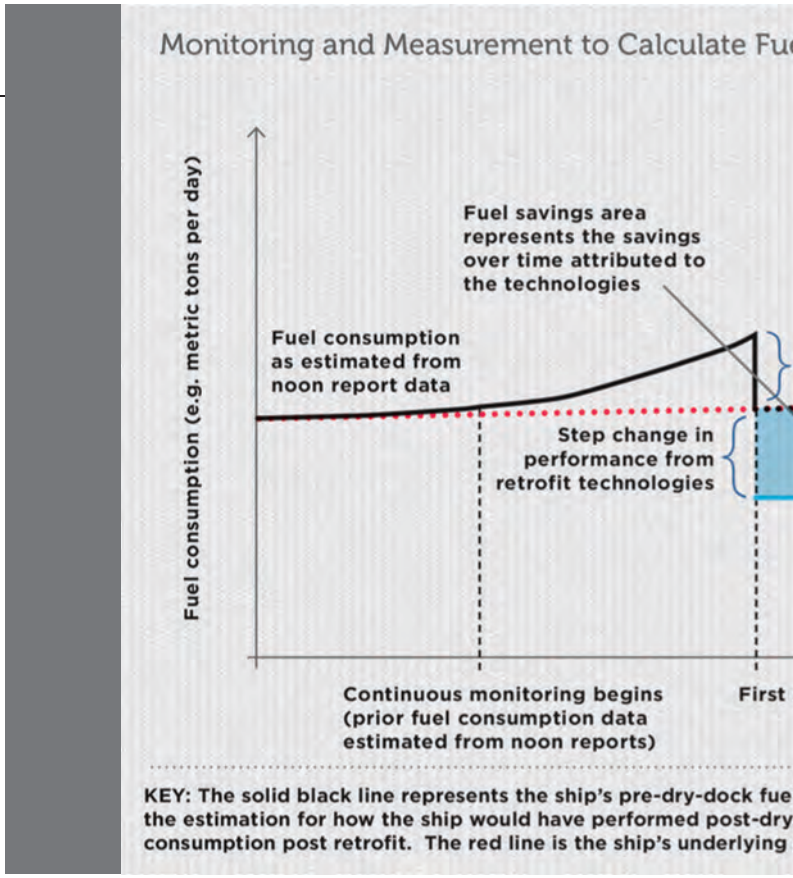
EASTERN SHIPBUILDING GROUP, INC.

To add an ESG built vessel to your fleet, contact us at:
Tel: 850-763-1900 ext 3216 Fax: 850-763-7904
Email: sberthold@easternshipbuilding.com

2200 Nelson Street, Panama City, FL 32401
13300 Allanton Road, Panama City, FL 32404
www.easternshipbuilding.com
www.youtube.com/user/EasternShipbuilding

NEW CONSTRUCTION • REPAIRS • CONVERSIONS

Artist's depiction of a wind-assisted tanker at sea.

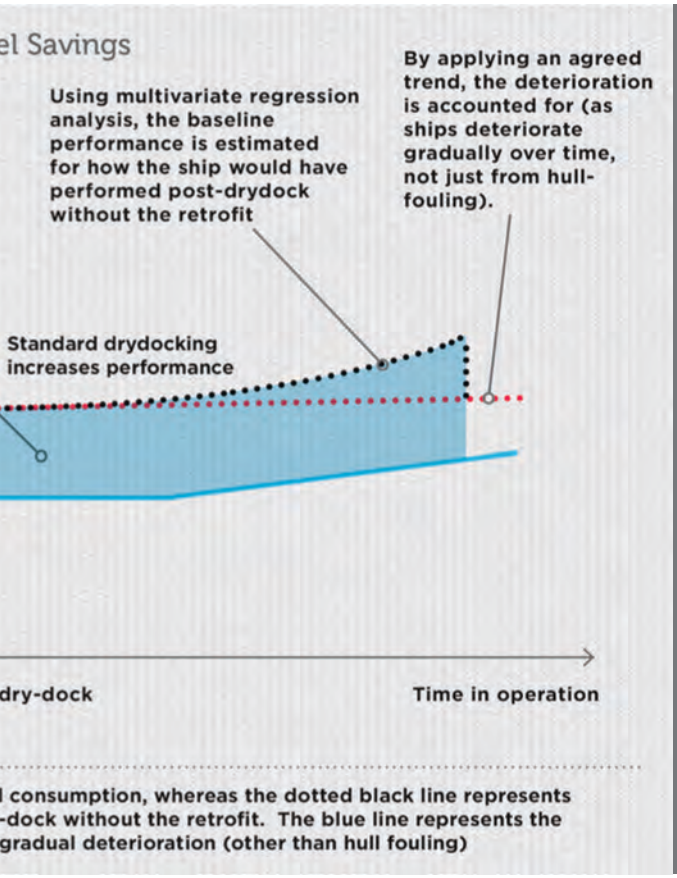


Historical Roots and Modern Solutions

Solutions for lowering fuel costs have their roots in sail power, the same technology that pre-dated diesel power up until the early 20th century. Turbosail, a company founded by Jaques Cousteau and one of the presenters, utilizes a device similar to an airplane wing turned upright on the deck of a ship, where a vertical hollow tubes, takes in air and create a pressure differential (resulting in lift and drag).

In the mid 1920's, a time that sail had been supplanted by steam powered engines (with diesel already gaining share), the phenomenon where a wind blowing on rotor can be converted into forward thrust, known as the Magnus effect, was harnessed on a schooner. This became the Flettner rotor, named for an engineer specializing in the nascent world of aeronautics.

In 2014, the rotor concept is arguably ready for prime time. Rhodes explained that the Magnuss VOSS is a vastly improved version of the original Flettner design, whereby wind hits the rotating hollow cylinder passes on two sides, setting up a high and low pressure differential. The sail is a 100-foot tall spinning, hollow, metal cylinder that propels a ship, somewhat like a conventional sail, but with as much as 10 times the efficiency. Each sail (typically four to five fitted on board) can produce up to 30,000 pounds of thrust, which is equivalent to the thrust of a 737 jet engine at take-off. The wind-powered thrust, effective across 290 degrees of wind angle, enables the ship's main engine to be throttled back while maintaining voyage speed. What makes the Magnuss sail system unique is its



Source: the Carbon War room

> "CWR focuses on accelerating the adoption of business solutions that reduce carbon emissions and selected Magnuss for ShIFT, showcasing the Magnuss VOSS (Vertically-variable Ocean Sail System) as the technology best suited to deliver a group of key benefits. Chief among these benefits are fuel savings of up to 50% and on average 10-35% for an industry breaking its back to save 2-4%."
>
> – Dr. Tristan Smith, University College London's (UCL) Energy Institute

ability to fully retract when loading/unloading in port and in unfavorable wind conditions.

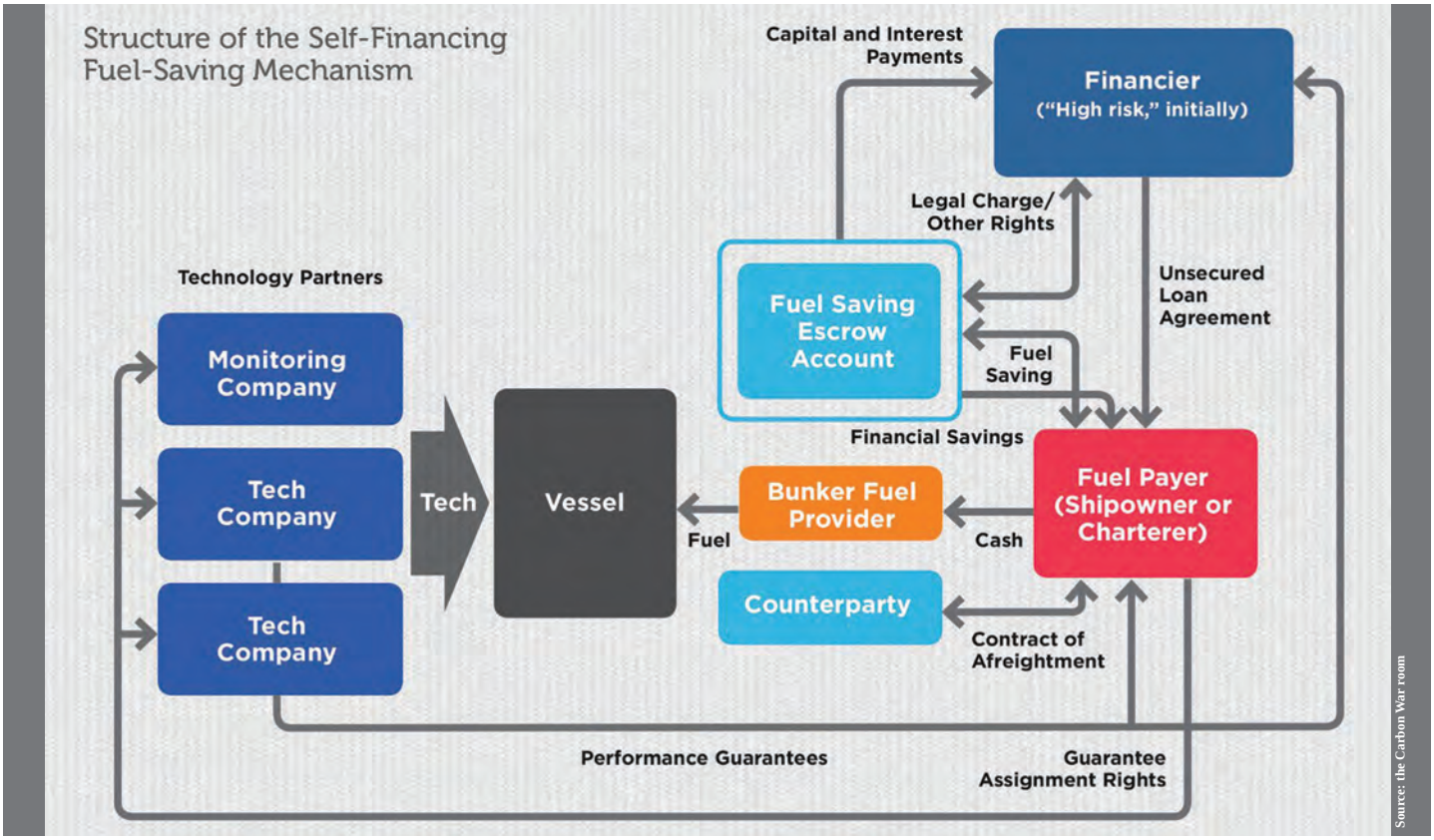
Panelist Norsepower (offering the standard fixed Flettner rotor) says that its, "…rotor sails can be installed in new vessels or they can be added to an existing ship." Later this year, trials will begin on a 1999 built Finnish flag RoRo set to begin a charter in the environmentally sensitive North Sea trades. Norsepower talks about 10% to 20% savings. Rhodes, from Magnuss, elaborated on the economics of the VOSS solution, thinks industry can do better. "Under optimal wind conditions, fuel consumption can be cut up to 50% and under typical operating conditions, annual fuel costs can be reduced by 10-35%." He added that because the Magnuss VOSS is retractable means it produces no drag in adverse wind conditions and therefore produces axiomatically greater savings versus other Flettner rotors or fixed sail designs.

New Technologies Guide the Voyage Ahead

The conceptual diagram (Monitoring and Measurement to Calculate Fuel Savings) shows an overview of benefits (the shaded area) from retrofits of fuel saving technologies deployed during a major dry docking. Graphics notwithstanding, multiple impediments standing in the way of deployment of sails and rotors are identified in a report authored by the Carbon War Room and the UCL Energy Institute in June 2014, *"Hidden Treasure: Financial Models for Retrofits."* In the report, major gaps facing fuel saving technologies (including wind assist) that need to be overcome are identified. These difficulties include technical, operational and financial issues. The difficulties are not insurmountable. Underscoring that claim, and beginning in late 2012, Magnuss collaborated with a leading mover of commodities, Rio Tinto (also a large vessel owner).

Wind assist is creating other opportunities for maritime technologists. Progress must be made on developing accurate reliable hardware and data transmission protocols for quantifying and verifying the much discussed, but elusive "savings." Improved measurement devices and monitoring devices must then be interfaced with equipment that will seamlessly (and securely) transmit reliable readings into large-scale databases. Such data will be required, especially for proponents of so-called "big data." Nevertheless wind assist advocates are hardly starting from scratch. Existing remote data gathering and transmission supporting condition based engine monitoring may prove useful in providing streams of reliable real time fuel savings information.

The Magnuss project is breaking new ground in the movement forward for wind assist technologies. For example, Rhodes told *MarPro* that another organization, the Sustainable Shipping Initiative (SSI), a cross-industry group representing shipowners, charterers, shipbuilders, engineers, banking, insurance, and classification societies) published the Rio Tinto case study advancing the benefits of the Magnuss technology. According to Rhodes, "The SSI is an ambitious coalition of shipping leaders from around the world that is taking practical steps to tackle some of the sector's greatest opportunities and challenges."



Financial Shoals Still to be Navigated

The effort to fund emerging technologies faces multiple obstacles. Mechanisms to bring in outside financiers, whose payback is integrally tied to (reliably measured) fuel savings, must be prototyped. The Financial Flow chart depicted below shows the importance of accurate measurement of the fuel savings, where repayments of debt service (capital and interest) to the financier flow through an "escrow" account that is continually topped up with real hard cash generated based on fuel savings.

Other wrinkles are in the province of financial engineers (rather than naval architects). Consider what happens when fuel prices drop, as they have in late 2014 without a series of transactions akin to a hedge to lock in the savings, in effect. One model to consider might be an insurance product developed by another group, The Global Innovation Lab for Climate Finance, which would protect against less than anticipated savings. Ship chartering transactions also present challenges, for example where an underlying owner installs the fuel saving technology, and then puts the vessel out on time-charter, or bareboat charter, to counterparty. If the increased charter rate (in $/day), resulting from more economical operation, does not fully match the fuel savings, then financiers will face a shortfall as they pull in cash. Nevertheless, *ShIFT* points out that considerable inspiration can be found in the solar power industry, where such documents underlie funding of capital expenditures.

For these new technologies to gain broad acceptance, there is much work still to be done by all stakeholders. Dr. Smith elaborated further on the voyage still ahead, telling *MarPro*, "For all technologies, it was evident that further trials are needed to validate the initial cost-benefit estimates, resolve teething problems and optimize the design, which will require close collaboration of owners, charterers and technology developers." This voyage is well underway. Rhodes also weighed in, saying, "The Rio Tinto case study is further evidence that the shipping industry will embrace the Magnuss VOSS, once sea-trialed."

The Author

Barry Parker, bdp1 Consulting Ltd. provides strategic and tactical support, including analytics and communications, to businesses across the maritime spectrum. The company can be found online at: www.conconnect.com

Maritime risks are vast. So is our team to see you through them.

Whether you provide marine services or transport goods, people or cargo, you face countless property and liability risks. When you work with Travelers Ocean Marine, you'll be working with a team that has deep knowledge of the maritime industry – backed by the financial strength of the #1 commercial property writer in the U.S.* We're dedicated to helping you understand how to protect against the unknown. But if the unfortunate should occur, you'll be ready with the power of Travelers. That includes a 12,000-person claim organization – with a catastrophe response team, ready to be deployed at a moment's notice – and the financial strength to handle major claims. You can rest easy knowing you're not going it alone.

*Reported by SNL Financial

TRAVELERS

It's better under the umbrella®

travelers.com

Insights

Middle Market M&A in the Offshore Industry

Market volatility for the petroleum sector provides a backdrop to an evolving Merger & Acquisitions environment for the Offshore Sector.

By Harry Ward

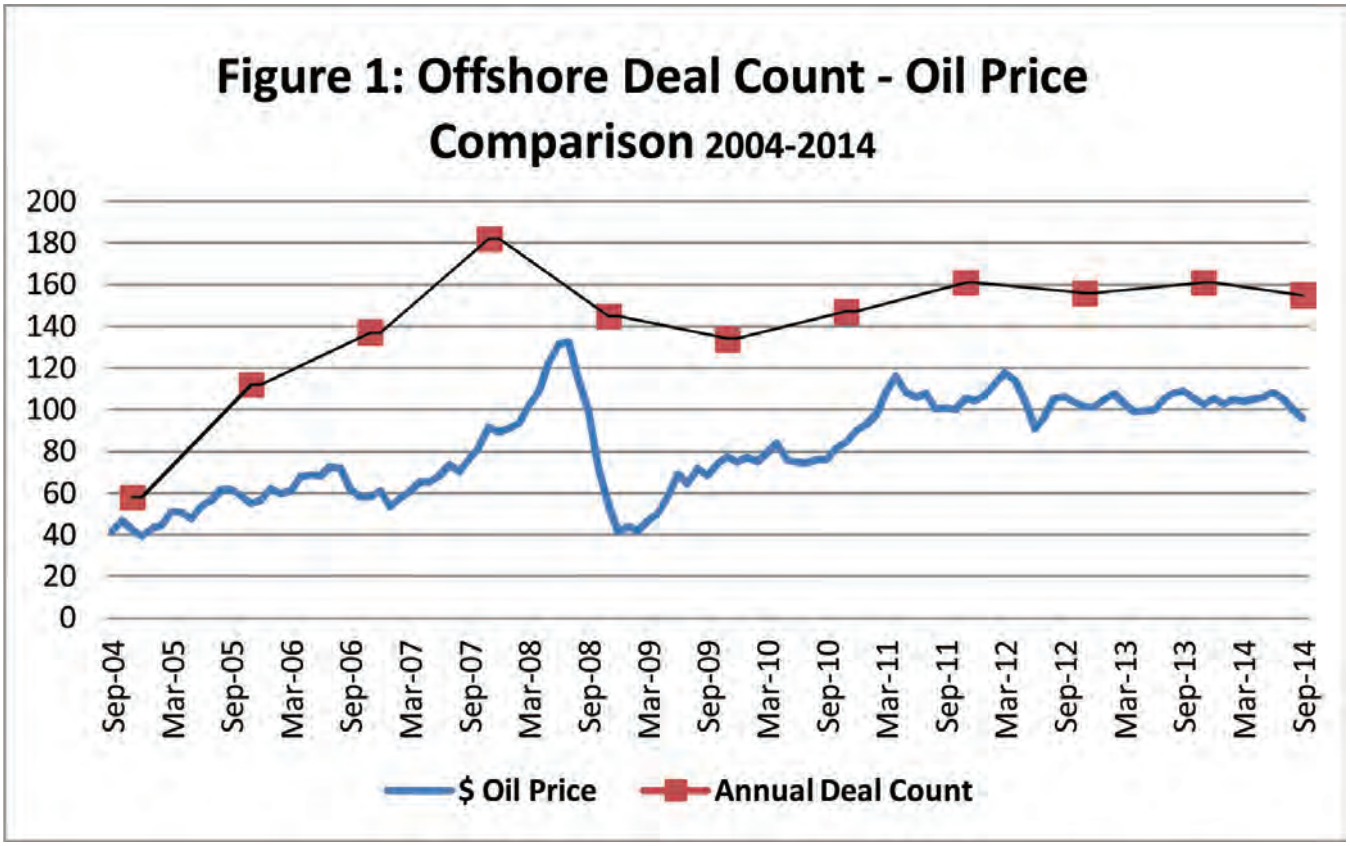
In the 3Q edition of *Maritime Professional*, this series of articles examined the overall evolution of maritime and offshore M&A activity since 2010, tracing the flow of deals in the post-financial crisis era. In this edition, we take a closer look at relevant U.S. offshore energy industry deal flow and market movements as they relate to oil prices over time, and highlight some recent middle market transactions.

Volatility in the petroleum markets is a constant refrain and seems to surprise even the best analysts more often than not. **Figure 1** displays a comparison of marine and offshore M&A deal flow with average world crude oil prices over the past ten years. Financial markets as defined by deal flow tended to slightly lead, or anticipate the upward surge in oil prices between 2004 and 2007. Looking to the wider markets, annual global deal counts more than tripled in the narrowly-defined segment through this period, capped by megadeals such as Transocean's (NYSE:RIG) $6 billion acquisition of GlobalSantaFe Corporation from Siem Industries and the $2.5 billion acquisition of TODCO by Hercules Offshore (NasdaqGS: HERO).

After reaching a peak in both volume and total value during 2007, the M&A market quickly reversed as the financial crisis approached and oil prices plummeted through 2008. Despite a few periods of volatility in the six years of uneven recovery, deal counts in the segment have largely rebounded and remained somewhat predictable. It is worth noting that North American oil and gas terrestrial M&A markets were much more active and volatile through this period, as the fracking and shale booms rapidly evolved.

Recent Market Moves

Fast forward to the second half of 2014, and volatility has begun to grow in both the crude oil and financial markets. **Figure 2** shows a public company offshore index that includes



a number of offshore service vessel operators and petroleum transport companies. A similar pattern emerges in relation to oil prices throughout the ten year period. A steady increase in share prices since the 2008 crash has been punctuated by a few periods of volatility, especially in 2012 and in recent months. Shares of Kirby Corporation (NYSE: KEX) experienced a 15% setback between August and October 2014, while offshore companies Tidewater Inc (NYSE: TDW) and Hornbeck Offshore (NYSE: HOS) declined as much as 30% through this unpredictable period. At the heart of the market retreat has been an oil price decline of around 25% from about $107 per barrel to as low as $80, due to a glut of both crude and refined petroleum products worldwide.

Mergers and Acquisitions activity has cooled slightly in recent months in offshore marine and energy sectors along with the overall market declines. The high-growth periods immediately before and after 2008 were marked by a large volume of deals involving large companies and drilling properties. However, more recent transaction flow has centered on smaller equipment and services company deals, as market players carve out profitable niches that are perhaps less exposed to major market swings.

Though some large transactions and companies were highlighted earlier, the bulk of mergers and acquisition activity tends to take place in the "middle market" or "lower middle market." These market labels do not have a precise definition, but in our industry segments the lower middle market tends to include very small deals and the middle market extends to those with a total transaction value of a few hundred million dollars. Boutique investment banks (such as this writer's) tend to focus on these smaller deals, and there is no shortage of interesting and varied U.S.-related deals to review.

Service Company Deals

Throughout the current year, a number of compelling middle market deals took place with companies that provide niche services in the offshore industry. Kicking off the year, in February, Denver-based private equity group Lariat Partners acquired the environmental services business of Newpark Resources, Inc. for $100 million in cash. Lariat merged Newpark

Environmental Services with Offshore Cleaning Systems to form Ecoserve, which they tout as the "first truly comprehensive solution to the management of oil and gas waste." In the same month, DigitalGlobe (NYSE: DGI) acquired Spatial Energy for $35.7 million. Both companies are based in Colorado and serve the oil and gas markets with geospatial data and analytics. DigitalGlobe is a full-service provider in the geospatial realm and Spatial's cloud-based solutions enable the company to provide vital insights to their customers in the O&G vertical.

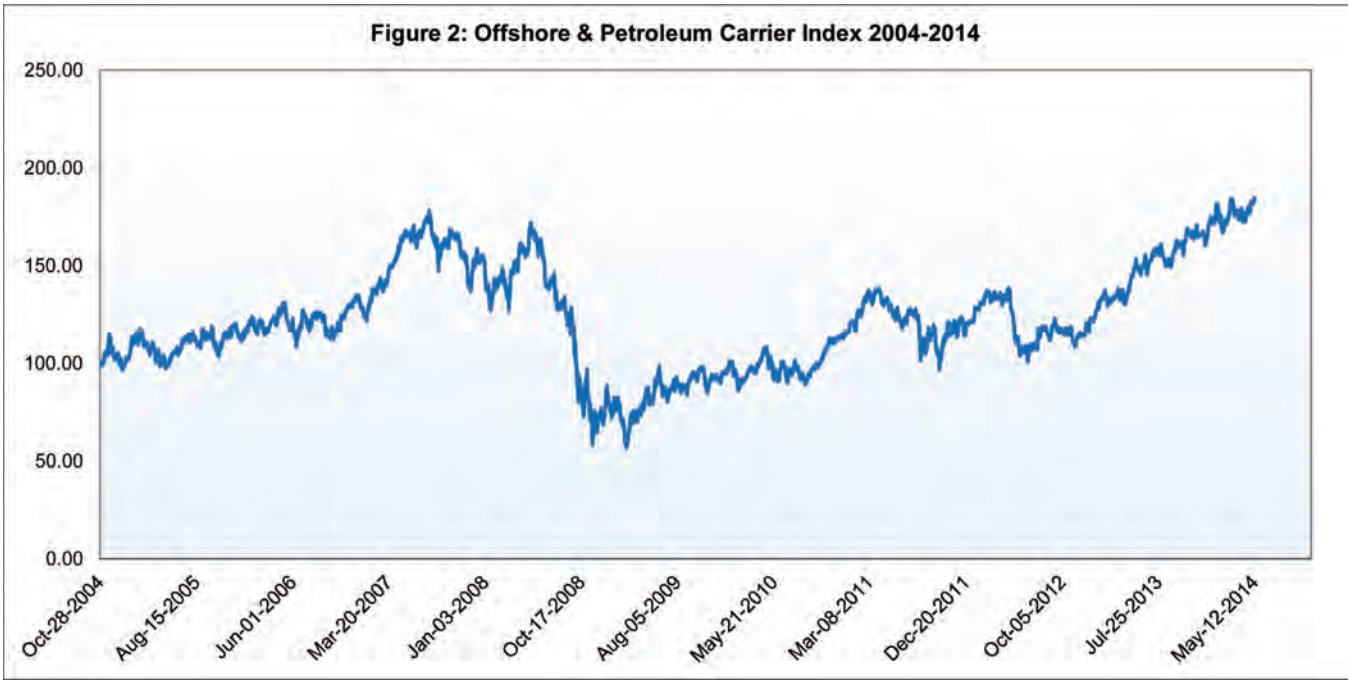
Virginia-based Huntington Ingalls Industries (NYSE: HII) completed a couple of transactions in 2014 including the acquisition of Houston-based UniversalPegasus in May. UniversalPegasus provides a range of project management, engineering, design, survey, inspection and construction management to the energy and offshore markets – terms of the deal were not disclosed. Earlier in the year, HII had acquired Colorado-based environmental consulting company SM Stoller for $53.7 million and the company is actively seeking additional acquisitions. These presumably will all complement their existing core businesses.

After a string of American acquisitions of UK offshore companies in recent years, Aberdeen-based WS Atkins plc swam against the tide and added to its portfolio of acquired companies when it bought Houston Offshore Engineering for $73 million in October 2014. HOE specializes in the design of offshore deepwater floating production platforms. The HOE acquisition followed Atkins' purchase 130-person, US-based Nuclear Safety Associates, Inc. in late 2013.

Equipment and Products M&A

Deal flow in offshore equipment and products segments so far in 2014 has been focused on relatively small, high-technology product companies. An exception was private equity group KKR's acquisition of Aberdeen, UK-based OEG Offshore for $171 million in July. OEG manufactures and leases a range of specialized cargo carrying units used to transport equipment and supplies to and from rigs. Up the technology spectrum a bit was UK private equity house Dunedin LLP's $117 million investment in EV Offshore, a provider of downhole cameras and camera services to the offshore O&G industry. Both the OEG and EV deals can be thought of as Management Buyouts (MBO), where a private equity sponsor teams with the executive management team to acquire and grow the company. In a typical MBO, the private equity firm will assume a controlling interest and management will retain significant ownership, with the opportunity to earn more equity over time.

In another technology-focused deal, Massachusetts-based Nova Instruments LLC acquired ultrasonic data acquisition company Technology Design Ltd from Oceaneering International (NYSE: OII). Based in the UK, Technology Design



will complement Nova's portfolio of non-destructive testing (NDT) solutions with industry-leading Phased Array instruments used in O&G seismic data acquisition. Earlier in the year, Nova had acquired another UK company called Phoenix Inspection Systems, a provider of ultrasonic NDT equipment to the offshore industry.

Beyond this sample of 2014 offshore service and equipment deals, there were many smaller transactions as well as large, recognizable mergers and acquisitions. Our examples and review provide a sense for the flavor of middle market deal activity in the marine, and particularly offshore industry sectors.

M&A transactions enable companies to grow and change in a number of ways. Mid-sized companies are able to expand through the addition of synergistic technologies and services; Investment companies can team with experienced managers to gain control of and grow and company that they know well; and entities that are struggling financially or have run out of ideas can find new life under the direction of an ambitious acquiring company.

The Author

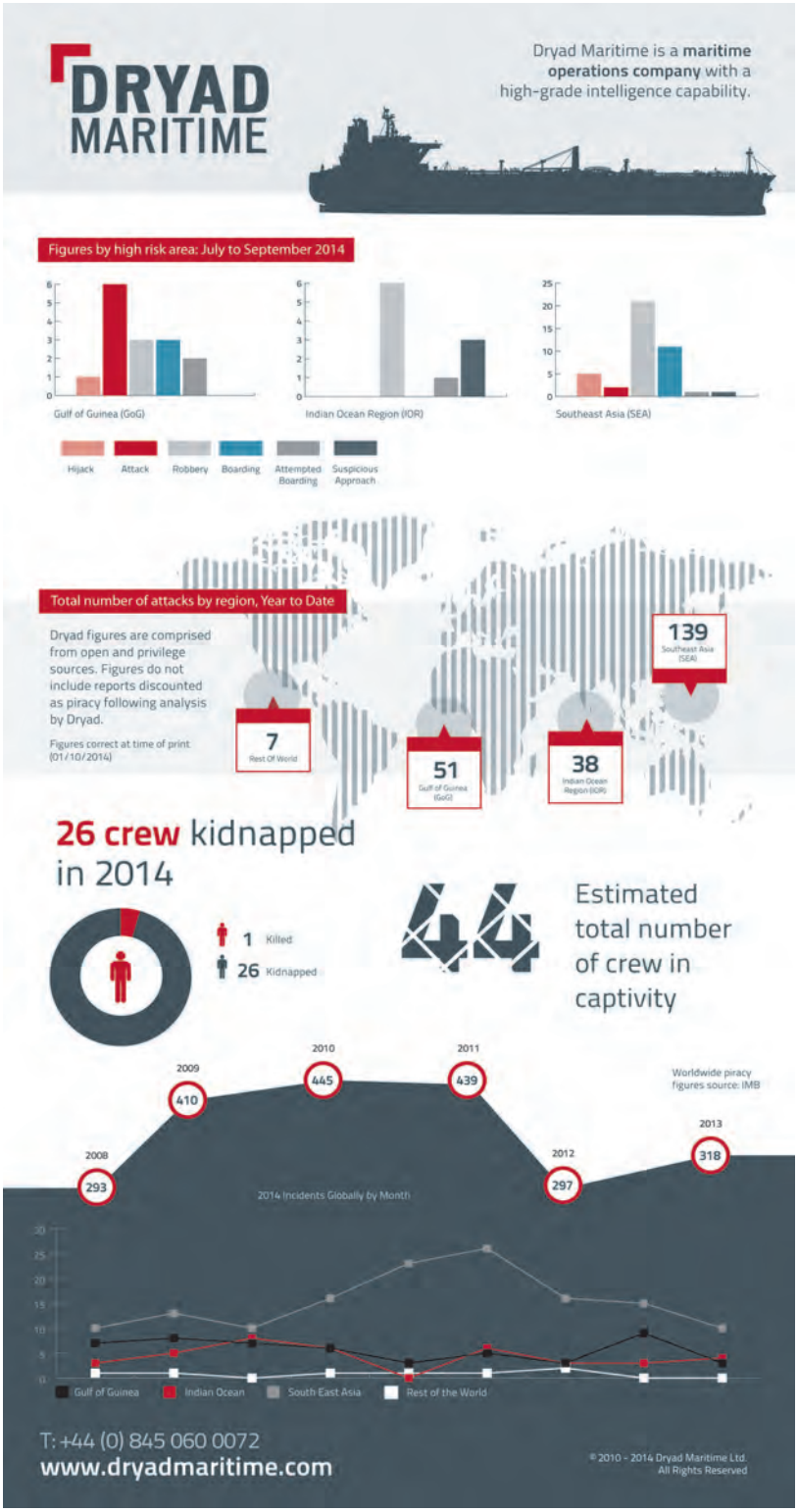
The McLean Group
INVESTMENT BANKING

Harry Ward leads the transportation and logistics practice at The McLean Group, a middle-market investment bank based in the Washington, DC area. Mr. Ward has executive management experience in the marine industry and focuses on mergers and acquisitions for mid-sized companies. He is a US Naval Academy graduate and earned an MBA at San Diego State University.

Maritime Crime Continues at Pace

In October, Dryad Maritime released the global latest piracy statistics. The Q3 maritime crime figures show that piracy is continuing across the globe at similar levels to Q2, with incidents of cargo theft in Southeast Asia continuing to rise. Dryad also reports a 27% drop in crime overall between Q2 to Q3, but at the same time points to the continuing attacks that are happening across the globe as reported in Q2. According to Ian Millen, Dryad Maritime's Chief Operating Officer, "The number of attacks across the globe shows that maritime crime and piracy remain a threat to the shipping industry, with both cargo theft and kidnapping high on the agenda for organized criminal gangs. We can expect to see a continuation in incidents of boarding and cargo theft in Southeast Asia and in the Gulf of Guinea as criminal groups continue to prey upon the vulnerable and the unprepared."

The ***Gulf of Guinea*** has seen 15 confirmed criminal incidents, compared with 22 in Q1 and 14 in Q2. The spike in the number of kidnapping incidents that occurred in Nigerian waters in Q1 of 2014 was followed by a break in such criminality, with just one further report being received in the five month period thereafter. However, on 14 August pirates boarded a support vessel south of Brass and two crewmembers were abducted for ransom. A similar raid followed on 18 September when pirates kidnapped five seafarers from another vessel. As is nearly always the case, both incidents occurred after midnight in areas just outside of the 12 nm TTW policed by the Nigerian Navy. Acts of criminality have shifted west to the maritime border area between Ghana and Togo and this trend continued with another abduction in the same area where MT Fair Artemis succumbed to the same fate in June. Nigerian based syndicates conducted both acts of piracy. No further successful hijackings of tankers have occurred, but the intent to do so remains; MT SP Boston was attacked overnight on 27 August off the Ivory Coast. The motive for the attack was once again to steal its cargo, but the gang found



the ship to be in ballast, and so merely looted the vessel and crew valuables and cash before fleeing the scene. There have been 15 confirmed incidents reported during the third quarter of 2014 compared with 22 in Q1 and 14 in Q2. The statistics are in keeping with the number of recorded attacks in previous years.

The Southwest Monsoon has dominated the ***Horn of Africa*** HRA during Q3, with any thoughts of piracy in the Indian Ocean/Arabian Sea are blown away with the Monsoon winds. Wind speeds of over 35 knots, accompanied by waves in excess of five meters are experienced for the majority of days between late June and mid-September. The Gulf of Aden has also seen increased wind speeds and sea states, which precludes piracy operations. The Monsoon does not affect the Southern Red Sea and Gulf of Oman and that is where most potential incidents have been reported. Despite 16 reported approaches there have been no confirmed piracy incidents reported in Q3. With calm seas and light winds across the Arabian Sea and Somali Basin during the next two months, conditions will be well within operating limits for pirate skiffs. However, a lack of funding, equipment and manpower will likely limit the number of Pirate Action Groups (PAGs) putting to sea. The potential for pirate operations to recommence out of the fishing villages south of Mogadishu, focusing on the target rich areas off Mombasa and Dar es Salaam, is very real. Coalition naval operations continue along the north eastern coast of Somalia, any PAGs that do venture into the open ocean run the risk of detection and disruption long before they reach the shipping lanes. Dryad maintains that vessels should transit through the Somali Basin at a minimum of 300 NM from shore.

Maritime crime across ***Southeast Asia*** continues at pace during Q3; there have been five further hijackings of product tankers for cargo theft, four of these occurred in the vicinity of Singapore and are assessed as being carried out by the same gang. To the east of the Singapore Strait a further eight vessels were boarded while at anchor, taking the total of similar incidents in the area to 30 so far in 2014. This is in comparison with just nine incidents in the area during the same period in 2013. With the exception of the anchorages to the east of Singapore, there has been a reduction in the number of incidents reported in the major ports of Indonesia. During the same period in 2013, there were 18 incidents off Balikpapan/Samarinda, Indonesia but this year there have been only five. The lower figures can be attributed to better patrolling by Indonesian Maritime Police, who in January instigated a new policy for the most impacted areas of 2013. During the final three months of 2014, Dryad expects to see an increase in boardings and attempted boardings in the northern Malacca Strait and Andaman Sea. Criminal syndicates will continue to target small product tankers soon after they depart Singapore with the intention of stealing their cargo of marine fuel oil for the black market. All vessels at anchor in the major ports across Southeast Asia remain at risk.

www.dryadmaritime.com

SIMULATION, RESEARCH & TRAINING

Margaret Kaigh Doyle

Vice President – Development, United States Maritime Resource Center
Maritime Simulation Institute

By Joseph Keefe

An hour spent with Margaret Kaigh Doyle is a high energy event, punctuated by her enthusiasm for everything she undertakes on a daily basis. Getting her to sit down for an hour to reflect on what she's accomplished and from where she has come, was therefore a tall order. And, her typical day involves plenty. That's because Doyle currently serves on the U.S. Delegation to the Sub-Committee on Human Element, Training and Watchkeeping (HTW) at the International Maritime Organization (IMO), and when she isn't doing that, she chairs the U.S. Coast Guard Chemical Transportation Advisory Committee (CTAC) LNG Fuels Working Group.

Concurrent with all of that, her day job as Vice President – Development at the United States Resource Center (USMRC), Maritime Simulation Institute, as you might expect, takes up a little bit of time all by itself. There, she is responsible for managing and executing all aspects of program development as well as the full spectrum of marketing and fundraising efforts. This year and as always, she found herself on the leading edge of industry developments when she set up and delivered of a range of courses focusing on LNG as a marine fuel at USMRC including an LNG Bunkering PIC course, the first of its kind in the US.

A Day Job – and More …

Today, many stakeholders still know USMRC as Maritime Simulation Institute or MSI. Doyle joined the USMRC team in 2012. Doyle says unapologetically, "I still feel that we are arguably the best shop around when it comes to simulation-based operations, research and training. Our management team decided that rebranding as United States Maritime Resource Center (the actual name of the 501-C) could give us a better shot at increasing the new market opportunities, revenue streams and outside investment for our little 'shop' in Rhode Island. The success with LNG Bunkering has been a testament to that."

Doyle's 25+ years of experience on the waterfront could fill two or three careers all by itself. Nevertheless, she continues to focus her attention on new challenges – all of which typically involve betterment of the profession she loves so much. Catching up with her in October, we asked her to single out the one particular experience along the way that has impacted her career the most. Doyle responded, "I can't point to one that trumps them all. Early in my career, I did everything I could to get on a ship for CDI and SIRE inspections, USCG audits, shipyard visits, etc. My first role at the Chemical Carriers Association was as its Technical Secretary. When I started that job, I worked hard to learn everything I could about chemical tanker design and operations. My work at International Maritime Organization (IMO) on the ISPS Code following 9-11, the 2007 MARPOL Annex II Amendments, and now my work with U.S. Delegation to the Sub-Committee on Human Element, Training and Watchkeeping (HTW) have been my reward for learning as much as I could about the spectrum of tankers. I really enjoy working in those types of forums."

That said, the majority of Margaret Doyle's career has involved representing the interests of various sectors in the industry including ship owners and operators, government agencies, and salvage and firefighting organizations. Perhaps best known for her work as Executive Director of the Chemical Carriers' Association (which later merged with INTERTANKO), for over a decade she represented over 80 percent of the world's chemical tanker fleet at the State, Federal and International Level. Before that, she earned a degree from the US Merchant Marine Academy and two Masters Degrees from The Pennsylvania State University and George Washington University. A three-time recipient of the US Coast Guard Public Service Commendation and winner of the (2010) Outstanding Professional Achievement Award from her alma mater at Kings Point, it is honestly hard to imagine how she fit all of it in and still arrived at where she is today.

Beyond her academy training, Doyle has never been to sea

in a professional capacity, but that wasn't for lack of trying. She explained, "When I graduated in 1985, the only sailing jobs available were for AB positions. I did get a union card, but after two failed attempts at getting a third mate gig, I tried my hand at maritime consulting." Ironically, what she does today has direct (and positive) impact on countless seafarers here and across the pond. Her work as Executive Director of the Chemical Carriers' Association was a perfect example. Doyle adds, "At first, the job was strictly technical in nature – attending meetings at the Coast Guard on emerging vapor control regulations, OPA'90 requirements, and publishing a monthly newsletter. As I grew into the job, CCA gave me the room to strengthen the advocacy and outreach arms of the organization. By the time we merged with INTERTANKO in 2003 I had assumed the full-time role as its Executive Director, representing 80 percent of the chemical tanker tonnage worldwide."

Women on the Waterfront

Doyle's success speaks for itself, and her colleagues point to her accomplishments and not her gender. Still, the maritime industry – like so many other aspects of its development – tends to be late to the party when it comes for opportunities for women. We asked Doyle to look back and then give today's young women the benefit of her considerable experience as they contemplate a career on the waterfront. Without hesitation, Doyle responded, "That's easy. It's such a great industry and it has come a long way in 30 years. I would give this advice to any woman entering a male dominated field: be a great listener, know your stuff. Always try to be the most well-read person in the room, never take yourself too seriously, but never back down if you know you are right. Beyond this, treat everyone you meet as if they are an equal; because they are."

Apart from this, Doyle stressed the need for more women in key positions to actively seek out sways to mentor those coming along behind them. And, she says, WISTA – the Women's International Shipping & Trading Association – where she is an active member today, is the perfect venue to that that done.

As the industry evolves, so too has Doyle's passion for helping to shape the changes that are occurring on a daily basis on the waterfront. For example, she speaks often of providing 'advocacy for LNG.' "If the prognosticators are correct, in five years the U.S. will be the Saudi Arabia of natural gas. Ships calling on U.S. ports and those doing business in the U.S. will have a real need for LNG as marine fuel," she told MarPro, adding, "The Society for Gas as a Marine Fuel (SGMF) has been established as an international organization to further this cause, but there is an incredible need to educate stakeholders in the U.S. (and Canada). As the infrastructure in areas such as Jacksonville, Tacoma and Seattle develop, we especially need an organization that will address the needs of local, state and federal players. USMRC is in discussions with a number of entities to make this a reality."

Separately, Doyle and USMRC are developing a range of courses focusing on LNG as a marine fuel at a first-of-its-kind LNG Bunkering PIC course. But, those efforts were developed in anything but a stovepipe fashion. Instead, she insists, "We made the decision to base our course on the Knowledge, Understanding and Proficiency (KUP) elements approved at HTW -1. This will be adopted at IMO this November. Moving forward we will take any USCG Guidance into account as we head into 2015. In the end, you defer to the IMO because that eventually will be the basis of any STCW compliant course." She continues, "The fact that we have been able to work with Harvey Gulf and provide their people with LNG Bunkering Training has proved to be icing on the cake."

The experience of serving on both domestic and international NGO/regulatory bodies provides Doyle with additional experience and perspectives, all of which she brings back to her day job. And, as someone who interacts with professionals for myriad countries and flag states, she also knows that there is much that the United states can learn from its contemporaries across the pond – and a few things they could learn from us, as well. To that end, she contends, "The U.S. maritime industry is evolving into a much more of diverse sector with the offshore and brown water growth exponentially outpacing the deep water tonnage. I would say that, like the U.S. fleet, many of our partners across the ponds (Atlantic, Pacific, etc.) are mixing the flags of their fleets. We could all do a better job of managing risk with an approach to training specifically designed for each ship and company."

Looking Back and Planning Ahead

At the end of the day, and like any successful professional, picking out the proudest moment of her career isn't an easy task, but Doyle eventually told us, "I would say that involves my work on 2007 MARPOL Annex II Amendments (both at IMO and with some great folks at the U.S. Coast Guard). I am also extremely proud of the work we are doing at USMRC on LNG Bunkering training. It is a close second, but this training is still evolving."

An hour of hearing about what Doyle has accomplished in the past – and is doing now – is fascinating stuff, but a look back to yesterday provides a better clue as to where she is going next. As we finished up, Doyle reflected, "My step grandfather was a Chief Engineer with Royal Dutch Shell, so I guess I could point to that. But the moment I walked on the Kings Point campus I knew it was what I wanted to do. The plan B, if I didn't go to Kings Point, was to play soccer at Tufts and major in engineering. Today, I can't imagine my life outside the shipping industry. It's the people who make this industry so remarkable." She's right. And, she remains part of that remarkable equation.

Key Impacts of LNG Fuel Storage on

Commercial Ship Design

The variables are many and the price of not carefully considering each and every one, costly.

By Ernest Van Rynbach

Maritime industry stakeholders continue to look for new solutions to address the quickly evolving requirements for reduced emissions from vessels navigating in the coastal waters of North America and Northern Europe. At the same time, new Environmental Control Area (ECA) requirements are likely to spread to other coastal regions of the world and after 2020, the sulfur content in fuel worldwide is slated to be reduced to 0.5%.

Liquefied Natural Gas (LNG), according to many, provides the best solution to meet the ECA requirements. LNG is clean burning, easily meeting the SOx requirements in the ECA, while offering much reduced particulate matter (PM) emissions as compared to most oil fuels (one of the US EPA's stated goals for the ECA is PM reduction). Beyond its clean burning characteristics, it has the added benefit of being lower in cost than low sulfur diesel oil or other alternate fuels under consideration, such as methanol.

While the widespread introduction of LNG as a marine fuel may be seen as a new development, LNG actually has a long history as an engine fuel on LNG Carriers (where the natural gas evaporating from the cargo tanks is consumed in the engines or boilers) and in shore-side natural gas fired engines. Nevertheless, it is important for anyone thinking about making the change to LNG to be aware that its adoption can have significant impacts on a ship's design and operation. Those key impacts were the subject of a presentation given by Herbert Engineering at the Shipping Insight 2014 Marine LNG Symposium in Stamford, CT on September 30, 2014. It is worth summarizing those impacts, with a focus on issues related to on board LNG storage, for anyone looking to jump on board the LNG bandwagon.

Key Impacts of LNG Fuel on Ship Design

Looking at the big picture, changing to LNG fuel does not involve a major change in the basic configuration or propulsion plant design of commercial ships. The ship and engine room will basically still look the same, except for a few unusual looking tanks and a few specially colored pipes and boxes in the engine room. Industry can adapt to this new fuel, just like it did when going from wood to coal to distillate fuel to heavy fuel over the course of the past 150 years. However, more so than with previous fuels, the storage and handling issues of LNG are complex, involving as they do a fuel which is highly flammable in its gaseous state and is stored at cryogenic temperatures. These characteristics mean more planning and engineering are needed from designers and owners in the construction and operation of LNG fueled vessels than was needed for oil fueled vessels.

In comparison to oil fuels, the major impacts of LNG fuel on ship design can be summarized as follows:

Variable	Impact (a.)	Impact (b.)
Fuel Storage	More Volume for Same Range	More hazardous (flammable, cryogenic)
Fuel Handling	**Time Sensitive (active boil-off)**	**Complexity: equipment, procedures**
Bunkering	Not a simple operation	Cargo Operation Affected
Fuel Systems	**Two systems (oil & gas typical)**	**Complexity: double wall piping, Venting, gas detection**
Maintenance	More Training Required	Added Complexity for LNG System
Cost	**Construction costs higher**	**Fuel costs lower (key driver)**

LNG Fuel Storage – Many Decisions

Unlike oil fuel, which can easily be stored in hull structural tanks with only a few restrictions on possible location, there are typically few simple answers to the questions of where and how to store LNG on board, and LNG storage is not space efficient. Some of the key issues to consider include the fact that LNG Storage requires more volume than oil fuel because of its low density, but it does contain more energy (heat value) in each kilogram, partially compensating for the lower density. Specifically:

- ***Density: LNG (0.45 t/m3) < HFO (0.98 t/m3); Ratio about 2.18***
- ***Heat Value: LNG (49 MJ/kg) > HFO (40.6 MJ/kg); Ratio about 0.83***
- ***Combined LNG/HFO Volume Ratio is 1.8, meaning it requires 1.8 times more LNG tank storage volume to get the same engine output as from oil fuel.***
- ***Tank shape (frequently cylindrical) and insulation further increase the space required for LNG tanks.***
- ***Overall, 3 to 4 times more volume onboard may be needed for LNG storage than for oil storage tanks offering the same range.***
- ***On many ships oil fuel storage is also required as a backup in case of lack of availability of LNG – further increasing the volume on board dedicated to fuel storage and likely reducing available cargo space.***

Tank Location on board is impacted by safety requirements limiting the size and location of the LNG tanks. Every cubic meter of LNG storage has a high cost so the tendency is to minimize LNG storage volume on board, reducing the vessel's range. Selection of storage tank type depends on the vessel size, type, route and gas usage profile – no one type is best for all. Portable Containerized

"... it is important for anyone thinking about making the change to LNG to be aware that its adoption can have significant impacts on a ship's design and operation. Those key impacts were the subject of a presentation given by Herbert Engineering at the Shipping Insight 2014 Marine LNG Symposium."

Tanks and IMO Type C pressure tanks offer convenience since they are built off site and easy to drop in place, but for long range and large volume, the built-in prismatic IMO Type A and B tanks or Membrane tanks provide much more volume in the same space and lower cost per cubic meter (same tanks as used on LNG Carriers). In the intermediate range of required LNG storage capacity of 1,500 to 3,000 cubic meters, tank types A, B, C, & Membrane are all practical and a detailed analysis of the costs and benefits of each should be carried out to optimize tank selection, and potentially save significant amounts of money.

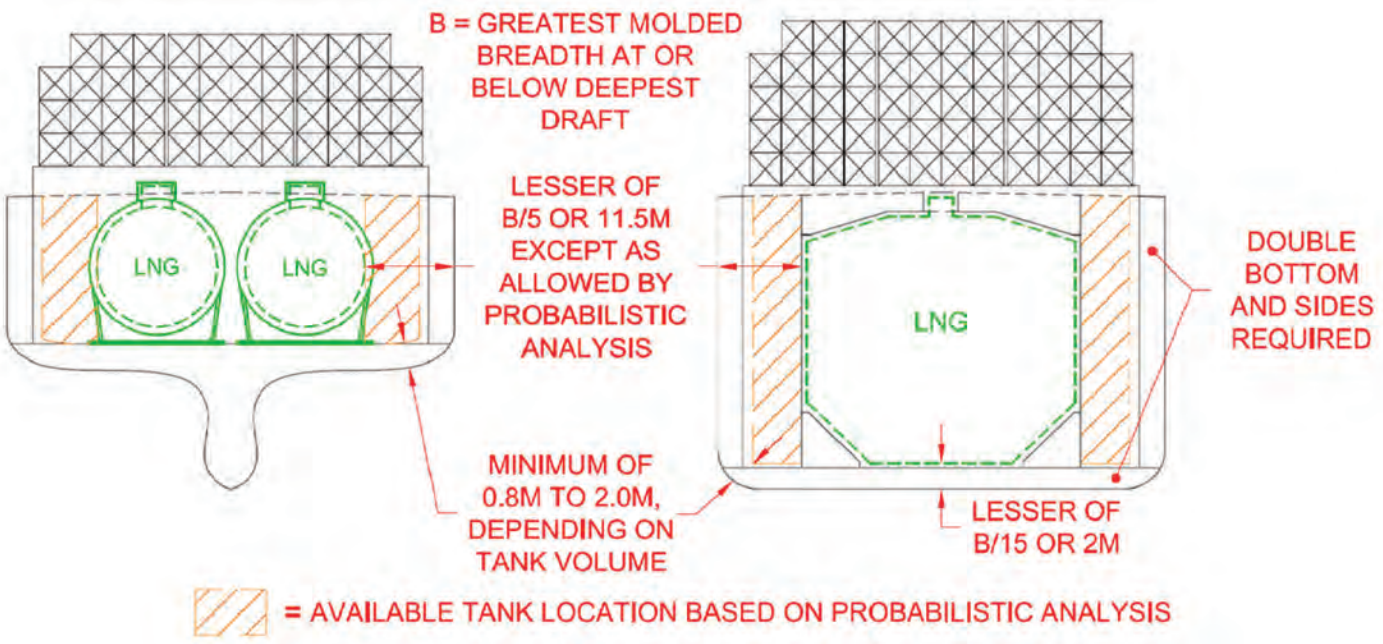
Reduced range leads to more frequent bunkering, which can be disruptive to operations and crew work time in port. Beyond this, bunkering may be needed on every round-trip voyage for a Jones Act vessel in coastwise or offshore trades (Puerto Rico, Hawaii, or Alaska).

LNG Tank Location – Protection from Damage Limits the Tank Size

LNG becomes highly flammable natural gas when exposed to ambient temperatures (such as from a leak or from damage) so LNG storage tanks are required to be away from the side and bottom of the ship to minimize potential damage from collisions and groundings. The requirements for LNG fuel storage tanks are more severe than for LNG cargo tanks on LNG carriers because of the concern that cargo ships using LNG fuel will not get the special attention that LNG carriers do, and thus will be as prone to collisions and groundings as any other ship.

According to the existing IMO Resolution (MSC285(86)) for LNG fueled vessels and the draft IGF Code (International Code of Safety for Ships Using Gases or Other Low Flash Point Fuels) slated to go into effect within the next few years, LNG storage tanks need to be away from the hull as shown in the figure by Beam/5 for the side clearance and Beam/15 for the bottom clearance (and a double bottom is necessary). However, the new IGF Code is expected to allow the creative naval architect to expand the space available for LNG storage tanks (the hatched area in the figure) up to the minimum allowed distances of 0.8 to 2.0 m from the side, depending on tank volume, by using probability based damaged stability analysis. This is one area where ship designers can directly aid the owner in getting more fuel in the same space on board.

Besides limiting tank width, the IGF Code will also limit the overall length of LNG tanks to 12% to 18% of the ship's length for cargo vessels. The final value has been left for decision when the MEPC votes on final adoption of the IGF Code later in 2014.



Boil Off Gas – the Fuel Doesn't Stay in the Tank

Unlike oil fuels that can stay in a tank for weeks, months, or even years, LNG because of its cryogenic nature is evaporating (referred to as Boiling Off in the LNG industry) every minute it is in the tank. As it evaporates, it builds up pressure, and if allowed to evaporate without restraint or relief, it can build up high enough pressure to damage tanks and fittings because the volume ratio of natural gas to LNG at atmospheric pressure is 600 to 1. The pressure build up from Boil Off Gas (BOG) is also a significant risk if any LNG is left in pipes, hoses, or fittings, so it is important to drain, vent or purge all LNG pipe systems when not in use. However, BOG cannot be vented to the outside atmosphere, except in an emergency after all else fails.

The best way to address the Boil Off Gas issue, and to be sure your vessel is not going to be in danger at some point, is to develop a Boil Off Gas Plan. This Plan should be started early in the design stage and consider how the BOG will be handled in all the LNG tanks and piping systems, how bunkering will take place, and how the tanks will be used in service. The plan should address all contingencies that could occur, such as what happens after the ship has just fully bunkered and the machinery plant or hull is damaged forcing the ship to stay tied up at the dock with no consumption from the main propulsion engine. Just pumping off the LNG to a shore tank or bunker vessel may not be a feasible option because a receiving tank might not be available (the vessel broke down away from the port), and venting to the atmosphere is not an option either. The proper equipment and procedures need to be implemented, such as a reliquefaction plant, a gas combustion unit, boiler with steam dump, or LNG fueled ship service generators with adequate load, even in port.

One way to consume BOG is using it in the ship's service diesel generators (SSDG) since these can be run even with the vessel tied up in port. The below table provides a quick reference guide showing some typical BOG rates from various quantities of LNG in storage and how many kW of continuous electric load are needed to consume the BOG on a daily basis. These numbers are approximate and can vary depending on the circumstances.

Gas Remaining (m3)	Daily BOG (m3)	SSDG Load to Consume (kW)
400	3	300
750	5	500
1500	7	700
2000	8	800

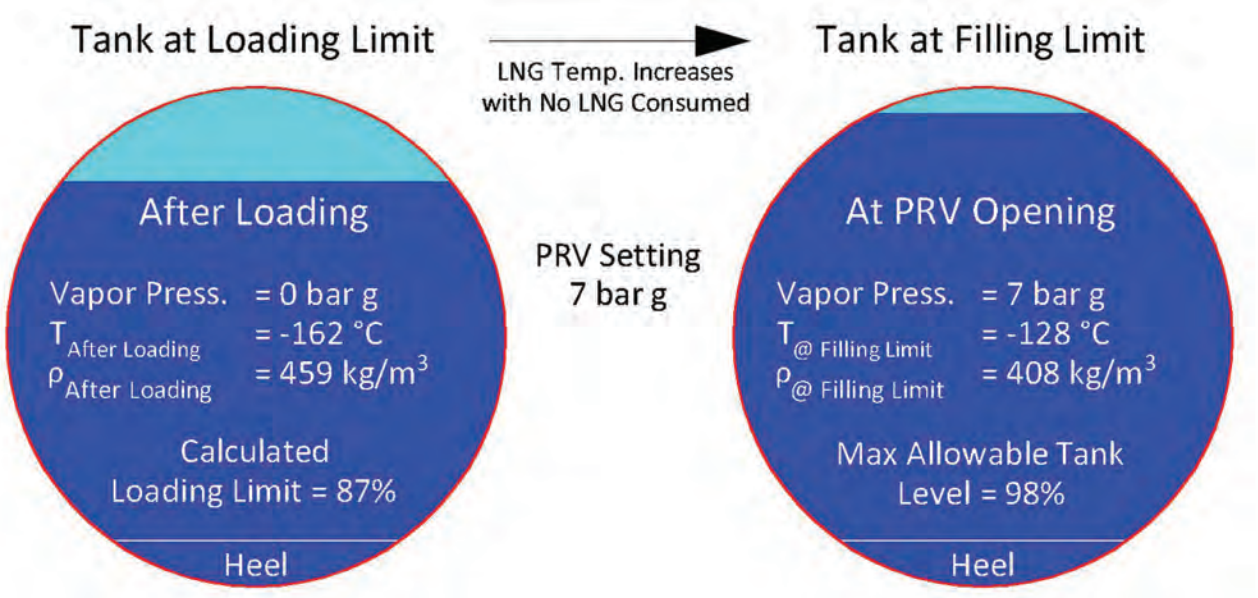
Filling Limits - You Can't Use All the Tank's Volume

Besides the fact that LNG tanks require extra volume due to the low density of LNG and the tank's shape and insulation, some tank volume is required to be reserved for LNG expansion and for residual LNG (heel) in the empty tank to keep it cold. The tank's relief valve pressure drives the limit placed on the loading level. The reason for this is that LNG's density decreases quickly as heat is absorbed, and its temperature and saturation pressure increase. The higher the temperature (and corresponding saturation pressure), the lower the density.

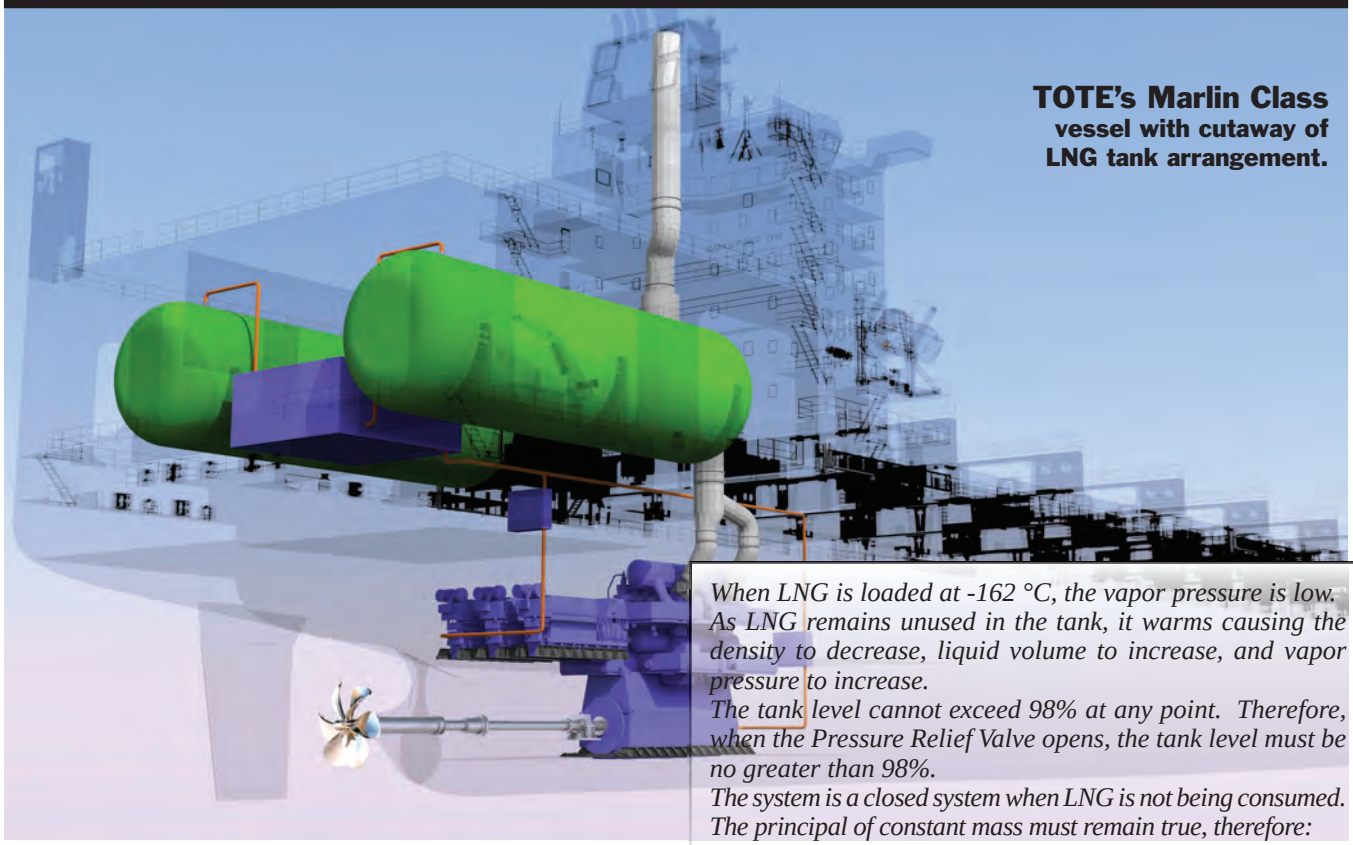
Current IMO regulations limit LNG tanks to 98% full at the relief valve setting (its maximum allowable volume). Loading a tank with LNG at -162º C, when it is close to atmospheric pressure, is the desirable loading condition because at that condition LNG can remain in the tank for the longest period of time before heat absorption raises the tank pressure to the relief valve setting. At this initial loading condition, the LNG density will be at its highest value. Since it can't be assumed that the ship will always be able to go to sea soon after bunkering and start consuming from all tanks at once, it is a requirement that LNG tanks be able to retain the boil off gas for a period of time up to the point the relief valve setting pressure has been reached. Before the relief valve setting is reached, gas will have to be removed and either reliquefied or consumed in accordance with the Boil Off Gas Plan.

Since the mass of LNG remains the same as the pressure is building and the LNG density is going down (raising the level in the LNG tank), the ratio of the densities between the LNG when bunkered and when at the 98% full limit determines the loading limit (the level the tank can be loaded while bunkering).

The table below lists loading limits for a range of relief valve pressures. As can be seen, the higher the relief valve pressure the lower the loading limit, but on the other hand, the higher the relief valve pressure, the longer the LNG can stay in the tank – *a classic tradeoff and decision point for the owner*. Besides the limit on filling, usable tank capacity is further reduced by the common practice of leaving LNG in the bottom 5% of the tank volume to continue boiling off,



At Filling Limit (Saturated Conditions)				
Tank Vapor Pressure = Tank PRV Set Pressure	LNG Temp. (T@ Filling Limit)	LNG Density (ρ@ Filling Limit)	Loading Limit = 98% * (ρ@ Filling Limit / 459 kg/m3)	Useable Capacity (Assuming 5% Heel)
bar g	**°C**	**kg/m3**		
0.7	-155	448	96%	91%
4	**-137**	**422**	**90%**	**85%**
7	-128	408	87%	82%
10	**-121**	**396**	**85%**	**80%**



TOTE's Marlin Class vessel with cutaway of LNG tank arrangement.

keeping the tank cold until the next bunkering. Cooling down an empty, warm tank before it can be refilled with LNG takes a long time and is normally avoided.

The bottom line is that usable capacity of LNG in a Type C pressure tank is only about 80% to 85% of its available volume, depending on the relief valve setting. All range calculations for the vessel should be based on the usable capacity and not the highest filling or loading limits. Owners who don't follow this advice will be disappointed when they find out the true range of their vessel is significantly less than they expected.

Summing Up: Much to Consider

There is much to learn when considering the use of LNG as ship's fuel, particularly those related to LNG fuel storage. Engine selection, bunkering, maintenance, operation, and training also need to be considered and each adds to the complexity of the switch to LNG fuel. Any owner looking to make a successful switch to LNG should be prepared to learn about them all. Based on today's fast pace of adoption of LNG as a fuel, it seems many owners are saying the hard work and complexity are worth the effort to obtain the benefits from a clean burning, low cost fuel like LNG. Many who have not decided to take the full plunge to LNG are still hedging their bets by building their new vessels to be "LNG Ready," meaning they are designed and built to easily make the switch in the future.

When LNG is loaded at -162 °C, the vapor pressure is low. As LNG remains unused in the tank, it warms causing the density to decrease, liquid volume to increase, and vapor pressure to increase.
The tank level cannot exceed 98% at any point. Therefore, when the Pressure Relief Valve opens, the tank level must be no greater than 98%.
The system is a closed system when LNG is not being consumed. The principal of constant mass must remain true, therefore:

Volume at Loading Limit x ρAfter Loading = Volume at Filling Limit x ρ@ Filling Limit

If the equation is divided by the Total Tank Volume, and the 98% Filling Limit is applied, the following formula can be used to calculate the Loading Limit:

Loading Limit = 98% x (ρ@ Filling Limit / ρAfter Loading)

The useable tank capacity will be even less than the Loading Limit because some volume of Heel should remain in the tank to keep the tank cold. Therefore:

Useable Tank Capacity = Loading Limit – Heel

The Loading Limit will vary depending on the Pressure Relief Valve setting. As shown in the table above, a tank with a higher pressure rating will have a lower Loading Limit.

Eugene van Rynbach is Naval Architect and Marine Engineer and Vice President of Herbert Engineering Corp. He has forty years of experience in general naval architecture and marine engineering, including time as a sea going engineer, classification society engineer, new construction supervisor, and many years working as a technical manager for former containership operator Sea-Land Service. Rynbach earned a degree in Mechanical Engineering and Naval Architecture from the University of California and a Masters Degree in Transportation Management from SUNY Maritime College.

Brian Buckley McAllister

It's not every "tugboat magnate" who is willing to show up at work in full Halloween costume, nor capable of running a NYC marathon in under 4 hours – decked out in Harry Potter wizard regalia, complete with hat, cape and wand – while wearing a T-shirt emblazoned with the name of a life-long friend who is fighting cancer. But that's Brian Buckley McAllister, the fifth generation of his family to lead McAllister Towing.

By Patricia Keefe

In fact Buckley and his brother (and co-owner) Eric, Chief Financial Officer, are one of the few family members to not hold a maritime degree, pilot or captain's license.

"I'm qualified to run a photo copier," Buckley joked.

This isn't to say Buckley lacks either seafaring experience, or professional degrees. As a teen and later, while in college, Buckley worked as a deckhand on McAllister tugs operating out of a variety of ports, and transited the East Coast and Gulf of Mexico several times. He memorably spent part of that tutelage under the supervision of legendary tugboat Capt. Arthur Fournier, on Penobscot Bay. "I think the time spent on board a vessel is important. It taught me the value of hard work. It taught me how to work with people from different backgrounds and regions of the country. It taught me the importance of respecting a chain of command, and doing what the Captain asked, as quickly as possible. When my son turned 15, I got him a TWIC [Transportation Worker Identification Credential] card and sent him up to Maine to work with Authur's son, Capt. Brian Fournier."

Foundations

Even more important, experience as deckhand provides an awareness of how an administrative decision can impact seafarers, and, says Buckley, "that's good experience for any of the leaders in the maritime industry to have." That experience has served McAllister well in his service on a variety of industry boards and organizations, including a recent term as chairman of the American Waterways Organization (AWO).

His apprenticeship also taught McAllister that "the backbone of our company is our captains and crews. These are the people providing services to our customers, and it's important to keep their perspective in mind when working back in the office."

After getting his feet wet in the business, Buckley went on to graduate cum laude in 1989 from Hamilton College in New York, also earning a law degree in 1993 from the University of California, Hastings College of the Law. He is a member of the bar in New York, California and a number of federal jurisdictions. After graduating, litigation between the two co-owners of McAllister Towing precluded Buckley and Eric from going to work for the family business. Instead, Eric went off to GE, while Buckley stayed in California, where he worked for four years as an associate for Hill Betts & Nash LLP, handling federal litigation and some admiralty law.

"It's always tough to raise kids who might feel they have a burden to go into the family business, but my brother and I had the odd advantage to establish outside careers and then make the choice to go back into the family business," says Buckley. Both sons returned home in 1997 to help their father take back the traditional business and sole ownership of the company. "After that, I came into the office to start solving problems and help put new deals together, and we've never looked back."

Fifteen years after formally joining the company in 1998 as general counsel and vice president, his father transferred ownership to both sons, naming Buckley President. Forty seven may seem young to carry the weight of a 150 year-old company. But Buckley McAllister has already helped to save his family's company once, and he's more than prepared to do it again, should the need arise.

He's also got a wealth of experience passed down from preceding generations over the century and a half his family's company has been in continuous operation. That's history visitors can feel and see, literally, when visiting the company headquarters at 17 Battery Place in New York City.

The offices are studded with ship models, maps, drawings, a photo collection that harks back to one of founder James McAllister in 1864, and an expansive collection of oil paint-

Brian Buckley McAllister, President, McAllister Towing & Transportation Company

ings by renowned maritime artists like Oswald Brett, William Muller and John Nobel. "I think it is a testament to the importance of history and tradition in this business."

In a speech given in September at the company's 150th birthday celebration, Buckley attributed its longevity to "safety, working hard to anticipate and meet the future needs of customers, and having great people supporting this company," including generations of some employee families. *Maritime Professional* spoke recently at length with Buckley about the challenges facing his company and the tug industry in general.

A 150-year Tradition

"It's certainly a big tradition to live up to; some of our customers have been with us for generations. It's a pretty great opportunity to try and live up to the tradition of serving those customers well. It's certainly nice to work in a business that is not solely focused on the bottom-line for a single quarter, but is also governed to some degree by sentimental principle. I got a lot of feedback from employees who have devoted their career to working for the company about how proud it makes them to be connected to the organization."

Resilience seems to be on the lips of the entire industry, and Buckley is no exception. He wants his company, industry and infrastructure to be resilient. "I plagiarized the word from the Coast Guard," he joked, adding in a more serious vein, "After Hurricane Sandy, consumers in the New York area saw what can happen if the supply chains they depend on get interrupted.'

"One of the clear messages from the Coast Guard and the federal government is to make sure we have resilient ports and strong supply chains to support our economy. We are dependent on port infrastructure to support the well-being of the city, and we need to make investments there to support the city." Resilient infrastructure, he adds, is expensive and doesn't provide a short-term ROI, "but those are the types of investments that are important for the maritime industry."

Much of Buckley's work with industry organizations, like the AWO, Coast Guard and Area Maritime Security Committee, is focused on creating resiliency and pushing the concept forward. He is particularly proud that his company stayed up and running through 9/11, the great Blackout and Hurricane Sandy.

Changes Facing the Tug Business

According to Buckley, shipping is "going through a revolution." More cargo is being brought in on fewer, bigger ships. By World War II, about 30,000 ships traveled to NY harbor annually. By 1950, it had dropped to 15,000/year; by 1970, 8,000 ships/year; and in 2014, "we're looking at under 5,000 ships," says Buckley. "There is an increasing efficiency in the whole supply chain, which has had the effect of needing fewer but more powerful tugs, so ultimately we'll have less work." Tractor tugs and the ATB have "revolutionized" the industry, he says. "We need to be able to provide more power to these customers – Z drive tractor tugs can handle larger ships more efficiently versus conventional tugs and provide a greater safety margin. We need to figure out ways to be more efficient ourselves. Meanwhile, we have grown our business by moving into other ports and places up and down the eastern seaboard."

Changes to the maritime business include additional layers of regulatory scrutiny. "In the last 10 years, between the TWIC regulation and various different environmental regulations coming through and the advent of subchapter M, which will be a new vessel inspection regime for tugs, we're seeing a pretty rapid culture change in the industry."

"It calls for a different approach to doing business, and it's going to require more adaptation on our part." And that creates another major challenge, managing change in the industry. Another aspect of regulation that concerns Buckley is making sure operators aren't forced to run a gauntlet of conflicting local laws. He wants to see interstate commerce issues addressed via "workable, science-based" federal laws to simplify compliance, versus a weave of conflicting and sometimes unachievable, local and states laws.

AWO Service and Current Priorities

One of the basic issues facing the industry is meeting the nation's changing transportation needs, and ensuring that laws and regulations are needed, and workable, says Buckley. An example of how AWO can have an impact is the time it invested, along with other maritime organizations, after the Macondo incident. "At that point, there was a reaction on Capitol Hill that included dozens of different bills that might have been passed to change various aspects of admiralty law and oil spill liability law, some of which would have changed laws dramatically and been unfair to vessel owners." Buckley, among others, testified before Congress. "Ultimately, Congress decided to leave the law as it was, so in essence, we were successful. Reason prevailed."

He counts among the organization's successes during his tenure as Chairman, passage of the WRDA bill, helping to reshape the organization in order to better enable it to educate and lobby congress and others on positions of importance to AWO members.

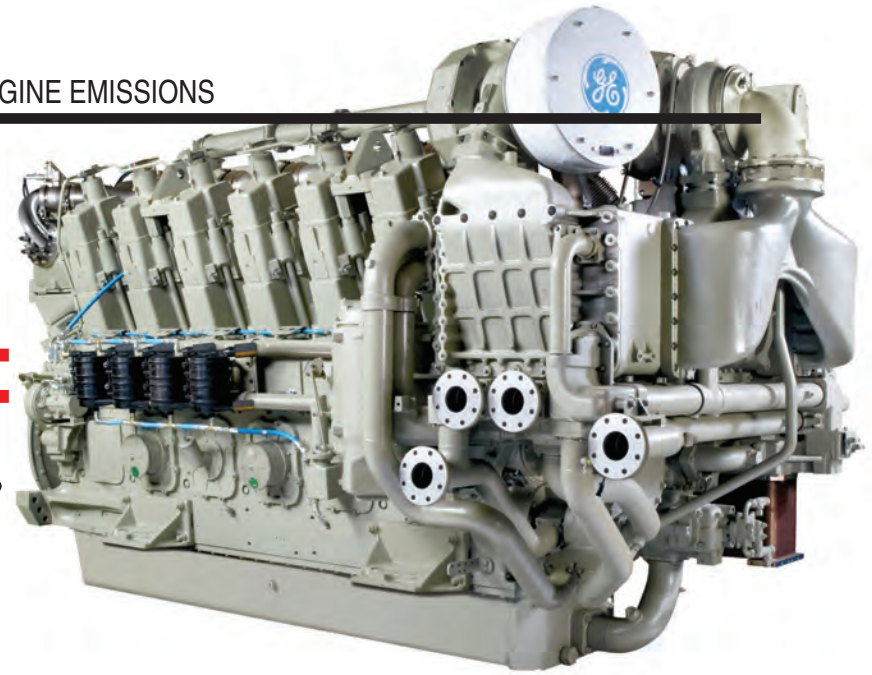
Going forward, Buckley says AWO's top priorities will include making sure WRDA gets funded, enhancing the waterway infrastructure, advocating on behalf of the Vessel Incidental Discharge Act to set a uniform standard to help protect the environment, advocating for the Jones Act and shepherding in subchapter M.

And speaking of Subchapter M, Buckley said this should be high on the list of things to get ready for. There will be a training element, and operators will need to familiarize crews. He anticipates that there will be some equipment requirement, but doubts it will force any one out of business. "The AWO Chairman will have a busy year the year subchapter M comes out."

Starting the Next 150 Years

"We're always looking to react to changes in the marketplace. One immediate challenge is to balance the increase in power of our fleet with the fact that the overall number of ship arrivals are declining. For me, that means listening to the customers to figure out what they will need. The three boats we constructed this year are a pretty good example of what we are doing to anticipate changes in the industry and be prepared for it." One area Buckley has his eye on is wind farms. "It could be one of the big developments, and it will obviously require very new technology." With that in mind, McAllister has purchased a crew boat in anticipation of future contracts. "It's an example of the manageable gambles we take to expand the type of services we can provide."

"I have a great job. I feel very lucky to have it. I can take satisfaction that my family has done a lot to provide good jobs for a lot of hard working U.S. mariners out on the water. And in the last 15 years, I think our company has noticeably improved working conditions and service levels in the ports on the East Coast. I can't claim the credit for that, but I would say it is a real motivator," says Buckley. My Dad's motto was to 'Keep the Flag flying!' I see no reason to change that. My Dad intends to die with his 'boots on,' as they say, and I wouldn't do it any differently. It is in our blood."



Engine Emissions:

GE Changes the Conversation

As operators ponder the thorny question of dual fuel, LNG or SCR Treatment, GE Transportation's new medium speed marine diesel engine seemingly simplifies the playing field.

By Joseph Keefe

Current Events, Futuristic Propulsion

The October 2014 news that global oilfield giant Oceaneering had committed to building a ship designed with GE Transportation marine diesel engines was ordinary enough, but the recent keel laying ceremony held at the BAE Systems Shipyard in Mobile, AL held special significance for not only Oceaneeering, but for GE as well. That's because the first ship to be outfitted with GE Transportation's newest marine engine offering – ones which meet EPA Tier 4i and IMO Tier III Emissions standards – all without the need for a Selective Catalytic Reduction system (SCR) exhaust gas after-treatment, could change the way marine operators go about selecting their next set of engines for retrofit or new build.

The GE Marine 12V250 Marine diesel engines reduce NOx emissions by 70 percent when compared to EPA Tier 2 or IMO Tier II. Beyond this, GE Marine's self-described 'breakthrough' engine technology not only eliminates the need for a Selective Catalytic Reduction system (SCR) exhaust gas after-treatment, but also the requirement to store or use urea aboard a vessel, thereby preserving cargo and tank space – not to mention all of the extra costs associated with that extraneous equipment.

Oceaneering specified five new GE Marine 12V250 Marine diesel engines to be integrated into gensets to power its new Inspection, Maintenance and Repair (IMR) vessel. GE Marine's distributor, Cummins Mid-South, LLC, integrated the GE Marine 12V250 engines into the required gensets. The state-of-the–art vessel is expected to launch in early 2016.

Even before that, however, Harvey Gulf International Marine and Eastern Shipbuilding Group entered into a contract to construct a new Robert Allan, LTD. (RAL) RAmpage 6400 Multipurpose Field Support Vessel (MPFSV) at Eastern's Panama City, Florida facilities. The MPFSV Hybrid designed vessel promises to provide better diesel fuel efficiencies than typical vessels of the same class during various offshore operating conditions. And, in this case, the vessel's main engines call for two GE Marine 12V250MDC IMO II, EPA Tier 4i marine propulsion diesel engines. That's important because Harvey Gulf, already the recognized North American leader in rolling out LNG and dual fuel propulsion vessels, in this case, selected a pure diesel engine. And, why not? An engine that meets EPA tier 4 requirements without the need for SCR after-treatment or urea injection arguably challenges the assumed supremacy of LNG as the fuel of choice for operators in a wide range and class of vessels.

Target Markets: Right on the Money

According to Rob Van Solingen, GE Transportation's Senior Product Manager – Marine, one of GE's markets for their new engine offering is the offshore oil and gas segment. "That includes PSVs, OSVs, offshore construction vessels, OCVs, IMR Inspection Maintenance and Repair vessels – all types of vessels that support the offshore oil and gas industry. They run on number two diesel fuel. No heavy fuel. And the power range they need is a perfect match to our GE medium-speed power range from 1,500 to 4,700 kW." Other marine segments for the GE diesel engines include tugs and workboats, ATB's, dredgers, ferries and inland waterways, to name a few. Engines are offered for direct mechanical propulsion or as gensets for diesel-electric propulsion.

GE Marine sets itself apart from its competitors, says Van Solingen, has to do with what emission path that GE selected, just a couple of years back. He explains, "We went to Tier 4 'intermediate' a year earlier than other engine brands in the

US. The difference being that we now still have a year of Tier 4 intermediate in 2015, before we go to Tier 4 final in 2016. The competition goes to Tier 4 final January of 2015".

Building on their original V-250 line introduced in 2005, GE developed a new platform which allowed them to bring emission technology improvements on the engine. These include high pressure common rail fuel injection, two-stage turbocharging and EGR – exhaust gas recirculation. He continued, "And so, the result of an 8 year development program of diesel engine technology together with an upgraded control system, we maintain EPA T4 and IMO Tier III emissions within the engine."

With their markets clearly defined, and because they spent all that money, GE will certainly want to make some (quick) returns in today's markets. But, for many operators with existing tonnage, they won't have to do anything at all until such time as they decide to either repower or replace those vessels. And, that could be a long time. That said, we asked Van Solingen just how wide his potential market could be. As it turns out; plenty wide.

"New vessel construction under EPA T4 time line needs to comply – as we see with the Oceaneering and Harvey Gulf vessels for our first customers. They could have selected a diesel engine with SCR exhaust after-treatment and urea, or as these customers did, select our engine and be free to carry more cargo or fuel," explains Van Solingen, adding, "In addition, we see that there is a market overseas for IMO TIII despite this not coming into effect until 2016 and only in the NOx emission control areas. For example, countries like Norway already drive cleaner engines because vessel owners are being taxed on NOx. What we see is that pretty much all Offshore O&G support vessels built in Norway today are fitted with SCR systems or are otherwise operating cleaner than IMO Tier II emissions."

Talking cost: today and tomorrow

Many operators talk a good "green game" but, in reality, most go green only when either (a.) forced to do so by regulatory pressures or (b.) the price is right and the move eventually impacts their bottom line in a positive fashion. The later scenario, though, is rarely the case. Consequently, just as the sticker shock of the new LNG / dual fuel propulsion arrangements give some players pause, the question of cost differential also has to be considered when considering GE's new Tier 4 compliant solution versus its diesel competition. By some estimates, the cost of the dual fuel engines commonly being offered today – coupled with the expensive bunker tanks and delivery systems – exceeds an equivalent diesel arrangement by as much as 20 percent. Rob Van Solingen acknowledged – with caveats – that for GE's newest engine, the same cost comparison also has to be made.

"Yes, there is a slight cost increase. This is represented by the additional equipment, the 2-stage turbo charging, and the exhaust gas recirculation, EGR, on the engine. But, when compared to what an SCR system and all its other related equipment – dosing system, monitoring systems, urea injection, and urea tanks – would cost, the difference is less. So CapEx is a little bit higher, but very much in line with what a similar engine system would cost with all the after treatment equipment included."

Solingen then points out the advantages of his offering: "With the SCR equipped vessel, you have higher operating expense – injecting urea, exchanging the catalytic reactors – which you don't have with our engines. So, the life cycle cost of the GE engine, as compared to an engine plus SCR system, is outstanding."

SCR and urea, says Van Solingen, comes with its own considerable baggage: carrying it, injecting it, consuming it, having to clean the SCR system, the space it takes up. He adds, "You're losing potential cargo and/or accommodation space over the life of the vessel. You have less fuel capacity, or need to add tanks, because now you need to carry 6 – 8 percent or more of your diesel fuel capacity in urea. All of that really starts to add up over the life of the vessel."

Size Matters – for a number of reasons

According to Van Solingen, the real beauty of the engine itself rests in its size. The engine itself has grown a little in width (due primarily to the three turbo chargers); about one foot on either side. But, he adds, the length and height hasn't changed appreciably. "It's a very compact solution for our customers. The engine hasn't grown by much, and they don't need all the after-treatment equipment. The EGR system requires some extra engine cooling capacity, but as we're dealing with ships, we haven't seen any issue with having the vessels install a bit larger heat exchanging capacity."

The engine is suitable for all manner of propulsion; standard propeller arrangements, Z drives, Voith Schneider systems, and diesel gensets for offshore electric vessels. And, for those owners looking to repower, Van Solingen claims that it would be much easier to go with an engine that doesn't need all the SCR equipment. He adds, "Especially on a repower, that vessel is not designed to have SCR systems installed, to have urea tanks, to have all that dosing equipment. So, on a repower, the GE Tier 4 engine is a much more elegant solution and likely the easiest way to comply."

Looking beyond diesel and SCR, there is, of course, the latest White Knight in the form of LNG. Leaving the infrastructure and logistics question completely aside, the lure of LNG remains attractive to many workboat operators. But LNG carries its own considerable baggage which, beyond its initial hefty price tag, includes the sizable physical footprint of the bunker tanks and delivery systems. All of that – like SCR but only more so – says, Van Solingen, adds up to a loss of carrying capacity and deadweight.

Clean – and Economical, too

Even the 'greenest' ship in the world, if it's a money-loser, is a dog and is not worth sending out to sea. The GE Tier 4 solution, sans SCR after treatment, is nominally a compact, clean, affordable and environmentally compliant engine package. But, fuel economy is still king in a market where freight and charter rates are still recovering, and recovering slowly, at that. Van Solin-

gen, addressing the six hundred pound gorilla in the room head on, says, "If you look at how these emission rules have evolved from EPA Tier 1, the initial methods of reducing emissions was to retard timing on the engine. Your fuel consumption actually went up. So it was, in my mind, quite a contradiction. You want to be greener, but now you're starting to use more fuel."

That, says Van Solingen, obviously doesn't work anymore in today's emission levels, which is why the after treatment systems have come into play. He explains further, "In our case, and this goes back again to where I was saying we have a relatively new engine platform that still had sufficient growth capacity with regard to development of combustion space and such, an allowed us to put together the combination of building blocks with which we meet the emissions requirements." One of those components, the high pressure common rail fuel injection, contributes to lower fuel consumption. And, while the EGR increases fuel consumption slightly, the two-stage turbo charging improves that metric.

Van Solingen insists, "Overall, our engineering teams have done a tremendous job developing this new engine to meet EPA T4 without SCR or urea after-treatment, while maintaining fuel consumption levels at neutral or, for certain duty cycles, better when compared against our Tier 2 or Tier 3 engines, that are class leading in fuel consumption. Reliability, ease of maintenance and low life cycle cost is what our customers expect from their diesel engines and why they select GE.

Consumption, Compliance & Convenience

Until just recently, the repower or rebuild quandary was largely a question of whether to go with diesel and SCR, dual fuel and/or pure gas engines. Operators tempted by the LNG route still must decide whether the present infrastructure – and that which is promised – will materialize and if so, will be adequate to their requirements. Beyond this is the question of whether an LNG or dual fuel engine will ultimately require SCR for Tier 4 final compliance in any event. For those who go the low sulphur diesel route, the answer was, until just recently, quite clear: eventually you'd need that SCR. And in the case of both LNG and SCR assisted diesel arrangements, operators were looking at large infrastructure installs and the potential loss of deadweight and/or capacity. Not so anymore, says GE.

Shipowners and operators want, above all, economy. But, they also want simplicity. GE Transportation and Rob Van Solingen are banking on the hunch that, faced with the choice of a simple, diesel fueled solution that includes no SCR hassles, and another which might involve infrastructure and equipment that involves loss of carry capacity, the likelihood of enduring the hassle of SCR treatments, the uncertainty of (LNG) fuel supplies and logistics and the hassle of carrying as many as two fuels on board, many will opt for the 'easy' button. Two of the biggest and most progressive offshore energy players in the game – Harvey Gulf (already heavily invested in the LNG propulsion game) and Oceaneering – seem to think so, too. It's not a stretch to say that they may be right.

Partnerships and Prodding Propel the *Ballast Water Treatment Game*

As the regulators inch towards the finish line, stakeholders and industry players are not sitting on their hands. For the OEM sector, partnerships and strategic alliances are emerging in advance of global mandates to install the equipment.

By Joseph Keefe

BALLAST WATER SITREP

The International Maritime Organization (IMO), in response to proposals by INTERTANKO and other industry advocates, has agreed to commence a review of the ballast water management system (BWMS) type approval guidelines. At the same time, IMO agreed not to penalize those owners who have already installed BWMS that are approved in accordance with the current approval guidelines. That's nominally good news for the international ocean shipping community, whose collective group of 70,000 ships of all shapes and sizes will eventually have to invest as much as $US90 billion in new ballast water treatment systems once the IMO Ballast Water Management Convention enters into force.

It's anyone's guess as to when the convention will be finalized, but most stakeholders are hoping that it comes before the end of 2016. At the most recent IMO Marine Environment Protection Committee (MEPC) meeting, the combined instruments of ratification from Turkey, Japan and Jordan brought to 43 the number of countries comprising approximately 32.5% of the world's tonnage, who have ratified the BWMC. With two other countries also nearing ratification, the tonnage figure could soon increase to about 34.2%, less than one percentage point away from the Promised Land of 35% which would bring the convention into force.

Even global harmony on the issue won't bring it to fruition, however, especially when the U.S. Coast Guard has yet to grant 'final' approval to any manufacturer and the alternative compliance nods touted by two dozen OEM's provide no guarantee that, five years after installation, that those systems will receive final Coast Guard approvals. Add to that the fractured, Balkanized individual U.S. state benchmarks – with as many as 16 in play at last count – and one can understand the lack of confidence that shipping companies have as they face very expensive new equipment installations that have no guarantee of being approved.

IMO approvals are nice, but a large percentage of this tonnage will eventually trade in U.S. waters. Unanswered questions also remain about the perceived lack of robustness of current IMO type-approvals, ballast water sampling criteria and the need for 'grandfathering' of type-approved equipment already or about to be fitted.

A side view of the Trojan Marinex ballast water treatment solution.

It can be argued that it is unreasonable to expect shipowners to invest millions of dollars without assurances that the equipment will not have to be replaced. Nevertheless, stakeholders, and BWT manufacturers are moving forward to ensure that the right equipment, in the quantities required, will be available when the bell rings. At this summer's SMM maritime exposition held in Hamburg, Germany, it was clear that path forward for many resides in the formation of strategic partnerships with key players.

It turns out that ballast water treatment system manufacturers don't necessarily want to be installation engineers. They prefer to concentrate on what they do best: produce equipment for the task at hand. Beyond this, many of these BWT players simply don't have the market access and/or relationships to adequately penetrate the coming multi-billion dollar global bonanza. On the other hand, the shipyards and equipment distributers do.

THE WAY FORWARD: PARTNERSHIPS

When Damen Shipyards in September announced that it had established three strategic partnership agreements with Ballast Water Treatment (BWT) system suppliers, it cemented the concept of a worldwide One Stop BWT Retrofitting Service. Designed to gives shipowners peace of mind in their challenge to comply with ballast water regulations in the most cost effective and timely way, it also provided three BWT manufacturers with not only expedited and well-connected market access, but also the engineering and design expertise of one of industry's best known shipyard names.

Gert-Jan Oude Egberink, Damen Manager Ballast Water Treatment, told ***MarPro*** in late October, "By working with selected BWM partners we will be able to offer a total cost effective package in a coordinated timely way. We need to ensure installation is done one time right as the vessels need to be compliant when they leave the dock. This can only be done in close partnerships and by standardizing and specializing as much as possible. With the current selection of partners we can cover a very broad range of vessel types and customer."

Also according to Damen, its BWT experts will use 3D scan techniques to create a customized engineering package at any one of Damen's 32 ship- and repair yards located worldwide. Systems will also be installed at a customer selected non-Damen yard or during operation.

The deal(s) address the coming possibility of BWT equipment supply problems and the lifecycle support that will eventually be needed to support this globally mandated hardware. Damen, perhaps best known for its ability to quickly produce (and stockpile) quality hull forms that bring vessels to market sooner, now promises the same sort of equipment availability in the ballast water game. The three partners include BWT systems manufacturers Trojan Marinex, Bio-UV, and Evoqua Water Technologies. All three boast IMO type approvals and are U.S. Coast Guard Alternate Management System (AMS) accepted.

And, while Damen arguably made famous the "just in time" delivery of vessels through its stock hull forms, the BWT game is just a little bit different, says Gert-Jan Oude Egberink. "A BWT retrofit needs to be prepared well to ensure 'one time right.' It will never be a full off the shelf solution because of the variety in vessel designs, engineering and class requirements." And he cautioned those getting ready to choose a system, "Customers therefore need to anticipate that they need to start preparing their BWT retrofit at least 10 months before their renewal survey."

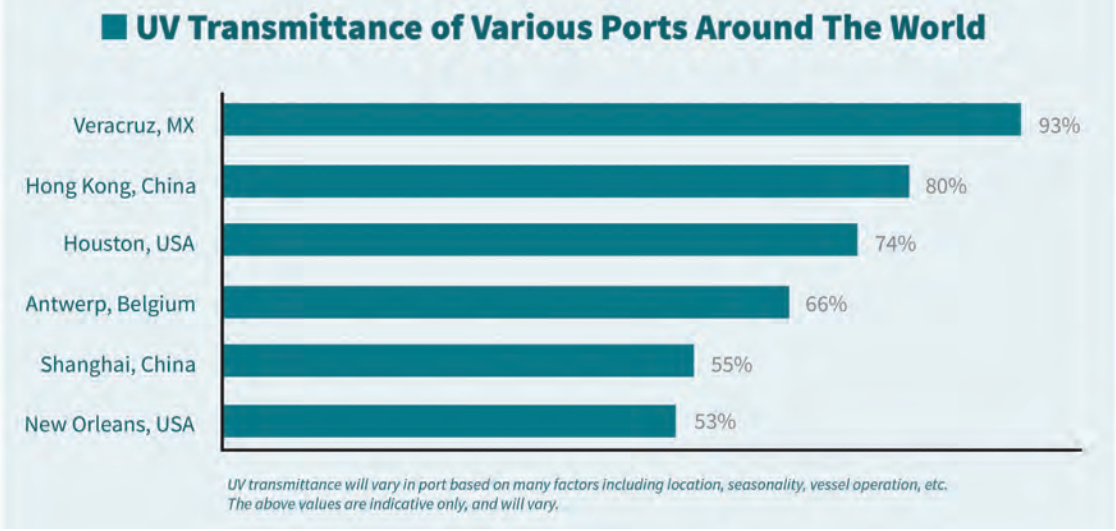
> By working with selected BWM partners we will be able to offer a total cost effective package in a coordinated timely way. We need to ensure installation is done one time right as the vessels need to be compliant when they leave the dock. This can only be done in close partnerships and by standardizing and specializing as much as possible. With the current selection of partners we can cover a very broad range of vessel types and customer.
>
> – Gert-Jan Oude Egberink, Damen Manager Ballast Water Treatment

Explaining the selection process, Gert-Jan Oude Egberink said, "We want to standardize as much as possible, but one technology/system type does not fit all. Based on the vessels characteristics, operational requirements and customer preference, Damen BWT experts select the most appropriate BWT technology for retrofitting. There are about 50 systems on the market and it is impossible to specialize in all and do a proper engineering and installation job. Besides not all type approvals of these 50 systems are the same. Some have not been tested under the most difficult conditions and will probably not meet USCG test standards."

For its part, Trojan Marinex delivers BWT systems purpose-built for the marine environment, providing filtration + UV in a single, compact unit. The Canadian-based firm touts, among other things, the low power draw of its equipment and deep roots and decades of experience in water treatment. Bio-UV designs and manufactures the BIO-SEA BWT system. The system, according to Damen, is a reliable, innovative, modular and cost efficient UV based system. BIO-SEA, with its smaller footprint, is especially attractive to smaller vessels needing BWT systems. Evoqua Water Technologies provides their SeaCURE BWTS. Operable in all salinities, it is based upon proven electrochlorination technology.

The Trojan Marinex market outreach isn't confined to just Damen, however. Jim Cosman, Market Manager at Trojan Marinex explains, "We've also partnered GEA Westfalia on a non-exclusive basis and they will be offering our product. They already have a ballast water treatment system, in fact, a filter / UV system. So why partner with them? It makes sense for three reasons: their existing system is targeted to smaller vessels. Our system is explosion proof, addressing the concerns of the tanker sector. And, finally, Trojan gets access to the people they are already talking to."

Separately, BWTS supplier Hyde Marine recently followed its 2013 announcement that it had named W&O Supply as its exclusive sales distributor in the U.S. and Canada for its Hyde GUARDIAN solution with a number of other strategic moves. These notably included the news that Goltens Green Technologies division will assist shipowners in determining how to best fit Hyde's equipment onto their vessels.



TROJAN MARINEX: FIRST IN THE GAME, LATE TO THE WATER

Trojan Marinex might just be biggest water treatment company that you never heard of. That's probably about to change. In terms of UV, they are today the largest supplier in the world for water treatment markets. With direct access to nearly 40 years of shore-based water treatment expertise, key markets include municipal plants that treat both drinking water and waste water. For example, all of the water in New York City – as much as 2.2 billion gallons daily – is treated by Trojan Marinex systems, as are City of Hong Kong and Chicago, too.

A part of Danaher Corporation (DHR : NYSE), Trojan Marinex enjoys the support that comes with a corporation that took in over $19 billion in revenue in 2013. And, while Trojan considers the BWT market an important one, they aren't going to go under waiting for it to happen. Not everyone in the market can say that.

Trojan Marinex originally entered the market in an exclusive agreement with Wärstilä, says Jim Cosman, Market Manager at Trojan Marinex told ***MarPro*** in November. "Things were moving along nicely. And then, Wärstilä purchased Hamworthy. They had two existing Ballast water treatment systems so we severed that agreement and it is in part why we're doing what we do now. Right now, we have minimal experience on the water, but we also have more lamps installed globally than any other OEM in the water treatment game. Our installed base in that regard dwarfs our marine competitors combined."

Cosman continues, "We have the financial wherewithal to weather this, but we also have the vision. We understand and we've been through this in other markets. And we understand how these markets evolve, and while it is frustrating in the early stages, we understand regulated markets. That's one of the things that Trojan does very well – we work in regulated markets. It is why we are doing the right things now, getting the right validations in place, designing for the US Coast Guard standards, because we understand how this will evolve."

Cosman, however, brushes aside the inference that Trojan Marinex is late to the party, insisting, "We've been working on our IMO approvals and just got that. We would have certainly liked to have entered this market far sooner than we did. But, it took an incredible amount of work and testing to get the product stable. Our approach – and sure we had plans to be in 2-3 years earlier – but we did a lot of testing and we found we weren't ready. Others – and here's what's different – pushed their products on the market and they're now on version 3 or 4. We did a lot of that testing behind closed doors. So version 4 is our final version and it's the one we bring to market."

Cosman also says that while many competitors can claim that they have 200 systems on the water, the majority of those systems aren't even turned on, adding, "We waited and stabilized the technology. Some early systems are going to have to be redesigned. And, we think we will get U.S. Coast Guard

> "We have the financial wherewithal to weather this, but we also have the vision. We understand and we've been through this in other markets. And we understand how these markets evolve, and while it is frustrating in the early stages, we understand regulated markets. That's one of the things that Trojan does very well – we work in regulated markets. It is why we are doing the right things now, getting the right validations in place, designing for the US Coast Guard standards, because we understand how this will evolve."
>
> – Jim Cosman, Market Manager at Trojan Marinex

approval far sooner than others. Our testing has been done far more recently in Coast Guard facilities. We didn't want to impact our good name and reputation just to get into this market. We came out with the right solution when we were ready."

There's no 'silver bullet' when it comes to ballast water treatment systems. And, arguably, there is a place and a vessel for every type of application. Cosman laments that, in some circles, UV treatments are still misunderstood – especially on the water. "Unfortunately, misconceptions about UV's ability to treat poor quality water remain high. There is a long track record of utilizing UV disinfection to treat wastewater, and, in most cases, wastewater is of poorer quality or lower UV transmittance (UVT) than ballast water. UV can, unequivocally, treat murky ballast water, as long as the system is engineered to the highest of standards. Our certainly is."

Cosman's final point involves testing and geography. Every port is different, he says. No matter where in the world your vessels trade – whether it's clear seawater or murky fresh water – your ballast water treatment system has to work. And, because water quality varies from port to port and day to day, different water quality parameters become more or less important depending on the type of ballast water technology used. Cosman adds, "In the case of Electrochlorination systems, the salinity and temperature of the water will have a dramatic impact on the overall efficacy of the system. For UV systems, UVT is the most important parameter impacting the effectiveness of the system." It is therefore important to test for all possible water conditions.

APPROVALS: IMO, AMS AND EVERYTHING IN BETWEEN

There are – at last count – as many as 53 IMO-type approved systems on the market. According to Jim Cosman, one of the notions out there right now is that Trojan Marinex was late to the game. Nothing could be further from the truth, he says, adding, "Part of that was by design. We did our IMO approvals and essentially killed two birds with one stone, doing the IMO testing at the same time as we did all of our USCG testing. What's different from everyone else is that we did it all according to the USCG ETV protocol, which is the protocol that governs how you actually do the testing. So, at the end of the day, we got our IMO approvals but also performed a key step in the Coast Testing process, as well. Building on that, we got our IMO approval in March 2014, and we're now in the process of applying for USCG type approval."

Cosman targets mid-2015 for his final approvals, but no one really knows how that will play out. In truth, no one yet has the full approval. As of September, 23 companies had achieved interim AMS approval. Cosman has his own thoughts about AMS, however. "AMS – and we have AMS as well – is surely a political solution and just because a company has AMS approval, it carries no guarantee that the system will eventually be type-approved. We've also been trying to educate the market about the pitfalls about believing some of the creative claims being made by other OEM's about what AMS means. What does it mean? It means that you can use that system to discharge ballast in US waters for a period of five years, after which you have to comply."

Trojan Marinex: On Course for USCG Type Approval?

Testing was conducted – under DNV supervision – IAW ETV Ballast Water Protocol.
Land-based testing: at DHI Maritime Technology Evaluation Facility in Denmark.
Shipboard Testing: on board the California Maritime Academy's "Golden Bear."
Both Testing Facilities: DNV and USCG Approved.
Tested in freshwater, brackish water and marine water.
Tested & approved to lowest UVT value in the industry, under full flow conditions.
Land-based testing conducted to 1250 m3/h, verifying efficacy at higher flow rates.

Source: Trojan Marinex

Shipyards today will, says Cosman, use AMS to narrow down a very big list of suppliers. With a list of 50+ different BWT providers, that list can be culled down to less than 30 based on AMS alone. He adds, "The danger in that is that these are only interim approvals. Owners need to focus on USCG approval. There are suppliers beyond ourselves who have firm plans to get this approval but we are of the opinion that just 3 to 5 will get USCG approval in 2015. And, that's why many suppliers are focusing on AMS – they are facing a very long road to get that final approval. The majority of suppliers are not going to be able use their existing testing results and are going to have to revalidate their data that they did for IMO because they did the work five years ago and they didn't do it to Coast Guard standards, nor did they do it in an accredited facility." He adds, "This is the key issue in the market today. Some vessel owners are very aware of it. And, others are not."

THE MARKET EVOLVES

Gert-Jan Oude Egberink, Manager of Ballast Water Treatment at Netherlands-based Damen Shipyards, also weighed in. "The market for BWT retrofits has been soft so far. Some regional operators will wait until it is clear whether they will be able to receive route exemptions or not. Many may also wait for USCG type approved systems to be available. In the end most will wait with retrofitting as long as possible. The big rush will start after full IMO ratification and we are preparing for that. As IMO is expected to be ratified next year we have seen more requests coming in past few months. We think it is wise of these proactive shipowners to start preparing and build their BWT retrofit strategy."

But, as owners wait and ponder the progress of the regulations, the time and expense of achieving final Coast Guard type approvals could eventually remove many BWT players from the field. Jim Cosman expects "significant" market consolidation during that timeframe. In the meantime, however, one part of the market that is moving very well is for offshore service and supply vessels – or in other words, Damen Shipyard's sweet spot. Cosman explains, "A lot of these vessels are being built in or for Norway markets and the systems are being installed so that when they move markets – from Norway or U.S. Gulf Coast to Brazil, for example – they'll able to load and discharge ballast. It isn't something that they'll do regularly, but they want the systems on there so that the vessels are versatile and can be moved from market to market."

In September, the first fruits of the Damen partnership plan became apparent when Damen selected the Trojan Marinex Ballast Water Treatment (BWT) system for a fleet of Platform Supply Vessels (PSVs) it is building for Atlantic Towing Limited. When launched, the vessels will operate in the challenging, subarctic waters of the Hibernia and Hebron oil fields, off Newfoundland and Labrador.

In the same target rich market, Hyde Marine In September cemented its position as a strategic supply partner for ballast water treatment (BWT) systems by Edison Chouest Offshore (ECO) for use on ECO's extensive fleet of vessels. At the same time, Hyde executed a Letter of Intent with ECO to guarantee the availability of BWT systems for compliance with regulations for ECO's growing fleet of more than 250 vessels. ECO has already ordered more than 15 Hyde GUARDIAN systems, with several already installed and in operation.

The ability to provide equipment in a timely manner once the regulatory floodgates are opened will be an important part of the equation. Damen, for example, is counting on BWT partners to be able to produce that equipment as demand increases. To that end, says Cosman, Trojan Marines is more than ready. "We're early in the relationship and the market has not yet fully evolved to the point where they have that urgency, but that's a realistic scenario. And, one of the things that differentiates us from other technologies, is that we have robust manufacturing capabilities already, having been in this business for more than 40 years. We have control over our supply chain, and a Danaher business system which is modeled after the Toyota system."

PARTNERSHIPS & WHEREWITHAL WILL CARRY THE DAY

As the ballast water treatment landscape begins to approach the end game, it is clear that partnerships and staying power will be two key aspects of the successful BWT stakeholder solution. That's because the need for (a.) market access and (b.) engineering and installation assistance have never been more apparent. Beyond this lurks the reality that final approvals for all markets may be as much as two years distant. Some shipowners will assess their options carefully and take the plunge while others, wary of making the wrong choice, may wait it out a bit further. In the meantime, the BWT field ebbs and surges with all parties questing for the brass ring of a U.S. Coast Guard final approval. When that comes is anyone's guess. Outlasting the field will therefore take cooperation, staying power – and partnerships.

Just in Time:
the ABS Ballast Water Treatment Advisory

ABS has updated its guidance for ballast water management (BWM) and launched a ballast water management system (BWMS) selection service for shipowners and operators.

Edited by Joseph Keefe

The third edition of the American Bureau of Shipping's (ABS) Ballast Water Treatment Advisory brings vessel owners and operators up to speed with the International Maritime Organization's (IMO) International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004, and the latest requirements in the United States. And, not a moment too soon.

In simple terms, the IMO's BWM Convention was created to provide global regulation that is designed to prevent the spread of harmful aquatic organisms from the ballast water and sediments carried by ships. But, its ratification requires approval from 30 of the IMO's member states who control at least 35% of the world's fleet tonnage; as of October 17, 43 members had signed, representing 32.54% of global tonnage. With the goal in sight, progress in meeting the tonnage requirements has nevertheless slowed. While the road to ratification has entered a temporary cul de sac, industry remains committed to finding a global solution, according to Debra DiCianna, ABS's Senior Environmental Solutions Consultant.

"The 67th meeting of the Marine Environment Protection Committee last month agreed on an aggressive schedule to revise the G8 Guidelines for approval of ballast water management systems and take into account industry concerns. Hopefully, a successful resolution of issues hindering progress will expedite ratification," Ms DiCianna said. "Invasive species are a significant concern in many areas. I think shipowners are leaning toward an international solution instead of a series of individual requirements."

AN EXPANDED ADVISORY

ABS's expanded advisory also covers some of the requirements for ballast water management (BWM) in the United States, such as the U.S. Coast Guard's (USCG) ballast water management regulations, the Environmental Protection Agency's Vessel General Permit and ballast water regulations for various states. It offers a summary of global BWM requirements and a new section on tools for sampling and monitoring. With a significant number of new rules emerging, shipowners whose ships trade globally face an increasingly complex challenge to comply with BWM regulations.

For example, many requirements for type approval of BWMS in the USCG regulation are not included in the IMO BWM Convention or related guidelines. The USCG implementation schedule also slightly varies because compliance is tied to a vessel's scheduled drydocking, not specific surveys. Table 7 from the Advisory, for example, provides details for these schedules:

Table 7. USCG Ballast Water Discharge Standards Implementation Schedule

	Ballast Water Capacity	Compliance Date
New Vessels (Constructed on or after 1 December 2013)	All	On Delivery
Existing Vessels (Constructed prior to 1 December 2013)	< 1,500 m^3	1st Scheduled Drydocking after 1 January 2016
	1,500 – 5,000 m^3	1st Scheduled Drydocking after 1 January 2014
	> 5,000 m^3	1st Scheduled Drydocking after 1 January 2016

photo: courtesy ABS

A typical ballast water treatment system arrangement

Similar to the BWM Convention, the USCG's program includes requirements for ballast water management, reporting and recordkeeping. All vessels with ballast tanks – unless specifically exempt – must comply with all three aspects of the regulation.

"In the US, the same discharge standards need to be achieved as with the IMO's Convention so, in that context, they are no more stringent. The difference is that USCG type approval is more prescriptive," Ms DiCianna says. "The U.S. is, however, unique in developing its own regulations that are not tied to the IMO Convention. If the convention is not ratified, additional countries may be tempted to go a similar route."

The USCG exempts crude oil tankers engaged in US coastwise trade and vessels that operate exclusively in one 'Captain of the Port' (COPT) zone from the BWM, reporting and record-keeping requirements of its regulation. Other vessels exempt from the BWM requirements of the regulation – but not reporting and recordkeeping – regulation include: seagoing vessels of not more than 1,600 GRT that operate in multiple COPT zones but not outside the U.S.'s 200 nautical-mile Exclusive Economic Zone; non-seagoing vessels; and vessels that take on and discharge ballast water exclusively within one COPT Zone.

For ballast water management, non-exempt vessels are required to select one of the following options:

- *Installation of a BWM system that has been type approved by the USCG;*
- *use only water from a U.S. public system for ballast;*
- *perform complete ballast water exchanges at least 200 nautical miles from shore prior to discharging ballast water, unless required to achieve the discharge standards;*
- *use a USCG accepted alternate management system, unless required to use a USCG type approved BWMS;*
- *no discharge of ballast water; and*
- *discharge to an onshore facility or another vessel for treatment purposes only*

$1 MILLION QUESTION (S)

For owners whose ships fly the U.S. flag or call at U.S. ports, the million-dollar question is when the USCG type-approve a BWMS. The USCG's type approval process is confidential, although some vendors have said recently that testing with qualified independent laboratories has been scheduled. The type approval process may take between 15 months to two years, by some estimates.

"The process of USCG type approval has begun," says DiCianna. "The big questions are how long the testing will require and when the first USCG type approved system will be available." For the interim, the USCG has chosen to allow approved Alternate Management Systems (AMS) to allow foreign type-approved systems to be installed and operated on ships for up to five years after they need to be in compliant with the U.S. standards.

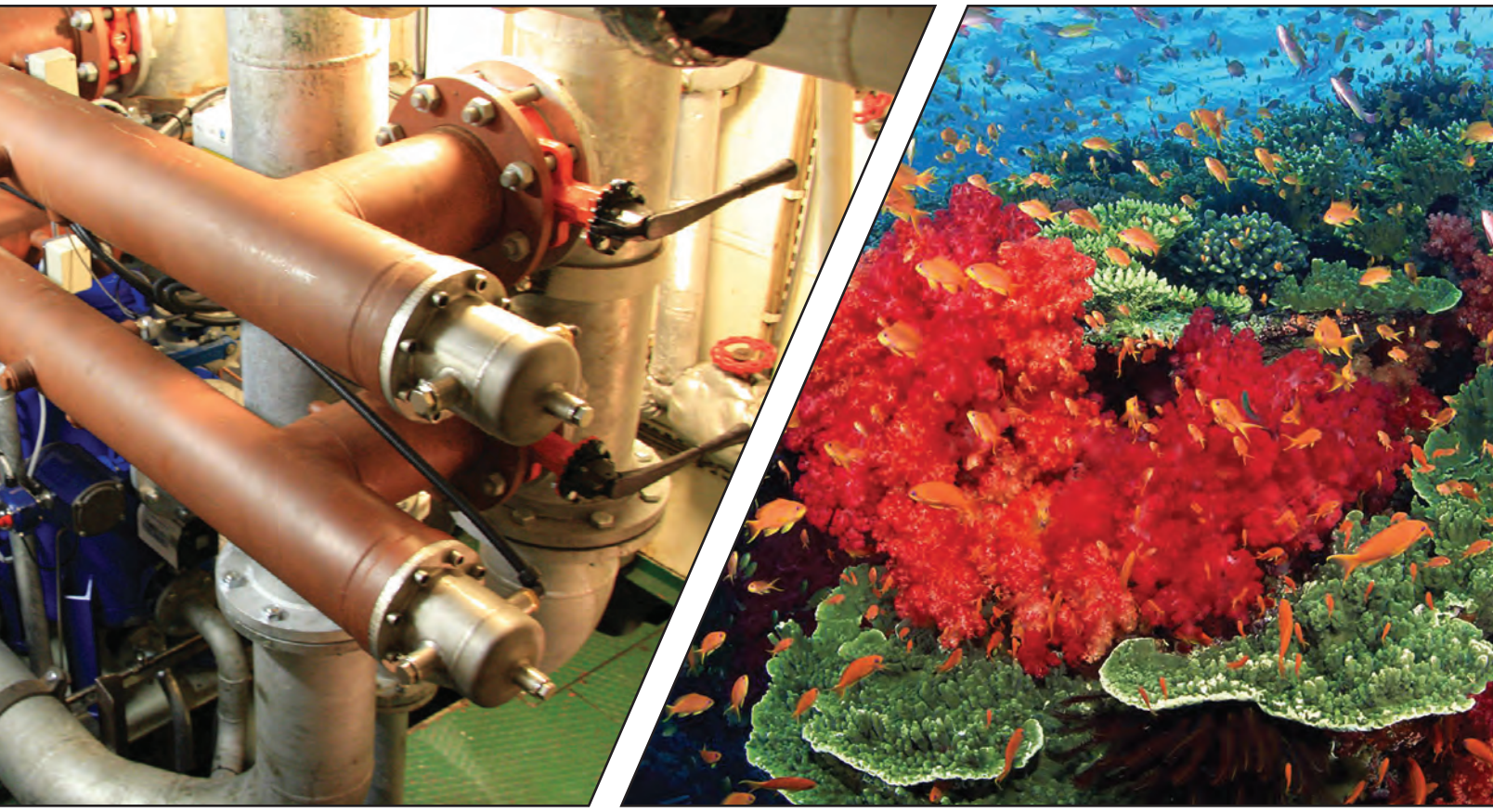
For shipowners, nagging doubts about whether anything they install now will pass muster down the road remain. The manufacture of BWMS has been conservatively estimated as an industry which will be worth many billions of dollars over the next decade. Clearly, shipowners have some technically complex, capital-intensive decisions to make. They'll need help – that's where ABS comes in.

THE ABS BWMS SELECTION SERVICE

ABS last month launched its BWMS Selection Service to help shipowners and operators navigate the challenges arising from the myriad of new technologies. "Shipowners have increasingly complex environmental issues to address, not least of which is ballast water management; it is complex from the ship operating standpoint, let alone having to select the appropriate system for your specific vessel," says DiCianna.

She continued, "ABS is offering this new service because it realizes that shipowners will need support to navigate the difficult decision-making process and it has the in-house knowledge to add real value in this area. Shipowners will need support to navigate the difficult decision-making process. The service will help designers, shipyards, owners and operators to find the solution that is best suited to the unique needs of each vessel."

The selection service is a multi-step process, beginning when ABS's Operational and Environmental Performance team examines a vessel's design and operating characteristics, trading patterns and regulatory requirements. That information is matched to an extensive database of BWMS and original manufacturer support networks, giving ABS's technical specialists the information they need to recommend systems



that meet the ship's regulatory requirements and match the installation criteria for its specific design.

ABS also provides a comparative review of operational and maintenance factors for each system, giving shipowners and operators the information they need to choose the right solution. The service takes advantage of ABS's deep knowledge of classification and regulatory compliance issues related to BWM. Information from the updated advisory, for example, formed an integral part of the unique methodology created for the selection service.

THE ABC'S OF EPA'S VGP

Aside from the USCG updates, the advisory also offers the latest updates on the U.S. Environmental Protection Agency's Vessel General Permit (VGP), which regulates discharges -- including ballast water -- incidental to the normal operation of non-military and non-recreational vessels.

The 2013 VGP became effective in December of last year, adding to the list of ballast water requirements. It only applies to vessels operating within three nautical miles of the U.S. shore and has some notable difference to the USCG regulations, such as the removal of the exemption for crude oil tankers engaged in coastwise trade and the requirement for monitoring. For example, vessels excluded from VGP requirements and reporting include:

- *Those that travel less than 10 nautical miles and which do not cross physical barriers (such as locks), whether or not they operate within one COPT zone;*
- *Unmanned, unpowered barges;*
- *Those with a ballast-water capacity of less than 8m3; and*
- *'Lakers' built before 2009.*

As if it weren't complicated enough, the EPA included detailed monitoring requirements for vessels operating BWMS. It requires three areas of monitoring: system functionality, biological indicator organisms, and residual biocides and derivatives. Functionality monitoring is intended to ensure that the BWMS is operating in line with manufacturer's specifications. The EPA has identified metrics for 18 types of technology that will require monthly recording, but the exact number of metrics that will require documentation will depend on the type of treatment technology that is employed.

Due to the current constraints for monitoring live organisms in the ballast water, the EPA listed three 'indicator' organisms for monitoring. Specifically, these include heterotrophic bacteria, E. coli, and enterococci. The monitoring of residual

biocides and their derivatives is related to the active ingredients -- such as chlorine, ozone, peracetic acid and hydrogen peroxide -- that may be used to kill any organisms found in ballast water.

The updated advisory also has a section on the tools being developed for ballast water sampling and monitoring. These tools, when validated, will aid shipowners to monitor the operating performance of the BWMS. Understanding the requirements and procedures for ballast water monitoring is important for shipowners, operators and shipbuilders to ensure that BWMS are operating properly.

The port state control guidelines recently approved at MEPC 67 identifies two type of analysis: indicative (a quick assessment of compliance potential) and detailed (thorough analysis of live organisms). For a comparison of the two types of analyses, see the chart below.

"We are likely to see more specific requirements for sampling. Various bodies are working on sampling protocols and test equipment to 'simplify' sampling for shipowners and port state control," Ms DiCianna said. "Work is needed to validate the tools being developed to determine their use. Sampling requirements cannot be overly cumbersome. A simple method of sampling and analysis would help shipowners to ensure their BWM systems are operating as designed."

U.S. STATES WEIGH IN AND ABS IS THERE

No discussion of ballast water regulations and invasive species would be complete without also discussing the unilateral, Balkanized actions taken by U.S. states – all 16 of them. To that end, and also included in the ABS advisory, with its thorough overview of U.S. regulation, is a comprehensive section on individual state requirements.

To date, 16 states in the U.S. have specific BWM requirements, predominantly those situated on the U.S. West Coast, the northeastern seaboard and of course, the Great Lakes. California, with a two-pronged approach governing BWM and hull-fouling for ships exceeding 300 GRT, is considered to have enacted the most stringent regulation. New York's statute, similarly onerous, came under severe criticism from its Canadian neighbors who felt it would impact commerce. That policy has since evolved.

The 80-page advisory also offers timely, informative sections on available ballast water treatment technologies, BWM options and USCG BWMS approval procedures. The guide looks at how to select the "best" system for the unique requirements of individual ships, including what a shipowner may need to consider when installing a BWMS, life-cycle costs, vendor qualifications and other critical variables. For owners with ships built before most BWM regulation was created, it also has a comprehensive section on retrofitting.

Table 5. Comparison of Indicative and Detailed Analyses

	Indicative Analysis	Detailed Analysis
Purpose	To provide a quick, rough estimate of the number of viable organisms	To provide a robust, direct measurement of the number of viable organism
Sampling		
Volume	Small or large depending on specific analysis	Small or large depending on specific analysis
Representative Sampling	Yes, representative of volume of interest	Yes, representative of volume of interest
Analysis Method		
Analysis Parameters	Operational (chemical, physical) and/or performance indicators (biological)	Direct Counts (i.e. Biological Organisms)
Time-Consuming	Lower	Higher
Required Skill	Lower	Higher
Accuracy of Numeric Organism Counts	Poorer	Better
Confidence with respect to D-2	Lower	Higher

Source: BWM.2/Circ.42

Maritime Professional

Photo: Greg Trauthwein

General Dynamics NASSCO in San Diego is on a shipbuilding tear with 11 ships in its three-year backlog, including the pair of LNG-fueled containerships for TOTE. **Kevin Graney, VP and GM**, (pictured with the first TOTE ship in the background) said **the yard is in full-bore recruitment mode**, and the yard's fresh group of young talent will gain unequaled shipbuilding experience. NASSCO's employment challenge? **Keeping a solid orderbook past 2017** to fully enjoy the benefits of this emerging shipbuilding talent pool.

Recruitment

EMPLOYMENT

WRS Job Seeker Survey

Results for Marine and Oil & Gas

In a marine and offshore business climate which has lately been nothing short of red hot in terms of both hiring trends and opportunities for seafarers and oil & gas professionals alike, it is helpful to know what is on the minds of the people you hope to attract. That's exactly what Worldwide Recruitment Solutions (WRS), a specialist in recruiting for this sector, has captured in its latest Job Seeker Survey: ***Recruitment trends within the marine industry – a job seeker's perspective***. A global survey of 5,300 job seekers shows that demographics definitely play a part in the skills shortage – especially for the marine sector. Could the results have an impact on how industry looks at attracting talent? This is the question by WRS as they look to identify trends within the marketplace. The survey sheds light on where the talent is (and wants to be) within the worldwide mariner community, along with key indicators to consider when attracting talent.

Zeroing in on the marine sector, 99% of respondents are male with over 52% working bridge crew, nearly 33% Engineering crew and nearly 21% Deck crew. Over 37% of respondents are in the 25-45 age group, with 30% in the 35-44 one and 20% in the 45-54 group. Just fewer than 20% are currently working on MPSV's, over 15% on PSV's and over 14% on either a DSV or AHTS with under 13% on cargo vessels. There is real diversity in the level of experience seeking new opportunities so, for those companies looking to recruit, with a good split of experience and skill in the market for all levels of role. Nearly 30% have over 15 years' experience and notably, a significant number (12%) have 25+ years' experience under their belt.

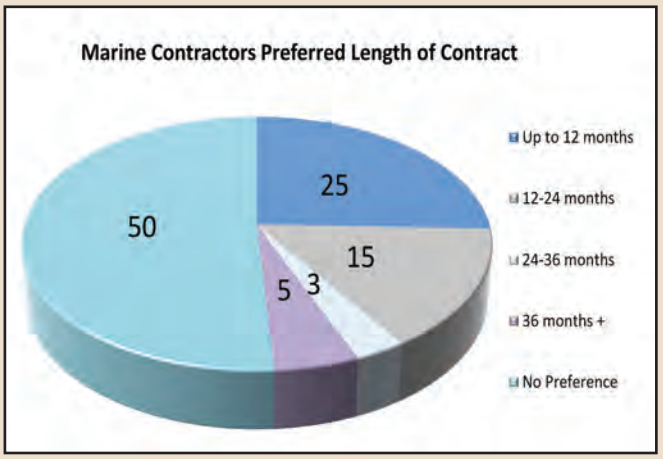
Demographics, vessel type and regional work preferences play a part in how/where this talent are willing to work. Currently 17% work in the Mediterranean with over 16% in the North Sea, nearly 15% in the Indian Ocean, just under 14% in Southern Ocean and just under 13% in the Pacific. However, when asked where they preferred to work, the results showed a different trend with 25% preferring the Mediterranean, just under 17% preferring the Pacific, 15.5% the Baltic and just over 14% prefer the Southern Ocean and Indian Ocean equally.

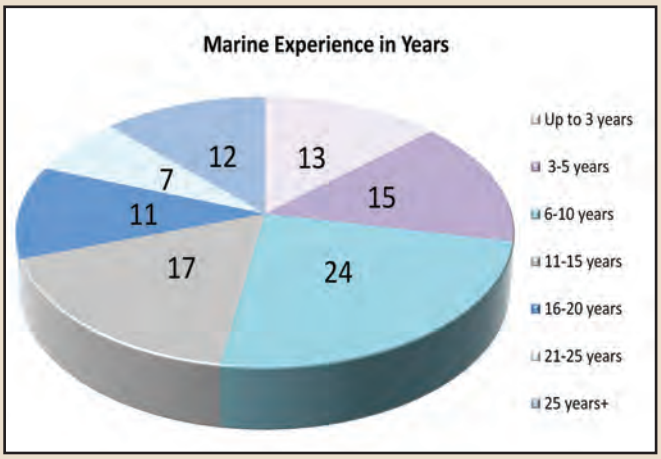
When it came to permanent versus contract work, 55% prefer permanent employment with nearly 20% favored contract and 25% showing no preference.

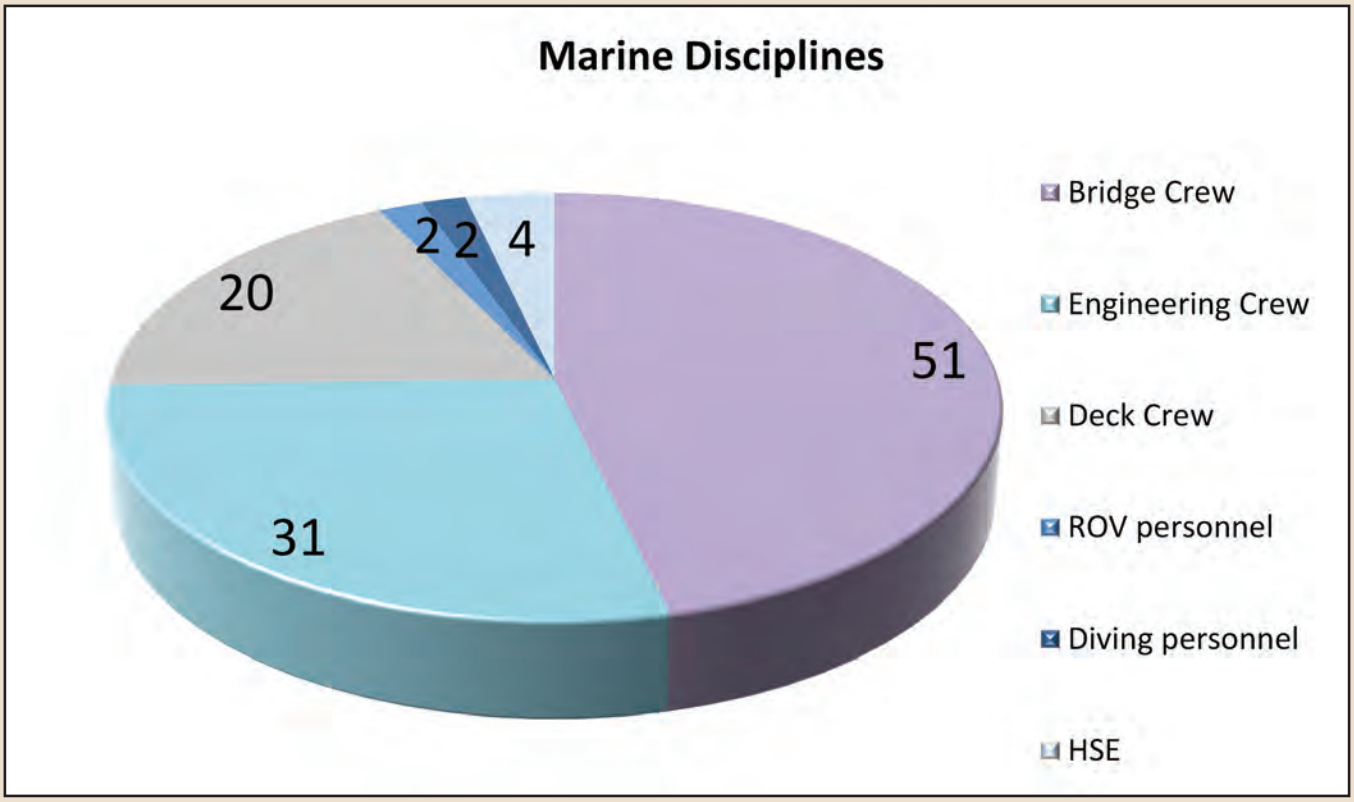
This is very different in reality with 26% in permanent work and nearly 58% in contract roles. Of those who do contract work, nearly 50% have no preference over length of contract with over 26% preferring those less than 12 months and 15% preferring 12-24 months.

Mariners are crying out for the stability of more permanent work opportunities but the market just isn't there. Beyond this, when applying for a new role, over 95% of respondents rated base salary/day rate as important/very important.

However, 90% topped their list with leave/rotation and over 87% focused on career progression as the deciding factor when considering new opportunities.







Contractors, coverage and confusion

Faststream USA Managing Director Eric Peters defines the risks in hiring contract workers in today's marine and offshore markets, and lays out the course to mitigating those headaches. Recruitment, insurance and peace of mind – all rolled into one neat package.

By Eric Peters

Misclassifying Contract Workers Leads to Insurance Confusion

It's no secret that the marine and offshore worlds require comprehensive insurance coverage in the event of an accident or emergency; however, the complex laws associated with contract workers mean that some employers are unaware of exactly what is needed to ensure their employees are properly covered. Since the easing of most recent recession, one that hit the global marine and offshore industries especially hard, companies have made changes to how they utilize talent in the workplace.

One such emerging trend is the change in personnel models from a fixed to more of a variable cost. This involves utilizing more contract, project and temporary labor. Marine and offshore businesses that employ contract workers could be at risk regarding maritime compliance, workers compensation and liability insurance for these employees. That's because the importance of correctly classifying employees is at an all time high, especially in light of the changing government regulations regarding the Patient Protection and Affordable Care Act (PPACA) and the Internal Revenue Service's (IRS) claim to be more vigilant against companies that don't meet contract employee classification requirements.

As a minimum, misclassifying W-2 employees as 1099 independent contractors may result in unwanted IRS audits that can leave employers responsible for the tax liabilities and penalties. It also can leave employers responsible for paying back taxes and penalties associated with the PPACA if they are found to have misclassified employees.

The dangers of employees not being properly covered are obvious and abundant. Many believe that general liability policies cover every circumstance from A to Z, but this simply isn't true. Faststream Recruitment Group, a leader in talent sourcing and acquisition, works closely with Hays Insurance, a globally-renown insurance group specializing in marine and offshore liability, to make sure each of the contractors placed is properly covered in order to protect them and the companies with which they work.

Compliance to The Merchant Marine Act, Longshore and Harbor Workers Compensation Act and misclassification of independent contractors are all contributing to the confusion of how insurance cover is laid out for contract workers. One of the most common misconceptions by employers is that paying people on a 1099 basis leaves them exempt from liability claims, but this is completely false. Combine this with the very specific laws on insurance coverage for those working in the marine and offshore fields and the fact that the vast majority of general liability policies do not meet these standards has left some employers confused as to what they need to do. This subject is a concern for many executives in the maritime and oil and gas industries – and they are looking for answers.

> “Most employers are unaware of what coverage their 1099 employees have (and don’t have). On the other hand, and by using a reputable recruitment firm that has all of the required insurance coverage and who directly employs the contractors, companies are able to mitigate risks associated with offshore contractors.”

Understanding Your Coverage

Understanding comprehensive marine liability insurance first of all involves two basic benchmarks for human resources professionals:

Know the laws: Merchant Marine Act (also known as The Jones Act), Longshore and Harbor Workers Compensation Act and others have had a profound impact on offshore oil and gas and maritime industries when it comes to liability insurance. The laws have very specific requirements for insurance coverage for those working in these fields – and the vast majority of general liability policies do NOT meet these standards.

Employer classification is KEY: One of the most common misconceptions by employers is that they have no "employees" due to their use of contractors and subcontractors. They assume that paying people on a 1099 basis leaves them exempt from liability claims – this is completely false! And the misclassification could cost an employer huge amounts of money in penalties. Also it opens up liability (in the form of lawsuits) to these companies to claims from injured employees.

Mitigate the Compliance Risk

In response, Faststream Recruitment Group, in partnership with marine and offshore specialists Hays Insurance, has de-

veloped and designed industry-leading coverage for all types of offshore workers which can mitigate the risk faced by many employers. *It works like this*: Faststream works with businesses who want to utilize their insurance coverage by employing their contractors directly. This means their workers are fully compliant with U.S. payroll and compliance. Clients gain the liability coverage they need and as an employer they never have to worry about classification, regulatory changes or risks associated with employing these types of people.

You CAN mitigate risk: These days, more and more offshore oil and gas and maritime employees are hired on a contract basis, rather than as full time employees. Most employers are unaware of what coverage their 1099 employees have (and don't have). On the other hand, and by using a reputable recruitment firm that has all of the required insurance coverage and who directly employs the contractors, companies are able to mitigate risks associated with offshore contractors.

In a nutshell, Faststream addresses these concerns by assuming the compliance risk associated with temporary, temp-to-hire and interim employees. By directly employing contract workers, Faststream eases uncertainty around classification status and assumes all risk for tax liability, insurance (health and liability) and benefits. Not sure if you are misclassifying employees and are at risk of an IRS audit? Click [**http://www.irs.gov/taxtopics/tc762.html**] to determine the differences between an employee and an independent contractor. Then, consider the option of passing that risk to a trusted partner.

Founded in the United Kingdom in the late 1990's and perhaps best known as a global recruitment organization specializing in sourcing and supplying hard-to-find candidates for the shipping, maritime, Oil & Gas industries, Faststream also offers comprehensive coverage for all types of offshore workers in the offshore oil and gas and maritime industries. That's because finding the right talent for the right job is only one part of today's recruitment challenge. Professional recruitment, insurance and, yes, peace of mind, can be rolled into one secure package.

Eric Peters is the Managing Director of Faststream USA. Contact him at 954 626 6893 or via E-mail at: eric.peters@faststream.com

faststream recruitment group

SHIPYARD Recruitment, Training and Retention Roundtable

The domestic shipyard industry is traditionally a cyclical business that sees wild upswings followed by deep downturns. More than 30 deep draft vessels reside on the back order books, supplemented by offshore energy fleet replacements and an inland industry that is rapidly modernizing, making this particular boom cycle especially pronounced. Moreover, and with subchapter M and the Ballast Water rules lurking just around the corner, the prospects for sustaining these conditions are very good. If – that is – we can find the right people, trained correctly, to do the job.

How each shipyard will attract the talent to perform this work, retain that talent and train it properly, are therefore important issues to the industry today. That's what this edition's industry roundtable tackles in the pages to come. Listen in as human resources personnel and educators from Shipyards, Training Providers and Industry Consortiums weigh in on the challenges ahead for recruiters, trainers and the prospective shipyard employees themselves.

What is the biggest issue facing HR managers at shipyards today? Is it recruitment, training, retention – or all three?

Ryan Blythe, Executive Director, Georgia Trade School: I work in welding education but many of my graduates work in shipbuilding. The biggest challenge is that my students come primarily from the Atlanta Metropolitan area and they have to make a significant cultural change to work in the smaller towns that surround shipyards. Some make the adjustment more successfully than others. The primary reason we see welders returning to Georgia is not their view of the employer or their welding skills not being at a suitable level but instead their inability to find a strong work/life balance. We train by design a very young group (18 to 22 is our primary demo) and they place a premium on work life balance.

Ray Barker, Human Resources Director, Bollinger Shipyards: The biggest issue today is the critical lack of skilled metal craft workers. This is being driven by many factors including an aging workforce, workers leaving the industry for new occupations and an ever dwindling pool of new workers. Young men and women are not entering the skilled crafts at the same rates as they have in past decades. This skilled craft gap affects all areas.

Ryan Lee, Workforce Development Manager Austal: All three. Really they are part of one system. Our issues with recruitment, training and retention are symptomatic of a deeper issue with a shrinking skilled workforce.

Barb Plastic, Director of Human Resources / Gulf Marine Ship Repair: We experience issues with all three. Finding qualified candidates for our highly skilled positions is very difficult.

Ongoing operations at one of Bollinger's many shipyards.

> "The primary reason we see welders returning to Georgia is not their view of the employer or their welding skills not being at a suitable level but instead their inability to find a strong work/life balance."

GEORGIA TRADE SCHOOL
REBUILDING AMERICA

Ryan Blythe

Executive Director, Georgia Trade School

Byron Dunn, Alabama Technology Network Regional Director, Gulf States Shipbuilders Consortium President, and National Maritime Education Council Treasurer: The biggest issue is training. If there were enough trained and capable folks in the workforce, recruiting would become a very easy issue. Recruiting is important to the shipyards today because there are not enough readily available craft workers in the market. Recruiting is an issue for the educational and training organizations. How do we interest the new young workers looking to enter the workplace in a job in the shipbuilding and repair industry, or any industry where craft workers are needed? On the subject of retention, over the next decade and a half, we will need to look at retention numbers a little differently. We all know that the boomers are going to be retiring in droves. This will mean there has to be turnover in the workforce. There will very little a company can do or offer to retain those older workers. They will retire. So every industry will see a churn and turnover in the workforce.

Jeff Allman, Strategic Planner, Huntington Ingalls Shipyard: Recruitment, Training, and Retention present unique challenges for shipyards today; however Recruitment tends to present the most challenging issues for shipyards. Manufacturing jobs in general fight a perception issue of not being highly desirable jobs when in fact these are rewarding career positions that offer employees competitive wages and benefits that allow the person to live above the national standard while also providing wide latitude of career tracts to choose from. Recruitment is challenging in that today's youth aren't being steered toward or encouraged to seek Manufacturing Jobs. Parents, School Systems, Guidance Counselors, Government Funding all steer students towards a college degree program. Students/Youth are built up to believe that the only way to be successful in life is to get a college degree. I do not knock a college degree program and an individual can certainly be successful following that tract; however, the facts are that the market place is flooded with degreed candidates that are competing for limited numbers of opportunities. Manufacturing Jobs on the other hand tend to be viewed as a less desirable career tract by those same influences listed above; when in fact, Manufacturing jobs provide tremendous opportunity to learn and develop a skillset that will be the foundation for a rewarding and beneficial career. In the past, Ingalls Shipbuilding would have been able to find qualified candidates available for work within a 150 mile radius of the Pascagoula facility and the recruiting effort would have been minimal and qualified would apply. Today, qualified, experienced, available craftsman do not exist. Ingalls Shipbuilding recruits nationwide for experienced and technically schooled candidates to fill as many openings as possible. Ingalls also recruits unskilled candidates for training positions designed specifically to develop a skill such as Shipfitting. An example of the recruiting efforts Ingalls makes and the challenges presented: In order to hire 80 Shipfitters Ingalls Shipbuilding reviewed 3,200 applications, tested 380 candidates, made job offers to 250, had 200 show up for first day of training, and had 120 fail or quit during the 4 week training program.

In the past 12 months, has your hiring and recruitment situation eased, stayed the same, or become more urgent?

Barb Plastic: During the last six months our hiring has been very active. We hired over 100 skilled craft positions.

Susan Inagaki, Human Resources Director / Gulf Copper & Manufacturing Corp.: It has become more urgent for the most part. However, due to project needs and the topsy-turvy needs within the marine industry we are on an eased

"I would characterize our workforce as a mixture of mature employees and those in the beginning of their careers. We do anticipate issues in the next 10 years as our long term employees consider retirement options."

Bollinger Shipyards, Inc.

Ray Barker

Human Resources Director, Bollinger Shipyards

recruitment at this time.

Jim Youker, Director, Human Resources / Detyens Shipyards, Inc.: The situation has remained the same. We continue to hire and have been for years, always looking for skilled labor.

Jeff Allman: Recruitment over the last 12 months has continued at an urgent pace. The skill mix that we are currently recruiting for has changed. At the beginning of the year we were recruiting heavily for Structural Welders and Shipfitters; that recruiting effort has eased somewhat, now Ingalls is heavily recruiting for Marine Electricians.

Ryan Lee: The situation has become more urgent as our needs have remained consistent and the market has tightened significantly.

When talking to current or prospective employees, what are the top three things that are important to them when deciding where to apply for work?

Ryan Blythe: They want to feel like they are part of a great team, they want to feel like their work matters, that they are part of an organization that values them and that the end product they weld makes a difference in our country's infrastructure, economy and national security. One of the mistakes too many employers make is using the "candy" alone to attract top talent. Instead of focusing so much energy into traditional employer benefits, management needs to build a culture that is so powerful their employees will not leave for another yard that offers slightly higher pay.

Susan Inagaki: Pay rate, Overtime available or not, Duration of project/work, employee satisfaction and benefits.

Rhonda George, Personnel Hiring Manager, Signal International: Amount of Pay, Hours (amount of OT they can expect), Length of job.

Ryan Lee: They are typically looking for opportunity/development, the best pay rate, and benefits such as medical, paid time off, etc.

Jeff Allman: Competitive Wages, Work Stability, Benefits.

A goal of the shipyard industry has been to not only standardize shipyard education, but also to create a credentialing system that would assure employers of what they are getting. How is that effort progressing?

Susan Inagaki: I believe that this effort is progressing elsewhere, but not locally to date. I believe that there are current discussion with the local institutions in regards to same and look forward to utilization of same and/or development of an in-house program.

Ryan Lee: It is progressing slowly. I think GSSC, NMEC and NCCER have done a good job; especially considering GSSC does not have paid staff, but the real challenge is getting all the shipyards on the same page. I think most, if not all, the shipyards have key personnel who are buying in, but that has not been enough to influence change at the pace needed. In addition, there are still some unanswered questions as to what this will really look like once it is fully implemented. I don't think the shipyards really understand what role they

WorkBoat Show&
Annual Conference

Where **new ideas** become **reliable solutions**

DECEMBER 3-5, 2014

Save $50! Register before the show and admission to the exhibit hall is **FREE*** with this promotion code: 110075
workboatshow.com
800-454-3007

To exhibit call: Chris Dimmerling 800-368-7932

Presented by: WORKBOAT
Produced by: diversified COMMUNICATIONS

The International WorkBoat Show NEW ORLEANS

NEW ORLEANS, LOUISIANA USA
MORIAL CONVENTION CENTER | HALL B, C, D, E + F

*Registration discount valid through December 2, 2014. Day of Show price: $50.

> "Essentially the market has gotten so competitive that the competition is shifting from recruiting the best A Class to recruiting the most capable/high potential trainee."

AUSTAL

Ryan Lee

Workforce Development Manager, AUSTAL

need to take on to push this through.

Ryan Blythe: We are one of the few schools that do not participate in NCCER. We have chosen to use our own curriculum based on the experiences that our staff have and what employers in a range of industries from Shipbuilding to Manufacturing have asked for. Our goal is not to simply train a welder to pass a certification exam but to ensure that their skills can be repeated in a variety of environments.

Rhonda George: It has been a steady process. However, we need more participation from companies in supplying SME's.

Ray Barker: The outlook for the standardized maritime curriculums developed by the NMEC is positive. Louisiana's Economic Development department and State workforce groups are actively supporting NMEC courses. Several Technical Colleges and Technical High Schools in our area are either actively incorporating NMEC curriculums into their course offerings, or are planning the implementation of these courses. The development and expansion of the NMEC courses are viewed as being critical to the development of a future workforce for our industry.

Byron Dunn: I am proud to say that we feel like we set the bar for short term technical training programs. Before GSSC developed the shipfitter curriculum and held our first three boot camps, I had never heard of a training program had a 100% employment of the those that completed the program. I think that is the new benchmark. Before we started we were told that there was no way we could take someone who had no experience in the industry and in 12 weeks deliver a person who could pass an entry level test. Well, we did it and we did it for 100% of the participants. The model we created shows that never again should we settle for less than 100% success in training programs. Not only should we expect it, we should demand it.

Where does your company accomplish the most training: in-house, contract off-site or on the job? Why?

Barb Plastic: Most of our training is in-house. We have an onsite training facility.

James Ivy, Gulf Coast Shipyard Group: Apprentices are trained off site at the local community college, and also receive on the job training. All others requiring training are trained on the job.

Susan Inagaki: This would be a combination of all types listed. We do expect a certain level of certification for some positions and lean mostly on the in-house/on-the-job training process.

Jim Youker: We utilize all three methods. On the Job Training would be the most common, because it involves more hours per week.

Jeff Allman: Most training is conducting in-house due to the certifications and requirements of the contracts on which we perform. However, Ingalls Shipbuilding has a hiring program in-place for Shipfitter and Structural Welder positions where non-skilled applicants are offered training positions at Mississippi

"During the last six months our hiring has been very active. We hired over 100 skilled craft positions."

Barb Plastic

Director of Human Resources, Gulf Marine Ship Repair

Gulf Coast Community College or at Bishop State Community College in Mobile, Alabama. Applicants that complete these training programs (4-12 weeks) are guaranteed an employment offer with Ingalls Shipbuilding. Once the applicant completes the pre-employment training, The applicant is employed and training requirements are completed at Ingalls training school. This pre-employment program has been highly successful, producing high quality candidates that are motivated to succeed.

Ryan Lee: Most of our training is accomplished pre-hire with Alabama Industrial Development Training (AIDT). Although there are some technical schools/high schools beginning to partner with us, Austal trains our production employees in-house at the AIDT Maritime Training Center (a state-of-the-art training facility provided to Austal and other local Gulf Coast shipyards by the State of Alabama) in apprentice or post-hire training, or what we call On-the-job training (OJT). Overall, I think our in-house and OJT make up our largest portion of training. Pre-hire sees a huge initial volume, but there is a lot of fall out before employment offers are actually made. In the past, pre-hire training through AIDT was our largest volume, but we have had to expand training and sourcing streams just to keep up with demand. As we rely on "entry" level talent more due to the lack of experienced shipbuilders in the market, we have had to expand training and recruitment opportunities to appeal to a wider variety of folks with "transferable" skills and to mitigate the impact of hiring larger volumes of less experienced workers. Essentially the market has gotten so competitive that the competition is shifting from recruiting the best A Class to recruiting the most capable/high potential trainee.

In terms of your workforce, would you characterize it as mature (or long term) and do you anticipate significant attrition due to retirement in the coming five to ten years?

Ryan Lee: Our workforce is young. Our average age is under 40 years old and most of our employees have 3 years of service or less. One of the advantages of building a workforce from the ground up is retirement doesn't usually have an effect for a while. There are, however, other challenges we contend with, namely generational risk. The younger generations have different aspirations and expectations. Most don't see themselves staying at a company or in specific job long-term. Statistics tell us most of them will have multiple careers. So, there are challenges either way with regards to retention.

Rhonda George: Mature, yes we expect significant attrition due to the aging crafts workforce.

Jeff Allman: 31% of Ingalls Craft Workforce is age 50 or more and will be eligible for retirement in the next ten years. Ingalls has a number of projects on-going to capture the knowledge of these employees; however this is a significant concern as we work to build and maintain our workforce and capabilities.

Ray Barker: I would characterize our workforce as a mixture of mature employees and those in the beginning of their careers. We do anticipate issues in the next 10 years as our long term employees consider retirement options. Much effort is being focused on developing a future workforce to address attrition rates.

Ryan Blythe: I can answer this from a unique perspective be-

> "...we were told that there was no way we could take someone who had no experience in the industry and in 12 weeks deliver a person who could pass an entry level test. Well, we did it and we did it for 100% of the participants."

GSSC GULF STATES SHIPBUILDERS CONSORTIUM

Byron Dunn

ATN, Regional Director, GSSC
President, NMEC Treasurer

cause I serve on the "Go Build Georgia Advisory Council" and tour our state's employers and technical colleges. Universally, from shipyards to construction, manufacturing and energy tell us that the next decade will be incredibly challenging. With the economy improving we are seeing more cranes than ever and businesses expanding or spending capital they had been withholding. The question is will the labor force be strong enough to meet customer needs. If manufacturers cannot produce their products fast enough as a result of workforce problems we are in real trouble. The rail car industry for example has been going bonkers in our state and around the nation as energy developments have lead to a significant increase in the demand for new cars. We hear the wait for cars can be up to two years!! Another factor is insourcing as more manufacturing will be done as Asia's middle class develops and it becomes cost prohibitive to send plants overseas. The question is again will we have the ready workforce to support this change.

Susan Inagaki: I would characterize our workforce as mature and feel that there will be a very large "crunch" for craft workers within the next five to ten years. This is largely due to the "push" for our young adults to obtain college degrees along with the lack of momentum toward or lack of the knowledge of the existence of skilled labor careers.

Just one year ago, private shipyards in the United States supported 402,000 jobs and 36 Billion in GDP. At the time, shipyards were facing severe skilled worker shortages. What's the outlook now?

Barb Plastic: The outlook is still very concerning.

Byron Dunn: As you well know, the shipbuilding and repair industry is very strongly influenced by the economy, interest rates and even events like oil spills. Each yard bases staffing on contracts or orders in hand. Lately, as a whole the yards have been getting more work. Therefore employment along the coast is increasing.

Susan Inagaki: I believe that the issue remains and that a collaborative effort to develop this particular workforce is the key to a successful turnaround.

James Ivy: Our situation remains about the same. There seems to be an increase in the education system promoting and offering more skills training programs.

Ryan Blythe: We send more graduates to Ingalls Shipbuilding than any company in Georgia or the United States for that matter. They have been a terrific partner and have invested in recruiting directly from schools. When prospective students tour our school they see banners of ships our graduates built, it is a very powerful impression to make on a young person trying to decide what pathway they want to take.

Rhonda George: We are facing even greater shortages in the near future due to the aging workforce and lack of youth entering the craft fields.

Shipbuilding and repair activities domestically are still red hot. Where is the biggest skill gap at this moment in terms of that business?

Jim Youker: We could use people in ALL trades.

> 31% of Ingalls Craft Workforce is age 50 or more and will be eligible for retirement in the next ten years. Ingalls has a number of projects on-going to capture the knowledge of these employees; however this is a significant concern as we work to build and maintain our workforce and capabilities.

Ingalls Shipbuilding

Jeff Allman

Strategic Planner, Ingalls Shipbuilding

Ryan Lee: In terms of soft skills; attendance, mechanical aptitude, critical thinking, and leadership skills are among the most desired. For craft/technical skills, it's welding, pipe fitting, structural fitting and a general lack of credentialed/qualified engineers.

Ray Barker: Our experience is that the biggest skill gap is in the piping trades as vessel piping systems become more and more complex.

What's changed in terms of your missions and industry conditions – if anything – in the short span of 12 months since we last profiled this training initiative?

Byron Dunn: NCCER Maritime Training materials are now available nationally. Introduction to Maritime Industry – a Core elective, Maritime Structural Fitter levels 1 & 2, and Maritime Pipefitting are all available. That's a big step forward. Before that, the only standardized curriculum was the GSSC Shipfitter Boot Camp curriculum.

Jim Youker: We have begun working with state, college, and local high schools to get young people involved in one single training initiative program that will develop Industrial Mechanics/Engineers.

The advances in training and technology change a lot of businesses over time. Give us some examples of this on the waterfront, especially in shipbuilding.

Byron Dunn: If you take just one craft; welding, think how much more a welder needs to know today compared to 10 years

> "I would characterize our workforce as mature and feel that there will be a very large "crunch" for craft workers within the next five to 10 years. This is largely due to the 'push' for our young adults to obtain college degrees along with the lack of momentum toward or lack of the knowledge of the existence of skilled labor careers."

GULF COPPER

Susan Inagaki

Human Resources Director, Gulf Copper & Manufacturing Corp.

ago. Different gases, different fill material, and more exotic metals to weld. Simulators are much better than even 3 years ago. And, that technology is moving form classroom to production. Never before in history have we been able to objectively measure work angle, travel angle, wire speed, etc. In training it's a great way for students to learn through objective measurable feedback. Transferring the technology to the job on live welds will help workers to produce a higher quality joint.

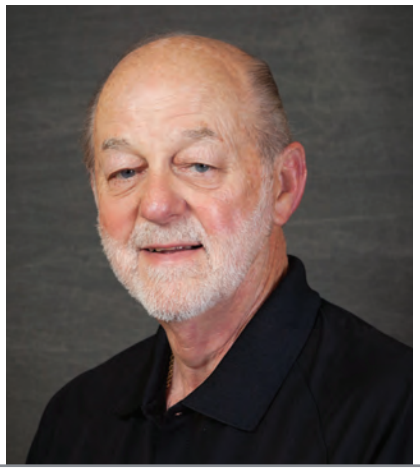
Ray Barker: Technology and training advances have changed the industry and how vessels are constructed today. Advances such as 3-D modeling enable engineering personnel to provide a construction puzzle with validated pieces through automated machinery that offers craft workers a map in constructing a vessel. With the inclusion of accuracy/control tools, many measurements are initiated on the ship and offer immediate results to ensure proper alignment/fits. These technological advances have been incorporated within shipbuilding processes and have allowed for today's craft workers to achieve attainable skill sets easier/quicker than it was in the past 10 years. Because of this, programs such as the GSSC's ship fitting boot camp and the NMEC's maritime curriculums are now viable training programs for the industry.

Have more shipyards signed on board with the standardized training models?

Byron Dunn: Mostly it has been the community colleges and other training providers who have signed on to deliver the training or offer boot camps. However, the shipyards eagerly await the newest graduates of the programs. That's why the employment rate is 100% from the boot camps.

The National Center for Construction Education and Research (NCCER) model can be used for specific task training on site, for remediation, or as part of a larger course of study. NCCER boasts 4,000 points of delivery for training and assessments under 912 individual programs and supports delivery of training in a blended learning environment. Compare today's NMEC's metrics to this breadth of delivery.

Byron Dunn: Everything you mentioned above is why GSSC and NMEC decide to partner with NCCER. In essence, NMEC has been the organization that is trying to raise the funds to let NCCER continue to develop maritime curriculum and assessments. So, by partnering with NCCER, the maritime industry can now benefit from the NCCER model including its infrastructure, oversight, development resources, delivery sites and Automated National Registry. When we started down this path in GSSC, we never wanted to reinvent or duplicate the wheel, where one existed. We prefer to find the best wheel and fit it to our wagon. Our goal was to prove that standardized training and credentialing would benefit the industry. While we were it the process of developing the Shipfitter Curriculum, we discovered NCCER. Everything we wanted to do for the industry, they had already done for the construction industry. It just made sense for us to "stand on their shoulders" and bring their top notch program to the shipbuilding and repair industry instead of trying to create something separate for the industry.



"Apprentices are trained off site at the local community college, and also receive on the job training. All others requiring training are trained on the job."

GULF COAST SHIPYARD GROUP

James Ivy

Apprenticeship Administrator, Production Trainer

UNITED STATES POSTAL SERVICE®

Statement of Ownership, Management, and Circulation (Requester Publications Only)

1. Publication Title	2. Publication Number	3. Filing Date
Maritime Professional	0 0 5 - 8 9 3	September 17, 2014
4. Issue Frequency: Quarterly	5. Number of Issues Published Annually: 4	6. Annual Subscription Price (if any): None

7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4®): New Wave Media International, 118 East 25th. St., New York, NY 10010. Contact Person: Dale L. Barnett. Telephone (Include area code): 212-477-6700

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer): New Wave Media International, 118 East 25th. St., New York, NY 10010

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)

Publisher (Name and complete mailing address): John C. O'Malley, New Wave Media International, 118 East 25th. St., New York, NY 10010

Editor (Name and complete mailing address): Greg Trautfheim, New Wave Media International, 118 East 25th. St., New York, NY 10010

Managing Editor (Name and complete mailing address): Joseph Keefe, New Wave Media International, 118 East 25th. St., New York, NY 10010

10. Owner (Do not leave blank. If the publication is owned by a corporation, give the name and address of the corporation immediately followed by the names and addresses of all stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, give the names and addresses of the individual owners. If owned by a partnership or other unincorporated firm, give its name and address as well as those of each individual owner. If the publication is published by a nonprofit organization, give its name and address.)

Full Name	Complete Mailing Address
John C. O'Malley	New Wave Media International, 118 East 25th. St., New York, NY 10010

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check box → ☒ None

Full Name	Complete Mailing Address

12. Tax Status (For completion by nonprofit organizations authorized to mail at nonprofit rates) (Check one)
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes:
☒ Has Not Changed During Preceding 12 Months
☐ Has Changed During Preceding 12 Months (Publisher must submit explanation of change with this statement)

PS Form **3526-R**, September 2007 (Page 1 of 3 (Instructions Page 3)) PSN: 7530-09-000-8855 **PRIVACY NOTICE:** See our privacy policy on www.usps.com

13. Publication Title: Maritime Professional			14. Issue Date for Circulation Data Below: Q3 (Third Quarter) August 2014	
15. Extent and Nature of Circulation: Requester			Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)			18290	19168
b. Legitimate Paid and/or Requested Distribution (By Mail and Outside the Mail)	(1)	Outside County Paid/Requested Mail Subscriptions stated on PS Form 3541. (Include direct written request from recipient, telemarketing and Internet request from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)	16364	16304
	(2)	In-County Paid/Requested Mail Subscriptions stated on PS Form 3541. (Include direct written request from recipient, telemarketing and Internet requests from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)	0	0
	(3)	Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid or Requested Distribution Outside USPS®	0	0
	(4)	Requested Copies Distributed by Other Mail Classes Through the USPS (e.g. First-Class Mail®)	745	771
c. Total Paid and/or Requested Circulation (Sum of 15b (1), (2), (3), and (4)) ▶			17109	17075
d. Nonrequested Distribution (By Mail and Outside the Mail)	(1)	Outside County Nonrequested Copies Stated on PS Form 3541 (include Sample copies, Requests Over 3 years old, Requests induced by a Premium, Bulk Sales and Requests including Association Requests, Names obtained from Business Directories, Lists, and other sources)	0	0
	(2)	In-County Nonrequested Copies Stated on PS Form 3541 (include Sample copies, Requests Over 3 years old, Requests induced by a Premium, Bulk Sales and Requests including Association Requests, Names obtained from Business Directories, Lists, and other sources)	0	0
	(3)	Nonrequested Copies Distributed Through the USPS by Other Classes of Mail (e.g. First-Class Mail, Nonrequestor Copies mailed in excess of 10% Limit mailed at Standard Mail® or Package Services Rates)	341	610
	(4)	Nonrequested Copies Distributed Outside the Mail (Include Pickup Stands, Trade Shows, Showrooms and Other Sources)	758	1200
e. Total Nonrequested Distribution (Sum of 15d (1), (2), (3) and (4))			1099	1810
f. Total Distribution (Sum of 15c and e) ▶			18208	18885
g. Copies not Distributed (See Instructions to Publishers #4, (page #3)) ▶			82	283
h. Total (Sum of 15f and g)			18290	19168
i. Percent Paid and/or Requested Circulation (15c divided by f times 100) ▶			94%	90%

16. Publication of Statement of Ownership for a Requester Publication is required and will be printed in the Q4 (4th. Quarter) November 201 issue of this publication.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner: Dale L. Barnett Circulation Department — Date: Sept. 17, 2014

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

PS Form **3526-R**, September 2007 (Page 2 of 3)

Advertiser Index

Page	Company	Website	Phone#
25	ABS	www.eagle.org	Please visit us online
C4	Austal USA	www.austaljobs.com	Visit our website
27	Baier Marine Company Inc.	www.baiermarine.com	(800) 455-3917
31	Blank Rome	www.blankrome.com	Please visit us online
25	Boll Filter Corporation	www.bollfilter.com	(284) 773-8200
C2	Catlin	www.catlinus.com	Visit our website
1	Compass Water Solutions	www.compasswater.com	(949) 222-5777
9	Continental Underwriters, Ltd.	www.cultd.com	(985) 898-5300
48	Creative Systems	www.GHSport.com	(360) 385-6212
37	DNV-GL	www.dnvgl.com	Please visit us online
19	Don Jon Marine	www.donjon.com	(908) 964-8812
11	Eastern Shipbuilding Group	www.easternshipbuilding.com	(850) 763-1900
C3	Fairbanks Morse	www.fairbanksmorse.com	Please visit us online
21	Fire Fighting Systems AS	www.fifisystems.com	+47 69 24 49 90
57	International Workboat Show	www.workboatshow.com	(800) 454-3007
3	KVH	www.kvh.com/powerofone	(401) 847-3327
7	LNG Americas	www.lngamerica.com	(281) 448-1114
53	Massachusetts Maritime Academy	www.maritime.edu	Visit our website
39	NABRICO Marine Products	www.nabrico-marine.com	(615) 442-1300
35	Patterson Company	www.pattersonmfg.com	(800) 322-2018
5	Seaspan	www.seaspan.com	Visit us online
17	Senesco Marine	www.senescomarine.com	(401) 295-0373
10	Seut Maritime AS	www.seutmaritime.no	+47 69 34 50 60
53	Smith Berger marine Inc.	www.smithberger.com	(206) 764-4650
39	Society of Accredited Marine Surveyors	www.marinesurvey.org	(800) 344-9077
37	Sound Propeller Services Inc.	www.soundprop.com	(206) 788-4202
35	Subsalve USA	www.subsalve.com	+1 401 884 8801
15	Travelers	www.travelers.com	Please visit our website
43	Water Cannon	www.watercannon.com	(800) 333-WASH (9274)
61	Weeks Marine	www.weeksmarine.com	Visit us online
27	Worley Parsons	www.worleyparsons.com	Please visit us online


OUT HERE, THERE'S
NO SUBSTITUTE
FOR EXPERTISE.
FACTORY CERTIFIED
TECHNICIAN
FAIRBANKSMORSE
Our commitment to your success starts with every engine we build, and continues with our Factory Certified Technician program. By building one of the industry's largest teams of technicians, and a nationwide network of service centers, you get the maintenance expertise and performance that can come only from the very people who built your engine. We train to a higher standard because we're driven to serve you better.
Learn more at www.fairbanksmorse.com/service.
Marine
FAIRBANKS
MORSE
ENGINE
an EnPro Industries company

INNOVATE AND ADVANCE
A PATHWAY TO THE FUTURE

AUSTAL IS IN SEARCH OF SPIRITED INNOVATORS LOOKING FOR THEIR NEXT CHALLENGE.

At Austal, it's not just our aluminum multihull designs that make us stand out. We're a dedicated Alabama workforce over 4000 strong, with international roots, redefining how the Navy builds warships. The same level of precision that goes into the construction of our advanced vessels also drives the cultivation of our outstanding team.

NOW HIRING:

- SENIOR MANAGER – VESSEL COMPLETION YARD
- CHIEF ELECTRICAL ENGINEER
- SCHEDULER
- NAVAL ARCHITECT
- DEPUTY PROGRAM ENGINEER
- PIPE WELDERS AND FITTERS
- WELDING PROCESS ENGINEER
- SUPPORTABILITY ENGINEER
- MANUFACTURING DATA ANALYST
- CONTRACT ADMINISTRATOR

AUSTAL

FOR A LISTING OF CURRENT OPENINGS AND TO APPLY,
VISIT WWW.AUSTALJOBS.COM

Austal USA shall abide by the requirements of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination against all individuals based on their race, color, religion, sex, or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, national origin, protected veteran status or disability.